GeoSmart Information

FloodSmart

Flood Risk Assessment

Site Address

Bricket Lodge Sports and Country Club
Lye Lane
Bricket Wood
St Albans, Hertfordshire
AL2 3TF

Grid Reference

513473, 202814

Report Prepared for

Brian Parker
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10 Orient Close
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Date

2022-02-18

Report Status

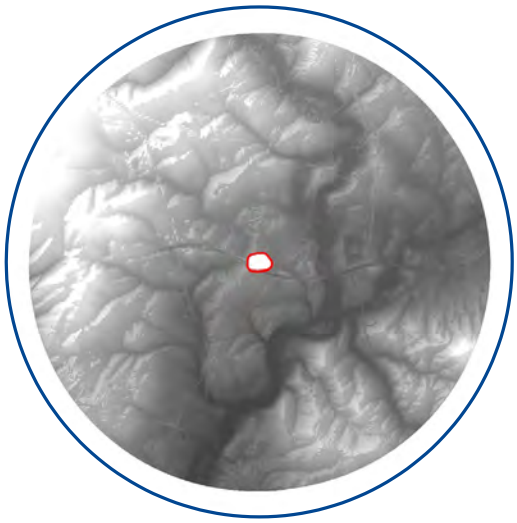
FINAL

Site Area

3.2 ha

Report Reference

76027R1



RISK - Very Low to Low

The Site is located within fluvial Flood Zone 1 (low probability). Taking into consideration the presence of defences, the risk of flooding from rivers and sea is classed as Very Low. The Site is at a Very Low to Low risk of pluvial flooding and a Negligible risk of groundwater flooding.

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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) (2021) 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) flooding	Very Low	N/A
Sea (coastal/tidal) flooding	Very Low	N/A
Surface water (pluvial) flooding	Very Low to Low	Very Low
Groundwater flooding	Negligible	N/A
Other flood risk factors present	No	N/A
Is any other further work recommended?	Yes (see below)	

N/A = mitigation not required

Summary of existing and proposed development

The Site is currently used within a mixed use capacity. The Site is brownfield land and comprises a number of dwellings, a former sports clubhouse and associated buildings, and a paintball centre, including associated access, car parking and landscaping. To the south of the Site there is approximately 3.3 ha of woodland.

Outline proposals comprise the development of the brownfield area of the Site, with the demolition of some existing buildings on-Site and the construction of approximately 113 dwellings, including associated access, car parking and landscaping.

Summary of flood risks

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).
- The nearest flood defences to the Site are located approximately 280 m east, in the form of high ground.
- A number of drainage ditches are located within the vicinity of the Site, the closest of which is c. 80 m south. A pond is c. 480 m east of the Site. The River Ver is located c. 1.2 km east of the Site.
- None of the surface water features are expected to cause a flood risk at the Site, as they are a significant distance away. In the case of the drainage ditch, any flood waters would be intercepted by the M25, which causes a low point to the south of the Site.
- 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 Very Low risk of flooding from Rivers and the Sea.
- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site is at a variable risk of pluvial flooding ranging from Very Low to Medium.

An area near the south-eastern boundary of the Site is at Medium risk of surface water flooding, totalling c. 0.3 % of the area of the Site. This area is contained entirely within the open space and woodland area along the south-eastern boundary and is not expected to affect on-Site buildings and roads.

The affected area expands in the Low risk scenario, totalling c. 1.2 % of the area of the Site. Flood depths are predicted to reach up to 0.3 m.

The rest of the Site is at Very Low risk of surface water flooding.

Due to the Medium risk event not having any impact on the proposed development, the surface water flood risk at the Site is considered to be Very Low to Low.

A Sustainable Drainage Strategy has been prepared separately (ref: 76027.01) to ensure the effective management of surface water runoff at the Site.

- 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 with Thames Water (Appendix B). 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 flooding. Site specific assessment indicates risk to the Site could increase significantly and appropriate mitigation measures are proposed.

In accordance with paragraphs 161, 168 and footnote 56 of the NPPF (2021), as the development proposals are for construction of residential buildings 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.

- As there is a Low risk of flooding from surface water (pluvial) sources, it is recommended that the regular maintenance of any drains and culverts surrounding/on the Site under the riparian ownership of the developer are undertaken to reduce the flood risk.

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 (2021) 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 (2021) 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, 2021).

The NPPF (2021) 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 South West Hertfordshire Strategic Flood Risk Assessment (SFRA) (JBA Consulting, 2015) 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 (2021).

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. 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	Thames Water (Appendix B)	OS Data
Historical	X	X	X		
River (fluvial) / Sea (tidal/coastal)	X	X	X		
Surface water (pluvial)	X	X	X		

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency	Thames Water (Appendix B)	OS Data
Groundwater	X	X			
Sewer		X		X	
Culvert/bridges		X			X
Reservoir		X	X		

*Local guidance and policy, referenced in Section 6, has been consulted to determine local flood conditions and requirements for flood mitigation measures.

3. Site analysis

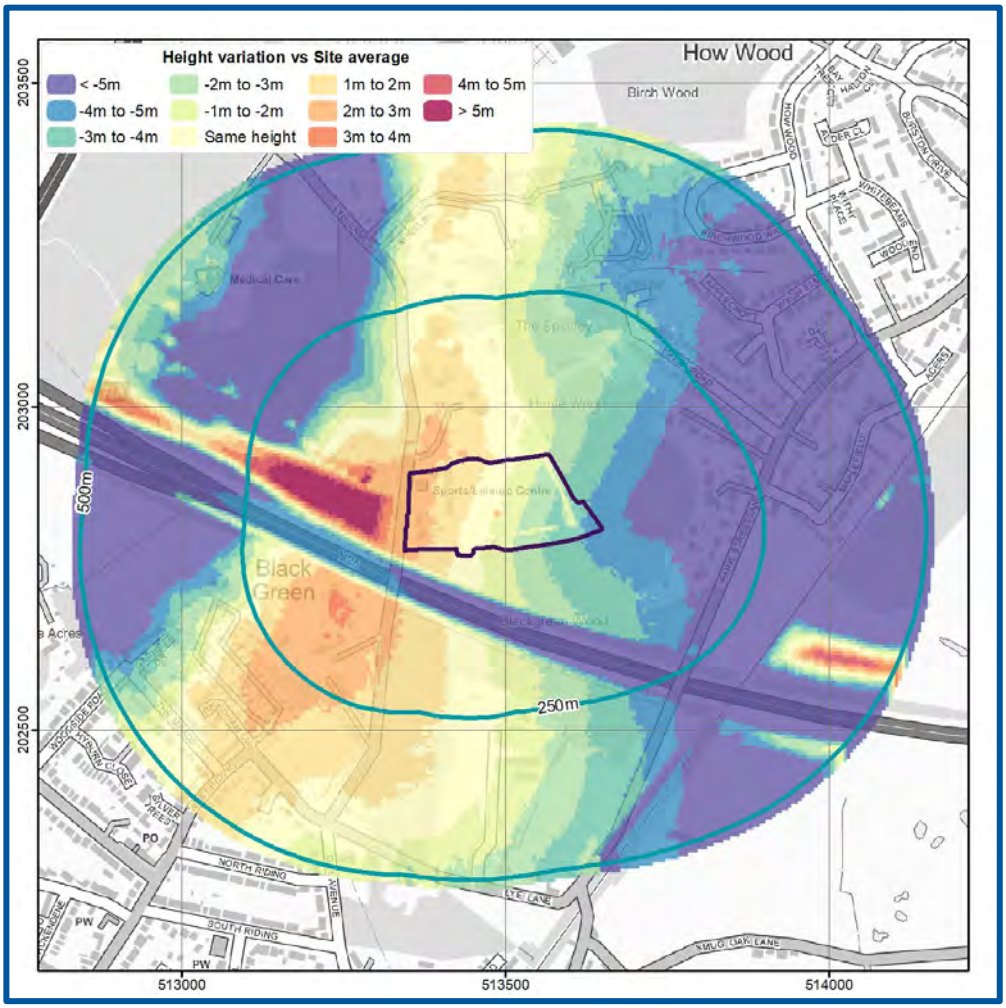
Site information

The Site is located on the outskirts of Bricket Wood, near St Albans, in a setting of commercial and residential land use at National Grid Reference TL 13473 02814. 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 plateau (Figure 1). It is noted that to the north land remains at relatively constant elevation, to c. 84 m above Ordnance Datum (AOD). To the west and east land falls to c. 74 mAOD and c. 77 mAOD respectively, and to the south land remains relatively constant, to c. 81 mAOD.

The general ground levels on the Site are between 80.6 and 86.9 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 C).

Figure 1. Site Location and Relative Elevations (GeoSmart, 2022).



