Land adjacent to Stebbing, Dunmow

Flood Risk Assessment

On behalf of **Montare LLP**

Project Ref: 332511125/203 | Rev: - | Date: September 2023

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Executive Summary

This Flood Risk Assessment (FRA) has been prepared by Stantec UK Ltd to accompany a planning application for a residential-led development at land adjacent to Stebbing, Dunmow. The proposed development is split across four plots (Plots A-D). Plots A and B are located in the North Field and Plots C and D are located in the South Field.

In accordance with the fundamental objectives of the National Planning Policy Framework (NPPF), the FRA demonstrates that:

(i) The development is safe;

(ii) The development does not increase flood risk; and,

(iii) The development does not detrimentally affect third parties.

The Environment Agency (EA) data confirms that the site is located mainly within Flood Zone 1 'Low Probability', as defined in Planning Practice Guidance (PPG), Flood Risk and Coastal Change, Table 1. The land along the western boundary of the North Field lies in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability' of the Stebbing Brook.

The proposals for this residential-led development constitute a 'More Vulnerable' land use. The site masterplan has been developed applying the sequential approach to demonstrate all proposed buildings are located within Flood Zone 1 'Low Probability', with the areas in Flood Zone 2 and 3 retained for ecological enhancements. As the proposed built development is wholly in Flood Zone 1 and low risk of flooding from other sources, the Sequential Test is de facto passed.

The PPG 'Climate Change Allowances' guidance confirms the proposed development and site criteria ('More Vulnerable' development, 'Essex Combined' River Management Catchment) requires consideration of peak river flow climate change allowances of +25% ('Central' allowance, 2115 epoch).

In the absence of detailed modelling the EA Flood Zones have been mapped against LiDAR data to provide an estimated extreme 1 in 1000 (0.1%) annual probability flood level of 60.30m AOD (Flood Zone 2), which has been taken as a conservative proxy 1 in 100 (1.0%) annual probability plus climate change flood level. Since the proposed development is elevated by over 10 metres above this flood level it is evident there will be a significant freeboard allowing for any inaccuracies in the estimated flood level.

The flood risk mitigation strategy for the development consists of the following elements:

- All built development is located significantly above the reference floodplain and will therefore not impact on floodplain storage or flood flow routes. The proposed ground floor levels are set at a suitable freeboard above surrounding ground level to mitigate surface water in an extreme rainfall event;
- Continuous safe access from the site is available from all dwellings;
- The proposals result in significant ecological and floodplain storage enhancement of the river corridor through incorporation of a wet woodland;
- A proposed surface water drainage strategy based on SuDS principles with the emphasis on 'soft engineered' surface features to also serve an ecological and amenity benefit – including the incorporation of swales for conveyance and attenuation basins/ponds.

In summary, the FRA demonstrates that the proposed development is safe and in accordance with the requirements of national and local planning policy.

Summary of Key FRA Data

Aspect of flood risk	Applicable Guidance/ Source of Data	Summary	Section of FRA
Site Location	n/a	Two linked developments parcels: North Field (Plots A and B) (CM6 3SH) and South Field (Plots C and D) (CM6 3RA) in Stebbing, Dunmow. Approximate OS grid reference: 565,850m E, 224,580m N	**3.1**
Existing Ground Levels	Topographic Survey by Solid Point	North Field: 74.30m AOD to 60.00m AOD South Field: 76.20m AOD to 64.00m AOD	**3.2**
Primary source of flood risk	EA Opendata Maps	Stebbing Brook, tributary of River Chelmer	**5.1**
Presence of flood defences	EA Opendata Maps	n/a	**3.3**
Proposed Development	Proposals by Alistair Downie Studio	Erection of 28 residential dwellings and local affordable employment unit/flexible community space, provision of public open space and associated local amenity facilities (activating Local Green Space Allocation), together with integrated landscaping and car parking (to include additional community parking facility).	**6.1**
Planning Aspects			
Flood Risk Vulnerability	Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change'	'More Vulnerable'	**6.2**
Flood Zone		Majority of North Field and all of South Field is located within Flood Zone 1 'Low Probability'. An area in western part of North Field is located within Flood Zone 3a 'High Probability' alongside the Stebbing Brook (All dwellings to be located in Flood Zone 1 'Low Probability')	**5.1**
Sequential Test		Built development to be located within Flood Zone 1 and areas of lowest flood risk from other sources. Sequential Test de-facto passed.	**6.3**
Exception Test		Not required.	**6.3**
Applicable Climate Change Allowances	EA climate change allowances guidance	Combined Essex River Management Catchment +25% (Central)	**4**
Reference Flood Levels			
Present Day	Flood level/EA LiDAR overlay	Estimated from Flood Zone contours - 1 in 100 annual probability = 60.0m AOD 1 in 1000 annual probability = 60.3m AOD	**5.3**
Climate Change		1 in 1000 AP level used as a proxy as there is no detailed modelling available for the area.	**5.3**
Proposed Mitigation Measures			
Ground Floor Levels	BS8533:2017 EA guidance Uttlesford SFRA	All units will be set significantly (over 10 metres) above the estimated flood levels. Finished floor levels to be set at a minimum of 150mm above external ground levels.	**7.2**

Floodplain Storage & Flood Flow Routes	Uttlesford SFRA	Improvement in floodplain storage through the creation of a wet woodland within the floodplain of North Field.	**7.3**
Safe Access	Uttlesford SFRA	Continuous dry and safe access available.	**7.4**
Surface Water Drainage	Uttlesford SFRA. Essex SuDs Design Guidance	Proposed SuDS drainage strategy based on permeable paving, swales and attenuation basins with a controlled discharge to adjacent watercourses at the 1 in 1 year greenfield rate.	**8**

Abbreviations

ABI	-	Association of British Insurers
BGS	-	British Geological Survey
CDM	-	Construction (Design and Management)
CIRIA	-	Construction Industry Research and Information Association
DDA	-	Disability Discrimination Act
DEFRA	-	Department for Environment, Food and Rural Affairs
EA	-	Environment Agency
ECC	-	Essex County Council
FAS	-	Flood Alleviation Scheme
FHR	-	Flood Hazard Rating
FMfSW	-	Flood Map for Surface Water
FRA	-	Flood Risk Assessment
FRAP	-	Flood Risk Activity Permit
FRMP	-	Flood Risk Management Plan
LLFA	-	Lead Local Flood Authority
m AOD	-	Metres Above Ordnance Datum (Newlyn)
m BGL	-	Metres Above Ground Level
NPPF	-	National Planning Policy Framework
PFRA	-	Preliminary Flood Risk Assessment
PPG	-	Planning Practice Guidance
SuDS	-	Sustainable Drainage Systems
SFRA	-	Strategic Flood Risk Assessment
UDC	-	Uttlesford District Council

1 Introduction

1.1 Scope of Report

1.1.1 This Flood Risk Assessment (FRA) has been prepared by Stantec UK Ltd ('Stantec') on behalf of our client, Montare LLP, to support a planning application for a residential led development on a site to the west of The Downs at Stebbing, Dunmow.

1.1.2 The report is based on the available flood risk information for the site as detailed in **Section 1.3** and prepared in accordance with the planning policy requirements set out in **Section 2**.

1.1.3 Stantec has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering. The authors and reviewers of the document are all experienced engineers, and the reviewers are members of chartered institutions such as the Chartered Institution of Water and Environmental Management (CIWEM) or the Institution of Civil Engineers (ICE).

1.2 Existing Site and Proposed Development

1.2.1 The existing site is located to the west of Stebbing village in Essex. It lies on the rising slope to the east of Stebbing Brook which flows roughly in the north-south direction.

1.2.2 The site lies within the administrative boundary of Uttlesford District Council (UDC) and Essex County Council (ECC) is the Lead Local Flood Authority (LLFA). Anglian Water is the statutory sewerage undertaker in the area.

1.2.3 The proposal is for the following:

> *"Erection of 28 residential dwellings and local affordable employment unit/flexible community space, provision of public open space and associated local amenity facilities (activating Local Green Space Allocation), together with integrated landscaping and car parking (to include additional community parking facility)".*

1.3 Sources of Information

1.3.1 The FRA has been prepared based on the following sources of information:

- Environment Agency (EA) published **'Open Data' datasets** available online, reproduced with OS mapping under licence to Stantec (contains Ordnance Survey data © Crown copyright and database right [2023], contains Environment Agency information © Environment Agency and database right) (see **Appendix A**);
- **Topographic survey** of the site (Drawing reference 1485-01 to 1485-05) undertaken by SolidPoint in May 2022 (see **Appendix B**);
- **EA Product 4** responses dated 6th June and 10th June 2022 (EA reference EAN/2022/262503) (see **Appendix C**);
- **Development proposals** by Alistair Downie Studio (see **Appendix D**);
- The Uttlesford District Council **Strategic Flood Risk Assessment (SFRA)** dated May 2016.

1.4 Caveats and Exclusions

1.4.1 This FRA has been prepared in accordance with the NPPF, the associated PPG and Local Planning Policy. The proposed flood management (including ground floor level recommendations) and surface water management strategies are based on the relevant British Standards (BS8533), the standing advice provided by the EA or based on common practice.

1.4.2 Activities during the construction phase may have an impact on the existing and future flood risk. Thus, an assessment of the risks and appropriate mitigation measures should be identified and managed by the contractor.

1.4.3 The Construction (Design and Management) Regulations (CDM Regulations) will apply to any future development of this site which involves “construction” work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate client) to fulfil its duties under the CDM Regulations.

1.4.4 The approach for the FRA and proposals for the surface water management strategy are based on the requirements of the EA and ECC in its role as the LLFA for the area. The conclusions are based on data available at the time of the study and on the subsequent assessment that has been undertaken in relation to the development proposals as outlined in **Section 1.2**. As such, we recommend the end user reviews the validity of the flood data on an annual basis with the EA.

1.4.5 It should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development. Stantec do not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

2 Planning Policy Context

This FRA has been prepared in accordance with the relevant national, regional, and local planning policy and statutory authority guidance as detailed below.

2.1 National Policy and Guidance

2.1.1 National policy in relation to flood risk is contained within the **National Planning Policy Framework (NPPF),** updated September 2023, issued by the Ministry of Housing, Communities and Local Government, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change'.

2.1.2 The associated **Planning Practice Guidance (PPG)** was released in March 2014 (with reference to the 'Flood Risk and Coastal Change' section) and also last updated August 2022.

2.1.3 The NPPF and PPG demonstrate a flood risk management approach for the lifespan of the proposed development considering the effects of climate change. The document sets the framework to minimise vulnerability, provide resilience to the impacts of climate change, and to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.

2.1.4 In May 2022, the guidance within the PPG on the application of climate change allowances in FRAs was significantly updated:

https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

2.1.5 The guidance provides contingency allowances for the potential increases in peak river flow, peak rainfall intensity and sea level rise which are considered accordingly subject to the site conditions – discussed further in **Section 4.**

2.1.6 The NPPF sets out the requirement for the Sequential Test and Exception Test in paragraphs 162 and 163 respectively – see below.

> *"**162.** The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.*
>
> ***163.** If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3."*

2.1.7 These Tests are to be applied where appropriate, depending on the proposed development flood risk 'vulnerability' and the Flood Zone in which it is located. This is detailed further in **Section 6**.

2.2 Local Policy

2.2.1 Local planning policy contained within the **Uttlesford Local Plan**, adopted January 2005, with reference to Policy '**GEN3: Flood Protection**' which states:

> *Within the functional floodplain, buildings will not be permitted unless there is an exceptional need. Developments that exceptionally need to be located there will be permitted, subject to the outcome of flood risk assessment. Where existing sites are to be redeveloped, all opportunities to restore the natural flood flow areas should be sought.*
>
> *Within areas of flood risk, within the development limit, development will normally be permitted where the conclusions of a flood risk assessment demonstrate an adequate standard of flood protection and there is no increased risk of flooding elsewhere. Within areas of the floodplain beyond the settlement boundary, commercial industrial and new residential development will generally not be permitted. Other developments that exceptionally need to be located there will be permitted subject the outcome of a flood risk assessment.*
>
> *Outside flood risk areas development must not increase the risk of flooding through surface water run-off. A flood risk assessment will be required to demonstrate this. Sustainable Drainage Systems should also be considered as an appropriate flood mitigation measure in the first instance.*
>
> *For all areas where development will be exposed to or may lead to an increase in the risk of flooding applications will be accompanied by a full Flood Risk Assessment (FRA) which sets out the level of risk associated with the proposed development. The FRA will show that the proposed development can be provided with the appropriate minimum standard of protection throughout its lifetime and will demonstrate the effectiveness of flood mitigation measures proposed.*

2.2.2 The **Stebbing Neighbourhood Development Plan 2019 – 2033**, dated July 2022. This includes Policy STEB13 'Managing Flood Risk and Drought Mitigation' which states:

> *To reduce the potential for flooding to occur in Stebbing Parish and mitigate against drought events, development proposals should:*
>
> *1) Not increase flood risk (including fluvial and surface water) on site or elsewhere;*
>
> *2) Where possible, use effective existing or innovative technology construction and design techniques to reduce the risk of flooding, mitigate any impact of flooding and minimise surface water run-off;*
>
> *3) Where ground conditions allow, ensure that sufficient hard external surface areas ar permeable or that run-off water is collected by effective infiltration systems;*
>
> *4) Where possible, collect and recycle grey water and incorporate water storage measures or 'rainwater harvesting' for high volume rainfall events and to minimise surface water run-off;*
>
> *5) Maximise opportunities to reduce the causes and impact of flooding through appropriate Sustainable Drainage Systems (SuDS). All SuDS proposals should be accompanied by a comprehensive management plan setting out the long term maintenance of and responsibility for SuDS features; and*
>
> *6) Where possible include tree and shrub planting to reduce run-off, particularly along field boundaries.*

2.2.3 The online **ECC Sustainable Drainage Systems Design Guide for Essex** (last updated April 2023), which provides an overview of the form and standard of sustainable drainage systems to incorporate into new development.

3 Site Setting

3.1 Site Description

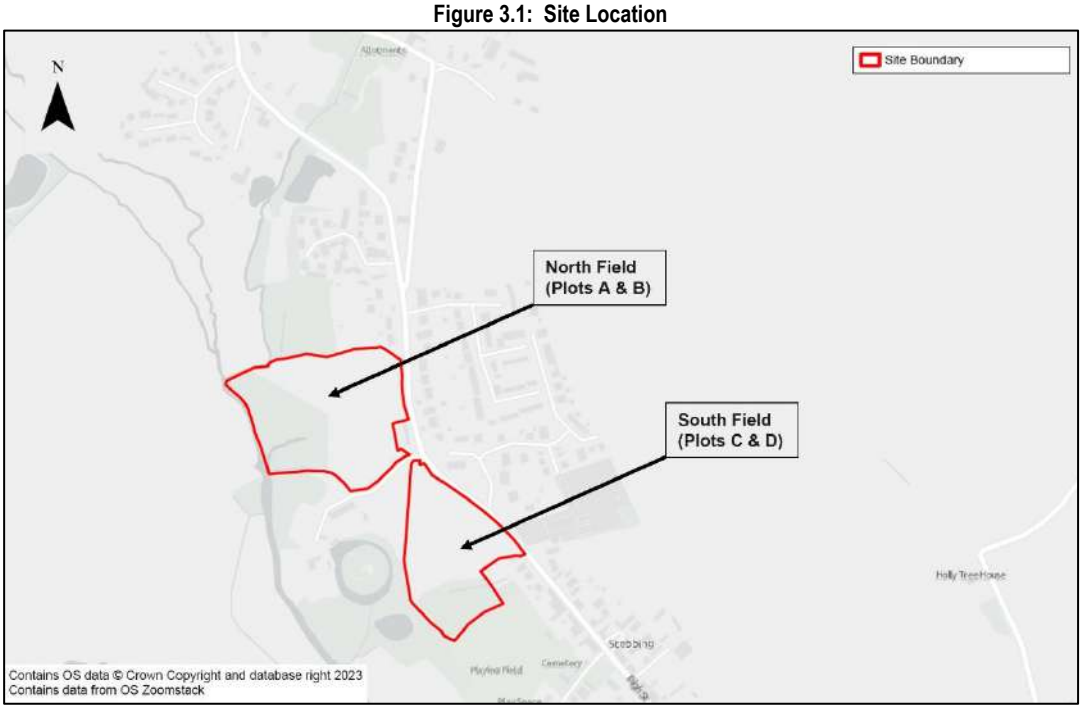
3.1.1 The 5.8 hectare (ha) site consists of agricultural land located on the western flank of Stebbing village in Essex and is split into two development parcels as shown on **Figure 3.1** and **Appendix A**, and described as follows:

- **North Field (Plots A and B) (3.5ha)** has a site centre at OS grid reference 565,750m E, 224,600m N (postcode CM6 3SH). The site is approximately rectangular, measuring 220m (east to west) by 170m (north to south). Access is off 'The Downs' (which becomes High Street further south), which runs along the eastern boundary. An access road runs along the south side of the field, the Stebbing Brook defines the western boundary and a hedgerow field boundary the northern boundary of the field.

- **South Field (Plots C and D) (2.3ha)** has a site centre at OS grid reference 565,900m E, 224,440m N (postcode CM3 3RA). The site is irregularly shaped, measuring approximately 260m in maximum length along its main axis. Access to Plot C is off 'The Downs' and access to Plot D is off the High Street on the eastern boundary of the southern field.

3.1.2 Stebbing Park lies to the south of the North Field and west of the South Field. This includes 'The Mount', a motte castle set on a circular earth mound.

