GeoSmart Information

Environmental Thinking

FloodSmart

Site address	Treetops Upland Road Sutton SM2 5EL
Site coordinates	526852, 163874
Report prepared for	Oemo Ltd. 20 Mortlake High Street London SW14 8JN
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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) (2019) and National Planning Practice Guidance (NPPG) (2014). 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	After Mitigation
River (fluvial) and Sea (coastal/tidal)	Negligible	Negligible
Surface water (pluvial) flooding	Very Low	Very Low
Groundwater flooding	Negligible	Negligible
Other flood risk factors present	No	N/A
Is any other further work recommended?	Yes	Yes (see below)

N/A = mitigation not required

The Site is currently used within a residential capacity. Development proposals comprise the demolition of the existing building and the construction of a single residential dwelling with associated driveway and garden areas.

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

- According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is located within a fluvial Flood Zone 1 (Low Probability).
- According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map, which considers the type, condition and crest height of flood defences, the Site has a Negligible risk of flooding from Rivers and the Sea.
- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site has a very low risk of pluvial flooding.
- Groundwater Flood Risk screening data indicates there is a Negligible risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.
- 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 not at risk of reservoir flooding.
- Ordnance Survey (OS) data confirms there are no canals near to the Site.
- A sewer flooding history search was undertaken using the Strategic Flood Risk Assessment (AECOM, 2015). This confirms no recorded incidences of sewer flooding at or within the vicinity of the Site.

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

- The risk to the development has been assessed over its expected 100 year lifetime, including appropriate allowances for the impacts of climate change. More extreme weather events could increase the risk to the site from increased potential for surface water. Site specific assessment indicates risk to the site will not increase significantly and appropriate mitigation measures are proposed.

In accordance with paragraphs 157, 164 and footnote 51 of the NPPF (2019), as the development proposals are comprised of the demolition of an existing building and construction of a similar building in its place within Flood Zone 1, the Sequential Test is not required.

Recommendations / Next steps

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

- The regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.
- A surface water drainage strategy report has been prepared separately by GeoSmart to ensure surface water can be managed effectively through the use of SuDS features, over the lifetime of the proposed development, including sufficient allowances for climate change.

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 (2019) and the source(s) of any flood risk present. Finally, a preliminary assessment of the steps that can be taken to manage any flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2019) and NPPG (2014).

"*The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied"* (NPPF, 2019).

The NPPF (2019) and NPPG (2014) 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.

"This general 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. The aim should be to keep development out of medium and high risk flood areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible" (NPPG, 2014).

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 2014 (Paragraph: 030 Reference ID: 7-030-20140306), a thorough review of a commercially available flood risk report 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 London Borough of Croydon, Merton, Sutton and Wandsworth Level 1 Strategic Flood Risk Assessment (SFRA) (AECOM, 2015), the London Borough of Sutton Local Flood Risk Management Strategy (LFRMS) (Capita URS, 2014) and the London Borough of Sutton Surface Water Management Plan (SWMP) London Borough of Sutton 2011) are used to ascertain local flooding issues and, where appropriate, identify information to support a Sequential and/or Exception test required as part of the NPPF (2019).

The existing and future flood risks 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.

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 (Appendix B)	SFRA	Environment Agency	OS Data
Historical	X	X	X	
Fluvial/tidal	X	X	X	
Surface water (pluvial)	X	X	X	
Groundwater	X	X		
Sewer		X		
Culvert/bridges		X		X
Reservoir		X	X	

*The SFRA and local guidance has been used to inform this report as referenced in Section 6.

3. Site analysis

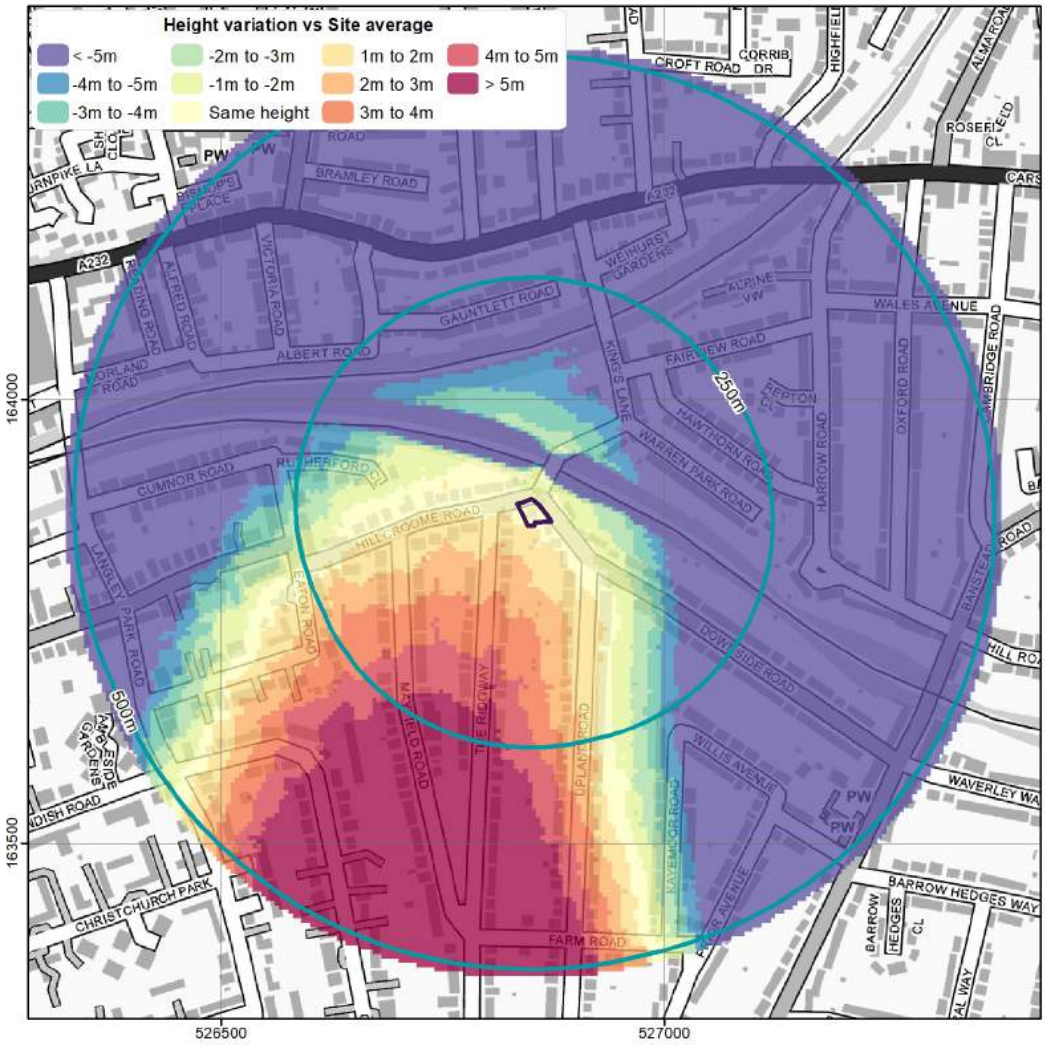
Site information

The Site is located in Sutton in a setting of residential land use at National Grid Reference TQ 26852 63874. Site plans and drawings are provided in Appendix A.

According to OS data, using a 500 m buffer around the Site, the area is on a gentle slope (Figure 1). It is noted that to the north land falls to c. 50.26 m above Ordnance Datum (AOD). To the west land falls to 60.77 mAOD, to the east land falls to c. 54.31 mAOD and to the south rises to 81.85 mAOD.

The general ground levels on the Site are between 73.18 and 73.96 mAOD with the Site falling gradually in a northerly direction. This is based upon a Site specific topographic survey undertaken in 2018 (Appendix A).