Development

The Site is currently used within a mixed use capacity. The Site is brownfield land and comprises a number of dwellings, a former sports clubhouse and associated buildings, and a paintball centre, including associated access, car parking and landscaping. To the south of the Site there is approximately 3.3 ha of woodland.

Proposals comprise the development of the Site, with the demolition of some existing buildings on-Site and the construction of approximately 113 dwellings, including associated access, car parking and landscaping. Site plans are included within Appendix A.

The effect of the overall development will result in an increase in number of occupants and/or users of the building and will result in the change of use, nature or times of occupation from mixed use to residential. 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

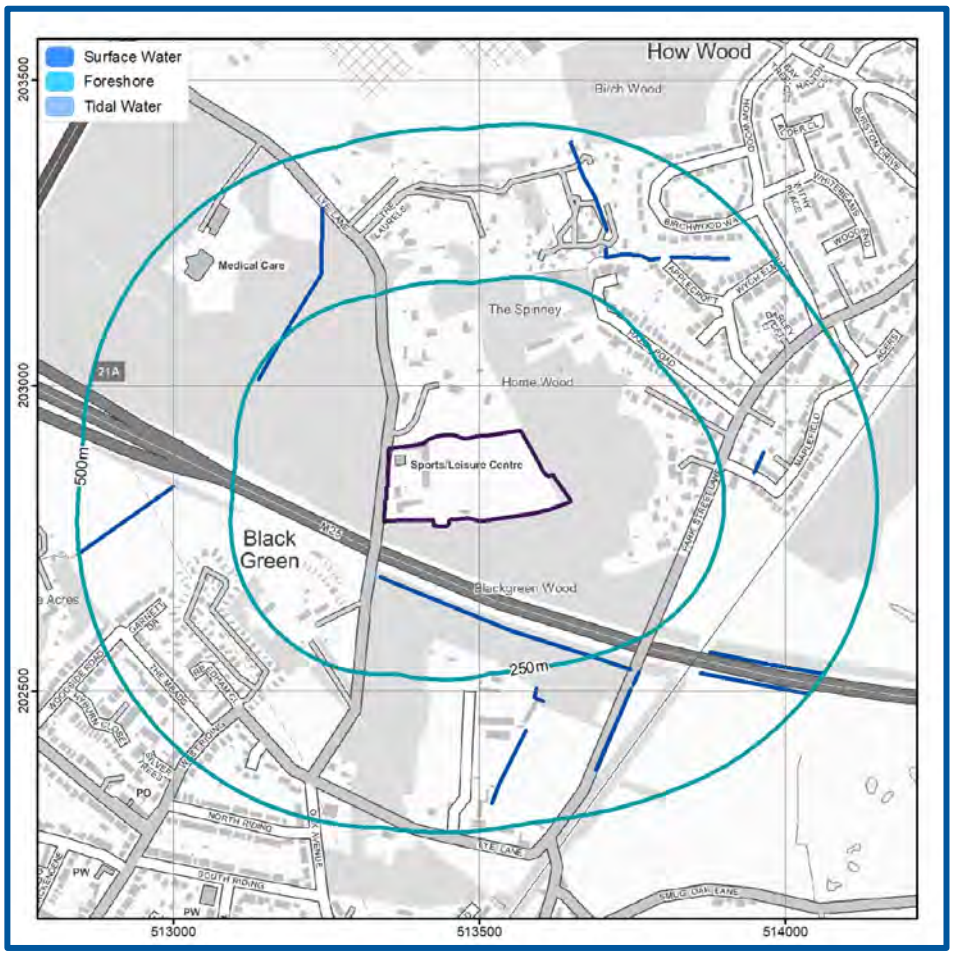
According to Ordnance Survey (OS) mapping included in the following figure, there are numerous surface water features within 500 m of the Site.

A number of drainage ditches are located within the vicinity of the Site. These include drainage ditches c. 110 m south, c. 190 m south, c. 240 m north-west, c. 350 m west, and c. 360 m north-east of the Site. The majority of these are at a lower elevation than the Site.

A pond is present c. 550 m east of the Site, at a lower elevation.

The River Ver is located c. 1.2 km east of the Site.

Figure 2. Surface water features (EA, 2022)



Proximity to relevant infrastructure

The nearest flood defences are located approximately 200 m north east of the Site.

A number of culverts are likely to be present on the drainage ditches near the Site. The nearest culverts are c. 200 m south-east and 240 m north-west of the Site.

The M25 is adjacent to the southern boundary of the Site.

Hydrogeological features

British Geological Survey (BGS) mapping indicates the underlying superficial geology (Figure 3) consists of the Lowestoft Formation (LOFT) (BGS, 2022), which comprises diamicton and is classified as a Secondary Undifferentiated Aquifer (EA, 2022).

Figure 3. Superficial Geology (BGS, 2022)

BGS mapping indicates the underlying bedrock geology (Figure 4) consists of the Lewes Nodular Chalk Formation And Seaford Chalk Formation (undifferentiated) (LESE) (BGS, 2022), which comprises chalk and is classified as a Principal Aquifer (EA, 2022).

Figure 4. Bedrock Geology (BGS, 2022)

The Site lies within an outer groundwater Source Protection Zone (SPZ II) (EA, 2022).

A review of the BGS borehole database (BGS, 2022) indicates there are a number of relevant boreholes within the vicinity of the Site from which the mapped geology can be confirmed.

The nearest and most relevant borehole (ref: TL10SW230) is approximately 50 m south of the southern boundary of the Site at an elevation of 83.52 mAOD, and indicates 0.42 m thickness of blue grey clay overlying fine and medium sand to 2.15 m below ground level (bgl) and mottled blue clay to 3.20 m bgl, at which the borehole ends. Groundwater levels are not recorded.

An additional relevant borehole (ref: TL10SW468) is approximately 80 m north of the northern boundary of the Site at an elevation of c. 85.90 mAOD, and indicates 12 m thickness of multi-coloured clays overlying sand and gravel to 14 m bgl, silty brown clay to 24 m bgl, chalk to 25 m bgl, sand, gravel and chalk to 29 m bgl and chalk flints to 42 m bgl. The standing groundwater level was recorded at 22 m bgl.

The hydrogeological characteristics suggest there is unlikely to be a shallow groundwater table beneath the Site. Groundwater may be derived from the bedrock aquifer but it is not anticipated that the groundwater table will be close to the surface at the Site.

4. Flood risk to the development

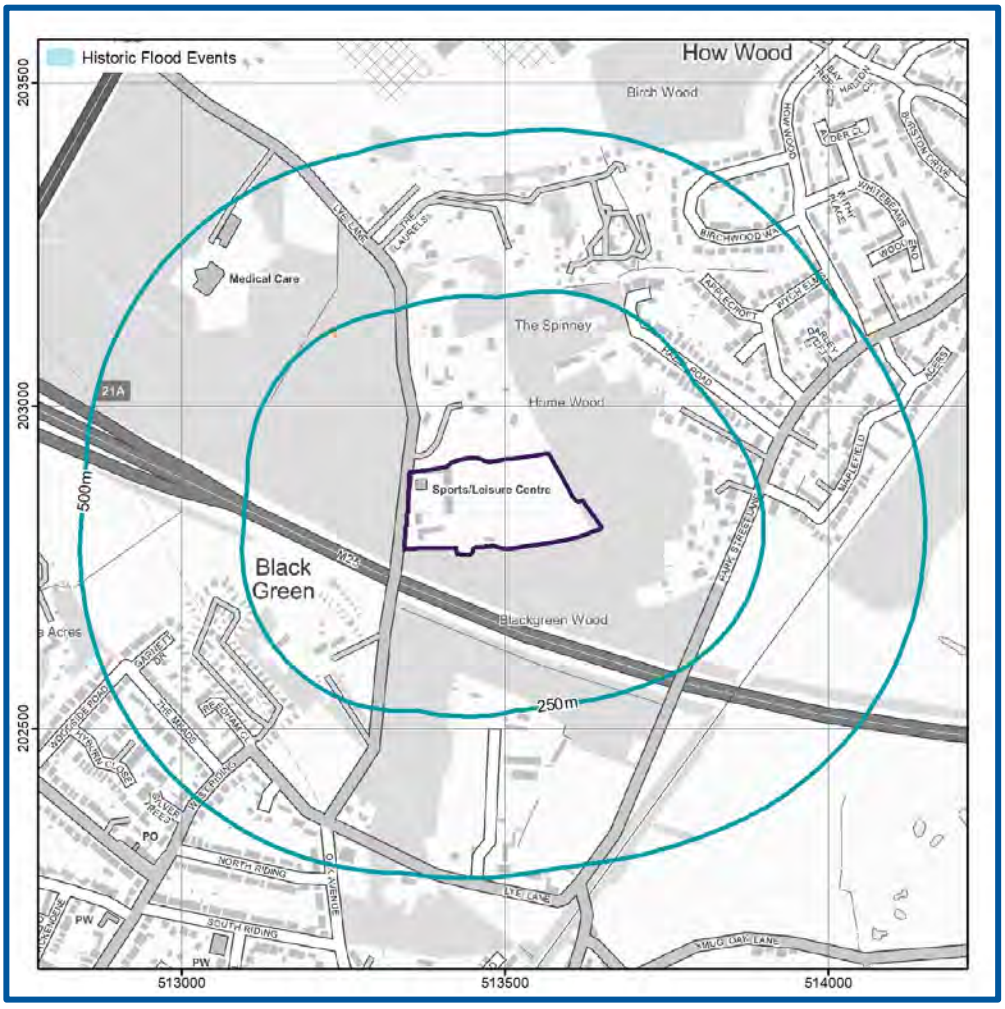
Historical flood events

According to the EA's historical flood map (Figure 5) no historical flood events have been recorded at the Site (EA, 2022).