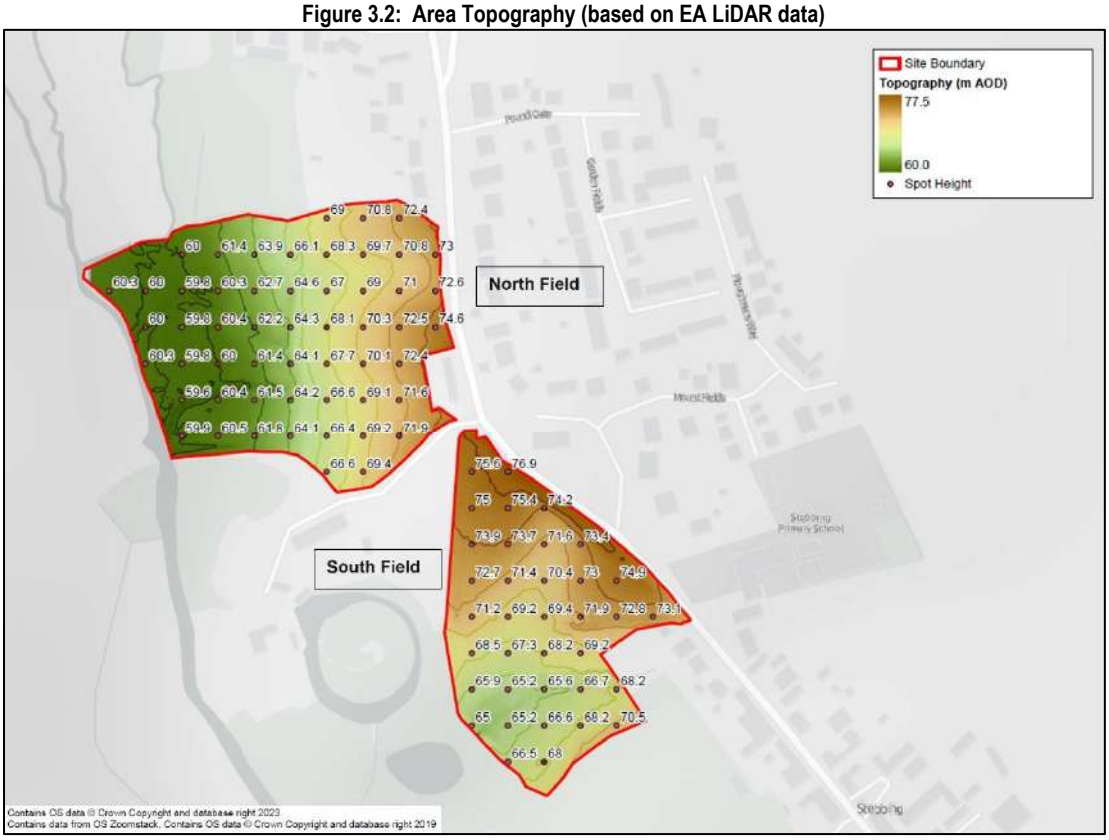
Figure 3.1: Site Location



3.2 Topography

3.2.1 A topographic survey of the site was undertaken by SolidPoint in May 2022 and is included in **Appendix B**. EA LIDAR survey data, as shown on **Figure 3.2** and within **Appendix A**, is also provided to show the general pattern of topography over the site and this illustrates the fall westward towards the Stebbing Brook across both sites.

Figure 3.2: Area Topography (based on EA LiDAR data)



3.2.2 The topographic survey shows that the ground levels over the North Field fall from 74.30m AOD on the eastern boundary and fall west to a level of approximately 60.00m AOD along the boundary with the Stebbing Brook.

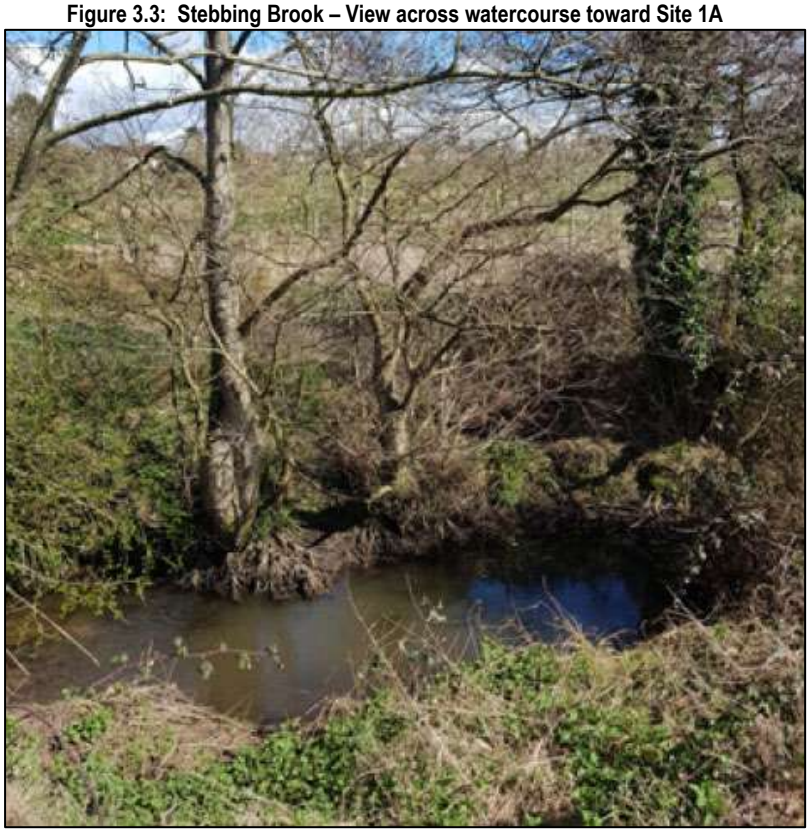
3.2.3 Over the South Field, levels fall from approximately 76.20m AOD in the northern part of the site, dropping to approximately 73.00m AOD further south-east and to approximately 64.00m AOD in the south-western corner of the site.

3.3 Hydrological Setting and Water Quality

3.3.1 The **Stebbing Brook** is the only 'main river' watercourse in the area and is formed by several tributaries which combine a short distance north of the site into a single channel flowing south along the western side of the North Field, draining a catchment area of approximately 30km^2.

3.3.2 The watercourse continues southwards, passing under the A120 and turning south-west to outfall into the **River Chelmer** at Flitch Green.

Figure 3.3: Stebbing Brook – View across watercourse toward Site 1A



3.3.3 The River Basin Management Plan (RBMP) identifies the water quality of the Stebbing Brook catchment, and this data has been interrogated through the EA online 'Catchment Data Explorer'. This resource identifies that the Stebbing Brook hydromorphological designation is not identified as 'artificial' or 'heavily modified'.

3.3.4 The ecological classification of the site, based on the 2019 testing results, is 'moderate'.

3.3.5 The chemical classification for the catchment based on the 2019 testing results, is identified as 'fail'. This followed a period of 'good' chemical quality from 2013 to 2016 and was classified as such due to an associated 'fail' in the measurement of 'priority hazardous substances', including Mercury, Benzo(g-h-i) perylene and Polybrominated diphenyl ethers (PBDE). The watercourse was otherwise identified as good quality on other chemical measures.

3.4 Geology and Hydrogeology

3.4.1 The British Geological Survey (BGS) Geology of Britain Viewer indicates the site lies on superficial deposits of 'Kesgrave – Sand and Gravel' over a bedrock of 'London Clay Formation – Clay, Silt, and Sand'.

3.4.2 The site does not lie within an EA Groundwater Source Protection Zone.

3.4.3 As an area of undeveloped land, the existing site drains naturally via percolation into the subsoil, or via overland runoff following the natural topography towards the Stebbing Brook.

3.4.4 There are no flood defences in the vicinity of the site.

4 Impact of Climate Change

4.1.1 The NPPF and PPG place emphasis on the need to fully consider – and design for – the impacts of climate change as set out in the planning guidance. This guidance provides contingency allowances for potential increases due to climate change in:

- Peak river flow;
- Rainfall intensity;
- Sea level rise.

4.1.2 These elements are discussed in turn below, except for sea level rise which is not applicable to this site.

Peak River Flow

4.1.3 The peak river flow allowances provide a range of allowances based on percentile (i.e., the degree of certainty of an event occurring, based on the range of climate change scenarios assessed through scientific investigations). The applicable values for a site are dependent on the 'River Management Catchment' in which the site is located, which can be confirmed via the online mapping tool embedded within the guidance.

4.1.4 The Central allowance is identified as the design standard for most forms of proposed development in all appropriate Flood Zones (the exception being 'Essential Infrastructure' which requires the 'Higher Central' value).

4.1.5 The conditions at the site and consequent peak river flow allowances to be considered as part of the FRA are as detailed in **Table 4.1**.

Table 4.1: Climate Change – Peak River Flow Allowances

River Management Catchment	Applicable Climate Change Allowance *(2080s Epoch – 2070-2115)*
	Central
Anglian River Basin *(Combined Essex Management Catchment)*	**+25%**

4.1.1 The assessment of the impact of climate change in relation to fluvial flood risk has been detailed in **Section 5.3**.

Peak Rainfall

4.1.2 The potential increase in peak rainfall intensity needs to be considered in the surface water drainage strategy for new developments.

4.1.3 The anticipated changes in peak rainfall intensity in small catchments (less than 5km^2), or urbanised drainage catchments are summarised in **Table 4.2** ('Table 1' from the associated guidance). For large rural drainage catchments, the peak river flow allowances are applied.

Table 4.2: Climate Change – Peak Rainfall Intensity Allowances (2070s Epoch)

Cherwell and Ray Management Catchment	**Total potential change anticipated** (2070s epoch – i.e. 2061 to 2125)	
	Central	***Upper End***
3.3% (1 in 30-year) rainfall	*20%*	*35%*
1% (1 in 100-year) rainfall	***25%***	***45%** (2050s epoch)*

4.1.4 As the development proposals are considered as having a design life of 100 years, a 45% climate change allowance will be assessed within the surface water drainage strategy discussed in **Section 8**.

5 Overview of Flood Risk

The assessment of flood risk has been undertaken based on the sources of information listed in **Section 1.3.**

5.1 EA Opendata Flood Maps

5.1.1 The following maps have been taken from the Stantec GIS flood maps report in **Appendix A** based on the EA Opendata datasets available online and reproduced with OS mapping under licence to Stantec.

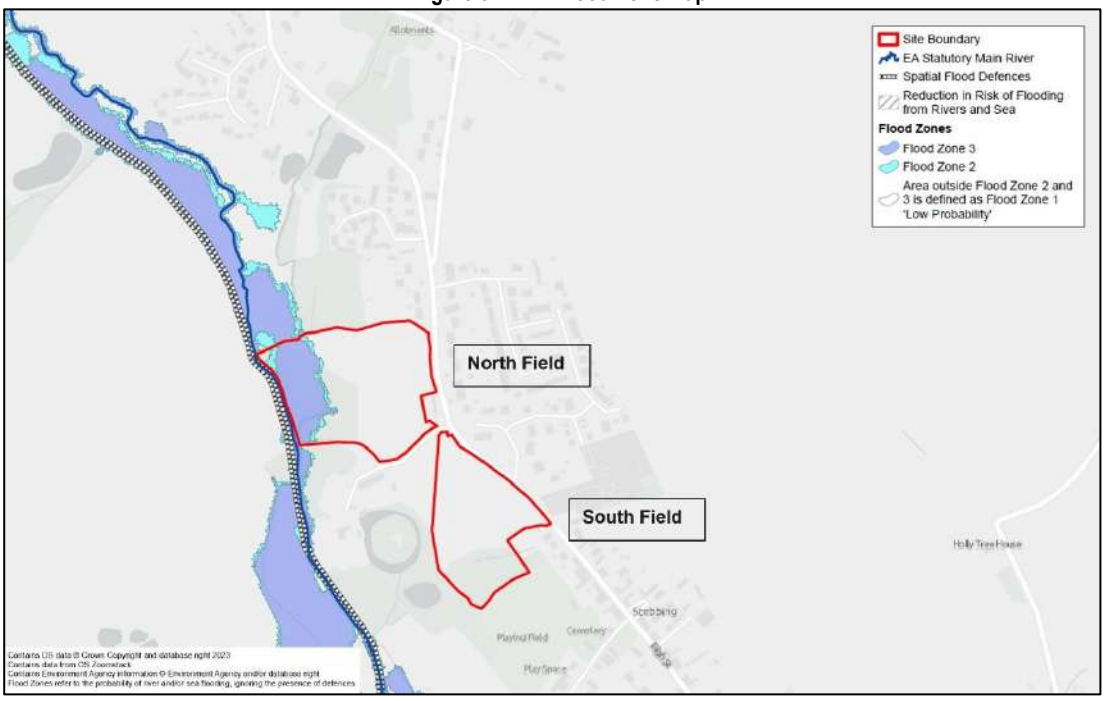
Flood Zone Map

5.1.2 The first phase in identifying whether a site is potentially at risk of flooding is to consult the GOV.UK 'Flood Map for Planning' website. This provides an initial indication of the extent of the Flood Zones, which is refined through the use of more detailed site-specific level survey and modelled flood levels.

5.1.3 The Flood Zones are defined in Table 1 of the Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' section as follows:

- **Flood Zone 1 'Low Probability'** – Land at less than 1 in 1000 (0.1%) annual probability (AP) of river or sea flooding;
- **Flood Zone 2 'Medium Probability'** – Land between 1 in 100 (1.0%) and 1 in 1000 (0.1%) AP of river flooding, or between 1 in 200 (0.5%) and 1 in 1000 (0.1%) AP of sea flooding;
- **Flood Zone 3 'High Probability'** – Land at 1 in 100 (1.0%) or greater AP of river flooding, or 1 in 200 (0.5%) or greater AP of sea flooding.

Figure 5.1: EA Flood Zone Map



5.1.4 The EA Flood Zone map in **Figure 5.1** indicates that the North Field lies mainly within **Flood Zone 1 'Low Probability'**, with the low-lying western part impacted by **Flood Zone 3 'High Probability'** of the Stebbing Brook.

5.1.5 The South Field lies wholly within **Flood Zone 1 'Low Probability'**.

5.1.6 The Flood Zone map does not differentiate between **Flood Zone 3a 'High Probability'** and **Flood Zone 3b 'Functional Floodplain'**. The mapped Flood Zone 3 is effectively a composite of Zone 3a and Zone 3b. The Uttlesford SFRA defines Flood Zone 3b as '*areas at risk of flooding in the 5% AEP (1 in 20 chance) design event*'.

5.1.7 It is noted that the August 2022 update to the PPG 'Flood Risk and Coastal Change' section includes an amended definition for Flood Zone 3b as the 1 in 30 (3.3%) annual probability flood, instead of the 1 in 20 (5.0%) annual probability flood. However, it also states that "*Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency*", so it is assumed for the purposes of this study that the aforementioned definition within the Uttlesford SFRA continues to apply until the local policy is amended.

Flood Risk from Reservoirs Map

5.1.8 The EA provides maps showing the risk of flooding in the event of a reservoir failure. The reservoir breach extents are captured in the baseline flood maps have been taken from the Stantec GIS flood maps report in **Appendix A**.

5.1.9 The mapping confirms the site is not at risk of flooding in a reservoir breach.

Flood Risk from Surface Water

5.1.10 The EA 'Risk of Flooding from Surface Water' map shows where areas could be potentially susceptible to surface water flooding in an extreme rainfall event. The latest mapping assesses flooding resulting from severe rainfall events based on the following three scenarios:

- 'High' Risk: 1 in 30 (3.3%) or greater AP rainfall event;
- 'Medium' Risk: Between a 1 in 100 (1.0%) and 1 in 30 (3.3%) AP rainfall event;
- 'Low' Risk: Between 1 in 1000 (0.1%) and 1 in 100 (1.0%) AP rainfall event;
- 'Very Low' Risk: Lower than 1 in 1000 (0.1%) AP rainfall event.

5.1.11 The EA mapping shows that the majority of the site is predicted to be at a 'Very Low' risk of surface water flooding; see **Figure 5.2**.

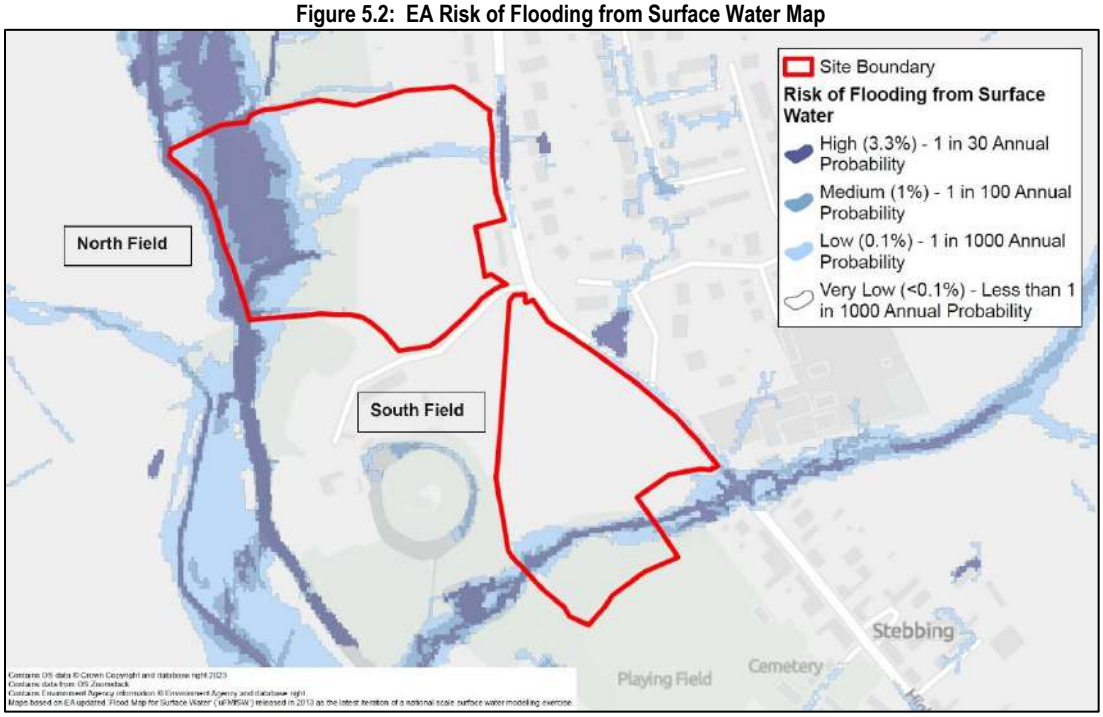
5.1.12 The North Field is mainly at 'Very Low' risk of flooding, but the lower lying western part of this area is at 'High' risk of flooding and is consistent with the EA Flood Zone mapping displayed in **Figure 5.1**.

5.1.13 A surface water route flows from east to west through the North Field and has a 'Low' to 'Medium' risk of surface water flooding. This flow route is associated overland flows following the natural topography of the North Field and potentially exceedance flow routes from The Downs to the east of the site in the extreme 1 in 1000 (0.1%) annual probability event.

5.1.14 The South Field is almost all at 'Very Low' risk, except for a corridor of 'High' risk running east-west which corresponds to a land drainage channel/ditch running through the site towards the Stebbing Brook and lower ground levels within the southern side of the South Field.

5.1.15 It should be noted that the model uses coarse topographical data and does not take into account the presence of below ground drainage infrastructure (gullies and conveyance piped systems) beneath The Downs. The mapping therefore represents a worst-case scenario.

Figure 5.2: EA Risk of Flooding from Surface Water Map



EA Historic Flood Map

5.1.16 The EA 'Historic Flood Map' is a dataset showing the maximum extent of all individual recorded flood outlines from river, the sea and groundwater and shows areas of land that have previously been subject to flooding.

5.1.17 The provided dataset did not show any historic mapping over the Stebbing Brook (consistent with the Uttlesford SFRA historic flood map – see **Section 5.2**) – however, the EA data request did identify the extent of the 1947 flood through the area, which impacted the western end of the North Field – see **Appendix C**.

5.1.18 The 1947 flood was the greatest flood of the last century in many catchments of southern England and was largely due to rare meteorological circumstances whereby an extensive period of heavy snowfall was rapidly followed by a rapid thaw combined with heavy rainfall, which could not percolate into the still frozen ground.