Figure 1. Site Location and Relative Elevations



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Development

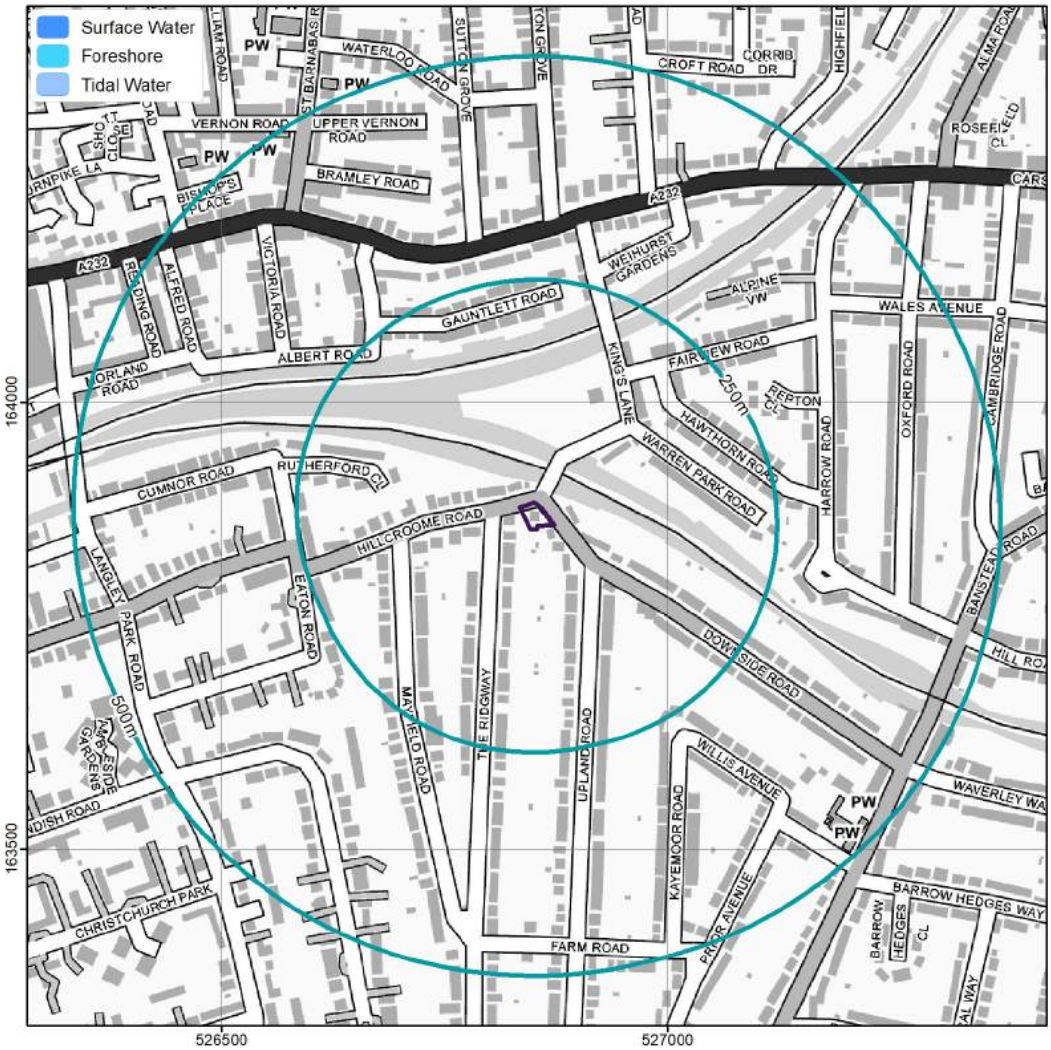
The Site is currently used within a residential capacity. Development proposals comprise the demolition of the existing building and the construction of a single residential dwelling with associated driveway and garden areas.

The effect of the overall development will result in an increase in number of occupants and/or users of the Site but will not result in the change of use, nature or times of occupation. According to Table 2 of the NPPG (2014), the vulnerability classification of the existing development is More Vulnerable and proposed development is More Vulnerable. The estimated lifespan of the development is 100 years.

Hydrological features

There are no mapped surface water features within 500 m of the Site (Figure 2).

Figure 2. Surface water features



Proximity to relevant infrastructure:

There is no relevant infrastructure within 500 m of the Site.

Hydrogeological features

British Geological Survey (BGS) mapping indicates there is no underlying superficial geology (BGS, 2020) or aquifer designation at the Site (EA, 2020).

BGS mapping indicates the underlying bedrock geology consists of the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) - Chalk (BGS, 2020) and is classified as a Principal Aquifer (EA, 2020).

The Site lies within an inner groundwater Source Protection Zone (SPZ I), an outer groundwater Source Protection Zone (SPZ II) and a total catchment groundwater Source Protection Zone (SPZ III) (EA, 2020).

The nearest and most relevant borehole (ref: TQ26SE73) is 120 metres to the east of the site boundary at an elevation of 63.66 mAOD, and indicates the underlying geology to be Top soil underlain with chalk flints to a depth of 100 m. Groundwater levels were recorded at 21 m below ground level on date of drilling and are likely to be subject to seasonal variations.

The hydrogeological characteristics suggest there is unlikely to be a shallow groundwater table beneath the site.

4. Flood risk to the development

Historical flood events

According to the EA's historical flood map no historical flood events have been recorded at the Site (EA, 2020). 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.

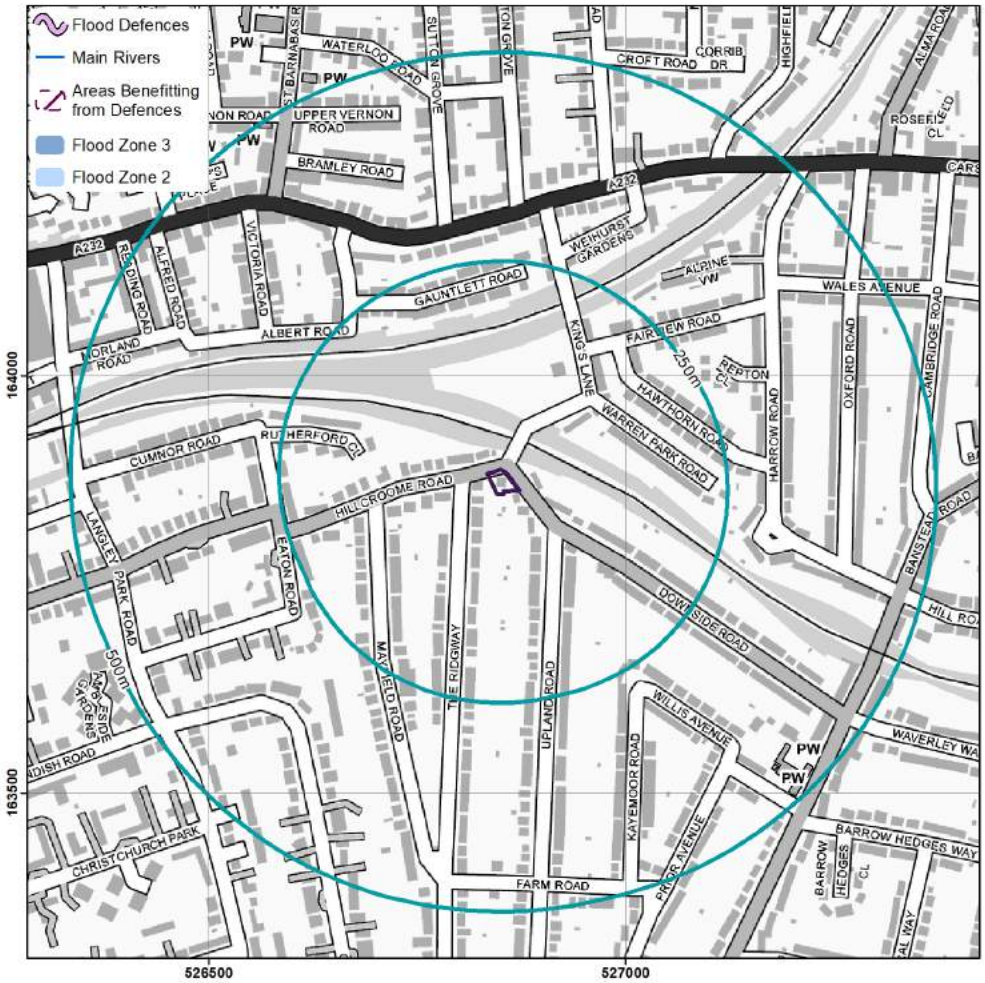
Rivers (fluvial) / Sea (coastal/tidal) flooding

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 3), the Site is located within fluvial Flood Zone 1 and is therefore classified as having a Low probability of fluvial flooding.