According to the LFRMS (Map 1b), there have been no records of historic flooding at the Site. Whilst flooding was recorded within the vicinity of the Site in September 2016, flooding occurred to the south of the motorway and so was not recorded at the Site (Hertfordshire County Council, 2019).

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 5. EA historic flood map



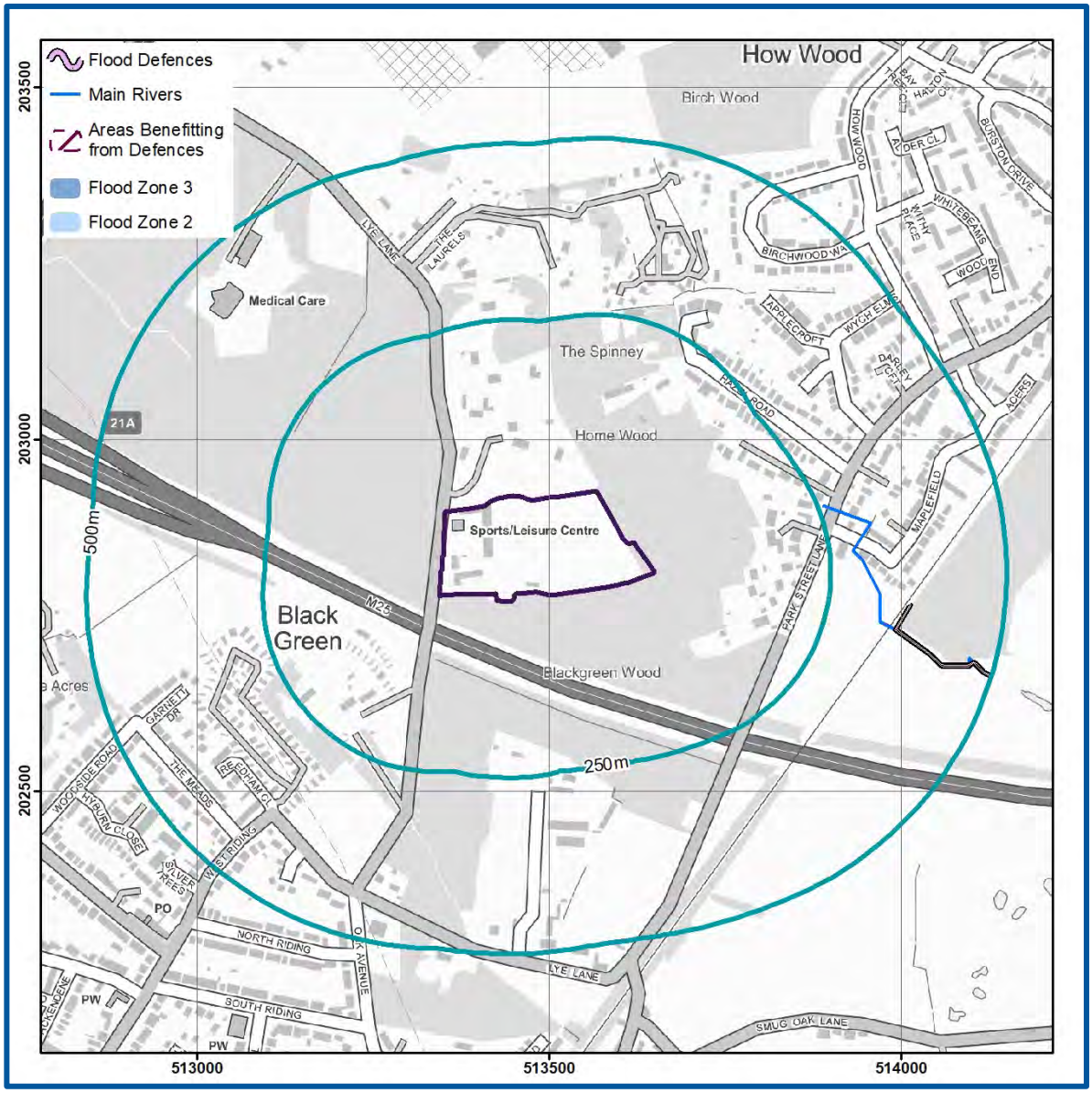
Rivers (fluvial) / Sea (coastal/tidal) flooding

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

Figure 6. EA Flood Map for Planning Purposes (EA, 2022)



Guidance

As defined in the NPPF (2021):

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

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.

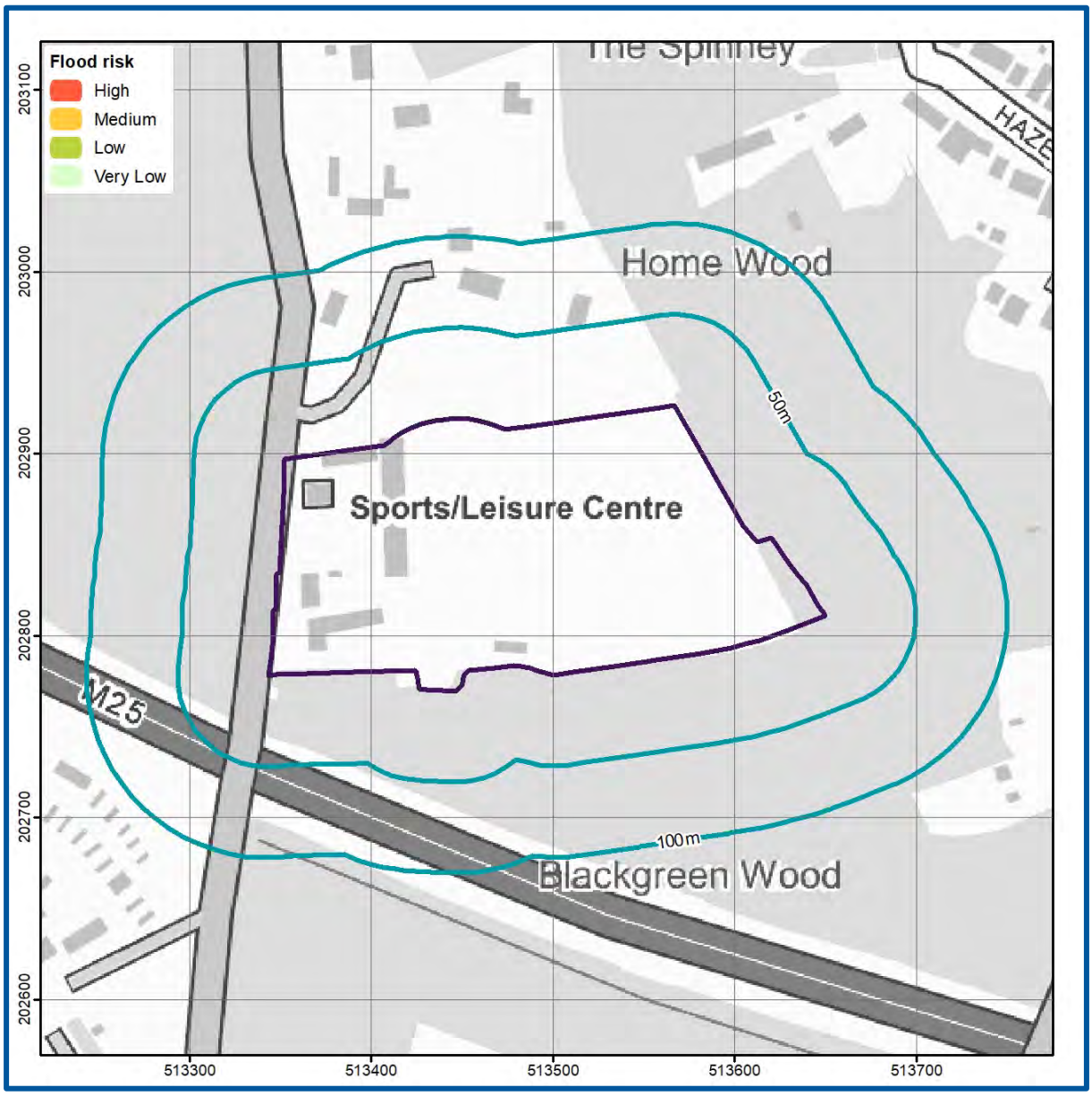
- The Site is not in an area which benefits from flood defences.
    - The nearest flood defences to the Site are approximately 280 m east of the Site, in the form of high ground. This is likely to be related to the pond approximately 480 m east of the Site.

