AMENDED

NPPF: Flood Risk Assessment

Old Ashford Road, Lenham

Dean Lewis Estates

SHF.1528.004.HY.R.001.D

'Experience and expertise working in union'

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Executive Summary

This report presents a Flood Risk Assessment in accordance with the National Planning Policy Framework and National Planning Practice Guidance: Flood Risk and Coastal Change ID: 7 guidance[1], for a proposed residential-led development located on land south of Old Ashford Road, Lenham.

The report assesses the flood risk and how this could be managed to allow the Site to be developed in support of the planning application. The FRA also includes an assessment of the surface water and foul drainage requirements.

A summary of the baseline Site condition is included below:

- The 13.45-hectare (ha) Site is comprised of two main land parcels currently mostly under arable farming with subsidiary grassland. A small separate 1.89ha parcel of farmland to the southeast is proposed for a nutrient treatment wetland to treat runoff and groundwater to ensure the proposed development is nutrient neutral.- the proposed wetland scheme is reported in report SHF.1528.004.HY.R.005.C, Enzygo December 2024 and shown in Drawing 0009.
- The Site is underlain by clayey soils and bedrock with low infiltration potential.
- Two watercourses convey flows through the Site.

The risk of flooding is assessed as follows:

  - The risk of fluvial flooding is assessed as negligible. There is however a residual risk of fluvial flooding from onsite watercourses.
  - The risk of groundwater flooding is assessed as negligible at the surface but low risk below ground.
  - The risk of surface water flooding is assessed as negligible for most of the Site, with an area of low risk associated with the surface water flow pathways and ponded areas.

Flood risk from identified sources can be reduced to a negligible or low and acceptable level through the following approach:

Subject to the proposed avoidance measures, the Sequential Test is not required:

  - Sequentially develop the Site, limiting the built development outside the mapped extent of surface water flooding which would be less than the 4m easement provided for inspection and maintenance.
  - Set the surface water outfall from the proposed development at an appropriate height (i.e. +300mm) above the bed level of the receiving watercourse.
  - Set finished floor levels a minimum of +300mm above external levels for dwellings located closest to watercourses, grading back to +150mm for dwellings located further away.

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

- It is recommended that the number of highway crossings along the route of Watercourse 1 and 2 is kept to a minimum. Culvert crossings would need to be sized to convey the 1 in 100-year plus climate change event, with a freeboard allowance.
- No below surface habitable buildings (i.e., basements).
- Lined attenuation to prevent groundwater ingress.

Further to the above, the FRA has recommended further measures in line with statutory requirements / following best practice. The FRA has explored control, mitigate and management measures. A summary is included in the table below.

The proposed residential use is classified as more vulnerable. More vulnerable uses are considered acceptable in terms of flood risk in Flood Zone 1 (low risk). There is however a risk of flooding from other sources. Subject to the implementation of the above avoidance measures, the Sequential Test would be passed, and the Exception Test would not be required.

Source of Flooding	Risk of Flooding	Risk Without Measures	Recommended Measures	Risk to Development with Measures
Fluvial - Watercourses 1, 2 and 3	Negligible for most of the Site but residual flooding from Watercourses 1 and 2.	Residual	Avoid and Control	Negligible
Tidal - None identified	Negligible	Negligible	N/A	Negligible
Groundwater - Principal Aquifer - bedrock designation and Secondary Undifferentiated Aquifer - superficial designation	Negligible above ground and low below ground.	Negligible to low	Avoid and Control	Negligible
Surface Water - Poor permeability and Site topography	Negligible for most of the Site, with an area of low to high risk associated with flow pathways and ponding.	Negligible to high	Avoid and Control	Negligible
Sewers and Mains - None identified	Negligible	Negligible	N/A	Negligible
Infrastructure Failure - Pond	Negligible	Negligible	N/A	Negligible

- The FRA has considered the potential impact of the development on surface water runoff rates, given the increase in impermeable areas post-development. These rates have been calculated, and it has been demonstrated that surface water can be managed, such that flood risk to and from the Site following development will not increase. This will be achieved through restricted discharge rates (i.e. calculated greenfield [QBAR]) and appropriately sized detention basins, with two outfalls to ditches within ownership.
- It is proposed that foul flows will discharge to the public foul system via a gravity connection in the southern extent of the wider client ownership.