5.2 UDC Strategic Flood Risk Assessment

5.2.1 The Uttlesford District Council (UDC) Strategic Flood Risk Assessment (SFRA) was released in May 2016 and provides an overview of flood risk across the District.

5.2.2 **SFRA Map 5** shows the Historic Flood Map and a review indicated no record of flooding along the Stebbing Brook.

5.2.3 **SFRA Map 6** 'Flood Zones' shows the extent of the Flood Zones across the District. While the precise impact is unclear due to the scale of the mapping (each Map covers the whole study area), the extent of the Flood Zones at the site appears to be consistent with the current EA Flood Zone mapping in **Appendix A** – see extract in **Figure 5.1**.

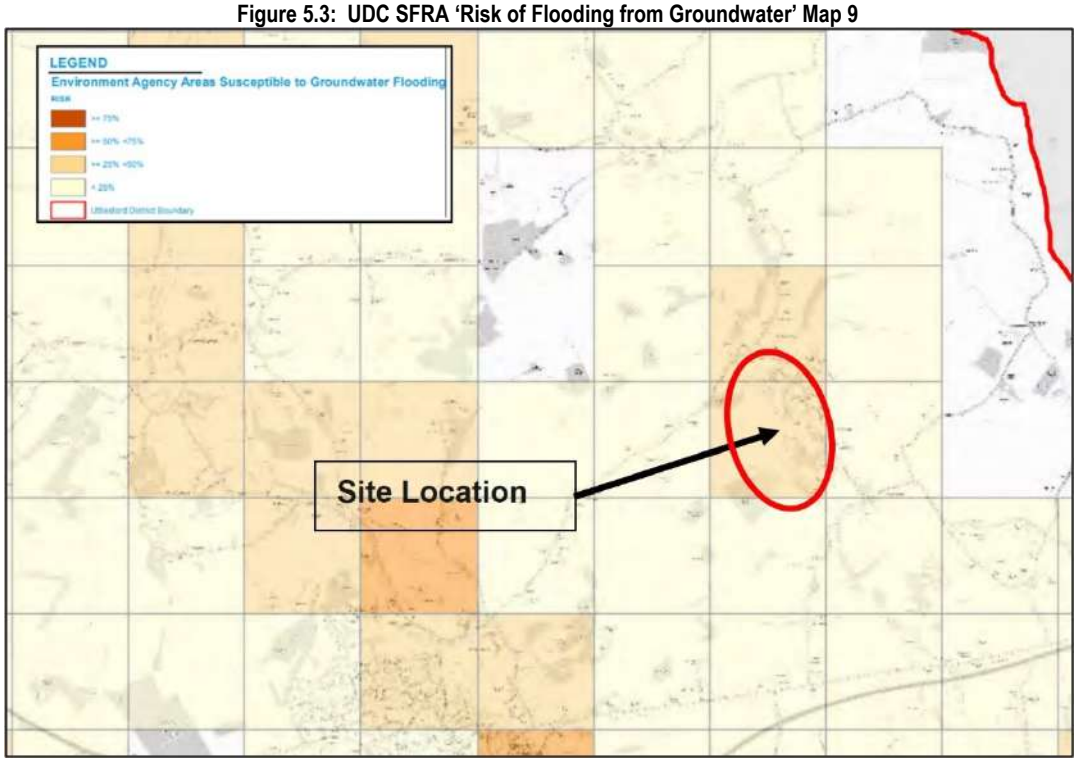
5.2.4 **SFRA Map 8** shows the Surface Water Flood Map and this appears to be consistent with the latest EA mapping in **Section 5.1**.

5.2.5 **SFRA Map 9** shows the 'Areas Susceptible to Groundwater Flooding' map – reproduced in **Figure 5.3**. This shows Stebbing in an area at medium/high susceptibility (50% to 75%).

However, it is noted that this is a strategic scale map showing groundwater flood probability areas on a 1km square grid. The data is annotated to show what percentage of the 1km area could be susceptible to groundwater flooding, based on national mapping of underlying ground conditions, thus providing an indication of the degree of probability of groundwater flooding that is present within a broad area.

5.2.6 The groundwater flood map data is not based on any record of flooding, or detailed modelling. There is no agreed national scale approach to modelling groundwater flood risk at the current time, and all the referenced mapping reiterates that they are a screening tool to identify areas '*potentially susceptible'* to such flooding based on underlying ground conditions. Given the topography over the site and the significant slope down to the Stebbing Brook it is considered very unlikely that the site of the proposed built development is at risk of groundwater flooding.

Figure 5.3: UDC SFRA 'Risk of Flooding from Groundwater' Map 9



5.2.7 **SFRA Map 10** identifies the Sewer Flooding Register, based on information from the sewer utility company DG5 sewer flooding register. This identifies very low records of sewer flooding across the district, and Stebbing is in an area where no such flooding records have been identified.

5.2.8 The SFRA identified a log of '*Recorded incidents of flooding in Stebbing in October 2001 and January 2003'*, although the source of such flooding was not identified.

5.3 Estimation of Stebbing Brook Flood Levels

5.3.1 A request for detailed flood risk information was made to the EA as part of this study, but the response of 6th June 2022 (see copy in **Appendix C**) confirmed that no detailed modelling has been undertaken of the Stebbing Brook.

5.3.2 The follow up EA response of 10th June 2022, also contained in **Appendix C**, further stated:

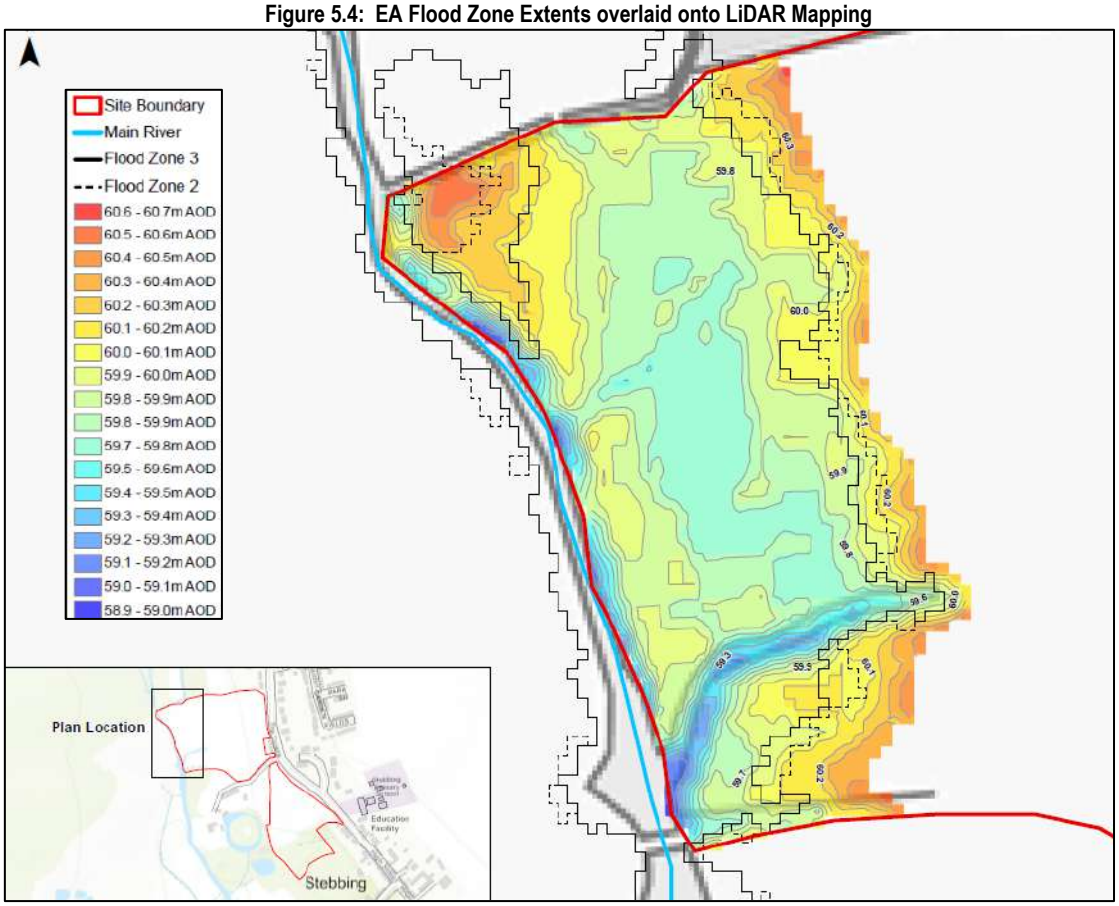
> *"The Flood Zone maps in your area are formed of national generalised modelling which was used in 2004 to create fluvial floodplain maps on a national* scale [i.e. JFLOW modelling]. *This modelling was improved more recently, using a more detailed terrain*

model for the area. This modelling is not a detailed local assessment, it is used to give an indication of areas at risk from flooding."

5.3.3 Under such circumstances, the extent of site impacted by fluvial flooding is limited to the western edge of one of the parcels, and the proposed built development is remote from this and significantly elevated by over 10 metres. As such, it is considered appropriate and proportionate to utilise a method whereby the EA Flood Zones have been overlaid onto the EA LiDAR mapping for the area to provide an estimate of the reference (undefended) 1 in 100 and 1 in 1000 (0.1%) AP flood levels, which define the Flood Zone 3a and Flood Zone 2 extents respectively.

5.3.4 The overlay of the Flood Zones onto the LiDAR mapping is displayed in **Figure 5.4**.

Figure 5.4: EA Flood Zone Extents overlaid onto LiDAR Mapping



5.3.5 The reference flood levels are displayed in **Table 5.1**.

Table 5.1: Estimated Flood Levels – Stebbing Brook – Present Day

Flood Event (Annual Probability)	Estimated Flood Level, m AOD
1 in 100 (1%)	**60.00**
1 in 1000 (0.1%)	**60.30**

5.3.6 Existing ground levels in the impacted area are typically between 59.6m AOD and 60.0m AOD, indicating maximum flood depths of up to 400mm in the present-day 1 in 100 (1.0%) AP event, and up to 700mm in the extreme 1 in 1000 (0.1%) AP event.

5.3.7 The estimated flood levels compare to ground levels at the location of proposed dwellings exceeding 70.0m AOD (North Field), and over 74.0m AOD (South Field), confirming the significant freeboard for future development above the fluvial flood risk area.

5.3.8 In order to consider flood risk for the lifetime of the development, the fluvial 1 in 100 AP +25% allowance for climate change flood event is considered the 'design event'. Given the situation regarding the lack of detailed modelling, the extreme 1 in 1000 (0.1%) AP scenario is considered a reasonable proxy for this climate change scenario, so the significant freeboard identified above is considered applicable for this event.

6 Proposed Development and Sequential Test

6.1 Proposed Development

6.1.1 The proposals consist of the following:

"Erection of 28 residential dwellings and local affordable employment unit/flexible community space, provision of public open space and associated local amenity facilities (activating Local Green Space Allocation), together with integrated landscaping and car parking (to include additional community parking facility)."

6.1.2 The proposals are shown on the drawings by Alistair Downie Studio in **Appendix D**.

6.1.3 The proposed mitigation is based on a design life for the development of 100 years, and the climate change allowances described in **Section 4** are also based on this assumption.

6.2 Flood Risk Vulnerability

6.2.1 The NPPF Annex 3 confirms the *'Flood risk vulnerability classification'* of a site, depending upon the proposed usage.

6.2.2 The proposed residential development is classed as **'More vulnerable'** development.

6.2.3 This classification is subsequently applied to PPG 'Flood Risk and Coastal Change' Table 2 'Flood risk vulnerability and flood zone incompatibility' to determine whether:

- The proposed development is permitted or not for the Flood Zone in which it is located, and;
- Whether an Exception Test is required for the proposed development.

6.2.4 The location of the proposed 'more vulnerable' development is in Flood Zone 1 'Low Probability' (the limited area of Flood Zone 2 and 3 in the north-west part of the site is being retained for biodiversity enhancement). Table 2 confirms that residential development is permitted within Flood Zone 1, and does not require the Exception Test.

6.3 Sequential Test

6.3.1 The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas.

6.3.2 The flood risk Sequential Test is required where it is not possible to locate development in low-risk areas (i.e. Flood Zone 1, land at low risk of flooding from other sources). As such, since development is located within Flood Zone 1 and on land at low risk from other sources, the Sequential Test is de facto passed.

7 Flood Mitigation Strategy

7.1 Sequential Approach

7.1.1 The NPPF encourages the application of the 'sequential approach' in the master-planning process for new development, i.e. locating the more sensitive/vulnerable elements of new development in the areas which lie at lowest probability of flooding and, conversely, reserve the areas of the site at greatest risk of flooding for the least vulnerable elements of the development (or, preferably, leave such areas undeveloped or as soft landscaping).

7.1.2 The proposed masterplan has been developed to fully adhere to the sequential approach; all proposed new buildings – and all elements of the scheme other than the biodiversity enhancements – are located wholly within Flood Zone 1 'Low Probability'.

7.1.3 The proposed biodiversity enhancements are specifically designed to maximise the ecological benefit within the area of floodplain and low-lying saturated ground – for example, through the provision of wet woodland areas – and therefore their location within Flood Zone 3 is appropriate and necessary.

7.2 Building Ground Floor Levels

7.2.1 Standard requirements for ground floor levels of new development are set out in BS8533:2017 'Assessing and Managing Flood Risk in New Development – Code of Practice'. This recommends floor levels are set a minimum of 300mm above the modelled 1 in 100 (1.0%) AP plus allowance for climate change flood level.

7.2.2 It is also recommended that ground floor levels are set a suitable freeboard above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from dwellings in such a scenario.

7.3 Floodplain Storage

7.3.1 Any new development located in the vicinity of a watercourse should be constructed such that it does not detrimentally impact on flow routes or reduce the available floodplain storage over a site; either of which could potentially cause an increase in flood levels on-site or elsewhere. This is considered up to the benchmark of the 1 in 100 (1.0%) AP plus allowance for climate change fluvial flood level.

7.3.2 The provision of wet woodland areas in these locations will include localised excavation and thereby provide a betterment in floodplain storage. The built development will not impact on floodplain storage or flood flow routes as it will be set significantly above the reference floodplain.

7.4 Safe Access

7.4.1 It is necessary to consider and incorporate safe access arrangements as part of the mitigation, to ensure the users/occupants of the development are safe in times of flooding. The proposed dwellings are a significant freeboard above reference fluvial flood levels, and continuous safe access is available vie The Downs/High Street.

7.5 FRAP Requirements

7.5.1 Proposed works in, over, under or near a main river or a flood defence require a 'Flood Risk Activity Permit' (FRAP) application to be made to the EA (this replaced the previous 'Flood Defence Consent' (FDC) procedure). This is required to demonstrate any new development

does not have a detrimental impact on flood risk, and the proposed biodiversity enhancement works proposed as part of the scheme will be subject to a comprehensive FRAP application in due course.

8 Surface Water Drainage Strategy

8.1 SuDS Drainage Hierarchy

8.1.1 The following section provides an overview of the existing surface water drainage arrangements and the proposed strategy for the management of surface water from the new development. The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. As the LLFA, ECC is therefore responsible for the approval of surface water drainage systems within new major development.

8.1.2 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites and recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development, this being complementary to the control of development within the floodplain.

8.1.3 As the intention of SuDS is to mimic the natural drainage regime of the undeveloped site, the PPG states the following (consistent with the Building Regulations H3 hierarchy):

> *"...The types of sustainable drainage system which it may be appropriate to consider, will depend on the proposed development and its location, as well as any planning policies and guidance that apply locally. Where possible, preference should be given to multi-functional sustainable drainage systems, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options::*
>
> *- into the ground (infiltration),*
>
> *- to a surface water body,*
>
> *- to a surface water sewer, highway drain or another drainage system,*
>
> *- to a combined sewer"*

8.1.4 Supplementing the above, the ECC 'SuDS Design Guidance' states the following:

> "*In accordance with the drainage hierarchy contained in Approved Document H of the Building Regulations, Planning Practice Guidance, and the need to mitigate against water scarcity, all surface water run off aim to be discharged as high up the following hierarchy as possible:*
>
> - *Rainwater re-use (rainwater harvesting/greywater recycling)*
> - *An adequate soakaway or other infiltration system*
> - *Hybrid solution of soakaway or other infiltration system*
> - *Hybrid solution of infiltration and discharging to a surface water body*
> - *To a surface water body*
> - *To a surface water sewer, highway drain, or another drainage system*
> - *To a combined sewer."*

8.1.5 The ECC drainage hierarchy is considered below, in order of preference:

i) Rainwater re-use

8.1.6 The proposed use is for residential, and there may be potential to utilise rainwater harvesting in rainwater butts for irrigation of landscaped/garden areas and systems for re-use for toilet flushing.

8.1.7 At this stage, this has not been considered as part of this assessment and all surface water runoff is assumed discharge off the site, as a conservative approach.

ii) Discharge into the ground (infiltration)

8.1.8 The consolidated information in **Section 3.4** provide a useful indication of ground conditions over the site. This indicates that aspects of infiltration drainage may be feasible within the upper sand/gravel layers.

8.1.9 For the purposes of this assessment, and pending intrusive site investigations to confirm ground conditions, groundwater levels and infiltration rates at the site, it is considered that the use of infiltration drainage is not feasible at the site as the primary route of surface water disposal.

iii) Discharge to a surface water body/watercourse

8.1.10 The next preference in the hierarchy is to discharge to a surface water body (i.e. lake or watercourse). The Stebbing Brook is present on the western side of the site, and this provides the most obvious destination for surface water emanating from the new development.

8.2 Design Criteria and SuDS Attenuation

8.2.1 The design criteria and assumptions are in accordance with the DEFRA '*Non-statutory Technical Standards for Sustainable Drainage Systems*' and ECC 'SuDS Design Guidance' as outlined in the sections below.

8.2.2 The impermeable area will increase post development. There will therefore lead to an increase in runoff rates and volumes without mitigation.

8.2.3 Each part of the site will have its own surface water drainage system, converging into larger attenuation features with a shared outfall. The surface water drainage proposals are shown on **Stantec drawings 332511125/203/001-002** in **Appendix E** and are summarised as follows:

- **Raingardens** may be incorporated into the streetscape green spaces however these have been discounted from the attenuation calculations as a conservative approach;
- **Permeable pavements** across the driveways and parking areas receive runoff from these areas and the houses and convey it through the development parcel to conveyance swales located to the south of the plots. Ramp areas within the main access roads have been excluded from the permeable pavement attenuation volume for the purposes of this assessment due to the slopes;
- The **swales** convey runoff from the plots to the **open attenuation basins** located within the open spaces of the wider sites. The swales will incorporate check dams at suitable intervals along their lengths;
- Analysis of the surface water drainage system to include a +45% allowance for peak rainfall intensity for the 1 in 100 (1.0%) annual probability event as set out in **Section 4**;
- A runoff coefficient (Cv) of 1 has been used within the MicroDrainage Source Control cascade models in accordance with ECC recommendations;
- 300mm freeboard above the critical storm for the 1 in 100 annual probability +45% allowance for climate change rainfall event will be incorporated into the attenuation basins (below crest level for the North Basin and above the crest level via a bund for the South Basin);
- The proposed attenuation basins and where required swales have been sized to include an allowance for upstream open space. Given the underlying sand/gravel superficial deposits at the site appear to be relatively permeable, these areas have been scaled down to 30% of the original areas for Swales B-D to compensate for the Cv of 1 used within the

MicroDrainage software. The open space area has been scaled down to 50% of the original area to allow for exceedance flows from The Downs to the east;

- A 10% allowance for urban creep will be applied to the residential dwelling roof areas within the model in accordance with ECC and the LASOO guidance.