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 7), which considers the crest height, standard of protection and condition of defences, the flood risk from Rivers and the Sea is Very Low.

Figure 7. Risk of Flooding from Rivers and Sea map (EA, 2022)



Surface water (pluvial) flooding

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

- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site is at a variable risk of pluvial flooding ranging from Very Low to Medium.
- An area near the south-eastern boundary of the Site is at Medium risk of surface water flooding, totalling c. 0.3 % of the area of the Site.
- This area expands in the Low risk scenario, totalling c. 1.2 % of the area of the Site. Flood depths are predicted to reach up to 0.3 m.
- The rest of the Site is at Very Low risk of surface water flooding.

Guidance

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

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

No surface water flooding is expected along the western boundary of the Site, and therefore access to the Site is not expected to be affected.

Figure 8 confirms the extent and depth of flooding during a 1% AEP (1 in 100 year - medium risk) event. This confirms areas of the Site along the eastern boundary which are at Medium risk of surface water flooding, where depths could range between 0 m and 0.3 m above ground level. The area of flooding is not expected to affect any Site roads or buildings and is likely to be contained within the open space and woodland area in the south-east corner of the Site.

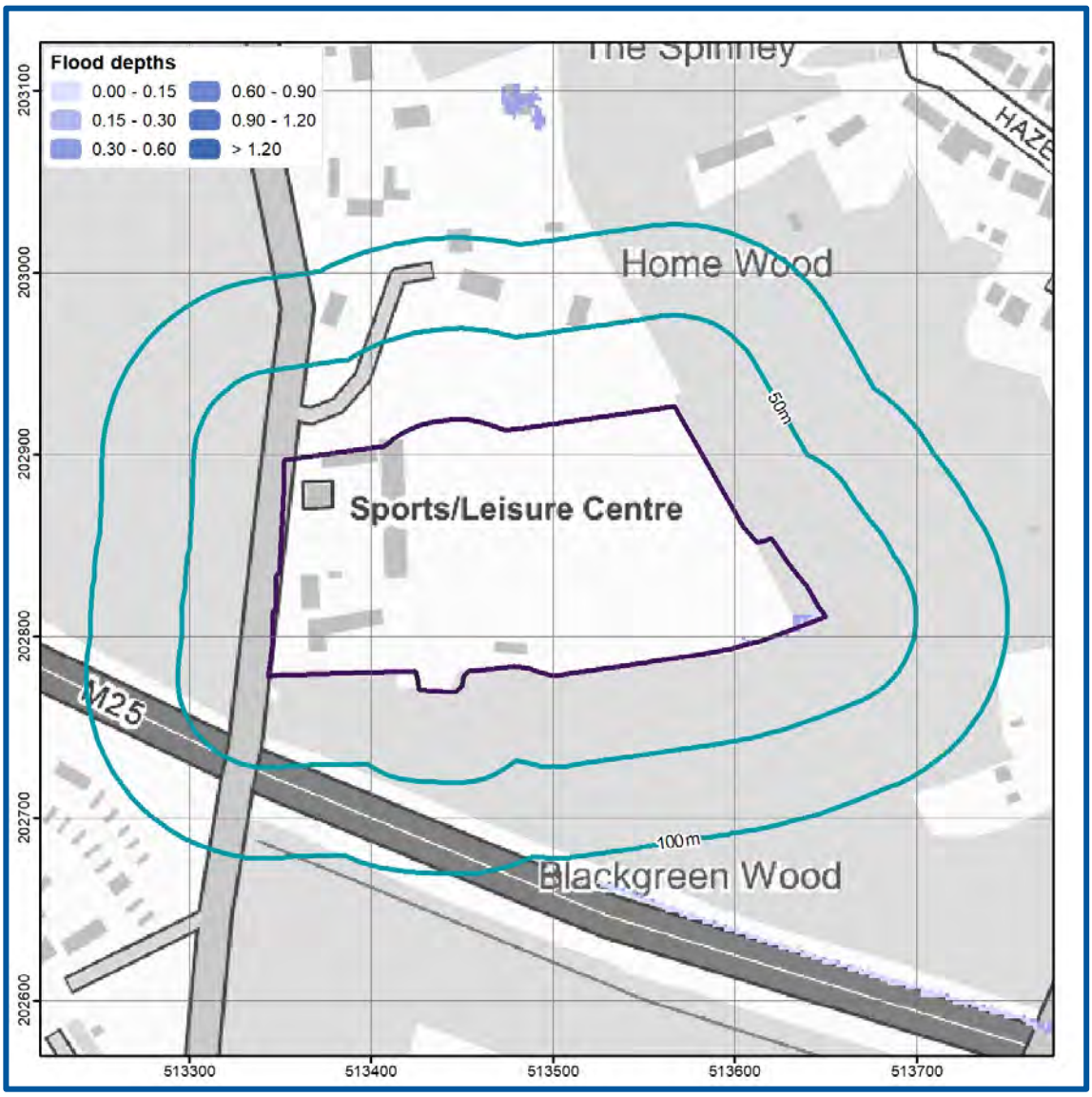
According to EA's surface water flood risk map the following advisory guidance applies to the Site:

Flood Depth

- 0.15 to 0.3 m - Flooding would: typically exceed kerb height, likely exceed the level of a damp-proof course, cause property flooding in some areas
- 0.3 to 0.9 m - Flooding is likely to exceed average property threshold levels and cause internal flooding. Resilience measures are typically effective up to a water depth of 0.6 m above floor level.

As no flooding is expected to impact on-Site buildings or roads in the Medium risk scenario, the surface water flood risk is considered to be Very Low to Low.

Figure 8. EA Medium surface water flood risk map (EA, 2022)



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 located on a potential overland flow route during a Low risk scenario. There is potential for the Site to transmit overland flows off-Site towards the south-east, although no surface water flows are expected to enter the Site from adjacent land. The overland flow could potentially affect the row of houses nearest to the south-eastern corner if appropriate mitigation is not provided. The majority of flow velocities are predicted to exceed 0.25 m/s.

The LFRMS does not indicate reported incidents of historical surface water flooding within 100 m of the Site (Hertfordshire Council, 2015), although it is noted that one flood event (of

unspecified type) was identified within the vicinity of the Site. The SFRA does not confirm whether the Site is located within a Critical Drainage Area (CDA)[1] (JBA Consulting, 2015).

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, 2022). The Site is susceptible to surface water flooding which may be increased as a result of climate change.

On-Site surface water drainage systems should be designed appropriately to manage the run-off over the lifetime of the proposed development.