The FRA demonstrates the proposed development would be operated with minimal risk from flooding and would not increase flood risk elsewhere. The development should therefore not be precluded on the grounds of flood risk, as well as surface water and foul drainage.

1.0 Introduction

1.1 Background

1.1.1 Enzygo Ltd was commissioned by Dean Lewis Estates to carry out a site-specific Flood Risk Assessment (FRA) including a surface water drainage strategy in support of an outline planning application for a proposed residential led development, located on land south of Old Ashford Road, Lenham ME17 2DL ('the Site').

1.1.2 The proposal is for residential development, with associated with sports / playing pitches and equipped play area development on the 13.45-hectare (ha) Site. A copy of the proposed layout is included in Appendix 1.

1.1.3 A site-specific FRA assesses the current and future flood risk to and from a development site. It demonstrates how flood risk will be managed now and over the development's lifetime, taking climate change, drainage, and the vulnerability of its intended users into account.

1.1.4 The objectives of a site-specific FRA are to:

- Assess whether a proposed development is likely to be affected by current or future flooding from a range of sources.
- Assess whether the development will increase flood risk elsewhere.
- Decide on measures to deal with these effects and risks and assess their appropriateness.
- Provide enough evidence for the local planning authority to apply (if necessary) the Sequential Test.
- Decide whether the development will be safe and will pass the Exception Test if applicable.

1.1.5 In England, planning applications for development need an FRA[2] for most developments including:

- In Flood Zones 2 and 3 including minor development and change of use.
- Sites of 1ha or larger in Flood Zone 1.
- Sites of less than 1ha in Flood Zone 1, including change of use to a more vulnerable class (for example from commercial to residential), and where they could be affected by sources of flooding other than rivers and the sea.
- Land in Flood Zone 1 in a Critical Drainage Area (CDA) as notified by the Environment Agency (EA).
- Land in Flood Zone 1 identified in a Strategic Flood Risk Assessment (SFRA) as being at increased flood risk in future.

1.1.6 Initial site screening using Environment Agency online indicative flood mapping shows that the Site is in Flood Zone 1 but is more than 1ha in area (13.45ha) and is at risk of surface water flooding. As such, an FRA is required.

[2] Department for Environment, Food & Rural Affairs and Environment Agency (published March 2014 and update February 2017). Flood Risk Assessments if You're Applying for Planning Permission [https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications].

1.1.7 The purpose of this FRA is to assess the risk of flooding to the proposed development and where possible recommend measures to demonstrate that future users of the development would remain safe throughout its lifetime, that the development would not increase flood risk on Site and elsewhere and, where practicable, would reduce flood risk overall.

1.2 Scope

1.2.1 Government policy on development and flood risk is set out in the National Planning Policy Framework (NPPF) [3] and is supported by National Planning Practice Guidance: Flood Risk and Coastal Change [NPPG ID7] [4].

1.2.2 NPPF paragraphs 157-179 set out the need for an appropriate assessment of flood risk at all levels of the planning process and require the application of a sequential risk-based approach to assess the suitability of land for development in flood risk areas[5].

1.2.3 The FRA should also make allowances for climate change[6] to minimise vulnerability and provide resilience to flooding and coastal change in the future. The allowances are predictions of anticipated change in:

- Peak river flow by river basin district.
- Peak rainfall intensity.
- Sea level rise.
- Offshore wind speed and extreme wave height.

1.2.4 The allowances are based on climate change projections and different scenarios of carbon dioxide emissions to the atmosphere. There are different allowances for different periods of time over the next century.