8.3 Proposed Runoff Rates and Volumes

8.3.1 DEFRA Technical Standard S2 states the following:

> "***S2.*** *For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.*"

8.3.2 The ECC 'SuDs Design Guidance' states the following in relation to runoff rate control:

> "*The LLFA preference is that runoff must not increase due to the development and all runoff must be first restricted to the greenfield 1 in 1-year runoff rate during all events up to and including the 1 in 100-year rainfall event with climate change.*
>
> *Alternatively, if restricting to the 1 in 1-year greenfield rate approach is not possible discharge rates can be limited to a range of equivalent greenfield discharge rates. For example, the 1 in 1-year storm event will be limited to the 1 in 1-year greenfield runoff rate……However, if this approach is used then an inclusion of long-term storage will be required.*"

8.3.3 It is proposed to one outfall to the adjacent watercourses from each plot, with the surface water discharge rate from each outfall restricted to the equivalent 1 in 1 year greenfield rate for the impermeable areas (no urban creep). Therefore, Long-Term Storage is not required.

8.3.4 The impermeable areas and urban creep for each plot are shown in **Table 8.1**. A 10% urban creep allowance has been applied to the roof areas only as it is considered the road and driveway areas do not have scope for extension/widening.

Table 8.1: Summary of Impermeable Areas

Plot	Impermeable Area (ha)	10% Urban Creep Roof Areas (ha)	Total Impermeable Area (ha)
A	0.236	0.011	**0.246**
B	0.149	0.007	**0.156**
C	0.087	0.004	**0.090**
D	0.351	0.010	**0.360**

8.3.5 The 1 in 1 year greenfield runoff rate for 1ha has been calculated using the FEH 2008 method as **1.0 l/s/ha**. This has been applied to the impermeable areas with no urban creep and are shown in **Table 8.2**. A copy of the calculations is provided in **Appendix E**.

Table 8.2: Summary of 1 in 1 Year Greenfield Runoff Rates for Impermeable Areas

Annual Probability Rainfall Event	Greenfield Runoff Rate (l/s)	
	Outfall 1 (North Field) 0.403ha	Outfall 2 (South Field) 0.437ha
1 in 1 year	0.4	0.4

8.3.6 The equivalent greenfield runoff rates for the proposed impermeable areas are very low the risk of blockage of the flow control device downstream of the attenuation basins would be unacceptable. It is therefore proposed to restrict the surface water discharge rate from each attenuation basin to a **maximum of 1.0 l/s** up to and including the 1 in 100 annual probability +45% allowance for climate change rainfall event.

8.4 Runoff Volume Calculations

8.4.1 DEFRA Technical Standard S6 states that:

> "***S6.*** *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with* ***S4 or S5*** *above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.*"

8.4.2 Runoff volumes will be managed by restricting to the equivalent 1 in 1 year greenfield runoff rate for the proposed impermeable areas (no urban creep) and the provision of a SuDS train with permeable pavements and swales with throttles before runoff is discharged to the attenuation basins.

8.5 Flood Risk within the Development

8.5.1 DEFRA Technical Standards S7-S9 state that:

> "***S7.*** *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.*
>
> ***S8.*** *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement) or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.*
>
> ***S9.*** *The design of the site must ensure that so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*"

8.5.2 The ECC 'SuDS Design Guidance' states the following in relation to attenuation storage volumes:

> **"Storage Volume:**
>
> *Our preference would be for all rainfall events up to the 1 in 100 plus climate change to be stored within SuDS. However, should this be considered unfeasible, storage should be provided for the 1 in 30 year event with flows above this managed in suitable exceedance areas. An additional 10% of impermeable area should be accounted for to mitigate against urban creep, unless this is not appropriate for the proposed development use.*"

8.5.3 **Table 4.2** shows the climate change allowances for peak rainfall intensity, taken from the EA '*Flood risk assessments – climate change allowances*' guidance, released in February 2016 and last updated in May 2022.

8.5.4 The proposed development is predominantly residential and is considered to have a lifetime of 100 years. In accordance with **Table 4.2**, the range of climate change allowances to be considered for the proposed development is therefore +35% for the 1 in 30 (3.3%) annual probability rainfall event and +45% for the 1 in 100 (1.0%) annual probability rainfall event.

8.5.5 The MicroDrainage calculations in **Appendix E** show that there is no flooding in the 1 in 100 annual probability +45% allowance for climate change rainfall event.

8.5.6 The attenuation volumes utilised within the basins during the critical 1 in 100 annual probability +45% allowance for climate change event are as follows:

- North Basin: 568m^3
- South Basin: 539m^3

8.5.7 As mentioned in **Section 7.1**, the recommendation for finished floor levels is that they be set at a minimum of 150mm above external ground levels, with ground laid to fall away from the entrances to the proposed units to mitigate the residual risk of surface water ingress during extreme rainfall events.

8.5.8 It is noted that the ECC 'SuDS Design Guidance' states that all attenuation features should demonstrate a half drain down time of less than 1440 minutes/24 hours in the 1 in 30 annual probability +35% allowance for climate change, or where this cannot be achieved be able to accommodate a further 1 in 10 (10%) annual probability rainfall event.

8.5.9 The half drain down times are achieved for the upstream permeable pavements and swales for all events up to and including the 1 in 100 annual probability +45% allowance for climate change rainfall event as shown in the results in **Appendix E**.

8.5.10 However, this is difficult to achieve for the attenuation basins as the outflow rates are being discharged at the 1 in 1 year greenfield rate which is very low at 1.0 l/s per outfall. The attenuation volume including the 300mm freeboard for the North Basin is approximately 720m^3. The required storage volume to accommodate the required rainfall events is approximately 637m^3, therefore the requirement can be met for this basin.

8.5.11 The attenuation volume for the South Basin is approximately 560m^3 and the required storage volume to accommodate the required events is approximately 584m^3. The provision of a 300mm bund above the crest level of this basin will ensure that sufficient attenuation storage is provided for the required events in order to meet the half drain time requirements in the ECC 'SuDS Design Guide'. Basin dimensions and bund requirements will be confirmed at the detailed design stage.

8.5.12 Results of the 1 in 10 (10%) annual probability and 1 in 30 annual probability +35% allowance for climate change rainfall events are provided in **Appendix E**.

8.5.13 The invert levels of the proposed attenuation basins will be set at a minimum of 1m above the receiving watercourses, therefore it is considered that there would be no impact from surcharging due to high water levels in the watercourses.

8.6 Water Quality

8.6.1 The SuDS Manual (CIRIA C753, November 2015) introduced a slightly different approach compared to the previous version for the water quality management of surface water. The

Manual describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e. the pollution **source**).
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels (i.e the pollutant **pathway**).
- The sensitivity of the receiving environment (the environmental **receptor**).

8.6.2 The recommended approaches for water quality risk management are given in the SuDS Manual C753 Table 26.1 as shown in **Figure 8.1**.

Figure 8.1: SuDS Manual C753 Table 26.1 'Approaches to Water Quality Risk Management'

TABLE 26.1 Approaches to water quality risk management

Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)
Risk screening[1]	Factors characterising traffic density and extent of infiltration likely to occur (eg Table 26.5 or equivalent)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (eg Table 26.5 or equivalent)
Detailed risk assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in event mean discharge concentrations and total annual load reductions delivered by the system	

Note
1 Risk assessment may be required as a result of the risk screening process.

8.6.3 In accordance with the above Table 26.1 (from the New SuDs Manual C753), the Simple Index approach will be used as the Pollution Hazard Index characterisation for this site.

8.6.4 Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS Manual C753. This table is shown in **Figure 8.2** for reference.

Figure 8.2: SuDS Manual C753 Table 26.2 'Pollution Hazard Indices

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

8.6.5 The SuDS Manual recommends that the selected SuDS components should have a total SuDS Mitigation Index for each contaminant type that either equals or exceeds the Pollution Hazard Index to provide adequate treatment. The following will have to be achieved for the surface water running off the site.

Total SuDS mitigation index >=pollution hazard index

8.6.6 The proposed land uses requiring surface water drainage for this site are as follows:

- Roof areas - surface water discharge to roof sumps before draining to permeable pavements with the final treatment stage at attenuation pond;
- Access road – permeable pavement surface with underlying sub-base which conveys surface water through the site to the attenuation pond.

8.6.7 From the guidance in Table 26.2 of the SuDS Manual C753, **Table 8.3** has been prepared and it shows a summary of the proposed Pollution Hazards levels for the proposed development.

Table 8.3: Pollution Hazard Index and Proposed Site Runoff Receptor

Land Use (Source)	Destination of Runoff (Receptor)	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential roof	Watercourse	Very Low	0.2	0.2	0.05
Driveways, Parking Areas with infrequent change & Low Traffic Roads	Watercourse	Low	0.5	0.4	0.4

8.6.8 The SuDS mitigation index has been obtained from Table 26.3 of the SuDS Manual C753 (for surface water) and the following **Table 8.4** has been prepared. This table summarises the proposed mitigation measures and the corresponding Mitigation Indices.

Table 8.4: SuDS Mitigation Index

	Mitigation Indices			
Land Use (Source)	**Type of SuDS Component**	**Total Suspended Solids (TSS)**	**Metals**	**Hydrocarbons**
Residential roof & Driveways	Permeable Pavement	0.7	0.6	0.7
	Attenuation Basin	0.7	0.7	0.5
Low Traffic Roads	Permeable Pavement	0.7	0.6	0.7
	Swale	0.5	0.6	0.6
	Attenuation Basin	0.7	0.7	0.5

8.6.9 A comparison of the information in **Table 8.4** and **Table 8.5** demonstrates that the proposed surface water treatment train incorporating SuDS and their corresponding mitigation indices are greater than the pollution hazard indices.

8.6.10 On this basis, it is considered that the proposed surface water management system provides an adequate level of treatment for a development of this scale and nature.

8.7 General Maintenance Regimes

8.7.1 The surface water drainage proposals for this site should include the following maintenance measures:

- Annual inspection and cleaning of the roof sumps and green roofs to remove leaf litter etc to improve the quality of the water;
- Inspection of the flow control chambers and de-silting of the inlet sump on a bi-annual basis or as required;
- Bi-annual cleaning and maintenance of the permeable pavement surfaces to remove litter, debris and accumulated leaf litter;
- Inspection, mowing, de-weeding and sediment control/removal in the attenuation basins and swales/raingardens.

8.7.2 The details of the body responsible for maintaining the proposed surface water drainage system will be confirmed post planning.

8.8 Foul Drainage

8.8.1 The foul drainage for the proposed development will likely drain to a public foul sewer beneath The Downs. Further details, including the submission of a capacity check application to Anglian Water, can be provided as part of a suitably worded planning condition.

9 Residual Risk

9.1.1 It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible however, it is practicable to minimise the risk by allowing a substantial freeboard (safety margin) and by using suitable construction and management techniques.

9.1.2 The residual risk for the proposed site is managed as follows:

- The sequential approach has been applied to ensure all dwellings are in Flood Zone 1 'Low Probability' and residential development is located on land over 10m above the estimated reference fluvial flood levels over the site;
- Ground floor levels are set a suitable freeboard above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from dwellings in such a scenario;

9.1.3 As such, the residual risk is considered to be acceptable for the lifetime of the development.

10 Conclusions

10.1.1 This FRA has been prepared by Stantec to accompany a planning application for a residential led development on land at Stebbing village, Essex.

Flood Risk

10.1.2 The main source of fluvial flood risk for the site is the Stebbing Brook main river, forming the western boundary of the Northern Field (Plots A and B). In the absence of detailed modelling, the reference flood levels have been estimated from overlaying the Environment Agency (EA) Flood Zone mapping onto LiDAR topographic data.

10.1.3 An estimated 1 in 1000 (0.1%) annual probability (Flood Zone 2) flood level of 60.30m AOD has been derived. This has been utilised as a proxy for the 'design' 1 in 100 annual probability +25% climate change allowance flood level, and this approach is considered appropriate and proportionate due to the significant (10 metre) elevation of proposed buildings above this flood level.

10.1.4 The remaining sources of flood risk are considered to be a low risk.

Vulnerability and Sequential Test

10.1.5 The proposals are for residential use, classified as 'More Vulnerable' and a commercial development, classified as 'Less Vulnerable' development, as defined in the National Planning Practice Framework (NPPF) Annex 3: Flood risk vulnerability classification'.

10.1.6 The proposed built development lies wholly in Flood Zone 1 'Low Probability' of river/sea flooding and is at low risk of flooding from other sources. All forms of development are considered acceptable in Flood Zone 1 and as the Flood Zone at lowest probability (and since the site is also at low risk from other sources) the Sequential Test is de facto passed. The Exception Test is not required.

Mitigation Strategy

10.1.7 All built development is to set significantly above the fluvial floodplain. As such, the finished floor levels will be set at a minimum of 150mm above external ground level, with ground around entrances to units laid to fall away to mitigate against the risk of surface water ingress in an extreme rainfall event.

10.1.8 The proposed units and access are located within Flood Zone 1 and therefore continuous safe and dry access is available.

10.1.9 The provision of wet woodland areas in these locations will provide a betterment in floodplain storage. The built development will not impact on floodplain storage or flood flow routes as it will be set significantly above the reference floodplain.

10.1.10 Surface water runoff will be managed through the use of SuDS techniques with a controlled discharge to the surrounding watercourses.

Summary

10.1.11 In conclusion, the future occupants and users of the proposed development will be at a low risk of flooding and the development will not increase flood risk elsewhere. It is demonstrated that the proposal complies with the National Planning Policy Framework (NPPF), PPG and the local planning policy with respect to flood risk and is an appropriate development at this location.

Appendix A OpenData Flood Maps

- Site Location Plan
- Site Location (Aerial Photography)
- Area Topography (LiDAR)
- EA Flood Zone Map
- EA Surface Water Flood Risk
- Reservoir Flood Map
- EA Historic Flood Map

Stantec

Client

LAND AT STEBBING VILLAGE

Site Location

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 01	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

Stantec

Client

LAND AT STEBBING VILLAGE

Site Location - Aerial

0 250 500 m

Maxar, Microsoft, Esri Community Maps Contributors, Esri UK, Esri, HERE, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 02	Rev: A

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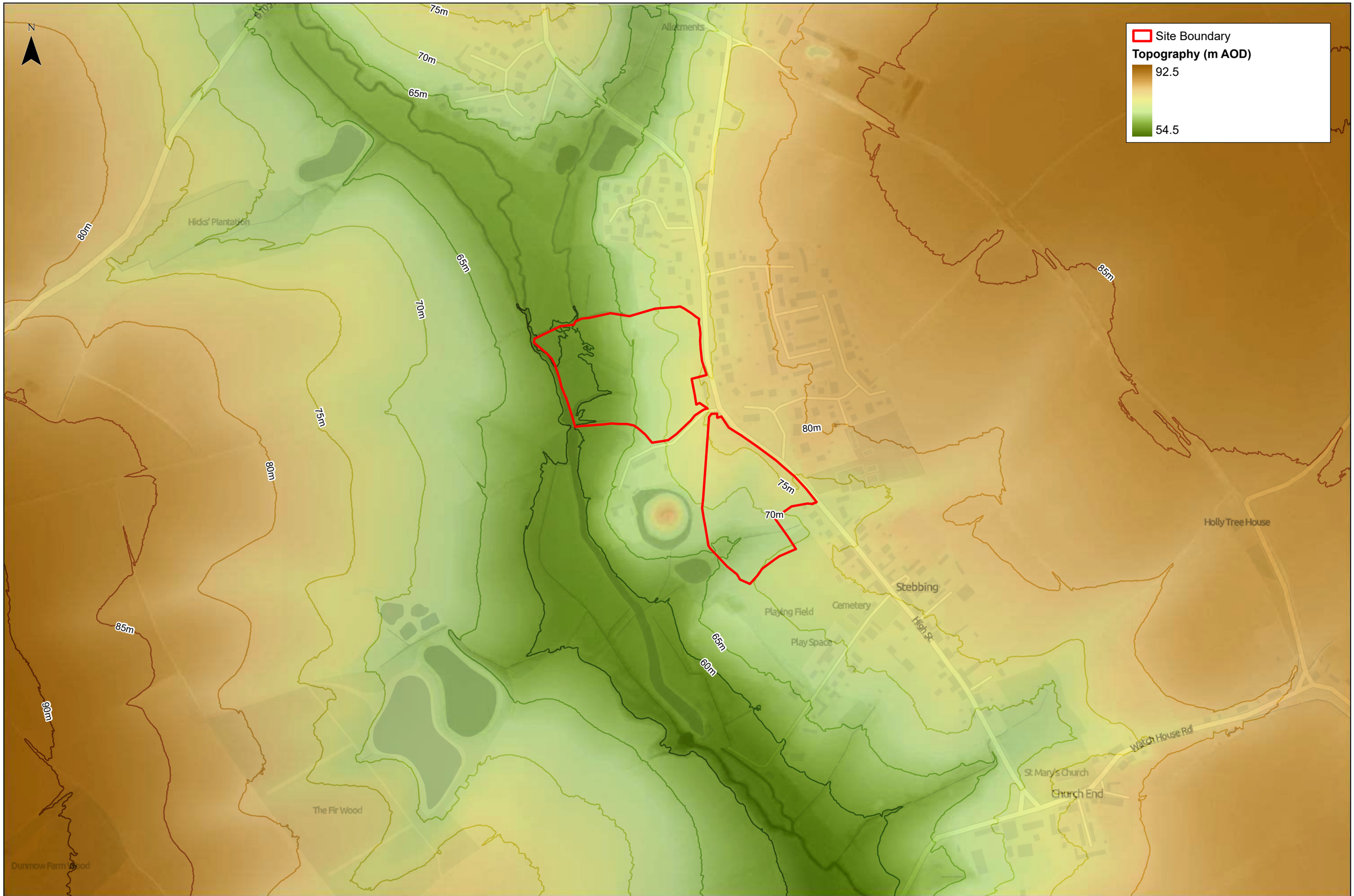


Stantec

Client

LAND AT STEBBING VILLAGE

Topography

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 03	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

N

Site Boundary

Topography (m AOD)