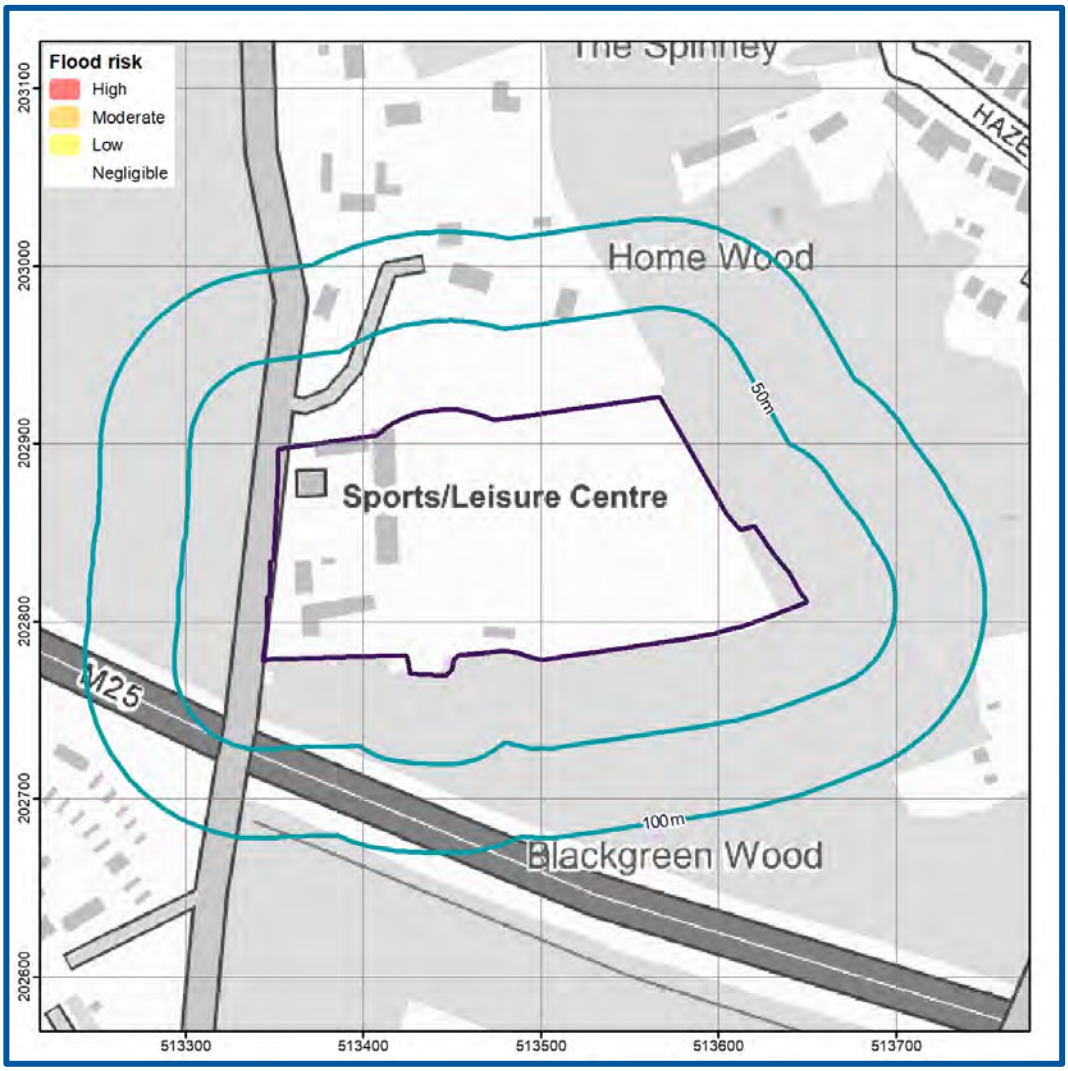
[1] A Critical Drainage Area (CDA) is an area that has critical drainage problems and which has been notified to the local planning authority as such by the Environment Agency in line with the National Planning Policy Framework (NPPF, 2021). CDA's are specific to Flood Zone 1, defined as areas where 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 9) indicates there is a Negligible risk of groundwater flooding at surface in the vicinity from permeable bedrock and superficial during a 1 in 100 year event.

Figure 9. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2022)



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

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.

Based on a review of (limited) site specific data, there is likely to be a deep groundwater table at the Site, and there is unlikely to be a mechanism for groundwater flooding.

- Map 1b of the LFRMS indicates the nearest reported incident of historical ground water flooding is c. 750 m west of the Site (Hertfordshire Council, 2019).
- There is potential for groundwater levels to rise in the bedrock aquifer in response to high river events or prolonged rainfall recharge. However, it is not expected that the groundwater table to rise sufficiently to intercept the surface.
- The local topography is such that the development threshold is likely to be higher than the area where groundwater emerges in adjacent low points east or west of the Site.
- The TL10SW468 borehole, approximately 80 m north of the Site at an elevation of c. 85.9 mAOD, recorded a groundwater table at 22 m bgl. This indicates the groundwater table is significantly below the Site including an allowance for seasonal variations.
- The contact between the Lowestoft Formation and Kesgrave Catchment Subgroup occurs approximately 200 m east and 270 m west of the Site, which could give rise to groundwater seepage. However, the contact is down-gradient of the Site in both directions, and therefore any groundwater seepage is not expected to impact the Site.
- The groundwater would be most likely to accumulate along the eastern boundary of the Site, which has the lowest on-Site ground levels.

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.

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

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, 2022; Appendix B).

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.

Culverts and bridges

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

Culverts and bridges have been identified within 500 m of the Site.

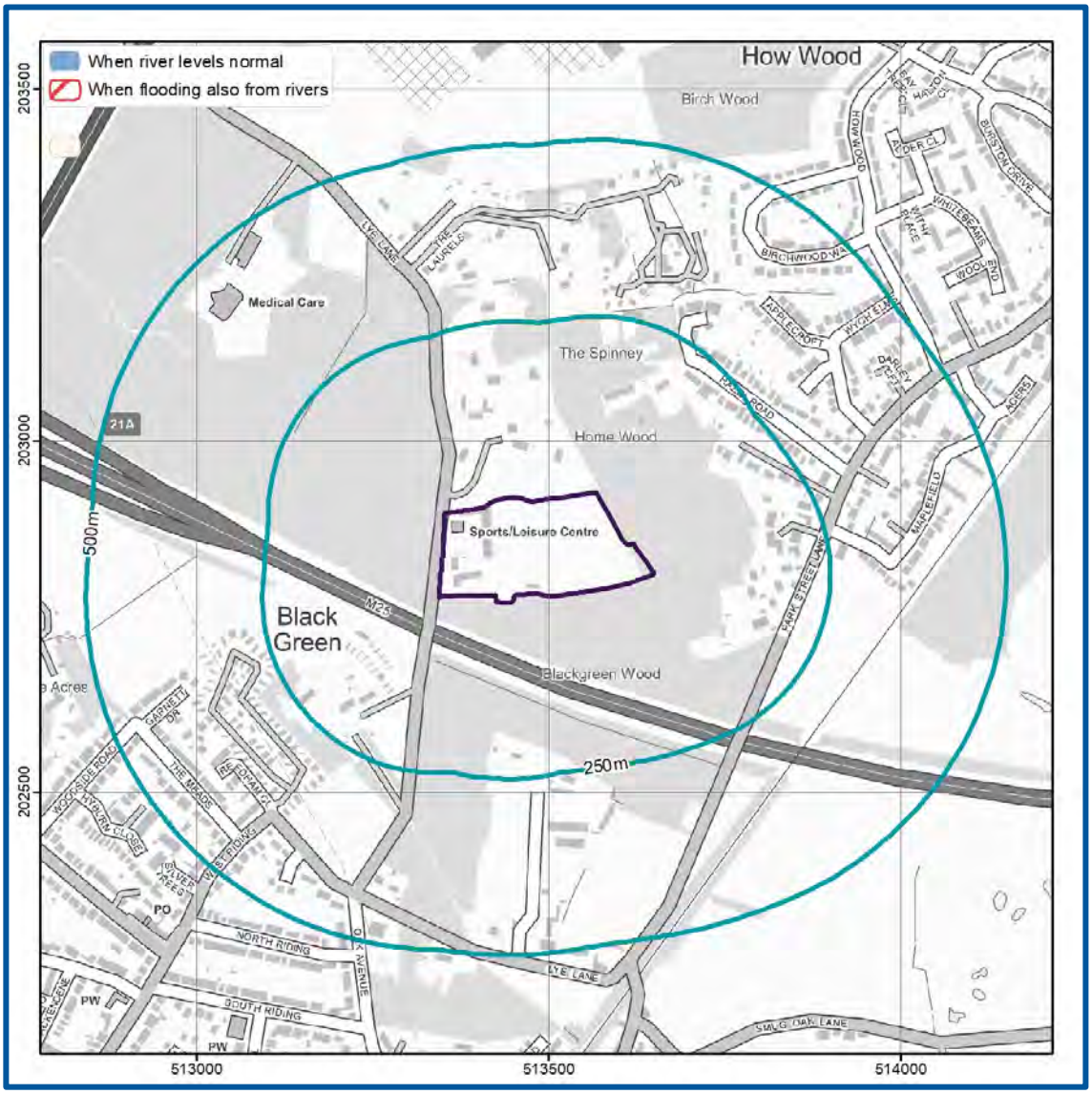
However, these structures are a significant distance from the Site and are unlikely to represent a flood risk to the Site in the event of a blockage. The nearest identified culvert is located south of the M25, so any flood waters are likely to be intercepted by the highway.

The SFRA has not identified any historic drainage issues within the Site area (JBA Consulting, 2015).

Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping the Site is not at risk of flooding from reservoirs (Figure 10) (EA, 2022).

Figure 10. EA Risk of Reservoir Flooding (EA, 2022)



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, 2022).

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 (Affinity Water).

5. Flood risk from the development

Floodplain storage

The development is located within fluvial Flood Zone 1. Therefore, the proposed development would not displace flood waters, and compensatory flood storage is not required.

Drainage and run-off

The proposed development involves alteration of external features at the Site and will involve changes in the proportion of impermeable surfaces at the Site. An estimation of run-off is therefore required to permit effective Site water management and prevent any increase in flood risk to off-Site receptors from the Site.

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

The NPPF (2021) recommends the effects of climate change are incorporated into FRA's and the recently updated climate change guidance (published in 2016 and updated in 2021) confirms the requirements for inclusion within FRA's.

As the proposed development is being changed to residential, the lifespan of the development and requirements for climate change should allow up to the 2115 scenario.