Figure 3. EA Flood Map for Planning Purposes (EA, 2020)



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As defined in the NPPF (2019):

Guidance

Ignoring the presence of any defences, land located in a Flood Zone 1 is considered to have a Low probability of flooding, with less than a 1 in 1000 annual probability of fluvial or coastal flooding in any one year.

Development of all uses of land is appropriate in this zone (see glossary for terminology).

Flood defences

There are no flood defences within 500 m of the Site.

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.

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 the Sea (RoFRS) mapping (Figure 4), which considers the crest height, standard of protection and condition of defences, the flood risk from Rivers and the Sea is Negligible.

Figure 4. Risk of Flooding from Rivers and Sea map (EA, 2020)

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) mapping, there is a Very Low risk of pluvial flooding at the Site.

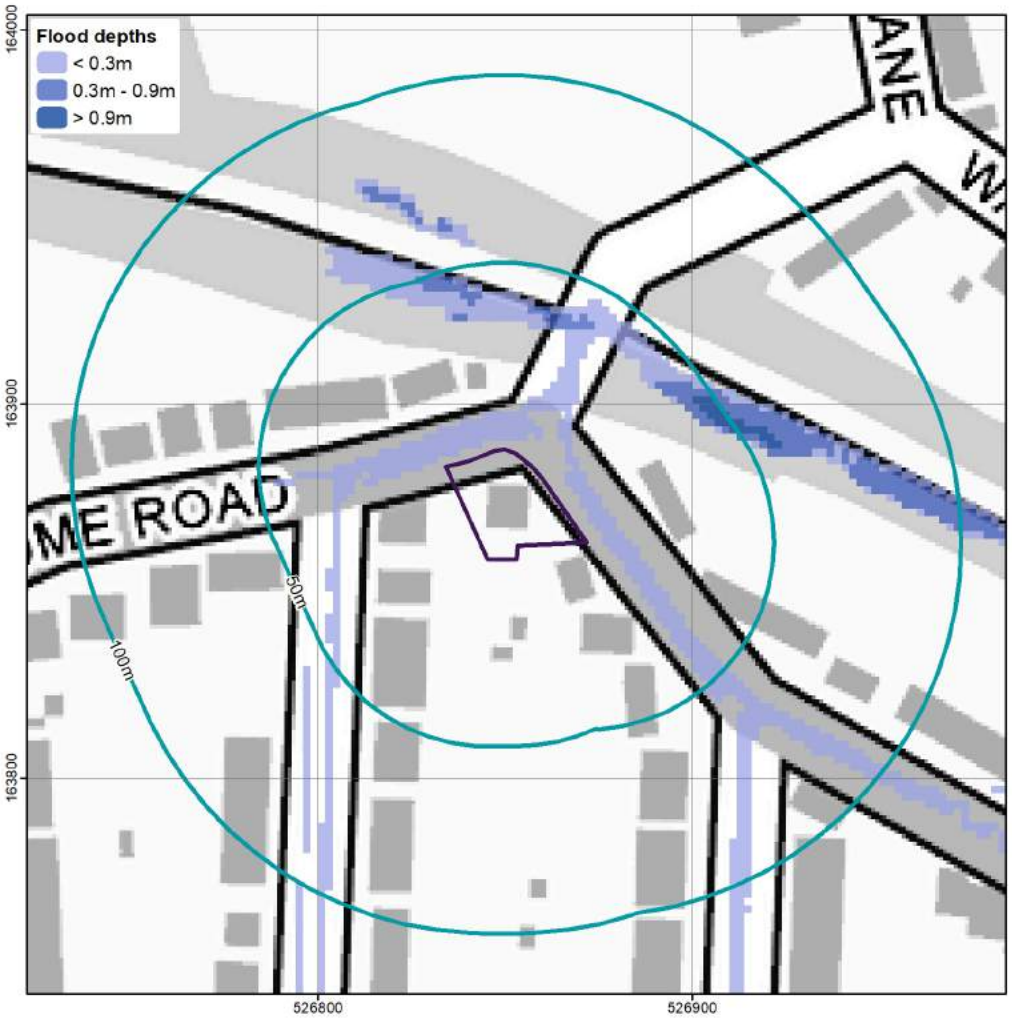
Access to the Site via Upland Road and Hilcroome Road is at Low to Medium risk of pluvial flooding. The flood depths are estimated to be up to 0.3m so are likely to remain within the highway and not affect the Site.

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%).

Figure 5. EA Medium surface water flood risk map (EA, 2021)



Analysis of OS mapping, ground elevation data and the EA's pluvial flow route mapping in the 1 in 1000 year event confirms the Site is not located on a potential overland flow route during a low risk scenario.

A review of the site plans, topography and the EA's Risk of Flooding from Surface Water Direction mapping indicates there are no mapped overland flows on the Site which be obstructed by the proposed development and occur across nonessential areas of the site. Localised depressions and accumulations cover a very small area of the site in non-essential areas.

Figure 4.2 of the SFRA does not indicate reported incidents of historical surface water flooding within 100 m of the Site (AECOM, 2015). Figure 6 of the LFRMS illustrates the Site is located adjacent to the Carshalton Beeches (027) Critical Drainage Area (CDA)[1] (Capita URS, 2014).

Climate change may lead to an increase in rainfall intensity which affects river levels, land and urban drainage systems. Rainfall intensity for small and urban catchments may increase from 5 to 20% (central estimate) or 10% to 40% (Upper estimate) over the period to 2115 (EA, 2021). The increase in surface water flood risk is best represented by the 1 in 1000 year pluvial flood extent but according to the mapping this is unlikely to impact the Site.

[1] 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, 2019). 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 may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 6) indicates there is a Negligible risk of groundwater flooding at surface in the vicinity from permeable bedrock during a 1 in 100 year event. Mapped classes 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.

Figure 6. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2021)

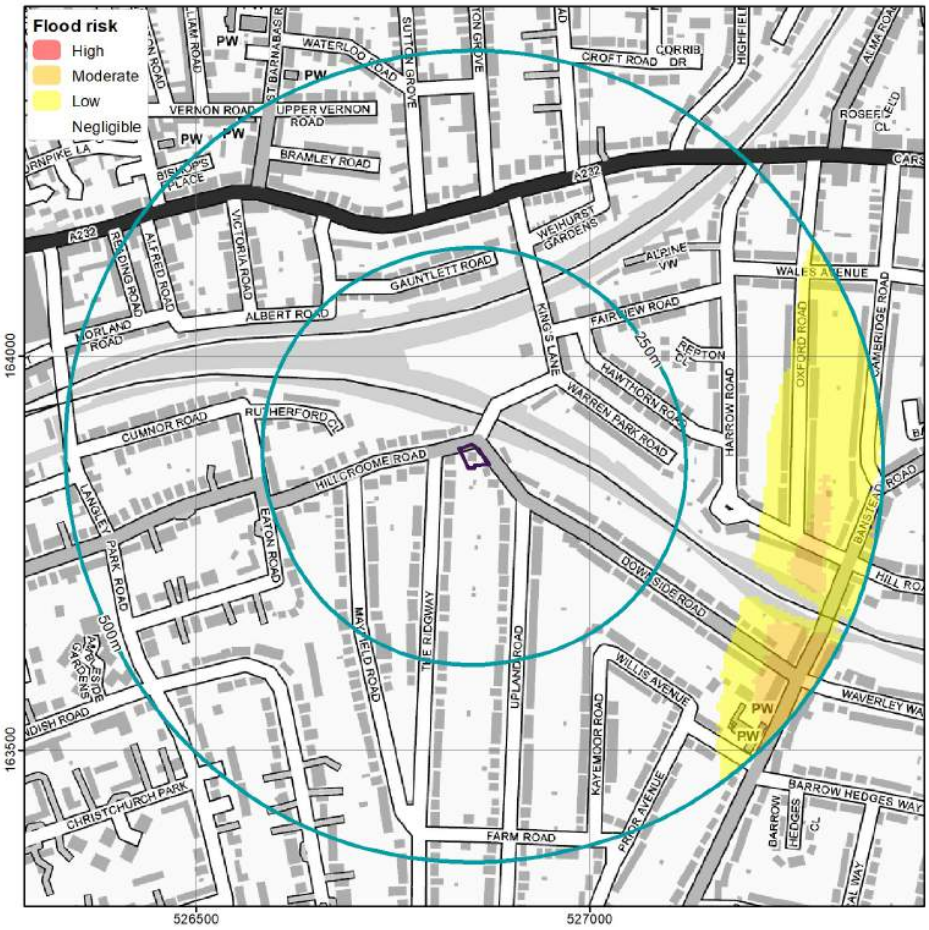


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Figure 4.4 of the SFRA does not indicate reported incidents of historical ground water flooding within 20 m of the Site (AECOM, 2015).