1.2.5 Site-specific FRAs are categorised according to level[7]. Simple Level 1 Screening studies give a general indication of the potential flood risk to a site and identify whether more detailed Level 2 assessment is required or not. A Level 2 assessment is a qualitative appraisal to develop understanding of flood risk to a site and the effects of the site on flooding elsewhere including recommended measures (see Section 5 - Avoid, Control, Mitigate, Manage). Level 3 assessments are more detailed quantitative studies, for example modelling to establish flood levels at a site in the absence of EA or other data or providing detailed outline drainage designs.

1.2.6 This report is a Level 2 qualitative FRA but includes a Level 3 assessment of the surface water drainage requirements for the proposed development.

1.3 Aims

1.3.1 This FRA aims to provide enough flood risk information to satisfy the requirements of the NPPF, PPG ID7 and regional/local government plans and policies. It describes the potential for

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[3] Ministry of Housing, Communities & Local Government (published March 2012 and updated December 2023). National Planning Policy Framework [https://www.gov.uk/government/publications/national-planning-policy-framework--2].
[4] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (published March 2014 and updated August 2022). Planning Practice Guidance ID7-020-20220825; Flood Risk & Coastal Change [https://www.gov.uk/guidance/flood-risk-and-coastal-change].
[5] https://www.gov.uk/guidance/national-planning-policy-framework/14-meeting-the-challenge-of-climate-change-flooding-and-coastal-change#footnote59
[6] Environment Agency (published February 2016 and updated May 2022). Flood Risk Assessments: Climate Change Allowances [https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances].
[7] CIRIA (October 2004) CIRIA C624 - Part C, Chapter 6, Section 6.1 to 6.3.

the Site to be impacted by flooding, the impacts of the proposed development on flooding elsewhere near the Site, and the recommended measures that could be incorporated into the development to manage the identified risks.

1.4 Planning Context

National Policy

1.4.1 The FRA was prepared in accordance with the NPPF and NPPG ID7.

Regional/Local Policy

1.4.2 The FRA considers the following policies within the Maidstone Borough Council Local Plan Review (2021 -2038)[8]:

- Policy LPRSP6(D): Lenham
- Policy LPRSP14(A): Natural Environment
- Policy LPRSP14(C): Climate Change

Strategic Flood Risk Assessment (SFRA)

1.4.3 The FRA has reviewed the guidance within the Maidstone Borough Council Level 1 Strategic Flood Risk Assessment (SFRA) update and Level 2 SFRA report9 and associated mapping.

1.5 Report Structure

1.5.1 This report is structured as follows:

- Section 2 identifies the sources of information that were consulted.
- Section 3 describes the existing Site.
- Section 4 outlines the baseline flood risk from all sources.
- Section 5 details the recommended measures against identified flood risk sources.
- Section 6 assesses the surface water drainage requirements of the proposed development.
- Section 7 presents a summary and conclusions.

[8] https://localplan.maidstone.gov.uk/home/local-plan-review
[9] https://localplan.maidstone.gov.uk/home/local-plan-review-examination/local-plan-review-evidence-page

2.0 Sources of Information

2.1 Sources of Information

2.1.1 The following information was consulted:

- Ordnance Survey mapping (Drawings 0001 and 0002).
- Detailed topographic survey (Appendix 2).
- EA online mapping (Flood Map for Planning[10], Long Term Flood Risk Assessment for Locations in England[11], Catchment Data Explorer[12] and Main River Map[13]).
- EA Reduction in Risk of Flooding from Rivers and Sea online mapping[14].
- Online mapping for Climate Change Allowances for Peak River Flow and Peak Rainfall in England online mapping[15].
- National Soils Resources Institute (NSRI): Soilscapes online mapping[16].
- British Geological Survey [BGS] Geology Viewer online mapping[17].
- British Geological Survey [BGS] Borehole Records online mapping[18].
- Landmark's Promap: Flood Data package (see Drawings).
- Geosmart 1 in 100-year groundwater flood risk map (see Drawings).
- DEFRA's Magic Map for identifying Designated Sites[19].
- River Levels UK for identifying Flood Alert and Flood Warning areas[20].