Table 2. Climate change rainfall allowances

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper end	10%	20%	40%
Central	5%	10%	20%

Sustainable Drainage System (SuDS)

A separate SuDS report has been prepared (ref: 76027.01) for effective management of surface water runoff.

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, 2021). 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 3 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. The Sequential Test is not required.

Table 3. 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

EA Flood Risk Standing Advice for vulnerable developments located in Flood Zones 2 or 3

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 the building; and
- Finished floor level of the lowest habitable room in the building.

Ground floor levels should be a minimum of whichever is higher of:

- 0.3 m above the general ground level of the Site; OR
- At least 0.6 m above the estimated river or sea flood level[2].

If you cannot raise floor levels above the estimated flood level, you need to consider extra flood resistance and resilience measures.

Extra flood resistance and resilience measures

Follow the extra flood resistance and resilience requirements for developments in flood risk areas where ground floor levels are lower than the estimated flood level for the Site.

Water depth up to 0.3 m

The design of the building or development should keep water out as much as possible. You should use materials that have low permeability (materials that water cannot pass through, for example, impermeable concrete).

[2] This is 0.6 m above the 1 in 100 year fluvial or 1 in 200 year tidal flood events. The 0.6 m is split into a 0.3 m freeboard allowance for climate change and 0.3 m allowance for the inaccuracies in the EA's flood modelling. Where the climate change flood level is known, a 0.3 m allowance should be added to the climate change flood level to allow for the inaccuracies in the EA's flood modelling.

Water depth from 0.3 m to 0.6 m

The design of the building or development should keep water out (unless there are structural concerns) by:

- using materials with low permeability to at least 0.3 m
- using flood resilient materials (for example lime plaster) and design (for example raised electrical sockets)
- making sure there's access to all spaces to enable drying and cleaning

Water depth above 0.6 m

The design of the building or development should allow water to pass through the property to avoid structural damage by:

- using materials with low permeability to at least 0.3 m
- making it easy for water to drain away after flooding
- making sure there's access to all spaces to enable drying and cleaning

Local policy and guidance

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

St Albans District Local Plan 1994 – Saved and Deleted Policies (St Albans City and District Council, 2020):

Policy 84: Flooding and River Catchment Management

The Council will consult with the National Rivers Authority on all matters likely to affect the water environment in order to reduce the risk of flooding and to ensure proper management of the river catchment. The following principles will apply:

- in areas liable to flood, development or the intensification of existing development, will not normally be permitted. Appropriate flood protection will generally be required where the redevelopment of existing developed areas is permitted in areas at risk from flooding;
- where appropriate, a condition will be attached to planning permissions to ensure that strips are provided alongside 'main river' watercourses and kept free of development in order to allow access for dredging and discretionary maintenance;
- all works in, under, over and adjacent to watercourses shall be appropriately designed and implemented and alternatives to culverting should be explored where possible;
- proposals shall not increase flood risk in areas downstream due to additional surface water runoff. If development is permitted, it must include appropriate surface water runoff control measures.

Local Flood Risk Management Strategy for Hertfordshire (Hertfordshire County Council, 2019):

- In Hertfordshire the main sources of flood risk are surface water, rivers and other watercourses (fluvial) and, less frequently, groundwater.
- Historic records of flooding across the county are not consistent and vary greatly depending upon the location; over time making it difficult to provide a consistent picture of any past flooding across the county
- The presence of the chalk aquifer in Hertfordshire and other under groundwater bearing areas such as the river gravel deposits mean that there is potential for groundwater flooding in Hertfordshire. There are confirmed cases of groundwater flooding in the county ranging from localised emergence affecting single properties to a number of larger events that have impacted at the settlement scale.

South West Hertfordshire Strategic Flood Risk Assessment (JBA Consulting, 2015):

- Table 10-2 of the SFRA identies woodland planting at Bricket Wood Common as an opportunity for Natural Flood Risk Management within Watford Borough Council.
- Surface water flood risk within South West Hertfordshire is concentrated in the densely urbanised areas, including Hemel Hempstead, St. Albans and Watford. The impermeable surfaces can allow localised surface water flow paths to form on steeper slopes, and ponding to occur on flatter ground, or low points in the topography. The roads, roofs and paved areas in these settlements are largely drained by underground surface water drainage systems, which have limited capacities. During intense rainfall events, or where blockages occur, the drainage systems can be prone to exceedance, which results in surface water flooding.
- Groundwater flood risk in South West Hertfordshire is concentrated in two areas. In the upper chalk catchments, the underlying geology has the potential to store and release large volumes of groundwater, and in the areas of permeable sand and gravel deposits, which can absorb and transmit water levels close to the ground surface.

Watford and St Albans Surface Water Management Plan (WSP, 2015):

- The Site is not identified as a "SWMP Site" at risk of surface water flooding.
- Appendix A of the SWMP shows an area on the eastern boundary of the Site as being located within the SWMP 1 in 100 year flood extent.

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, 2021).

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

A Very Low to Medium surface water (pluvial) flooding risk has been identified at the Site. However, in a Medium risk surface water flood event no flooding is expected on any Site buildings or roads, with all flooding contained in woodland areas and open space in the south-eastern corner of the Site; therefore, the surface water flood risk is considered to be Very Low to Low.

As no on-Site buildings are expected to be affected by surface water flooding in the Medium risk scenario, there is no additional requirement for finished floor levels.

However, the regular maintenance of any drains and culverts surrounding/on the Site under the riparian ownership of the developer should be undertaken to reduce the flood risk.

A surface water drainage strategy has been prepared separately (ref: 76027.01R1) to ensure surface water runoff can be managed effectively over the lifetime of the proposed development.

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

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.

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

The Site is not within the fluvial floodplain, and therefore emergency evacuation measures are not considered to be necessary.

Should flooding occur on-Site, emergency evacuation should occur if feasible. 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.

On-Site refuge

Evacuation should be the primary action in preference; however safe refuge could be sought at first floor level in a worst-case scenario.

8. Conclusions and recommendations

Table 4. Risk ratings following implementation and subsequent maintenance of mitigation measures

Source of Flood Risk	Baseline	After Mitigation
River (fluvial) flooding	Very Low	N/A
Sea (coastal/tidal) flooding	Very Low	N/A
Surface water (pluvial) flooding	Very Low to Low	Very Low
Groundwater flooding	Negligible	N/A
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 5. Summary of responses to key questions in the report

Key sources of flood risks identified	Surface water (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: EnviroSmart Report		Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective. Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements. Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions. Please contact info@geosmartinfo.co.uk for further information.

10. References and glossary

References

British Geological Survey (BGS) (2022). Geology of Britain Viewer. Accessed from: http://mapapps.bgs.ac.uk/geologyofbritain/home.html on 04/01/22.

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St Albans City and District Council (2020). St Albans District Local Plan 1994 – Saved and Deleted Policies. Accessed from:

https://www.stalbans.gov.uk/sites/default/files/documents/publications/planning-building-control/district-local-plan-review-1994/District%20Local%20Plan%20Review%201994%20Saved%20and%20Deleted%20Policies%20Version%20[July%202020].pdf on 04/01/22.

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Glossary

General terms

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

Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.
SFRA	Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council
SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

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

NPPF (2021) 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 2022 BlueSky copyright and database rights 2022
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Environment Agency copyright and database rights 2022 Ordnance Survey data © Crown copyright and database right 2022

Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2022) Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2022
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2022 Environment Agency copyright and database rights 2022