Based on a review of (limited) site specific data there is unlikely to be a mechanism for groundwater flooding at the site and the risk is negligible.

Site specific assessment suggests that groundwater levels are unlikely to reach the surface at the Site.

The presence of local drainage features are likely to intercept the groundwater.

The local topography is such that the development threshold is likely to be higher than the area where groundwater emerges in adjacent low points.

On the basis of the site-specific assessment the groundwater flood risk is considered to be negligible.

Guidance

Negligible Risk - There will be a remote 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 variation in rainfall recharge which is uncertain.

Based on the available evidence the resulting increase to groundwater flood risk is not considered significant.

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

Figure 4.5 of the SFRA has identified 2 incidences or modelled incidences of flooding as a result of surcharging sewers within the SM2 5 postcode. However, it is recognised that this four digit postcode covers a large area and instances of flooding are not specific to the Site (AECOM, 2015).

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

Bridges and Culverts have not been identified within 500 m of the Site.

Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping, the Site is not considered to be at risk of flooding from a breach in any nearby reservoirs.

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, 2020).

5. Flood risk from the development

Floodplain storage

As the development is located within Flood Zone 1, there would be no losses in floodplain storage as a result of the development. Therefore, compensation for any loss in flood plain storage will not be required.

Drainage and run-off

A surface water drainage strategy report has been prepared separately by GeoSmart to ensure surface water can be managed effectively through the use of SuDS features, over the lifetime of the proposed development, including sufficient allowances for climate change.

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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, 2019). 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 Table 6 overleaf (Table 3 of the NPPG (2014)).

As the Site is located within Flood Zone 1, all types of development listed within the Table overleaf are acceptable according to National Policy.

Table 6: Flood risk vulnerability and flood zone 'compatibility (taken from NPPG, 2014)

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

Local policy and guidance

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

London Borough of Croydon, Merton, Sutton and Wandsworth Level 1 Strategic Flood Risk Assessment (AECOM, 2015):

- The vast majority of London Borough of Sutton (96%) is defined as Flood Zone 1 Low Probability of flooding from rivers. Approximately 2% is defined as Flood Zone 2 Medium Probability, >1% as Flood Zone 3a High Probability, and <1% as Flood Zone 3b Functional Floodplain.

- The risk from sewer flooding in the London Borough of Sutton is low as the majority of Sutton is served by separate foul and surface water sewers.

- With the exception of one groundwater flooding event in proximity to Sutton Police Station, all recorded groundwater flood incidents held by Sutton Council are located in the north-west of the Borough, north of the A232, and west of the rail line running through the Borough from Sutton station to Mitcham Junction station.

London Borough of Sutton Local Flood Risk Management Strategy (Capita URS, 2014)

- Sutton is at greatest risk of flooding from surface water, river and groundwater sources and it is predicted that this will increase in the future; influenced by climate change and increasing pressures on development and housing need.

- Parts of Sutton have a particular susceptibility to surface water and sewer flooding due to the urbanised nature of the area and the complexity of the sewer system leading to a high potential for constrictions, blockages and failure. Over recent years, severe surface water flooding has been experienced across the area causing damage to property and disruption to businesses and services.

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, 2019).

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

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

Surface water (pluvial) flood mitigation measures

As the Site is not identified as being at risk of pluvial flooding, mitigation measures are not required however, the regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.

A surface water drainage strategy report has been prepared separately by GeoSmart to ensure surface water can be managed effectively through the use of SuDS features, over the lifetime of the proposed development, including sufficient allowances for climate change.

Groundwater flood mitigation measures

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

Reservoir flood mitigation measures

The Site is not a risk of flooding from reservoirs; therefore, mitigation measures are not required.

Other flood risk mitigation measures

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

8. Conclusions and recommendations

Table 9: Risk ratings following implementation and subsequent maintenance of mitigation measures

Source of Flood Risk	Baseline	After Mitigation
River (fluvial) and Sea (coastal/tidal)	Negligible	Negligible
Surface water (pluvial) flooding	Very Low	Very Low
Groundwater flooding	Negligible	Negligible
Other flood risk factors present	No	N/A

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.

Table 10: Summary of responses to key questions in the report

Key sources of flood risks identified	None (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?	
Recommendations for mitigation are provided below, based upon the proposed development and the flood risk identified at the Site: • The regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk. • A surface water drainage strategy report has been prepared separately by GeoSmart to ensure surface water can be managed effectively through the use of SuDS features, over the lifetime of the proposed development, including sufficient allowances for climate change. 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.	

9. Further information

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

Additional GeoSmart Products		
✓	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

AECOM (2015) London Borough of Croydon, Merton, Sutton and Wandsworth Level 1 Strategic Flood Risk Assessment. Accessed from https://www.sutton.gov.uk/info/200487/flood_risk_management/1279/flood_risk_information_and_maps/3

British Geological Survey (BGS) (2021). Geology of Britain Viewer. Accessed from: http://mapapps.bgs.ac.uk/geologyofbritain/home.html on 29/04/2021.

Capita URS, (2014) London Borough of Sutton Local Flood Risk Management Strategy. Accessed from https://www.sutton.gov.uk/downloads/download/609/local_flood_risk_management_strategy

Department for Communities and Local Government (2019). National Planning Policy Framework (NPPF). Accessed from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf on 07/08/2020.

Defra/Environment Agency (2005). Flood Risk Assessment Guidance for New Development. *Phase 2 Framework and Guidance for Assessing and Managing Flood Risk for New Development – Fill Documentation and Tools*. R & D Technical Report FD232-/TR2.

Environment Agency [EA] (2021). Flood risk assessments: climate change allowances. Accessed from: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances on 29/04/2021.

Environment Agency [EA] (2021). MagicMap. Accessed from: http://magic.defra.gov.uk/MagicMap.aspx on 29/04/2021.

Environment Agency [EA] (2021). Flood map for planning. Accessed from https://flood-map-for-planning.service.gov.uk/ on 29/04/2021.

Environment Agency [EA] (2021). Long term flood risk assessment for locations in England. Accessed from https://flood-warning-information.service.gov.uk/long-term-flood-risk on 29/04/2021.

GeoSmart (2021). GeoSmart groundwater flood risk (GW5) map (version 2.4).

London Borough of Sutton (2011) Surface Water Management Plan, Accessed from https://www.sutton.gov.uk/info/200487/flood_risk_management/1279/flood_risk_information_and_maps/2

Ministry of Housing, Communities & Local Government (2014). Planning Practice Guidance (NPPG). Flood Risk and Coastal Change. Accessed from http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

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Survey Open Data (2021). Accessed from: http://www.geostore.com/environment-agency/survey.html#/survey/tandc on 29/04/2021.

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 200 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 (2019) 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 2021 BlueSky copyright and database rights 2021
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Environment Agency copyright and database rights 2021 Ordnance Survey data © Crown copyright and database right 2021
Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (version 2.4) Map (GeoSmart, 2021) Contains British Geological Survey materials © NERC 2021 Ordnance Survey data © Crown copyright and database right 2021
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2021
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2021 Environment Agency copyright and database rights 2021

Appendices

Appendix A

Site plans

Rev. Note. Date.