2.2 Consultation and Discussion with Regulators

2.2.1 Consultation and discussions were undertaken with the relevant water regulators.

Environment Agency

2.2.2 The Environment Agency (EA) is a statutory consultee on flood risk and planning and is directly responsible for the prevention, mitigation, and remediation of flood damage for main rivers and coastal areas; and it has a strategic overview for all forms of flooding.

2.2.3 EA Standing Advice[21] and the NPPF/PPG ID: 7 was consulted and reviewed.

2.2.4 Correspondence with the EA is included in Appendix 3.

[10] https://flood-map-for-planning.service.gov.uk/
[11] https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[12] http://environment.data.gov.uk/catchment-planning/
[13] https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386
[14] ArcGIS - My Map
[15] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
[16] https://www.landis.org.uk/soilscapes/
[17] https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/
[18] https://www.bgs.ac.uk/information-hub/borehole-records/
[19] https://magic.defra.gov.uk/magicmap.aspx
[20] https://riverlevels.uk/flood-map#.XclKwPn7RPZ
[21] Environment Agency and Department for Environment, Food & Rural Affairs (published April 2012 and updated February 2022). Preparing a Flood Risk Assessment: Standing Advice [https://www.gov.uk/guidance/flood-risk-assessment-standing-advice].

Lead Local Flood Authority

2.2.5 Kent County Council, as the Lead Local Flood Authority (LLFA), is responsible for local flood risk management in their area and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater, and ordinary watercourses.

2.2.6 Correspondence with the LLFA is included in Appendix 4.

Water Utility

2.2.7 Drainage and sewerage services in the UK are provided by a number of water and sewerage companies. Southern Water is responsible for sewerage within the area of the Site.

2.2.8 All sewerage undertakers maintain the 'DG5 register' of properties and external areas (such as gardens, highways, open spaces) which have suffered flooding from public foul/combined sewers. It does not include flooding caused by blockages.

2.2.9 Southern Water asset plans are included in Appendix 5.

Internal Drainage Board

2.2.10 The River Stour (Kent) Internal Drainage Board (IDB) area is located 2.4km southeast of the Site. The Site is likely to drain into the IDB area; A consultation request was issued but no response was received.

2.3 Site Walkover

2.3.1 Enzygo staff conducted a walkover of the Site during March 2019. Observations made were used to inform the Site description.

3.0 Site Location and Description

3.1 Location

3.1.1 The Site is located on land south of Old Ashford Road, Lenham, ME17 2DL.

3.1.2 The Site is centred on National Grid Reference (NGR) 590745, 151921.

3.1.3 The 12.55ha Site is shown in Drawing 0001 and in more detail in Drawing 0002.

3.2 Land Use

3.2.1 The site comprises two main land parcels; The larger parcel is centred on National Grid Reference (NGR) 590745, 151921 with a smaller parcel (for a proposed nutrient treatment wetland) to the south centred on NGR 590586, 151391.

The larger parcel is subdivided into a northern parcel which is a single agricultural (arable) field (Figures 3.1 and 3.2). The southern land parcel is three fields bisected by hedgerows (South 1, South 2 and South 3). The southern extent is agricultural (arable) land, and its northern extent is grassland.

3.2.2 The Site is bounded by hedgerow and mature trees along all boundaries. To the north is Old Ashford Road with commercial buildings beyond, to east, south and west is agricultural land and residential dwellings to the north-west.