77.5

60.0

Spot Height

69 70.8 72.4
60 61.4 63.9 66.1 68.3 69.7 70.8 73
60.3 60 59.8 60.3 62.7 64.6 67 69 71 72.6
60 59.8 60.4 62.2 64.3 68.1 70.3 72.5 74.6
60.3 59.8 60 61.4 64.1 67.7 70.1 72.4
59.6 60.4 61.5 64.2 66.6 69.1 71.6
59.9 60.5 61.8 64.1 66.4 69.2 71.9
66.6 69.4

75.6 76.9
75 75.4 74.2
73.9 73.7 71.6 73.4
72.7 71.4 70.4 73 74.9
71.2 69.2 69.4 71.9 72.8 73.1
68.5 67.3 68.2 69.2
65.9 65.2 65.6 66.7 68.2
65 65.2 66.6 68.2 70.5
66.5 68

Pound Gate
Garden Fields
Ploughmans Way
Mount Fields
Stebbing Primary School
Stebbing
Cemetery
Playing Field
Bowling Green
High St
Play Space
Mill La

Stantec

Client

LAND AT STEBBING VILLAGE

Topography - Detailed

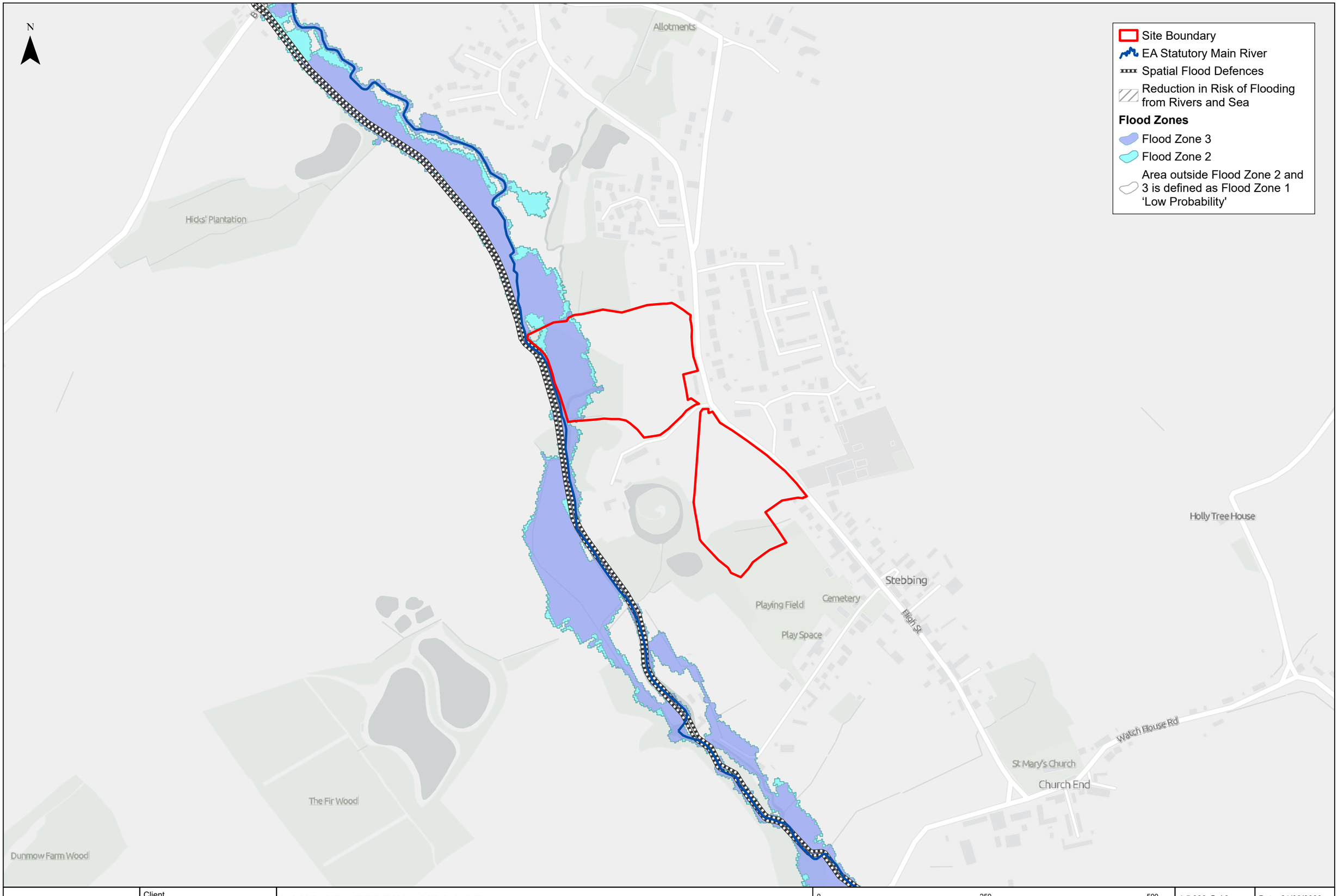
0 125 250 m

1:2,500 @ A3 | Date: 21/09/2023

Drawn: ZW | Checked: EE

Figure: 03.1 | Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx



Stantec

Client

LAND AT STEBBING VILLAGE

Environment Agency Flood Map for Planning

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 04	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

N

Site Boundary
Main River
Flood Zone 3
Flood Zone 2
60.6 - 60.7m AOD
60.5 - 60.6m AOD
60.4 - 60.5m AOD
60.3 - 60.4m AOD
60.2 - 60.3m AOD
60.1 - 60.2m AOD
60.0 - 60.1m AOD
59.9 - 60.0m AOD
59.8 - 59.9m AOD
59.8 - 59.9m AOD
59.7 - 59.8m AOD
59.5 - 59.6m AOD
59.4 - 59.5m AOD
59.3 - 59.4m AOD
59.2 - 59.3m AOD
59.1 - 59.2m AOD
59.0 - 59.1m AOD
58.9 - 59.0m AOD

60.3
59.8
60.2
60.0
60.1
59.9
60.2
59.8
59.6
60.0
59.3
59.9
60.1
59.7
60.2

Plan Location

Stantec

Client:

LAND AT STEBBING

Flood Zones overlaid onto LiDAR Mapping

0 35 70 m

1:700 @ A3	Date: 08/06/2022
Drawn: CE	Checked: EE
Figure 004a	Rev A

Z:\Projects\332511125 - Land at Stebbing\02_mxd\FRA\mxd/Figure004a_FloodZonesOverlaidOntoLiDARMapping.mxd

Stantec

Client

LAND AT STEBBING VILLAGE

EA Surface Water Flood Risk

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 05	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

N

Site Boundary

Risk of Flooding from Surface Water - Depth

- Below 150mm
- 150 - 300mm
- 300 - 600mm
- 600 - 900mm
- 900 - 1200mm
- Over 1200mm

Hicks' Plantation
Allotments
Holly Tree House
Stebbing
Playing Field
Cemetery
Play Space
High St
The Fir Wood
Dunmow Farm Wood
St Mary's Church
Church End
Church House Rd

Stantec

Client

LAND AT STEBBING VILLAGE

EA Surface Water Flood Risk - Depth
3.3 Percent Chance

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 05a	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

N

Site Boundary

Risk of Flooding from Surface Water - Depth

- Below 150mm
- 150 - 300mm
- 300 - 600mm
- 600 - 900mm
- 900 - 1200mm
- Over 1200mm

Hicks' Plantation
Holly Tree House
Stebbing
Playing Field
Cemetery
Play Space
High St
St Mary's Church
Church End
The Fir Wood
Dunmow Farm Wood

Stantec

Client

LAND AT STEBBING VILLAGE

EA Surface Water Flood Risk - Depth
1.0 Percent Chance

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 05b	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

Stantec

Client

LAND AT STEBBING VILLAGE

EA Surface Water Flood Risk - Depth
0.1 Percent Chance

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 05c	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

N

Site Boundary
Main River
High Risk Surface Water Flood Extent
Medium Risk Surface Water Flood Extent
Low Risk Surface Water Flood Extent
61.6 - 61.7m AOD
61.5 - 61.6m AOD
61.4 - 61.5m AOD
61.3 - 61.4m AOD
61.2 - 61.3m AOD
61.1 - 61.2m AOD
61.0 - 61.1m AOD
60.9 - 61.0m AOD
60.8 - 60.9m AOD
60.7 - 60.8m AOD
60.6 - 60.7m AOD
60.5 - 60.6m AOD
60.4 - 60.5m AOD
60.3 - 60.4m AOD
60.2 - 60.3m AOD
60.1 - 60.2m AOD
60.0 - 60.1m AOD
59.9 - 60.0m AOD
59.8 - 59.9m AOD
59.7 - 59.8m AOD
59.6 - 59.7m AOD
59.5 - 59.6m AOD
59.4 - 59.5m AOD
59.3 - 59.4m AOD
59.2 - 59.3m AOD
59.1 - 59.2m AOD
58.9 - 59.1m AOD

61.5
60.4
61.2
60.0
59.8
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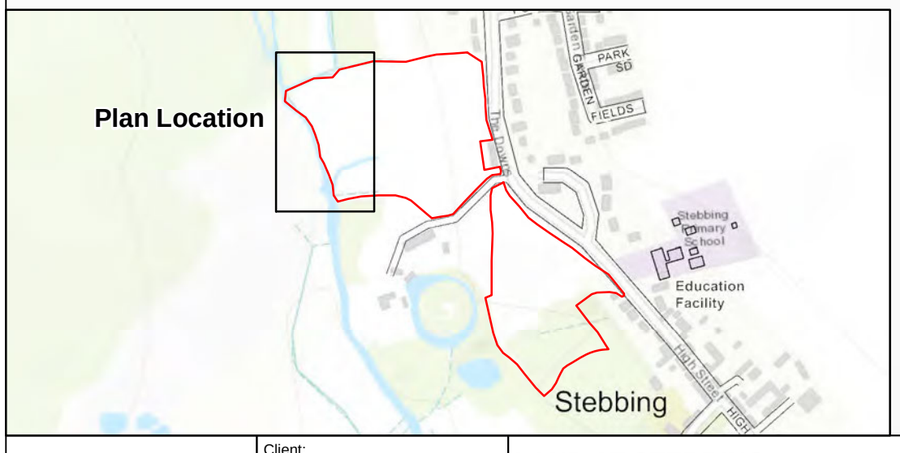
59.3
59.9
61.1
59.8
60.5

Plan Location



Stantec

Client:

LAND AT STEBBING

Risk of Flooding from Surface Water overlaid onto LiDAR Mapping

0 35 70 m

1:700 @ A3	Date: 10/06/2022
Drawn: CE	Checked: EE
Figure 005d	Rev A

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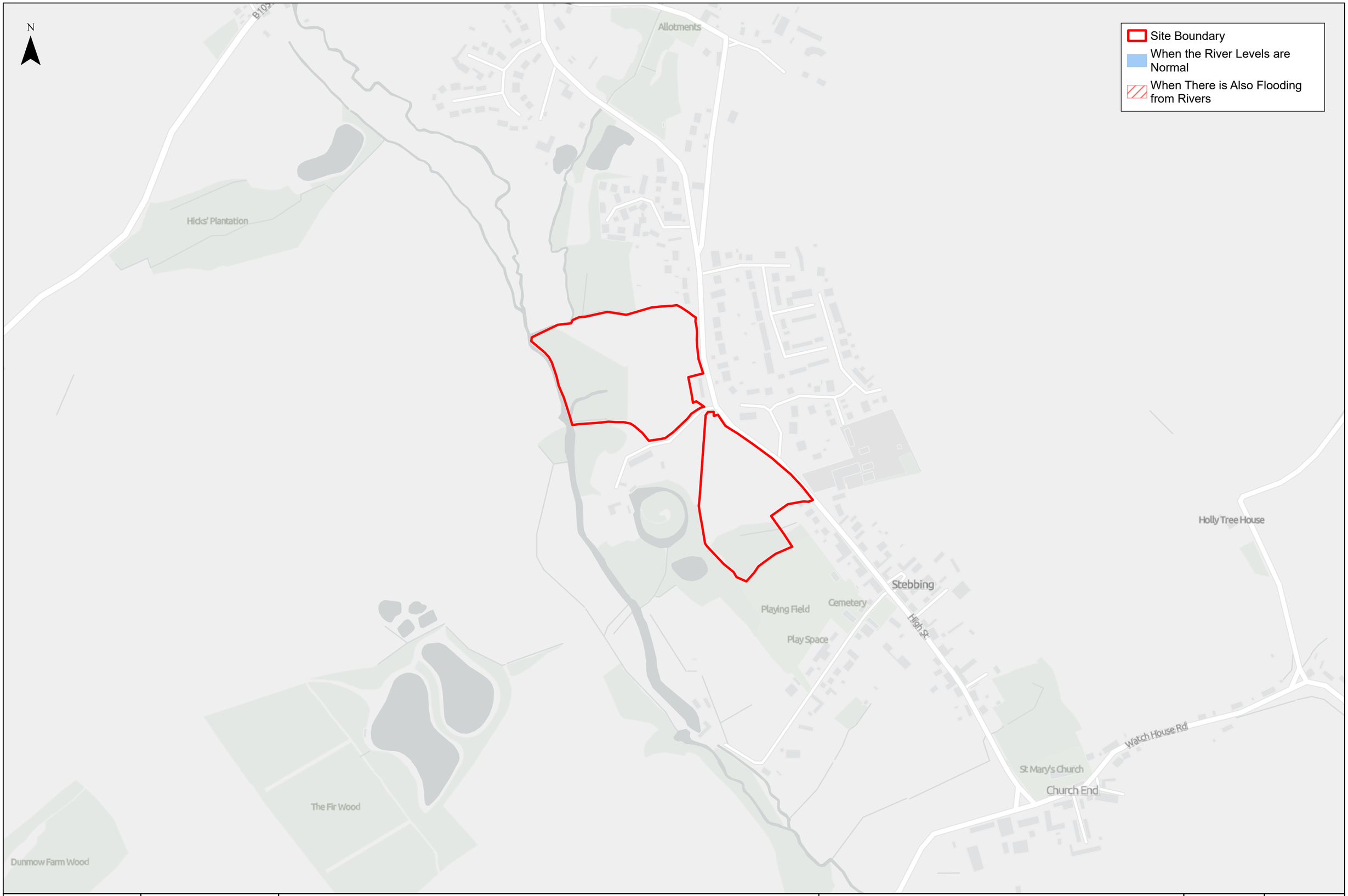

Stantec

Client

LAND AT STEBBING VILLAGE

Risk of Flooding from Reservoirs - Maximum Flood Extent

0 250 500 m

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 06	Rev: A

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N

Site Boundary
Zone I - Inner Protection Zone
Zone II - Outer Protection Zone
Zone III - Total Catchment
Zone of Special Interest