526820mE 526830mE 526840mE 526850mE 526860mE 526870mE 526880mE

163900mN 163890mN 163880mN 163870mN 163860mN

KINGS LANE

HILLCROOME ROAD

UPLAND ROAD

existing boundary fence retained

pv panels

Existing tree

Existing tree

Parking

Crossover unchanged

NO.1
THE RIDGEWAY

NO.3
THE RIDGEWAY

NO.4
UPLAND ROAD

Proposed Site Plan
Scale 1:200

N

0 1 2 3 4 5 10m

SITE AREA = 639m2

FOOTPRINT = 102m2

Site Boundary

PLANNING	
Client: Tag Homes Ltd c/o OcMO	
Project: Treetops Upland Road, Sutton SM2	
Drawing: Proposed Site Plan	
Drawing No: SMA/904/100	
Scale: 1:200	
Size: A3	
Date: April 2021	Rev: C

1

Proposed West Elevation
Scale 1:100

Proposed South Elevation
Scale 1:100

Proposed North Elevation
Scale 1:100

Proposed East Elevation
Scale 1:100

2

Proposed West Elevation
Scale 1:100

Proposed South Elevation
Scale 1:100

Proposed North Elevation
Scale 1:100

Proposed East Elevation
Scale 1:100

HILLCROOME ROAD

UPLAND ROAD

eaves storage

rooflight

Rev. Note. Date.

Site Boundary

PLANNING	
Client: Tag Homes Ltd c/o OeMO	
Project: Treetops Sutton SM2 5EL	
Drawing: Proposed Attic Plan	
Drawing No: SMA/904/103	
Scale: 1:100	
Size: A3	
Date: April 2021	Rev:

ATTIC = 18m2

Proposed Attic Floor Plan
Scale 1:100

N

0 1 2 3 4 5 10

HILLCROOME ROAD

MASTER

BED 2

BED 3

ENSUITE

DRESS

BATH ROOM

High level window

UPLAND ROAD

Rev. Note. Date.

Site Boundary

PLANNING	
Client: Tag Homes Ltd c/o OcMO	
Project: Treetops Sutton SM2 5EL	
Drawing: Proposed First Floor	
Drawing No: SMA/904/102	
Scale: 1:100	
Size: A3	
Date: April 2021	Rev:

FIRST FLOOR GIA = 65.5m2

Proposed First Floor Plan
Scale 1:100

N

0 1 2 3 4 5 10m

HILLCROOME ROAD

Low level brick wall with timber fence above

Paving

Timber fence

Existing tree

grass

grass

KITCHEN

DINING

OFFICE

HALL

LIVING

Paving

Low level brick wall

grass

UPLAND ROAD

Existing tree

NO.1
THE RIDGEWAY

Paving

Timber fence

Trees along boundary to reach maximum height of 5 meters

Paving

Crossover unchanged

grass

bins

1

2

Existing tree

NO.4
UPLAND ROAD

N

0 1 2 3 4 5 10m

Proposed Ground Floor Plan
Scale 1:100

Rev. Note. Date.

Site Boundary

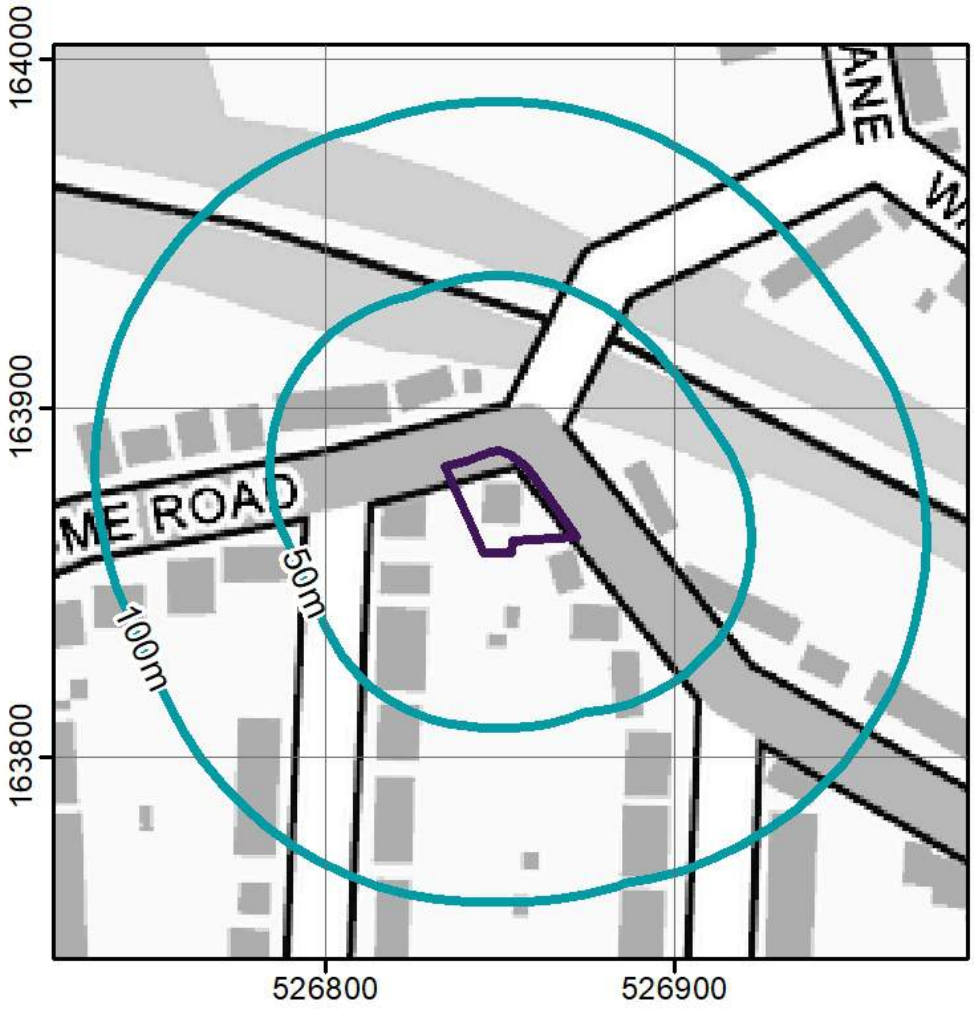
PLANNING	
Client: Tag Homes Ltd c/o OeMO	
Project: Treetops Sutton SM2 5EL	
Drawing: Proposed Ground Floor	
Drawing No: SMA/904/101	
Scale: 1:100	
Size: A3	
Date: April 2021	Rev:

SITE AREA = 639m/sq
FOOTPRINT = 102m2
GROUND FLOOR GIA = 88m2

Appendix B

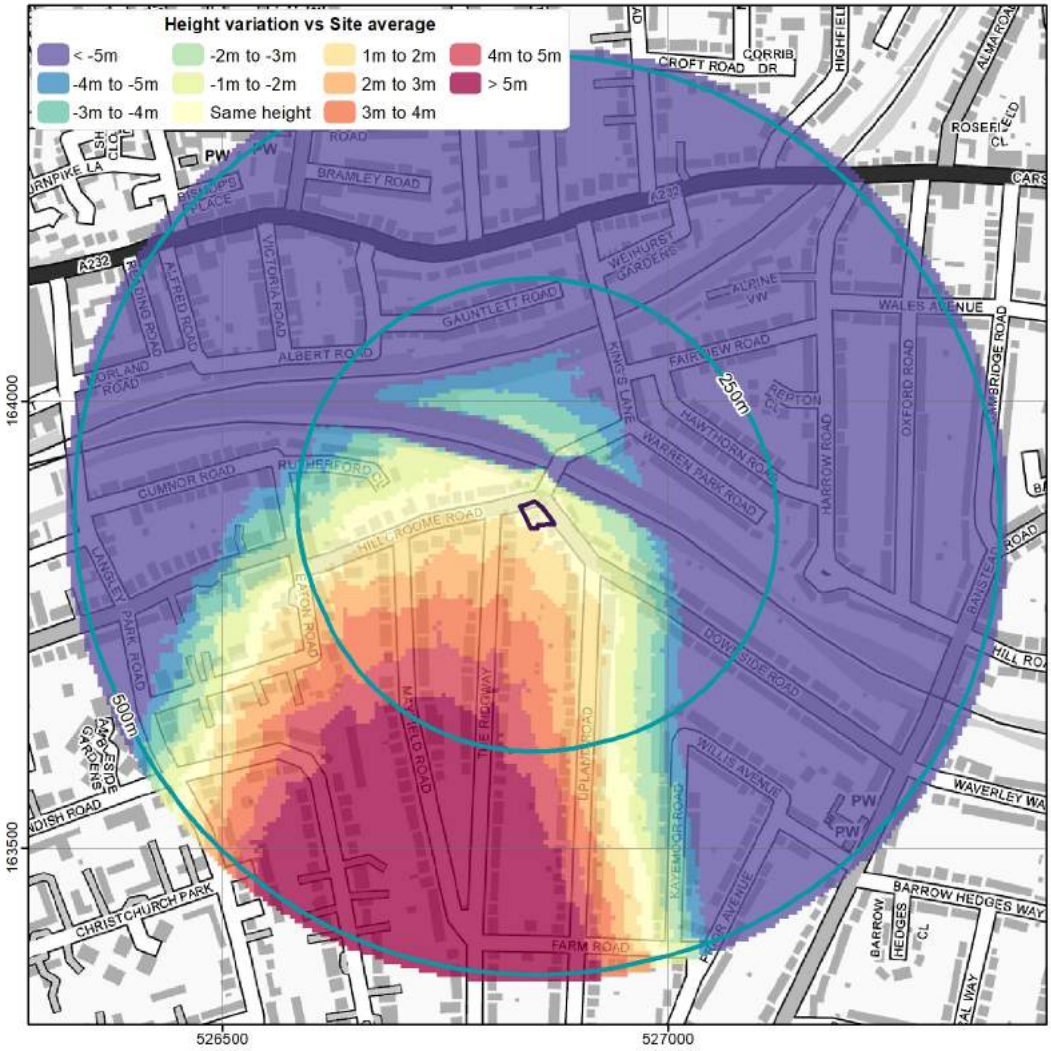
Commercial flood mapping

Site Location Plan (OS, 2021)



Aerial Photograph (BlueSky, 2021)

GeoSmart DTM5 (5m) map (EA, 2021)



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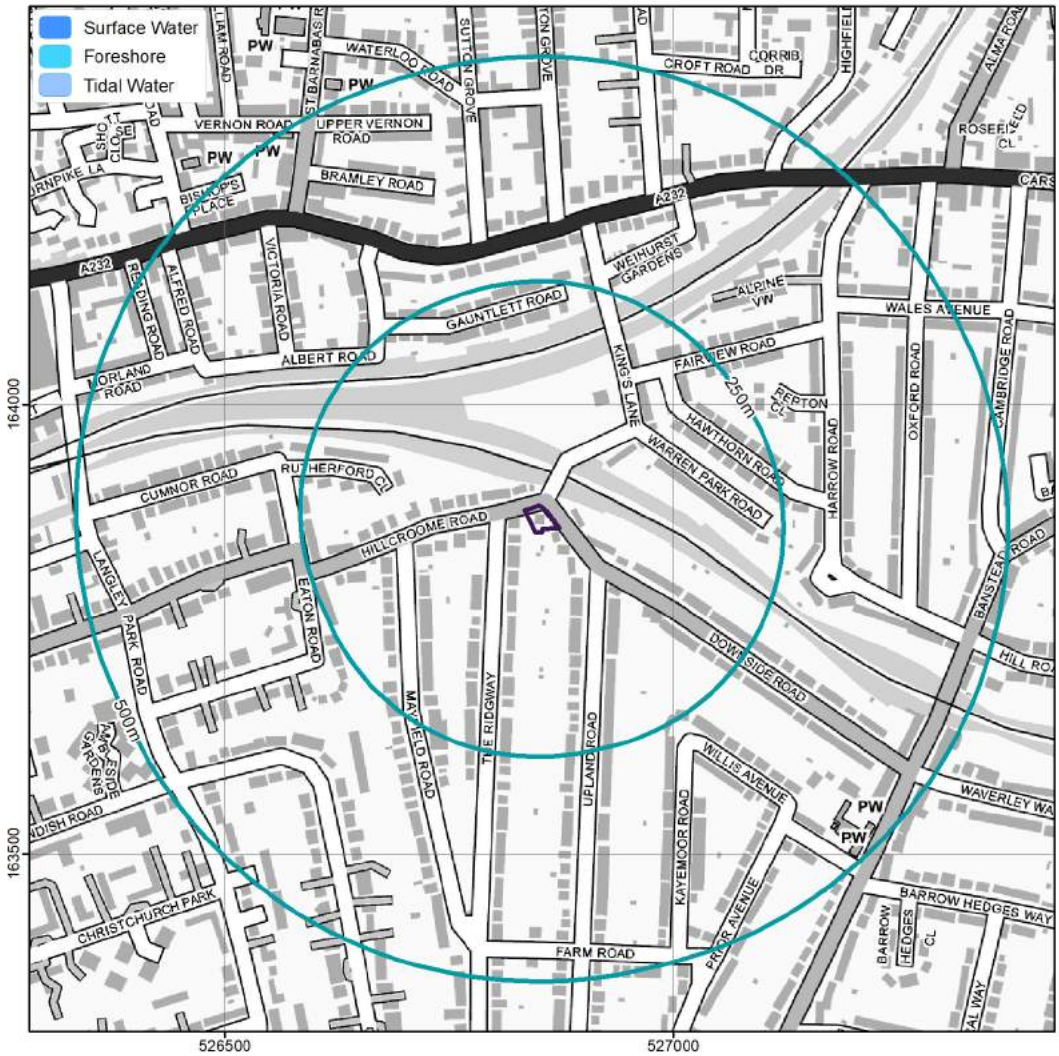
Ordnance Survey Surface Water Feature Vector Map (OS, 2021)



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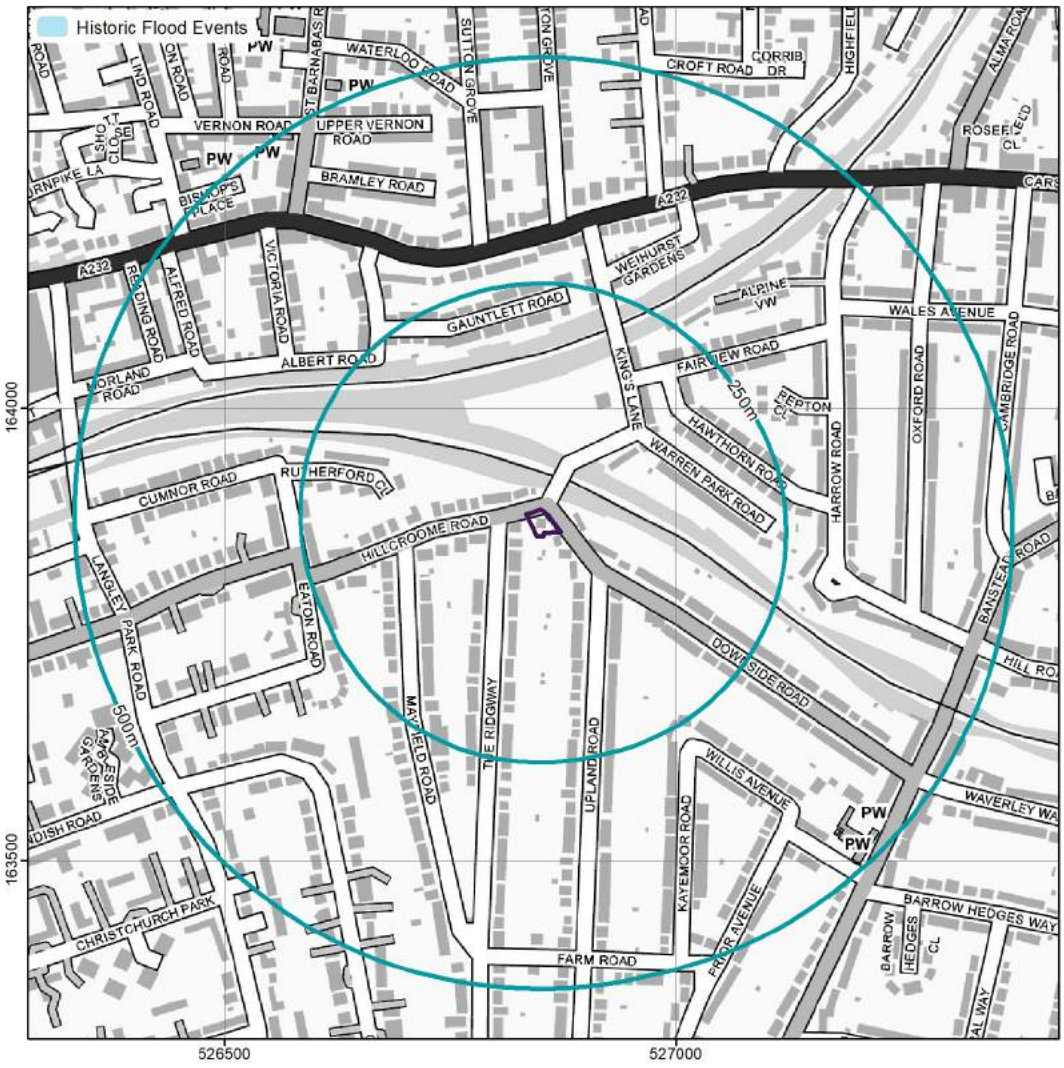
Environment Agency Historic Flood Map (EA, 2021)