3.2.3 The Site is currently accessed via a track from a farm (The Dast House) to the east. There is a footpath orientated east to west through the southern extent of the northern parcel and a footpath orientated east to west through the northern extent of the southern parcel

Figure 3.1: Images of the Site

Top Left: *North-east corner of northern land parcel looking south across the Site.* ***Top Right:*** *Northern corner of South 1 looking south across the Site.* ***Bottom Left:*** *Northern corner of South 2 looking south across the Site.* ***Bottom Right:*** *Eastern corner of South 3 looking west across the Site.*

Figure 3.2: Aerial Image of the Site (wetland parcel to south east not shown)

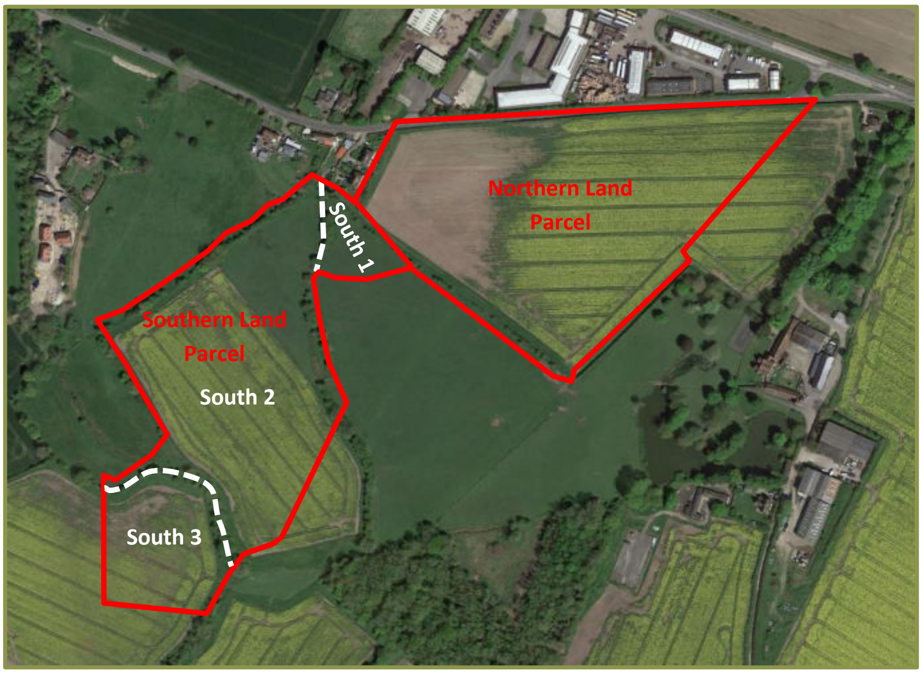


Image © 2024 Digital Globe.

3.3 Topographic Information

3.3.1 A detailed topographic survey was carried out in March 2018 (Appendix 2).

3.3.2 The northern land parcel falls south-west from 117.33 metres Above Ordnance Datum (mAOD) (in the north-east corner) to 107.08m AOD (in the south-west corner). The fall of 10.25m over 344m gives a gradient of 1:34.

3.3.3 South 1 falls south-west towards Watercourse 1, from 107.15m AOD (in the north-east corner) to 105.61m AOD (in the south-west corner). The fall of 1.54m over 71m gives a gradient of 1:46.

3.3.4 South 2 falls south from 107.69m AOD (in the northernmost corner) to 101.47m AOD (in the southernmost corner). The fall of 6.22m over 341m gives a gradient of 1:55.

3.3.5 South 3 falls south from 102.77m AOD (in the north-east corner) to 99.62m AOD along the southern boundary). The fall of 3.15m over 120m gives a gradient of 1:38.

3.3.6 A proposed wetland area parcel to the southeast of the northern and southern parcels shown on Location Plan Drawing 7968-L-200 [F] slopes south from around 100mAOD to 97mAOD.