Stantec

Client

LAND AT STEBBING VILLAGE

EA Ground Water Source Protection Zones

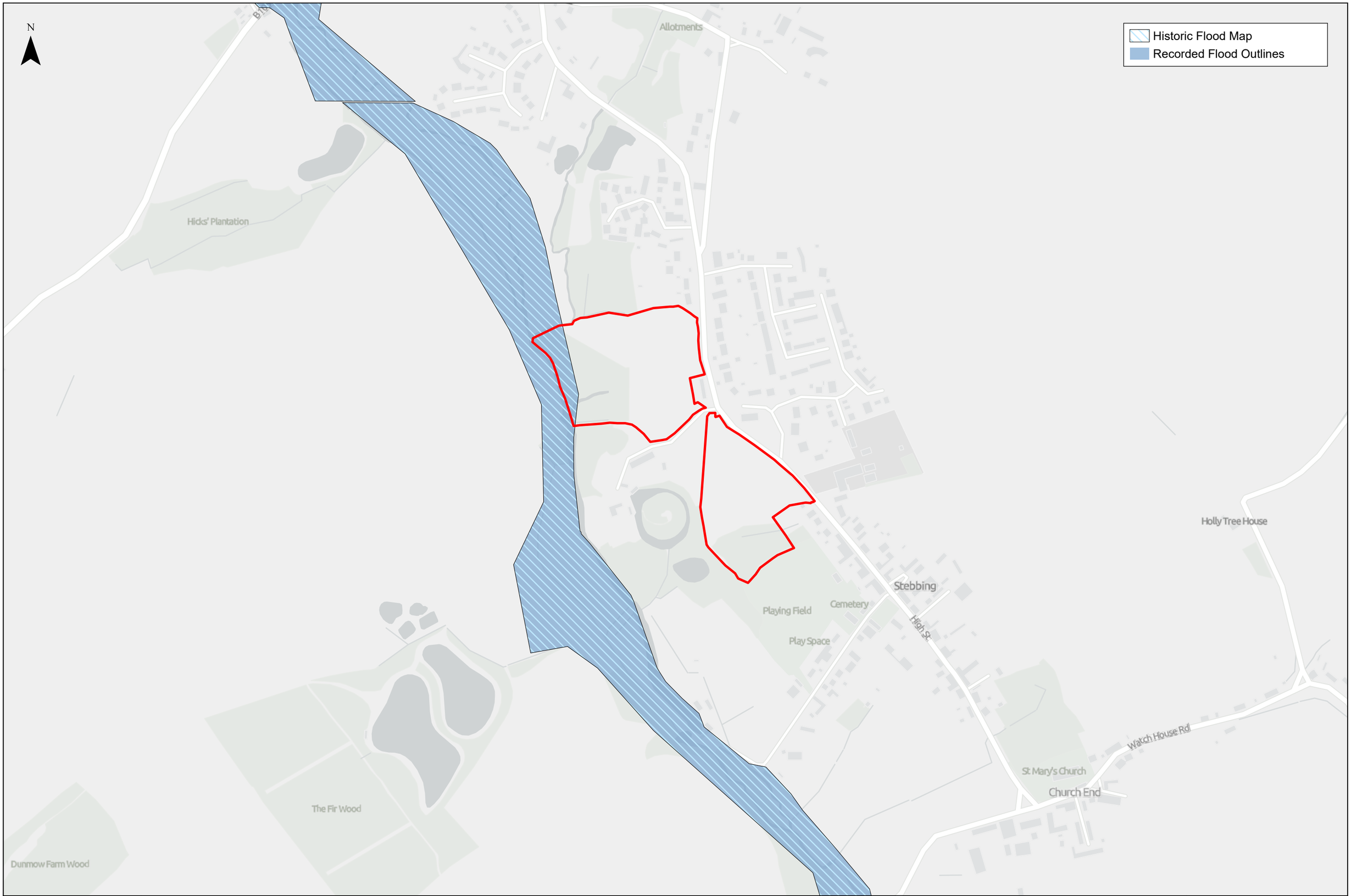
0 250 500 m

1:5,000 @ A3 | Date: 21/09/2023

Drawn: ZW | Checked: EE

Figure: 07 | Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx



Stantec

Client

LAND AT STEBBING VILLAGE

EA Recorded Historic Flood Extents

0 250 500 m

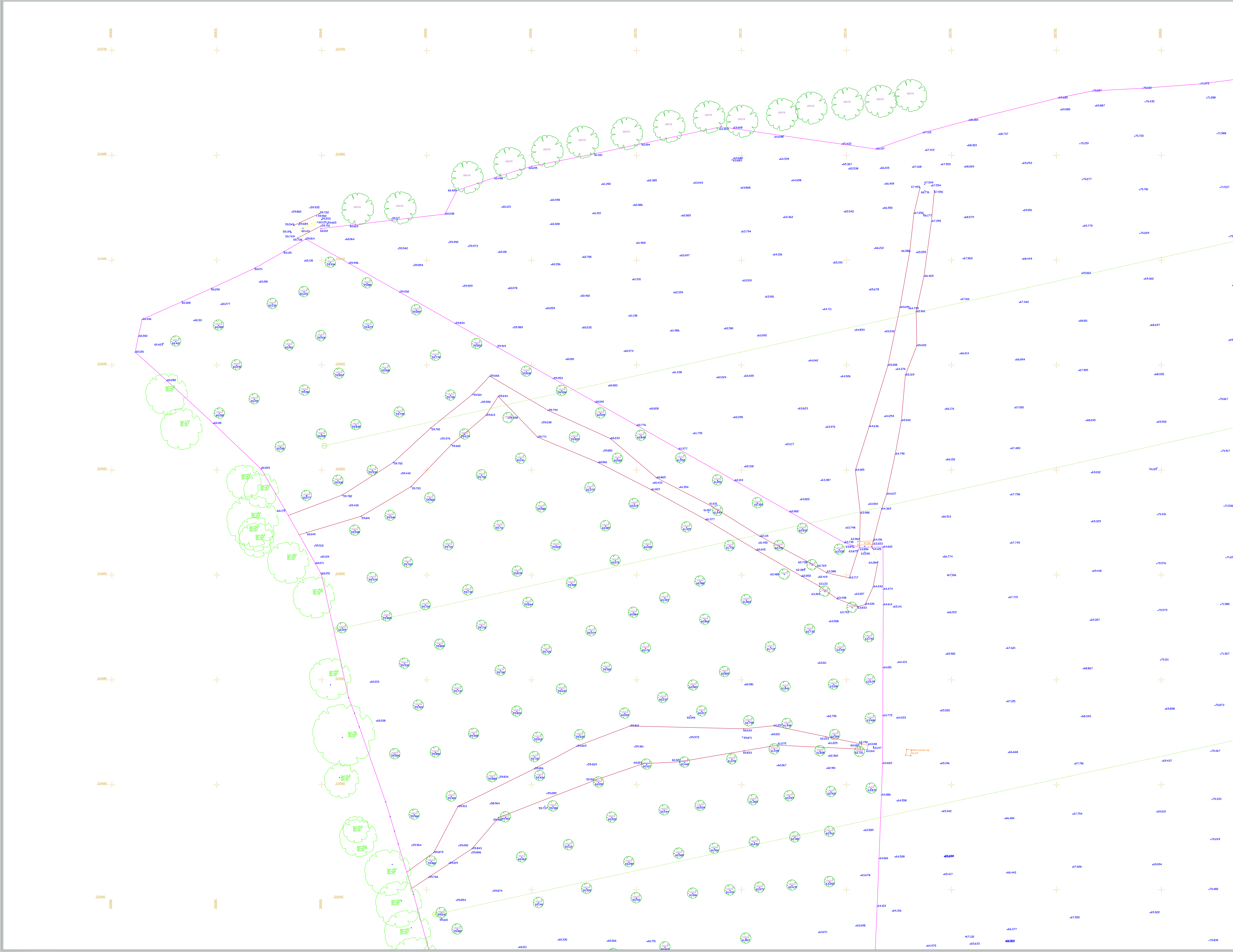
Historic Flood Map shows the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs and shows areas of land that have previously been subject to flooding in England.
Recorded Flood Outlines shows all EA records of historic flooding from rivers, the sea, groundwater and surface water

1:5,000 @ A3	Date: 21/09/2023
Drawn: ZW	Checked: EE
Figure: 08	Rev: A

Document Path: C:\Users\zawang\OneDrive - Stantec\Documents\ArcGIS\Projects\332511125\332511125.aprx

Appendix B Topographic Survey

- Drawings 1485-01 to 1485-05 by SolidPoint dated May 2022



Sheet:

Survey Legend:

Station	Easting (m)	Northing (m)	Level (m)

Rev:	Date:	Description:	Surveyed:	Quality Ref:

SolidPoint
2 Wentworth House
Vernongate
Derby
DE1 1UR

SolidPoint
Tel: 01332 898350
Email: projects@solidpoint.co.uk
Website:www.solidpoint.co.uk

Client Austin Design Works

Project Stebbing Essex

Title Topographical Survey (Sheet 1)

Survey date: 09/05/22 Issued : 24/05/22

Quality Ref: CA Scale: 1:200@A0

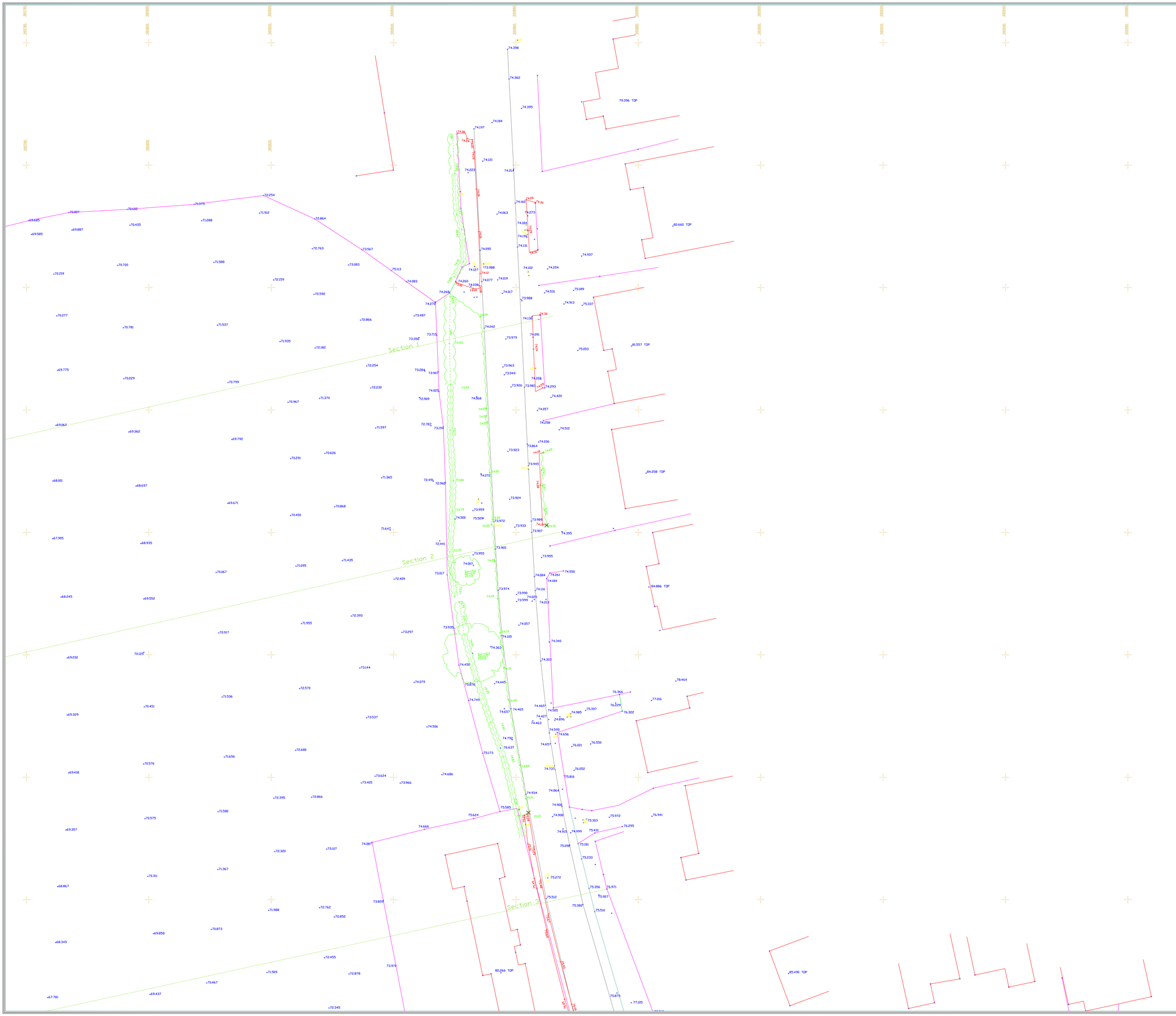
Level Datum: OS GNSS Grid: OS GNSS

Job No. 1485-01 Rev.

Comments:
The survey has been orientated to the Ordnance Survey (OS) National Grid (OSGB36) via a GPS and the OS active network.

Trees are positioned accurately unless stated, Boles & Canopys are indicative unless otherwise stated where possible.

All dimensions are in metres.
No liability will be taken for this drawing if passed onto a third party without written permission of SolidPoint.



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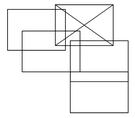


Survey Legend:

Buildings	Vegetation	FL	Flood light	IFL	Internal floor level
Overhead Structure	Paths	LP	Lamp post	THL	Threshold level
Wall	Services	TP	Telegraph post	SP	Sign post
Line marking	Top of Bank	EP	Electricity post	TH	Trafhole
Centre line	Bottom of Bank	TL	Traffic light	BH	Boxhole
Kerb Bottom	Overhead Cable	Box	Box inlet	ELE	Electric
Kerb Top	Fence	SV	Stop valve	BT	British Telecom
Road Edge	Contour	ST	Stop tap	CTrm	Control box
Surface Change	Grid Line	ER	Earth rod	TT	Tactile
Steps	Obstruction	WM	Water meter	BP	Brick paved
Gate		Gas	Gas valve	CPS	Concrete paving slabs
MH Manhole		AV	Air valve	CVR	Cover
IC Inspection Chamber		ICU	Underfilled inspection	IC	Inspection chamber
CVR Cover		WO	Wash out	Rwall	Retaining wall
CL Cover level		RE	Rodding eye	Uft.	Unable to lift
IL Invert level		BB	Bellsha beacon	100	Station and Name
PInv Pipe invert		CTV	Cable tv	100.000	Station Level
Gy Gully		Mkr	Marker post		
Rg Back gully		Gmkr	Gas marker post		Tree / Bush / Sapling
Rwp Rain water pipe		Sv	Soffit		Area of Vegetation
Pgw Pipe above ground		BO	Bollard	TCL	Tree canopy level
WL Water level		IB	Illuminated bollard	Dt	Tree Trunk Diameter
Ridge Ridge Level		Bin	Rubbish bin	MG	Multi girth
Eaves Eaves Level		VP	Vent pipe	MB	Multi Bole
Flat Flat Roof Level		GH	Ground light	Stmp	Tree Stump
		Lbox	Letter box		
		Ldr	Ladder		
		Sty	Stile		

Station	Easting (m)	Northing (m)	Level (m)

Rev:	Date:	Description:	Surveyed:	Quality Ref:

SolidPoint
2 Wentworth House
Vernongate
Derby
DE1 1UR

SOLIDPOINT
Tel: 01332 898350
Email: projects@solidpoint.co.uk
Website:www.solidpoint.co.uk

Client Austin Design Works

Project Stebbing
Essex

Title Topographical Survey (Sheet 2)

Surveyed: 09/05/22 Issued : 24/05/22

Quality Ref: CA Scale: 1:200@A0

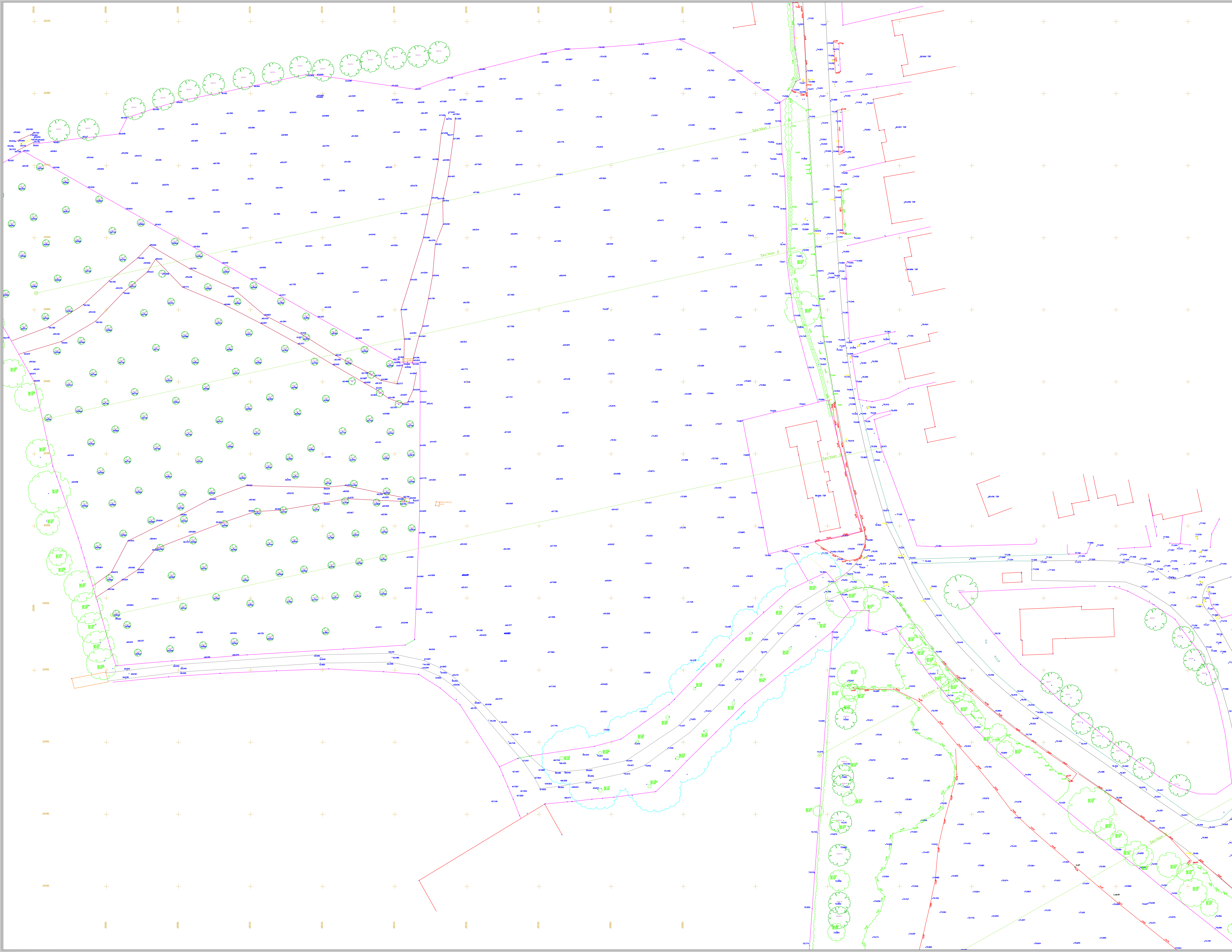
Level Datum: OS GNSS Grid: OS GNSS

Job No. 1485-02 Rev.

Comments:
The survey has been orientated to the Ordnance Survey (OS) National Grid (OSGB36) via a GPS and the OS active network.

Trees are positioned accurately unless stated, Boles & Canopys are indicative unless otherwise stated where possible.

All dimensions are in metres.



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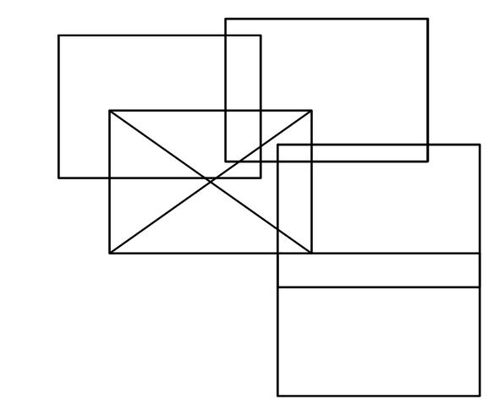

Survey Legend:

Station	Easting (m)	Northing (m)	Level (m)

Rev:	Date:	Description:	Surveyed:	Quality Ref:

SolidPoint
2 Wentworth House
Vernongate
Derby
DE1 1UR

SolidPoint
Tel: 01332 898350
Email: projects@solidpoint.co.uk
Website:www.solidpoint.co.uk

Client: Austin Design Works

Project: Stebbing Essex

Title: Topographical Survey (Sheet 3)

Surveyed: 09/05/22 Issued: 24/05/22

Quality Ref: CA Scale: 1:200@A0

Level Datum: OS GNSS Grid: OS GNSS

Job No. 1485-03 Rev.