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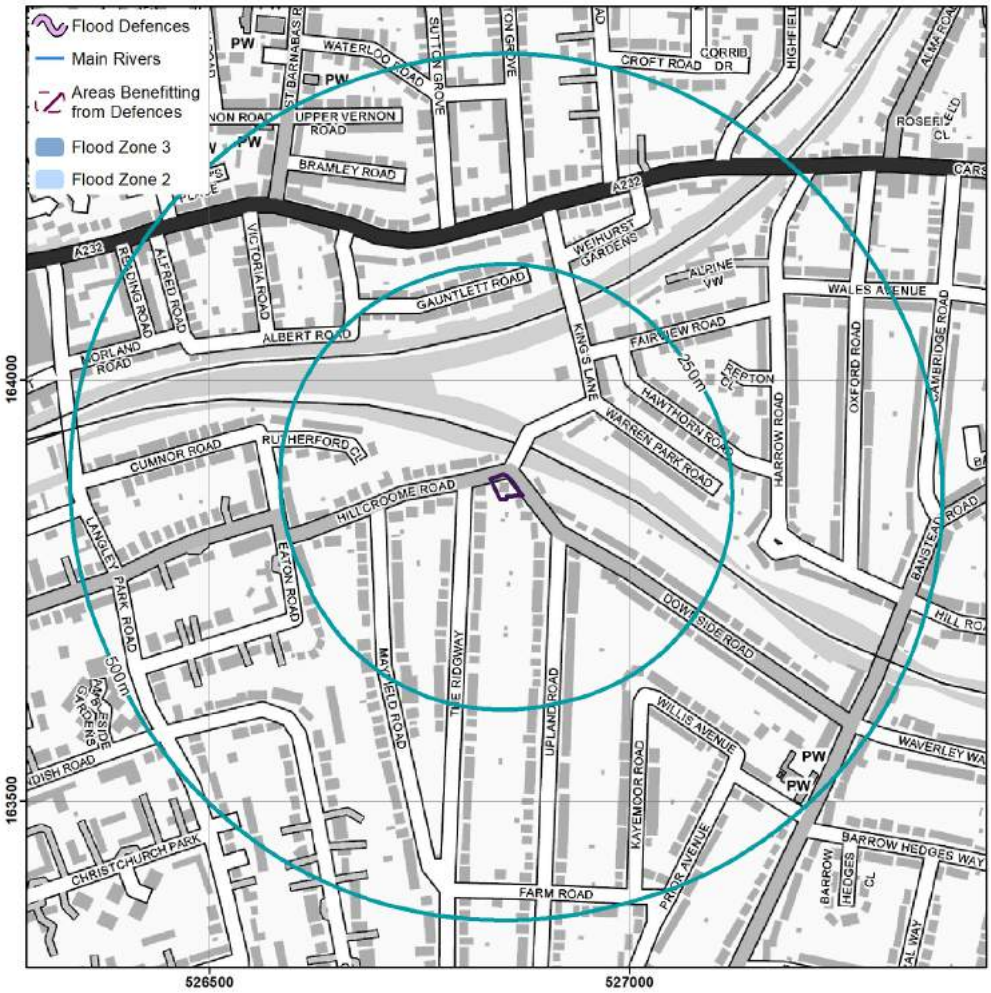
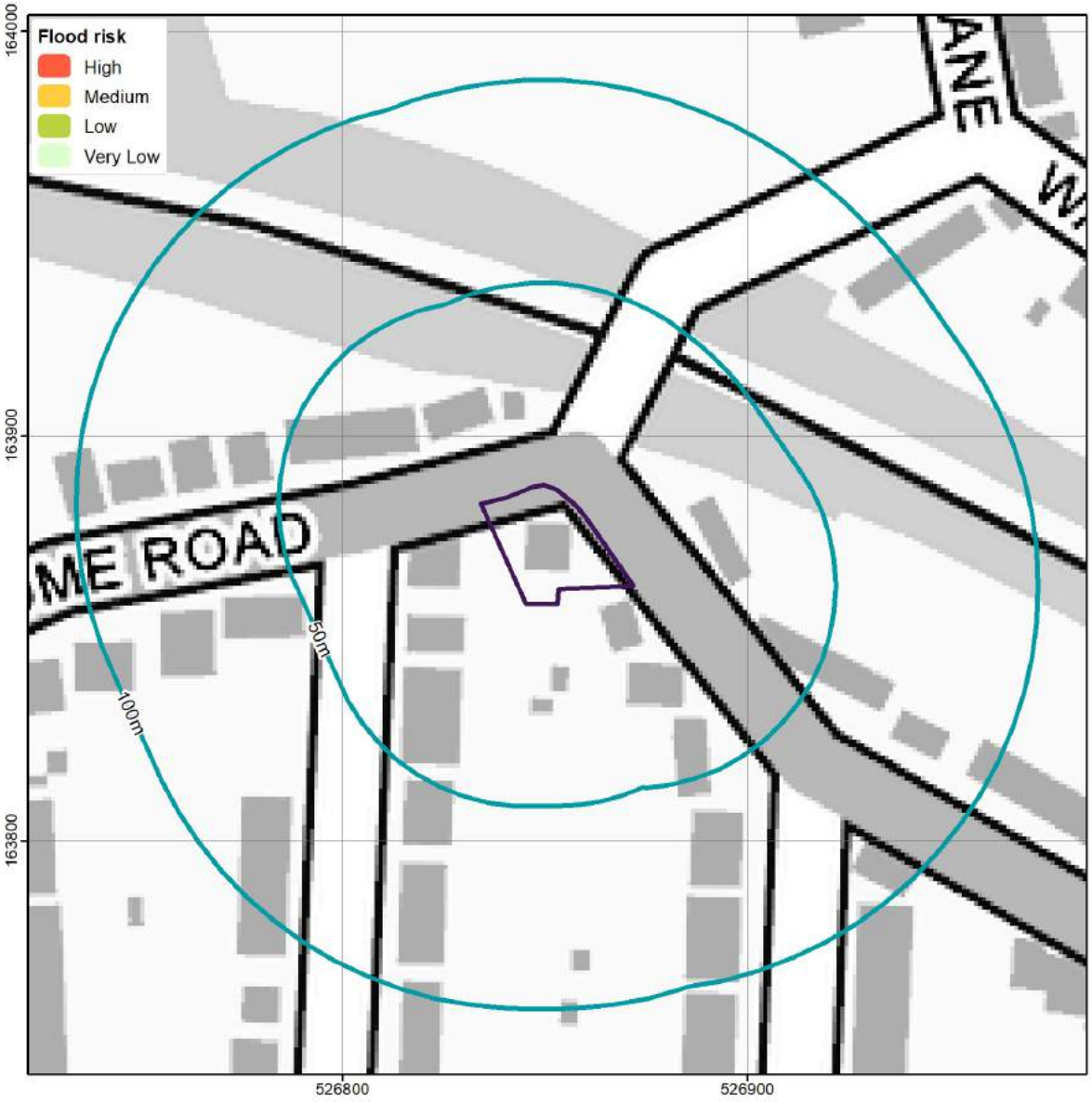
Environment Agency's Flood Map for Planning Purposes (EA, 2021)