3.4 Soils and Geology

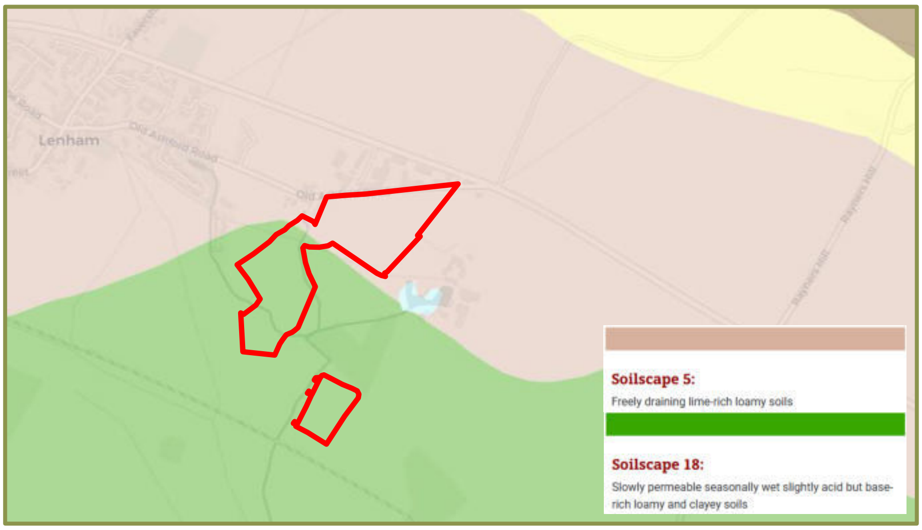
Soils Mapping

3.4.1 The online NSRI Soilscapes mapping shows that the northern land parcel is underlain by freely draining lime-rich loamy soils. The southern land parcel is underlain by slowly permeable slightly acidic base-rich loamy and clayey soils (Figure 3.3).

3.4.2 The soils beneath the northern land parcel are indicative of high infiltration potential and the soils beneath the southern land parcel are indicative of low infiltration potential.

3.4.3 The soils mapping is indicative and there may be localised variation in soil type.

Figure 3.3: Soils Mapping



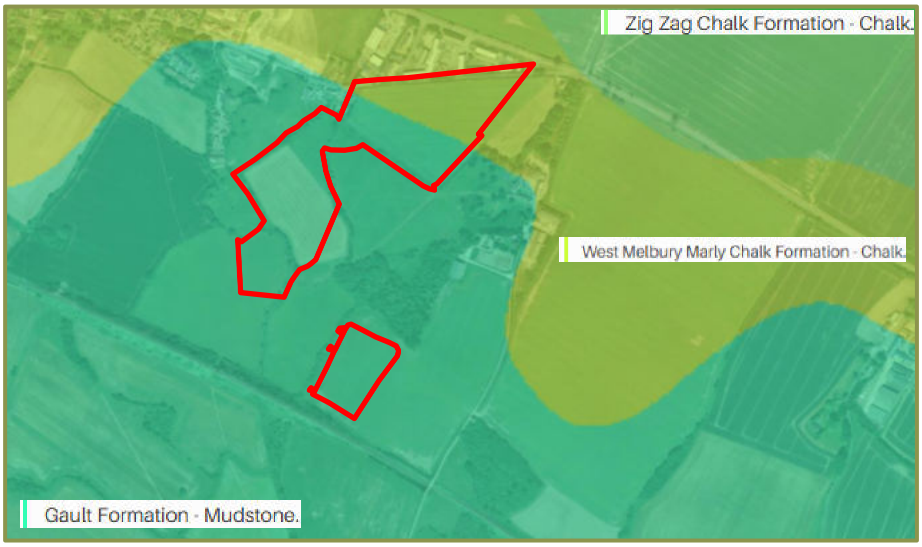
Soils Data © Cranfield University (NSRI) and for the Controller of HMSO [2024].

Geology Mapping

3.4.4 There are no superficial deposits recorded beneath the northern land parcel. Most of the southern land parcel is underlain by Head - clay, silt, sand and gravel superficial deposits. An area beneath the eastern south/central area of the southern land parcel is underlain by Alluvium - clay, silt, sand and peat. The infiltration potential of the superficial deposits is likely low due to the presence of clay.

3.4.5 The Geology of Britain online map viewer (Figure 3.4) shows the bedrock beneath the southern land parcel and the south of the northern land parcel is Gault Formation-Mudstone. The north of the northern land parcel is underlain by West Melbury Marly Chalk Formation-Chalk. The infiltration potential of the Mudstone bedrock is likely to be low, whereas the Chalk is potentially good, depending on the depth of the weathered layer.