Comments:
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All dimensions are in metres.
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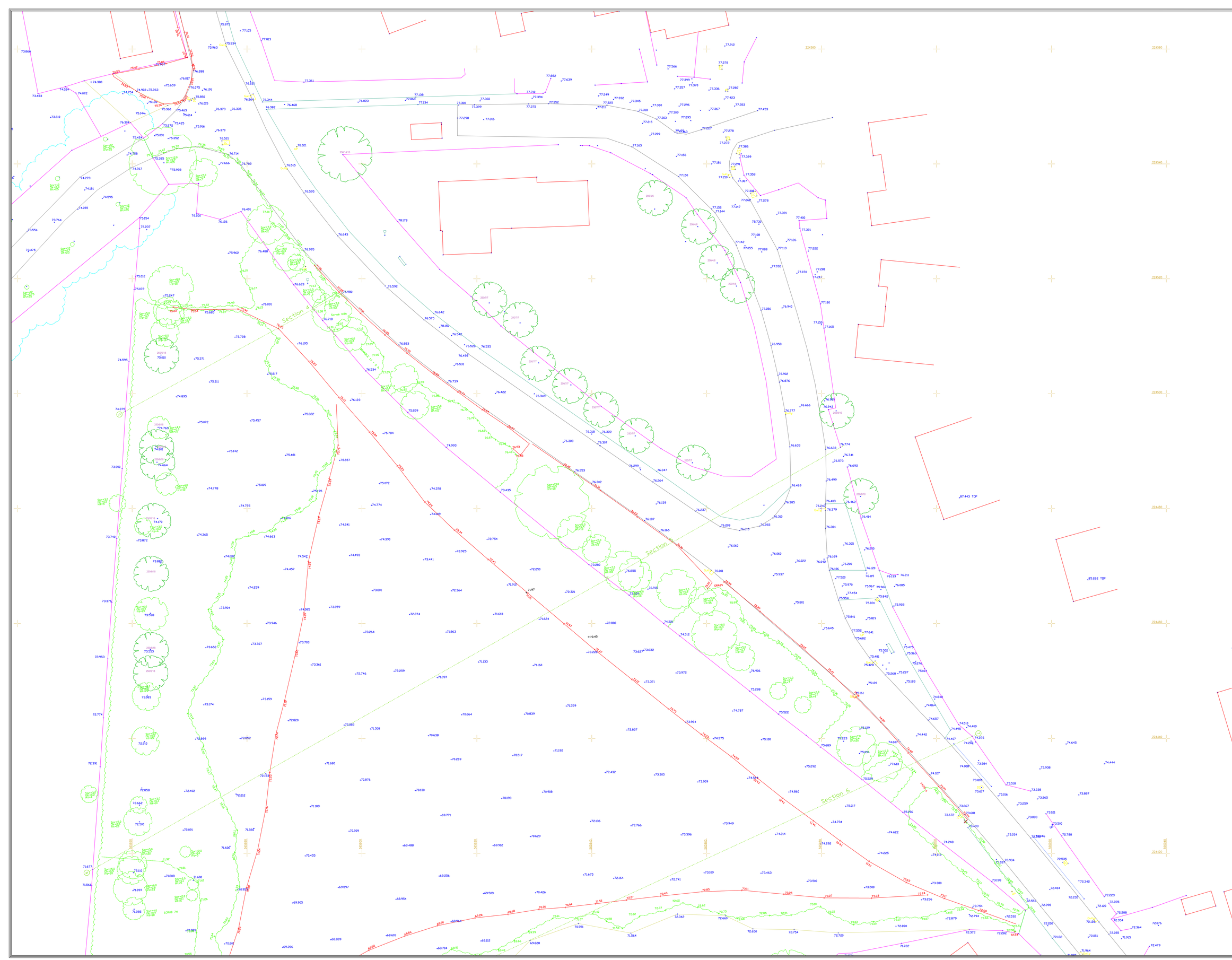

Site Notes:

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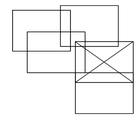

Survey Legend:

Buildings	Vegetation	FL	Flood light	IFL	Internal floor level
Overhead Structure	Paths	LP	Lamp post	THL	Threshold level
Wall	Services	TP	Telegraph post	SP	Sign post
Line marking	Top of Bank	EP	Electricity post	TH	Triathole
Centre line	Bottom of Bank	TL	Traffic light	BH	Boreholes
Kerb Bottom	Overhead Cable	Box	Box inlet	ELEC	Electric
Kerb Top	Fence	SV	Stop valve	BT	British Telecom
Road Edge	Contour	ST	Stop tap	Ctrox	Control box
Surface Change	Grid Line	ER	Earth rod	TT	Turtle
Steps	Obstruction	WM	Water meter	BP	Brick paved
Gate		Gas	Gas valve	CPS	Concrete paving slabs
MH Manhole		AV	Air valve	CVR	Cover
IC Inspection Chamber		ICU	Unidentified inspection	IC	Inspection chamber
CVR Cover		WO	Wash out	Rwall	Retaining wall
CL Cover level		RE	Rodding eye	UTL	Unable to lift
IL Invert level		BB	Bellsha beacon	4260 100.000	Station and Name Station Level
Pinv Pipe invert		CTV	Cable tv		
Gy Gully		Mkr	Marker post		
Rg Back gully		Grnd	Gas marker post		
Rwp Rain water pipe		Sv	Soffit		
Pipe Pipe above ground		BO	Bollard		
WL Water level		IB	Illuminated bollard		
Ridge Ridge Level		Bin	Rubbish bin		
Eaves Eaves Level		VP	Vent pipe		
Flat Flat Roof Level		GR	Ground light		
		Llow	Letter box		
		Ldr	Ladder		
		Sty	Stile		

Station	Easting (m)	Northing (m)	Level (m)

Rev:	Date:	Description:	Surveyed:	Quality Ref:

SolidPoint
2 Wentworth House
Vernongate
Derby
DE1 1UR

SOLIDPOINT
Tel: 01332 898350
Email: projects@solidpoint.co.uk
Website:www.solidpoint.co.uk

Client Austin Design Works

Project Stebbing
Essex

Title Topographical Survey (Sheet 4)

Surveyed: 09/05/22 Issued: 24/05/22

Quality Ref: CA Scale: 1:200@A0

Level Datum: OS GNSS Grid: OS GNSS

Job No. 1485-04 Rev.

Comments:
The survey has been orientated to the Ordnance Survey (OS) National Grid (OSGB36) via a GPS and the OS active network.

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All dimensions are in metres.
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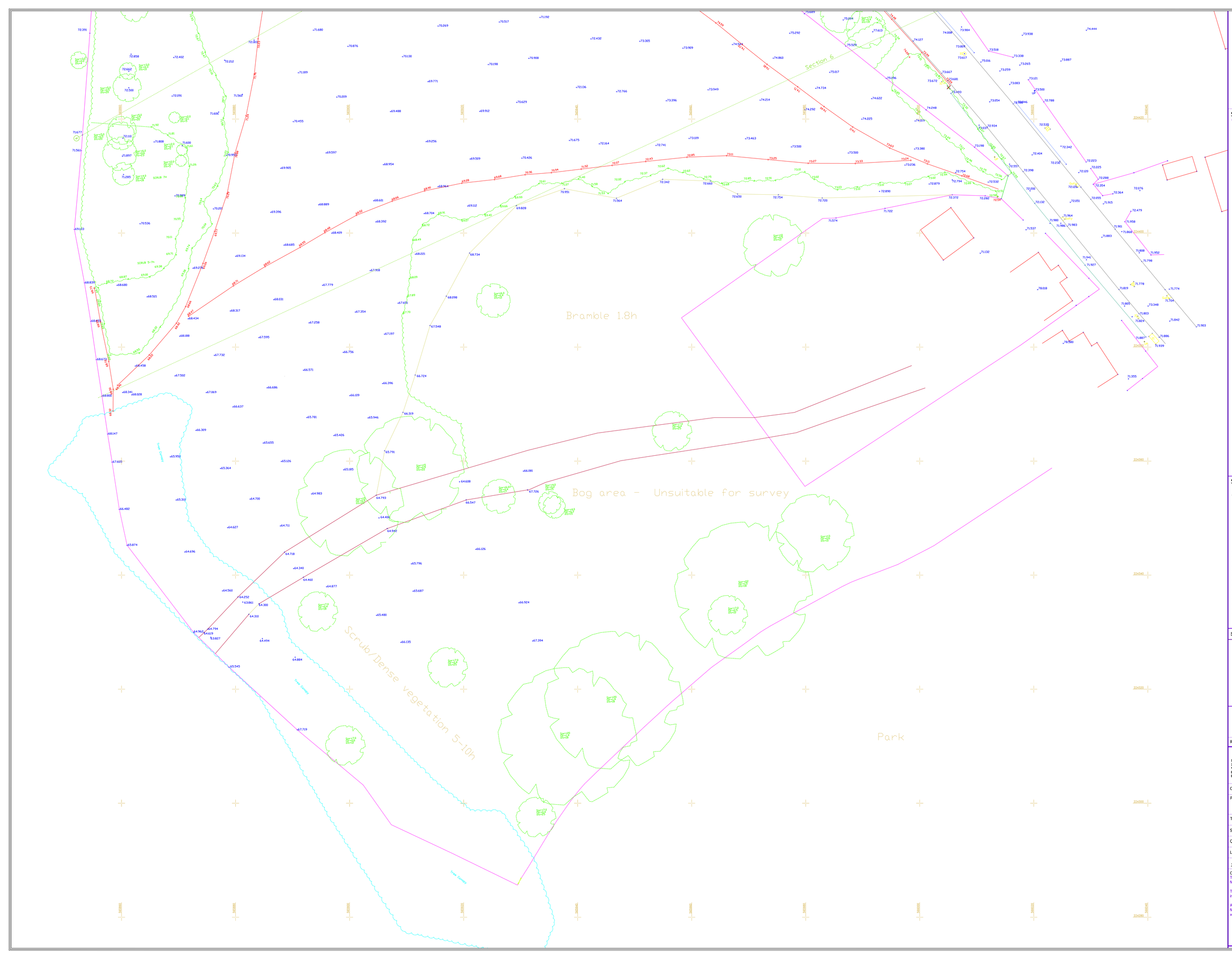

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Survey Legend:

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Overhead Structure	Paths	LP	Lamp post	THL	Threshold level
Wall	Services	TP	Telegraph post	SP	Sign post
Line marking	Top of Bank	EP	Electricity post	TH	Triathole
Centre line	Bottom of Bank	TL	Traffic light	BH	Borehole
Kerb Bottom	Overhead Cable	Bus	Bus stop	ELC	Electric
Kerb Top	Fence	BT	Bus shelter	BT	British Telecom
Road Edge	Contour	SV	Stop valve	Chbx	Control box
Surface Change	Grid Line	SP	Stop tap	TT	Tactile
Steps	Obstruction	ER	Earth rod	SP	Brick paved
Gate		WM	Water meter	CPS	Concrete paving slabs
MH Manhole		Gas	Gas valve	CVR	Cover
IC Inspection Chamber		AV	Air valve	IC	Inspection chamber
CVR Cover		ICU	Unidentified inspection	Rwall	Retaining wall
CL Cover level		WO	Wash out	UTL	Unable to lift
IL Invert level		RE	Rodding eye	285 / 68.000	Station and Name / Station Level
Pinv Pipe invert		BB	Bellzink bsaxon		
Gy Gully		CTV	Cable tv		
Bg Back gully		Mkr	Marker post		
Rwp Rain water pipe		Gmkr	Gas marker post		
Pipe Pipe above ground		Sv	Soffit		
WL Water level		BO	Bollard		
Ridge Ridge Level		IB	Illuminated bollard		
Eaves Eaves Level		Bin	Rubbish bin		
Flat Flat Roof Level		VP	Vent pipe		
		Gri	Ground light		
		Lbox	Letter box		
		Ldr	Ladder		
		Sty	Stile		

Tree / Bush / Sapling
Area of Vegetation
TCL Tree canopy level
D Tree Trunk Diameter
MG Multi girth
MB Multi Bole
Stmp Tree Stump

Station	Easting (m)	Northing (m)	Level (m)

Rev:	Date:	Description:	Surveyed:	Quality Ref:

SolidPoint
2 Wentworth House
Vernongate
Derby
DE1 1UR

SolidPoint
Tel: 01332 898350
Email: projects@solidpoint.co.uk
Website:www.solidpoint.co.uk

Client Austin Design Works

Project Stebbing
Essex

Title Topographical Survey (Sheet 5)

Surveyed: 09/05/22 Issued:24/05/22

Quality Ref: CA Scale: 1:200@A0

Level Datum: OS GNSS Grid: OS GNSS

Job No. 1485-05 Rev.

Comments:
The survey has been orientated to the Ordnance Survey (OS) National Grid (OSGB36) via a GPS and the OS active network.

Trees are positioned accurately unless stated, Boles & Canopys are indicative unless otherwise stated where possible.

All dimensions are in metres.
No liability will be taken for this drawing if passed onto a third party without written permission of SolidPoint.

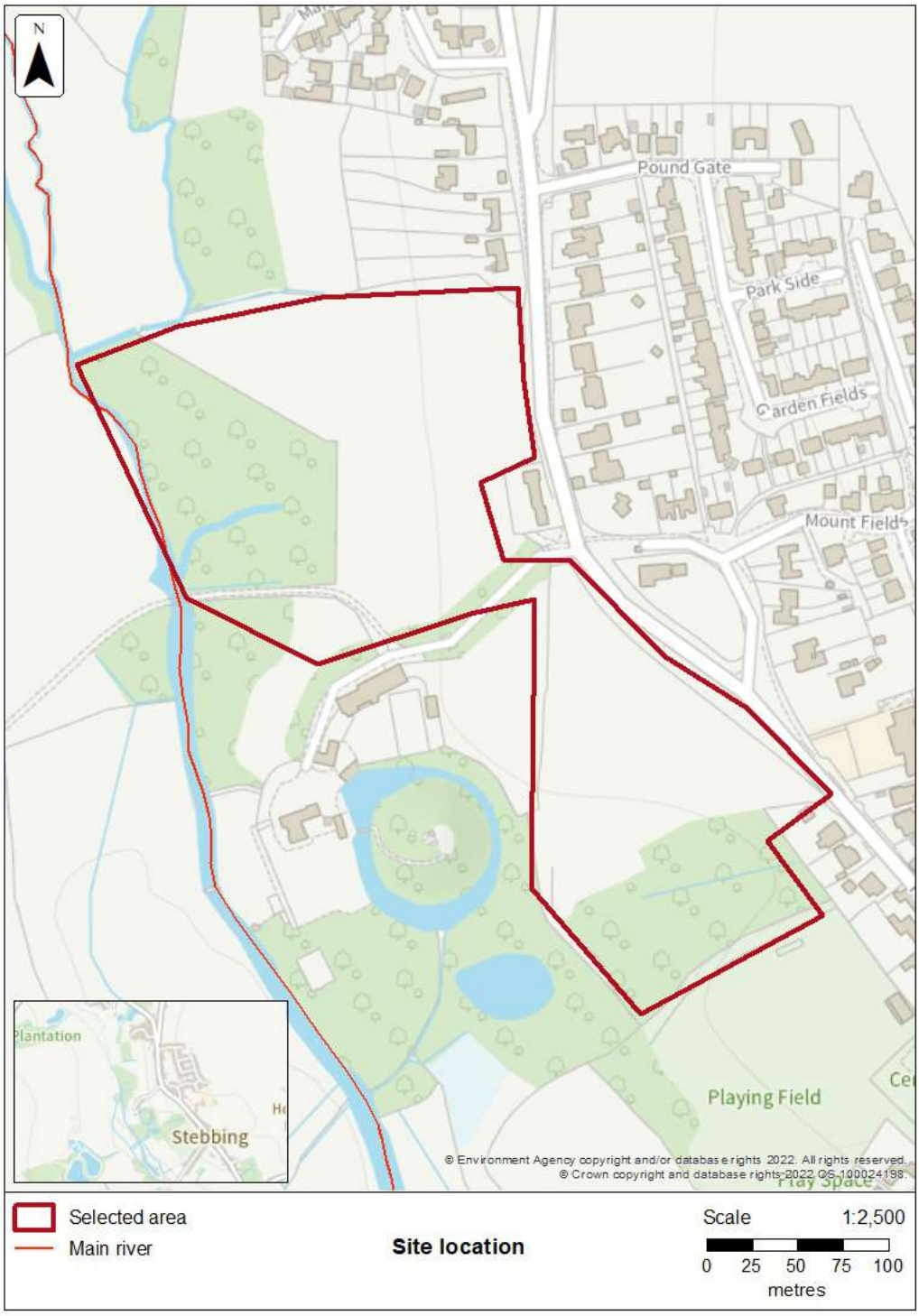
Appendix C Environment Agency Information

- Product 4 data ref. EAN/2022/262503 and correspondence dated 6th and 10th June 2022

Flood risk assessment data

Location of site: 565814 / 224519 (shown as easting and northing coordinates)
Document created on: 16 May 2022
This information was previously known as a product 4.
Customer reference number: D8UMWJDWDMJP

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

> **We recommend that you work with a flood risk consultant to get your flood risk assessment.**

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of
- flooding definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- historic flooding
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- flood defences and
- attributes modelled data
- climate change modelled data

We do not have historic flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to floodng from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

There is not any modelled data available for this location. This is because detailed modelling hasn't been carried out in this area.

There is not any modelled climate change data for this location. This is because detailed modelling hasn't been carried out in this area. You will need to consider the latest flood risk assessment climate change allowances and factor in the new allowances to demonstrate the development will be safe from flooding.

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

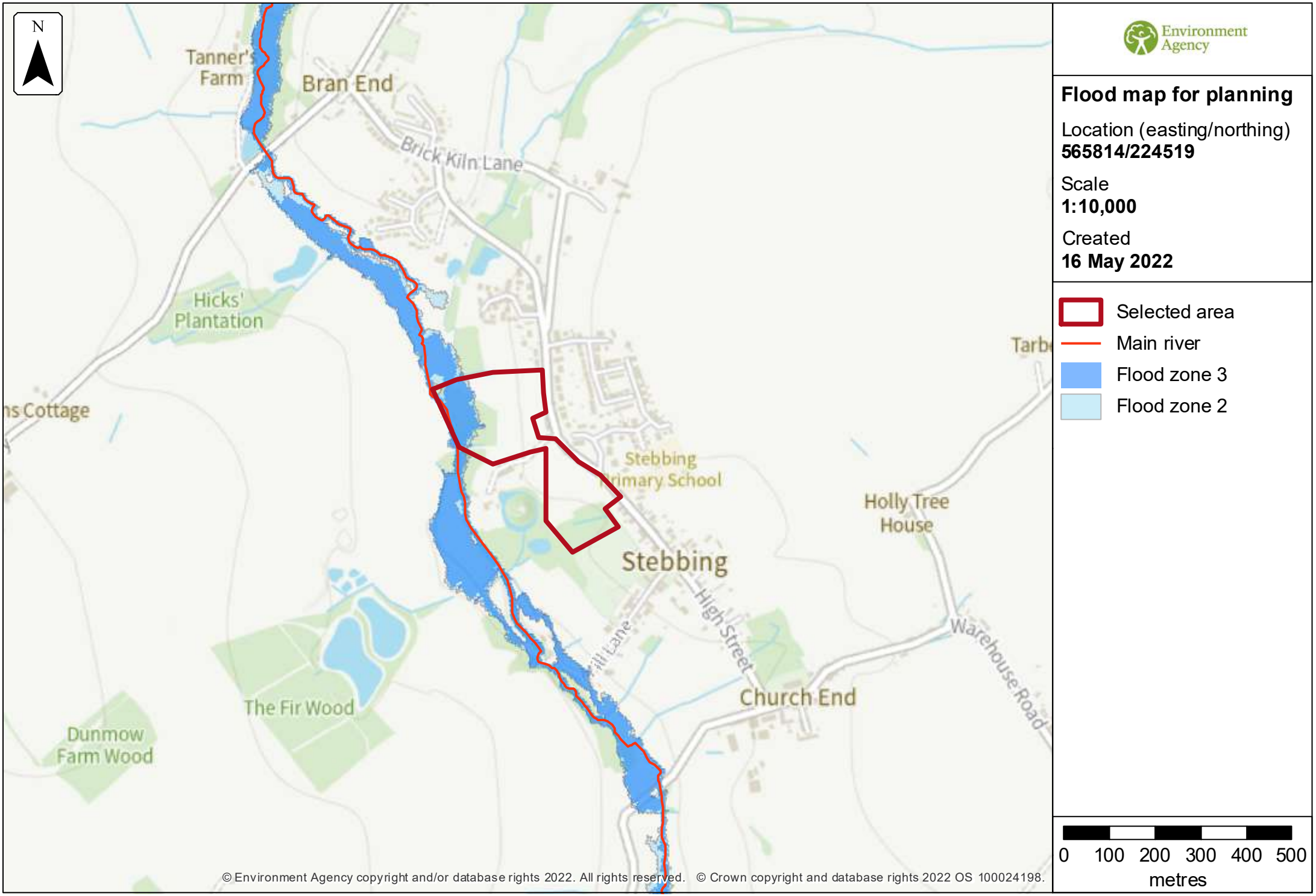
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.