11. Appendices

GeoSmart Information

Appendix A

Site plans

N

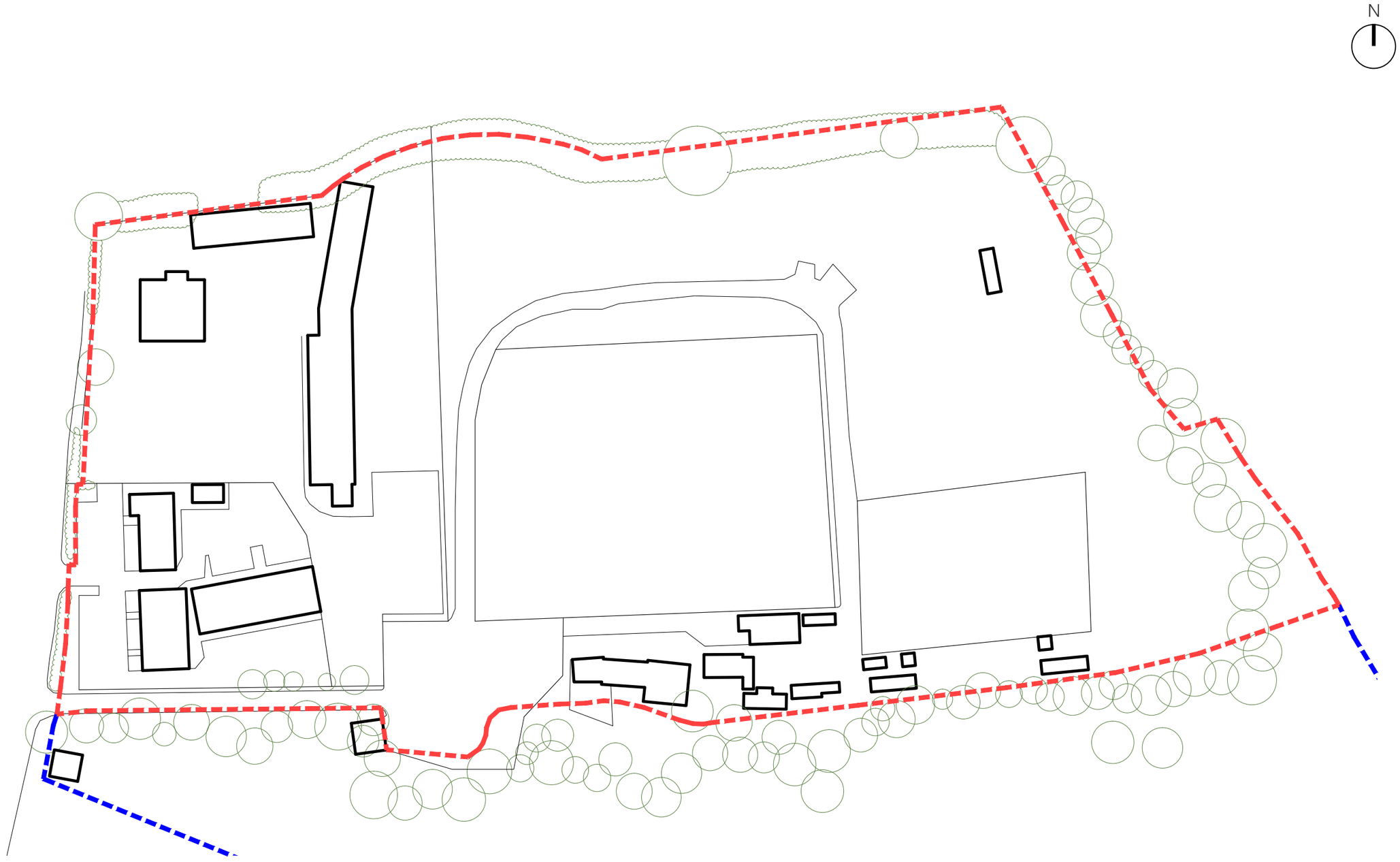
Site Location Map - 1:2500@A3

Bricket Lodge

Tom Gristwood Architects e: tom@tomgristwoodarchitects.com t: 01367 615585

Existing Aerial Photo - 1:1000@A3 (approx)

Tom Gristwood Architects e: tom@tomgristwoodarchitects.com t: 01367 615585



This plan has been created by tracing the Google aerial photo. The red / blue line is based on the ordnance survey map download

Existing Site Plan - 1:1000@A3

Bricket Lodge
Tom Gristwood Architects e: tom@tomgristwoodarchitects.com t: 01367 615585

UNIT NUMBERS

1-bed unit, 2 storey, 58sqm	33	20%
2-bed unit, 2 storey, 70sqm	35	31%
3-bed unit, 2 storey, 93sqm	34	30%
4-bed unit, 2 storey, 107sqm	13	12%
5-bed unit , 2.5 storey, 139sqm	8	7%
Total	113	100%

OPEN SPACE AREAS

Open frontage space	700sqm
Linear space A	600sqm
Linear space B	900sqm
Open space & play area	2,000sqm
Total	4,200sqm

Proposed Site Plan - 1:1000@A3

Bricket Lodge

Tom Gristwood Architects e: tom@tomgristwoodarchitects.com t: 01367 615585

GeoSmart Information

Appendix B

Thames Water sewer flooding history

Sewer Flooding
History Enquiry

Property Searches

GeoSmart Information Ltd

Bellstone

Search address supplied	Bricket Lodge Sports and Country Club Lye Lane Bricket Wood St. Albans AL2 3TF
Your reference	76027
Our reference	SFH/SFH Standard/2022_4564720
Received date	**4 January 2022**
Search date	**4 January 2022**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: Bricket Lodge Sports and Country Club,Lye Lane,Bricket Wood,St. Albans,AL2 3TF

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
DX 151280 Slough 13

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

0800 009 4540

Sewer Flooding
History Enquiry

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
DX 151280 Slough 13

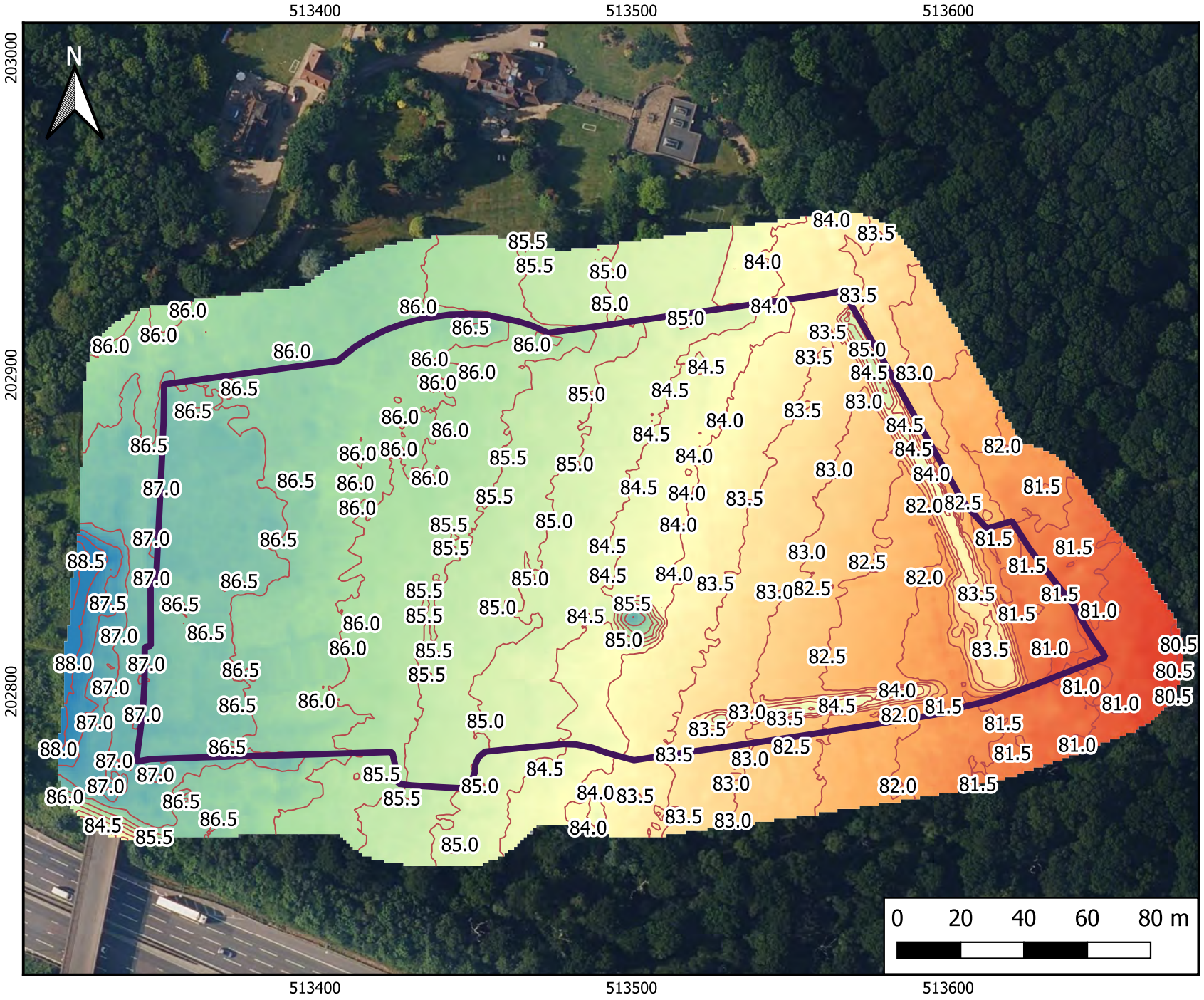
searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

GeoSmart Information

Appendix C

Environment Agency LiDAR ground elevation data



Elevation on Site (LiDAR Data)

Legend

- Site Boundary
- 0.5 m Contours

LiDAR Elevation (mAOD)

- 80.0
- 82.0
- 84.0
- 86.0
- 88.0

GeoSmart Information

Date 14/02/2022	Drawn
Scale 1:1,699.425871	Checked
Original	Revision
File Reference	

GeoSmart Information

Appendix D

Borehole logs

Soil Mechanics

BOREHOLE No. AUHA271

Sheet 1 of 1

Equipment & Methods
Dynamic sampling in 80mm diameter to 3.20m.