Figure 3.4: Geology Mapping (continues over page)



***Top**: Bedrock Geology. **Bottom:** Superficial Deposits. Contains British Geological Survey materials © NERC [2024].*

BGS Borehole Logs

3.4.6 The Geology of Britain online map viewer shows there are no borehole logs located within the Site or its immediate vicinity.

Soakaway Testing

3.4.7 Soakaway testing was undertaken during March 2019 (Appendix 6).

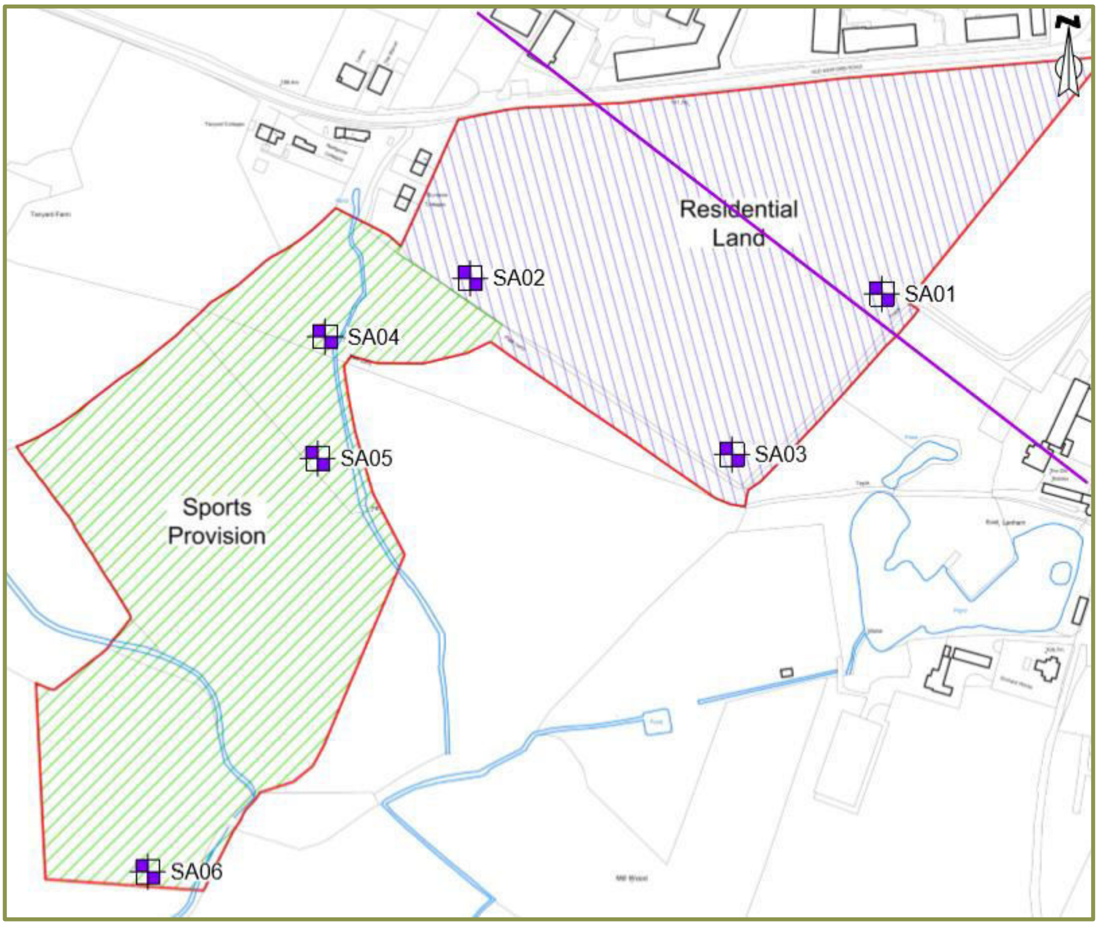
3.4.8 The test pits were excavated to a depth of between 1.60 and 4.00 m below ground level (mbgl). Table 3.1 summarises the trial pit logs. Six trial pits were excavated across the northern and southern parcels (locations in Figure 3.5 and summary descriptions in Table 1). Superficial deposits were found in 3 trial pits excavated across the northern parcel (SA01, SA02, SA03) and comprised sand, gravel, and clay mixtures in varying proportions to depths up to 3.8 metres below ground level (mbgl) (SA02). Three trial pits excavated across the southern parcel (SA04, SA05 and SA06) recorded similar superficial deposits with an increasing dominance of clay at a depth of 4 mbgl in SA06 at the south end of the southern parcel.