N
Tanner's Farm
Bran End
Brick Kiln Lane
Hicks' Plantation
Stebbing Primary School
Holly Tree House
Stebbing
High Street
Church End
Warehouse Road
The Fir Wood
Dunmow Farm Wood
Environment Agency
Flood map for planning
Location (easting/northing)
565814/224519
Scale
1:10,000
Created
16 May 2022
Selected area
Main river
Flood zone 3
Flood zone 2
0 100 200 300 400 500
metres
© Environment Agency copyright and/or database rights 2022. All rights reserved. © Crown copyright and database rights 2022 OS 100024198.

Historic flooding

This map is an indicative outline of areas that have previously flooded. Remember that:

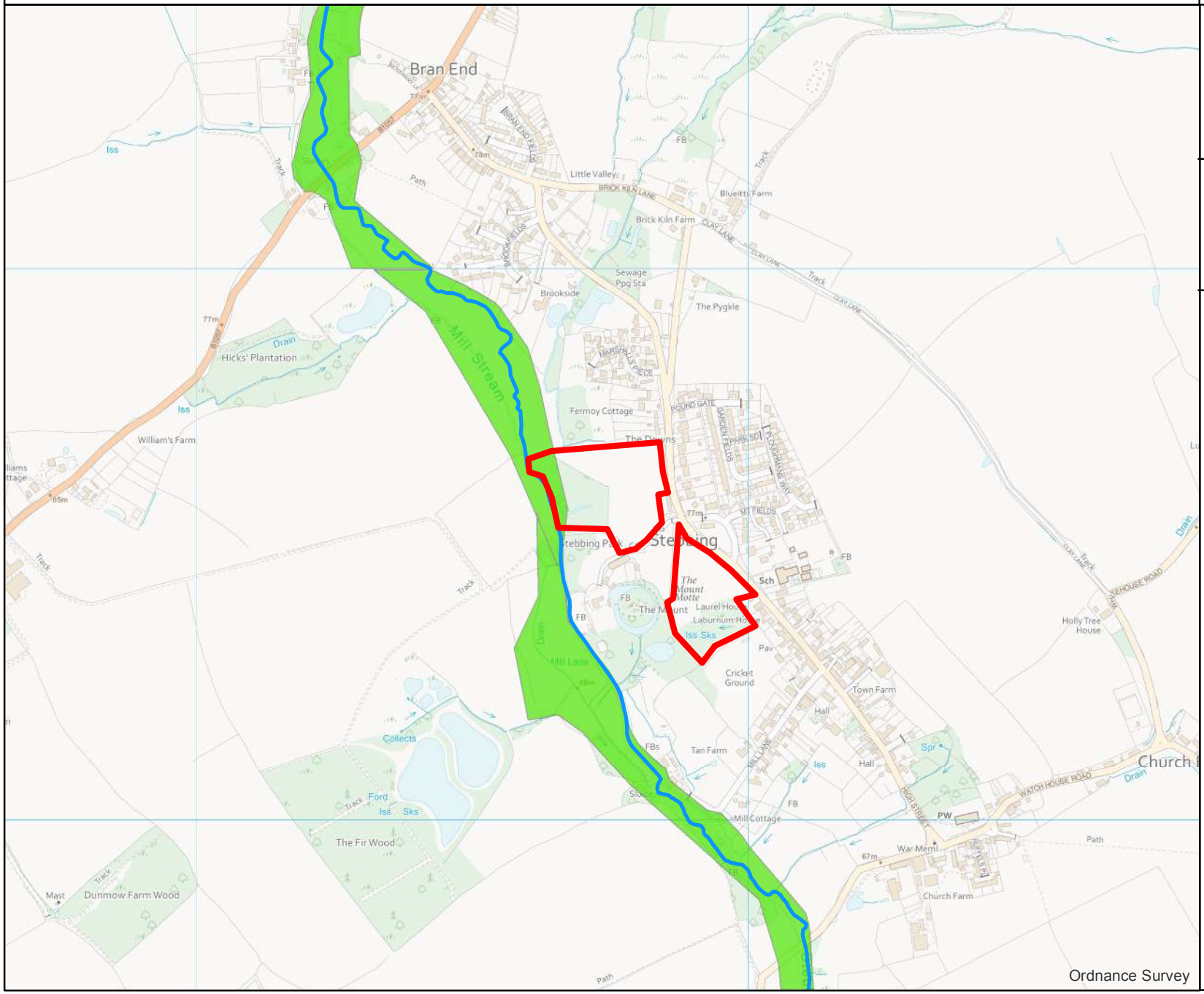
- our records are incomplete, so the information here is based on the best available data
- it is possible not all properties within this area will have flooded
- other flooding may have occurred that we do not have records for
- flooding can come from a range of different sources - we can only supply flood risk data relating to flooding from rivers or the sea

You can also contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

Download recorded flood outlines in GIS format

Recorded Flood Outlines

At: 565736, 224585 Created: 16/05/2022 Ref: EAN/2022/262503



Environment Agency
Iceni House
Cobham Road
Ipswich
Suffolk
IP3 9JD

N

0 120 240 480

Metres

1:10,000

Legend

- Site Location
- Main Rivers
- 1947 Flood Outline

The historic flood event outlines are based on a combination of anecdotal evidence, Environment Agency staff observations and survey.
Our historic flood event outlines do not provide a definitive record of flooding.
It is possible that there will be an absence of datain places where we have not been able to record the extent of flooding.
It is also possible for errors occur in the digitisation of historic records of flooding.

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

Produced by: Partnership & Strategic Overview East Anglia: Essex, Norfolk & Suffolk

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the East Anglia Environment Agency team at enquiries_eastanglia@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for

Edney, Elizabeth

From: Enquiries_EastAnglia <Enquiries_EastAnglia@environment-agency.gov.uk>
Sent: 10 June 2022 14:38
To: Fisher, Richard
Subject: EAN/2022/263202 Response to your request for P4 data - Stebbing, Essex

Dear Richard

Thank you for your request of 16 May 2022.

Unfortunately, we cannot provide you with any flood levels for the area you requested. We have not conducted any detailed modelling in this area. The Flood Zone maps in your area are formed of national generalised modelling which was used in 2004 to create fluvial floodplain maps on a national scale. This modelling was improved more recently, using a more detailed terrain model for the area. This modelling is not a detailed local assessment, it is used to give an indication of areas at risk from flooding.
JFLOW outputs are not suitable for detailed decision making. Normally, in these circumstances, an FRA will need to undertake a modelling exercise in order to derive flood levels and extents, both with and without allowances for climate change, for the watercourse, in order to inform the design for the site. Without this information, the risk to the development from fluvial flooding associated with the ordinary watercourse is unknown.
Detailed modelling is not a cheap process and we have focused our resources on areas with most properties at risk of flooding. At some point in the future we may conduct detailed modelling in this area. However presently we have no plans to conduct any such modelling now or in the near future.

The data we do have is too far away to demonstrate that your site is at risk or not. Maybe it would be best to contact your local authority about flood risk. Your local authority may have conducted some modelling in this area on their own behalf.

We have considered your request under the provisions of the Freedom of Information Act 2000 / Environmental Information Regulations 2004 (EIR). The Act requires that we respond to requests by advising you whether or not information is held, and if so by providing you with that information.

EIR Regulation 3(2) states that information is held if it is in our possession and has been produced or received by us, or it is held by another person on our behalf at the time the request is received.

Information not held
In this case, the information you have requested is not held by us. Therefore we are refusing your request on the grounds that there is no information we can provide.

Where a request is for environmental information, the Regulations allow us to refuse to disclose it if the exception at EIR Regulation 12(4)(a) applies. The regulation states that a public authority may refuse to disclose environmental information to the extent that it does not hold that information when an applicant's request is received.

It is not possible for us to conduct a public interest balancing test because the reason for non-disclosure is that the information is not held.

Rights of appeal
If you are not satisfied you can contact us within 2 calendar months to ask for our decision to be reviewed. We shall review our response to your request and give you our decision in writing within 40 working days.

If you are still not satisfied following this, you can raise a concern with the Information Commissioner, who is the statutory regulator for Freedom of Information and the Environmental Information Regulations. The contact details are:

Information Commissioner's Office

Wycliffe House
Water Lane
Wilmslow
Cheshire
SK9 5AF
Tel: 0303 123 1113
Website: http://ico.org.uk.

Kind regards

Sam

Samantha Clemens
Customers & Engagement Officer, Customers & Engagement Team, East Anglia Area
Environment Agency | Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE
Environment Agency | Iceni House, Cobham Road, Ipswich IP3 9JD
[redacted] [redacted]

Edney, Elizabeth

From: Enquiries_EastAnglia <Enquiries_EastAnglia@environment-agency.gov.uk>
Sent: 06 June 2022 12:10
To: Edney, Elizabeth
Subject: Land off The Downs, Stebbing, Dunmow - Our ref: EAn/2022/262503
Attachments: Product 4 Supporting Documentation.pdf; 262503 product 4.pdf

Dear Elizabeth

Thank you for your enquiry of 5 May 2022.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

In response to your enquiry, please see the attached document.

Please find attached supporting documentation which includes licence information for the data.

If you have any comments regarding the attached letter please contact our Partnership & Strategic Overview team directly by email at PSOENS@environment-agency.gov.uk

We have not undertaken any detailed modelling for the nearby Stebbing Brook, so this source of flood risk has not been assessed for the purpose of the flood map. This will need to be investigated further in any FRA.
Normally, in these circumstances, an FRA will need to undertake a modelling exercise in order to derive flood levels and extents, both with and without allowances for climate change, for the watercourse, in order to inform the design for the site. Without this information, the risk to the development from fluvial flooding associated with the main watercourse is unknown.

Critical drainage areas:
Critical drainage area can be checked by from the following page:

Areas with critical drainage problems - data.gov.uk

Please read the Open Government Licence: www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ which explains the permitted use of the defence information we have provided.

Data Available Online
Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

What's In Your BackYard (WIYBY) is no longer available
Most of the data is still available via other sharing services such as DATA.GOV.UK, MAGIC map and new GOV.UK digital services. Where the datasets are no longer available as maps, you will be able to download and use within specialist applications.

To find out all the services the Environment Agency have available, please click here.

Additional information

Please be aware that we now charge for planning advice provided to developers, agents and landowners. If you would like advice to inform a future planning application for this site then please complete our https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion and email it to our Sustainable Places team at: planning.ipswich@environment-agency.gov.uk. They will initially provide you with a free response identifying the following:

- the environmental constraints affecting the proposal;
- the environmental issues raised by the proposal;
- the information we need for the subsequent planning application to address the issues identified and demonstrate an acceptable development;
- any required environmental permits.

If you require any further information from them (for example, a meeting or the detailed review of a technical document) they will need to set up a charging agreement. Further information can be found on our website.

If you want to discuss this please call our Sustainable Places team on 0203 025 5475.

Climate Change Allowances

The National Planning Practice Guidance refers planners, developers and advisors to the Environment Agency's guidance on considering climate change in Flood Risk Assessments (FRAs). This guidance was updated in October 2021 and is available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

The guidance provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, which varies depending on which management catchment a site lies within. It advises on which allowances to use for assessing the impact of climate change on fluvial flood risk based on vulnerability classification, flood zone and development lifetime.

TEAM2100: delivering the first 10 years of investment in tidal flood defences for the Thames Estuary 2100 Plan. For more information, visit the TEAM2100 website or email thamesestuary2100@environment-agency.gov.uk

Please get in touch if you have any further queries or contact us within two months if you would like us to review the information we have sent.

Regards
Teresa

Teresa Chapman
Customers & Engagement Officer, Customers & Engagement Team,
Environment Agency East Anglia Area

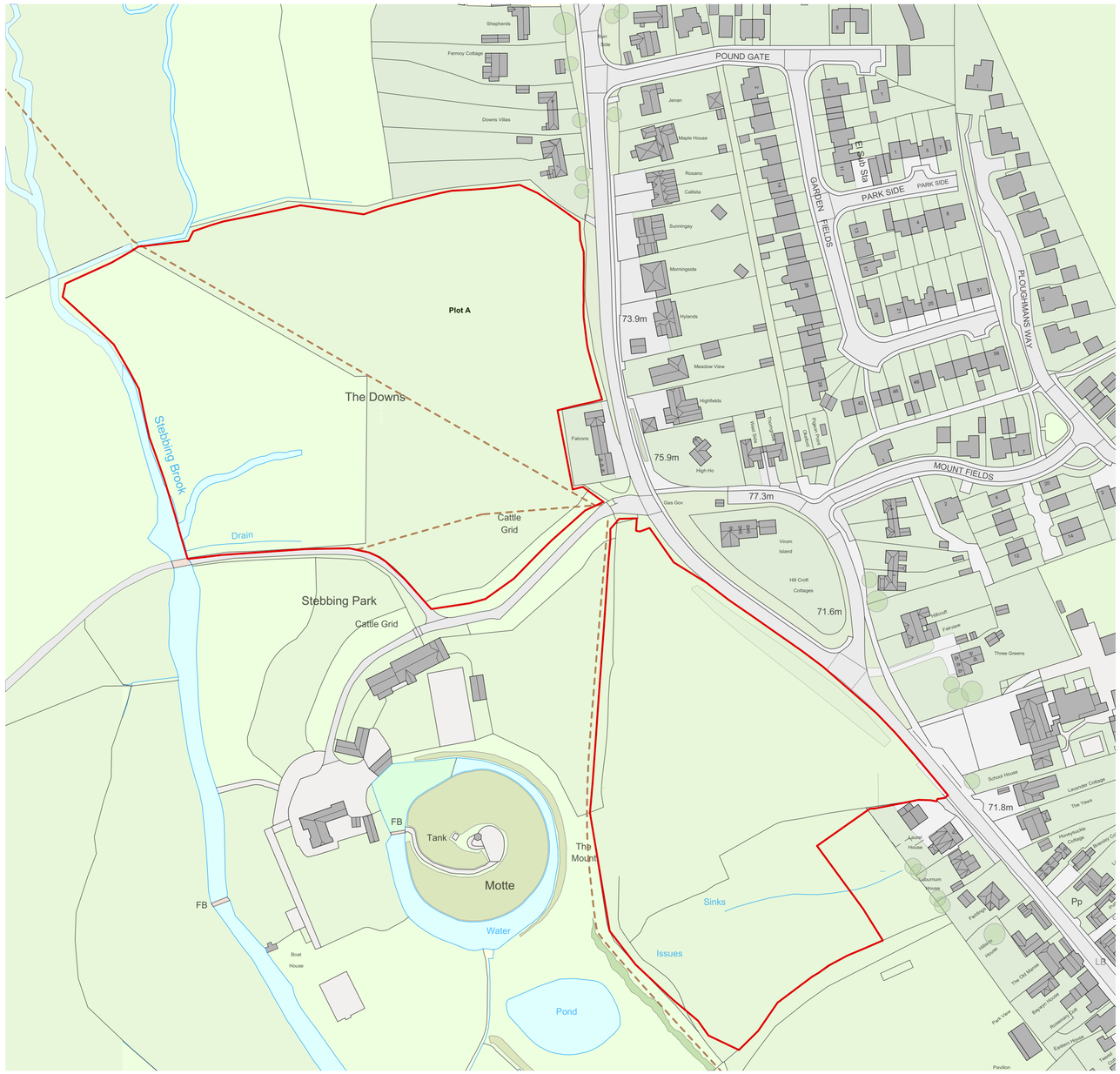
[redacted]

DATA.GOV.UK
Opening up Government

If you use the Defra **Data Sharing Platform** (DPS) you can use this link to find out about new and updated datasets and much more. Not using DPS yet? **Register for an account** here and you will receive email notifications direct.

Appendix D Development Proposals

- Drawings by Alistair Downie Studio dated September 2023



0 25 50 100m

1.Do not scale from this drawing. Use figured dimensions only.

2. This drawing may not be based on survey drawings and areas are therefore subject to change as part of the general design process and/or the obtention of a survey drawing study.

Legend:

- Site boundary
- Existing right of way

Planning Application

ALISTAIR DOWNIE STUDIO

Stebbing development

Land adjacent to Stebbing, Dunmow, Essex
Plot 1a CM6 3SH/ Plot 1b CM6 3RA

PROJECT NO.	DWG NO.	REV.
21202	DR_010	-

TITLE

Location Plan

DATE	SCALE
27/09/2023	1:1250@A1 / 1:2500@A3

Alistair Downie studio, Home ground, Glebe Farm, Great Rissington, Cheltenham, Glocs, GL54 2LH
T., +44 7973 154540 E., studio@alistairdownie.com W., www.alistairdownie.com

0 25 50 100m

1.Do not scale from this drawing. Use figured dimensions only.

2. This drawing may not be based on survey drawings and areas are therefore subject to change as part of the general design process and/or the obtention of a survey drawing study.

Legend:

- Site boundary
- Existing right of way

Planning Application

ALISTAIR DOWNIE STUDIO

Stebbing development

Land adjacent to Stebbing, Dunmow, Essex

Plot 1a CM6 3SH/ Plot 1b CM6 3RA

PROJECT NO.	DWG NO.	REV.
21202	DR_020	-

TITLE

Proposed Masterplan

DATE	SCALE
27/09/2023	1:1250@A1 / 1:2500@A3

Alistair Downie studio, Home ground, Glebe Farm, Great Rissington, Cheltenham, Glocs, GL54 2LH
T., +44 7973 154540 E, studio@alistairdownie.com W, www.alistairdownie.com

0 1 2 5 10m 20m

1.Do not scale from this drawing. Use figured dimensions only.

2. This drawing may not be based on survey drawings and areas are therefore subject to change as part of the general design process and/or the obtention of a survey drawing study.

Legend:

- Site boundary
- Existing right of way
- Existing fencing (TBD)
- Potential curtilage

Plot A - 6 units
A1 - 3B6p 165sqm (single storey)
A2 - 3B6p 210sqm
A3 - 2B4-5p 140sqm
A4 - 4B8p 235sqm
A5 - 4B8p 230sqm
A6 - 2B4-5p 130sqm

Plot A - Parking
2 visitors space
3 space per 4B+ dwellings
2 space per 2B & 3B dwellings

Planning Application

ALISTAIR DOWNIE STUDIO

Stebbing development
Land adjacent to Stebbing, Dunmow, Essex
Plot 1a CM6 3SH/ Plot 1b CM6 3RA

PROJECT NO.	DWG NO.	REV.
21202	DR_0190A	-

TITLE
Proposed Site plan - Plot A2

DATE	SCALE
20/09/2022	1:150 @ A0 / 1:300 @ A2

Alistair Downie studio, Home ground, Glebe Farm, Great Rissington, Cheltenham, Glocs, GL54 2LH
T., +44 7973 154540 E., studio@alistairdownie.com W., www.alistairdownie.com