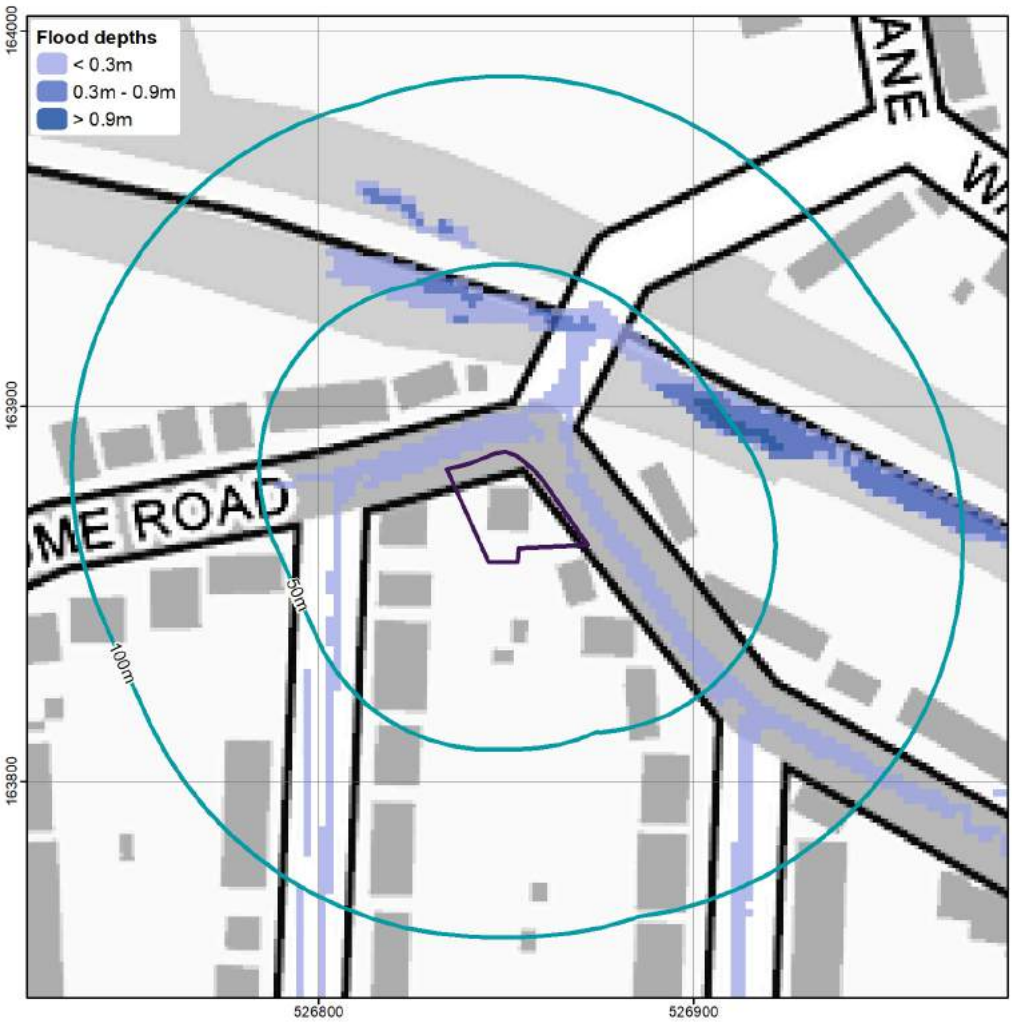


Environment Agency's Flood Risk from Rivers and Sea map (EA, 2021)



GeoSmart Groundwater Flood Risk (GW5, v2.4) Map (GeoSmart, 2021)

EA Risk of Flooding Surface Water (pluvial) Depth map 1 in 100 year (EA, 2021)



Appendix C

Environment Agency LiDAR Ground Elevation Data

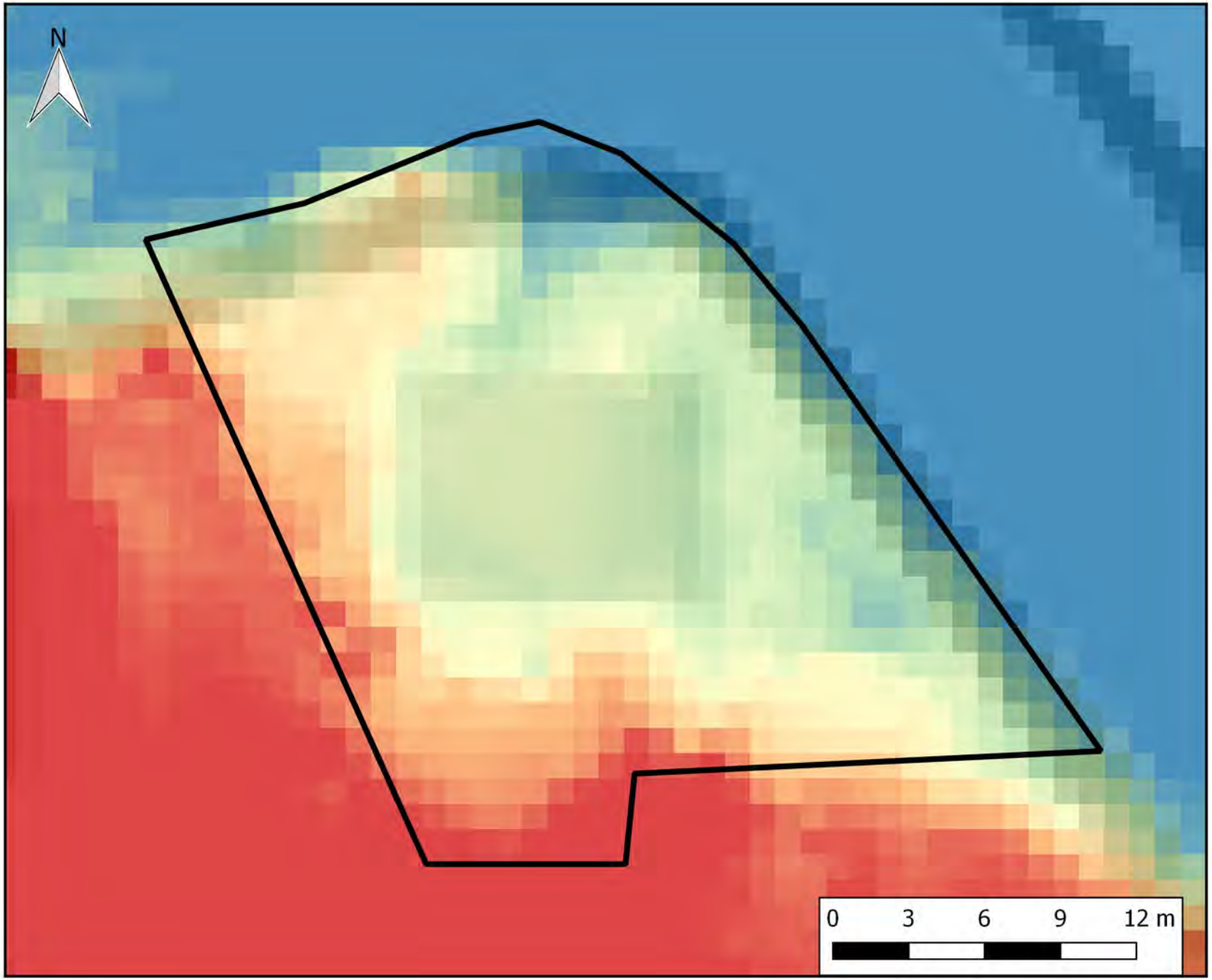


Figure D.1
Elevation on Site
(LIDAR Data)

Legend

Site Boundary

Ground Levels (mAOD)

- 73.25
- 73.425
- 73.6
- 73.775
- 73.95

GeoSmart Information
Environmental Thinking

Date 07/08/2020	Drawn
Scale 1:218	Checked
Original	Revision
File Reference	

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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

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- Liaise, at your request, with anyone acting formally on your behalf.

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Alan White
Operations Manager
GeoSmart Information Limited
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Old Bank Buildings,
Bellstone, Shrewsbury, SY1 1HU
Tel: 01743 298 100
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