Location No. 7886
Location M25 WIDENING JUNCTION 19 TO 23
TL10SW 230

Carried out for
Department of Transport (ECPD)

Ground Level
83.52 m A.O.D.

Coordinates
513406.27
202716.13

Date
27.04.94

Description	Reduced Level	Legend	Depth (Thick)	Samples/Tests: Depth	Sample Type	Sample No.	Test	Field Records
(Very stiff) orange brown and light brown mottled light blue grey CLAY. (EASTEND GREEN TILL)	83.52		(0.42)	0.00 - 0.40	D	1		
				0.00 - 1.20	DS			0.93m recovery. 19 seconds.
	83.10		0.42					
				0.40 - 0.90	D	2		
Light brown slightly clayey fine and medium SAND. (EASTEND GREEN TILL)			(1.73)					
				1.20 - 3.20	DS			1.56m recovery. 91 seconds.
	81.37		2.15	2.00 - 2.50	D	3		
(Very stiff) grey brown mottled blue CLAY with very closely spaced partings up to 4mm thick of brown silty fine and medium sand. (EASTEND GREEN TILL)			(1.05 pen)					
BOREHOLE ENDS AT 3.20 m.	80.32		3.20					

Remarks
1. Borehole abandoned due to collapse from 3.20m to 1.00m.

Logged by
PR

Scale
1:50

Notes:
Materials are described in accordance with Appendices. For explanation of symbols and abbreviations see Fig. 1 (c) Soil Mechanics
All depths and reduced levels in metres. Thicknesses given in brackets in depth column. 01 09 94/11 49 (Ver 4 1 28)

Fig. A

Driller....Graham.....

TL10/148

SMITH & WEBB (DRILLING) LTD
BORING RECORD

Site Bricketwood **B.H. No** 1

Client Mr Ken Rudkin TL 1340 0305

Site Address Kettlewell Farm, Lye Lane, Bricketwood **Location** ~~513765, 200370~~

Boring Started 2nd October 2006 **Boring Completed** 16th October 2006 **Level**

Dia. of Bore 250mm **Cased to** 3m **b.s with** 200mm **dia. casing and to** 24m **b.s with** dia. casing

Water struck at: (1) 22m b.s. (2) b.s. (3) b.s. (4) b.s.

Standing W.L. in bore at 22m **on** b.s.

Remarks. 30m of steel lining tube installed. Borehole headworks chamber constructed.

	DEPTH		THICKNESS	SAMPLE DETAILS		
	FROM	TO		NO.	TYPE	DEPTH
Multicoloured clays	G.L.	12.00	12.00			
Sand and gravel – large	12.00	14.00	2.00			
Silty brown clay	14.00	24.00	10.00			
Chalk	24.00	25.00	1.00			
Sand and gravel & chalk	25.00	29.00	4.00			
Chalk flints	29.00	42.00	13.00 42.00			
Pumping 3m³/hr No drop in level						

GeoSmart Information

Appendix E

Local Council document mapping

Drawn By: ukfjh001

DO NOT SCALE

Legend

- Previous SWMP sites Colney
- WSP and HCC sites Colney
- St Albans boundary
- uFMfSW 1 in 100
- Draft SWMP Flood Extent 1 in 100
- Fluvial FZ3
- Fluvial FZ2

Colney area property statistics

Total properties:	13117 properties
100yr old modelling:	4121 properties flooded
100yr updated modelling:	1124 properties flooded
30yr old modelling:	2932 properties flooded
30yr updated modelling:	473 properties flooded

Development sites:
26. Peters Avenue
27. High Street London Colney
30. Haseldine Road

Proposed Sites:
63. Alexander Road, Colney

0 0.075 0.15 0.3 0.45 0.6 Kilometres

DRAWING STATUS: FOR INFORMATION ONLY

WSP
Unit 9, The Chase, John Tate Road,
Foxholes Business Park, Hertford SG13 7NN
Tel: +44 (0) 1992 526 000
Fax: +44 (0) 1992 526 001
Website: www.wspgroup.co.uk

CLIENT: HERTFORD COUNTY COUNCIL

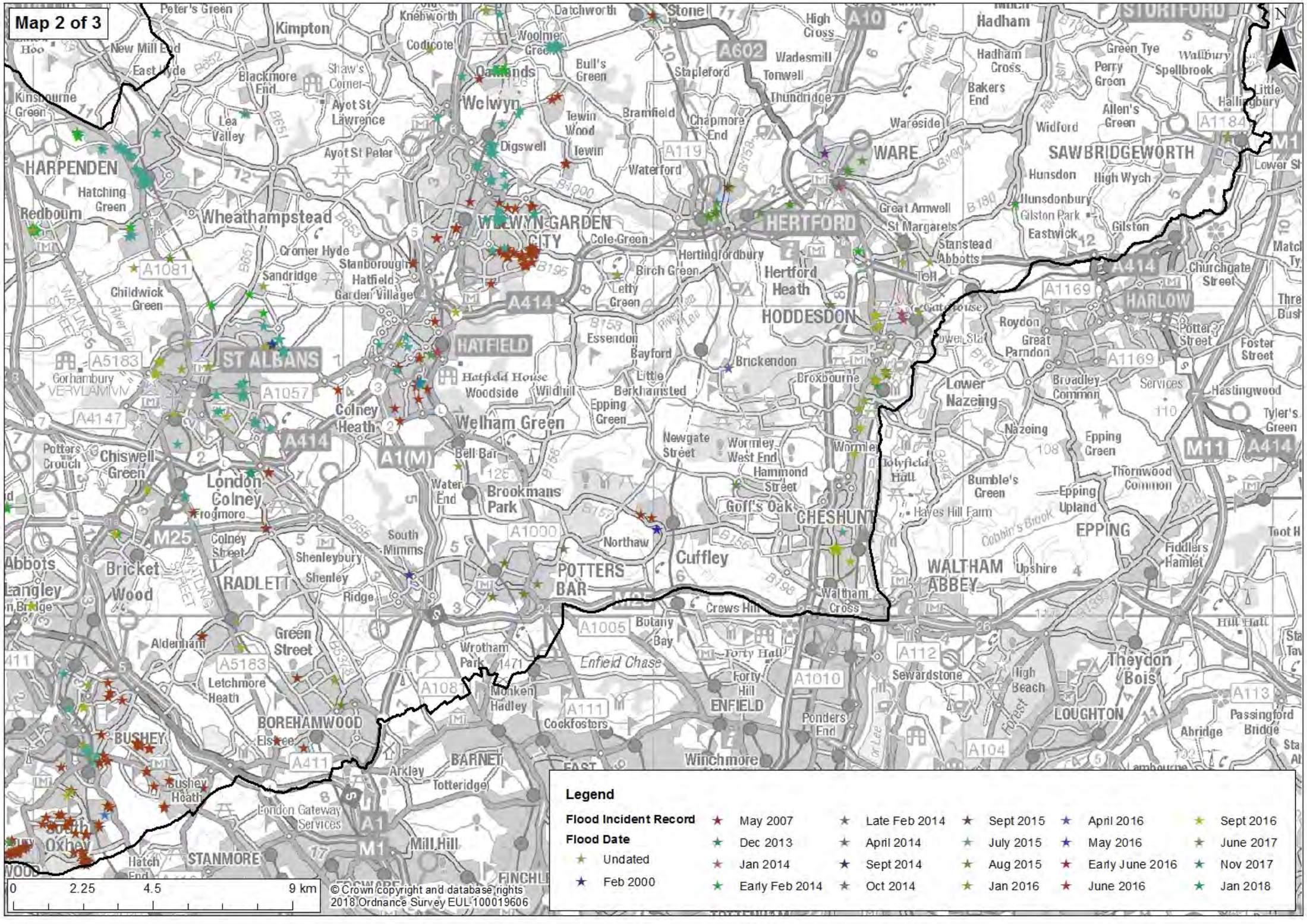
ARCHITECT:

PROJECT: 70002221 - UPDATE OF SWMP FOR WATFORD AND ST ALBANS

TITLE: COLNEY AREA 100YR FLOOD EXTENTS - COMPARISON OF OLD AND UPDATED MODEL RESULTS

SCALE @ A1:	CHECKED:	APPROVED:
1:12000	CHK	
CAD FILE: WSP - A1 Landscape	DESIGN-DRAWN: FJH	DATE: 21/03/2014
PROJECT No: 70002221	DRAWING No: FIGURE 2	REV: A

File: \\Client\QB\WSP_UK\WSP_DI\Hertford\70002221 - Update of SWMPs for Watford and St Albans\Colney area results.mxd



Map 1b: Map 2 of 3 – Flood Incident Record for Hertfordshire (South)

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Email: info@geosmartinfo.co.uk

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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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- 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.

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Martin Lucass

Commercial Director

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Tel: 01743 298 100

martinlucass@geosmartinfo.co.uk

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