Table 3.1: Soakaway Data

Trial Pit	Summary of Strata
SA01	0.00 - 0.45m = made ground (top soil) 0.45 - 1.90m = slightly sandy gravelly sand 1.90 - 2.20m = slightly sandy gravelly clay
SA02	0.00 - 0.80m = made ground (top soil) 0.80 - 1.70m = slightly sandy gravelly clay 1.70 - 3.80m = slightly sandy clay
SA03	0.00 - 0.60m = made ground (top soil) 0.60 - 0.90m = slightly gravelly clay 0.90 - 2.00m = slightly gravelly sandy clay
SA04	0.00 - 0.30m = made ground (top soil) 0.30 - 1.00m = slightly sandy gravelly clay 1.00 - 2.00m = slightly gravelly clay

Trial Pit	Summary of Strata
SA05	0.00 - 0.40m = made ground (top soil) 0.40 - 1.10m = gravelly clay 1.10 - 2.00m = slightly sandy gravelly clay
SA06	0.00 - 0.50m = made ground (top soil) 0.50 - 0.90m = slightly gravelly clayey sand 0.90 - 2.00m = slightly sandy clay 2.00 - 4.00m = clay

Figure 3.5: Trial Pit Location Plan



3.5 Hydrogeology

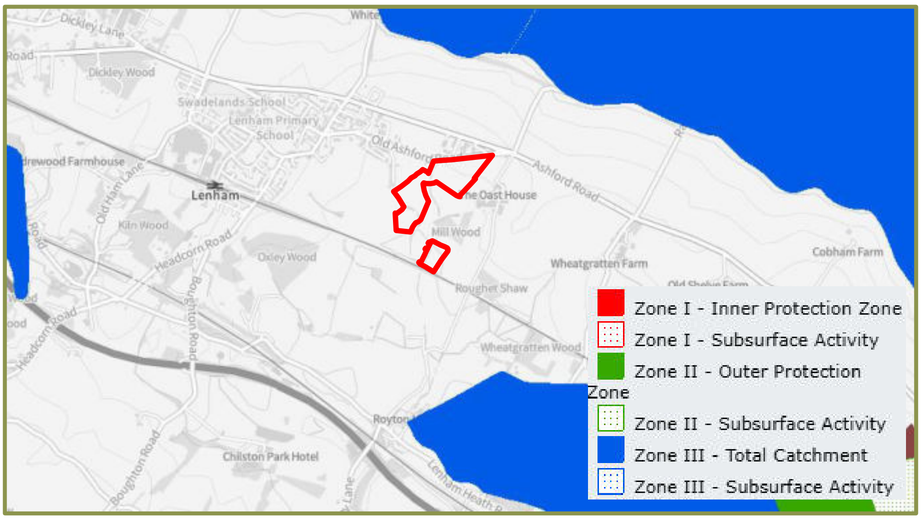
Soakaway Testing

3.5.1 Soakaway testing demonstrated low infiltration potential across the Site. Groundwater ingress was encountered in SA02, SA03 and SA06 between 2.00mbgl and 3.50mbgl. The groundwater is likely to be perched, associated with the sandy superficial deposits on top of the clay.

Defra Magic Map

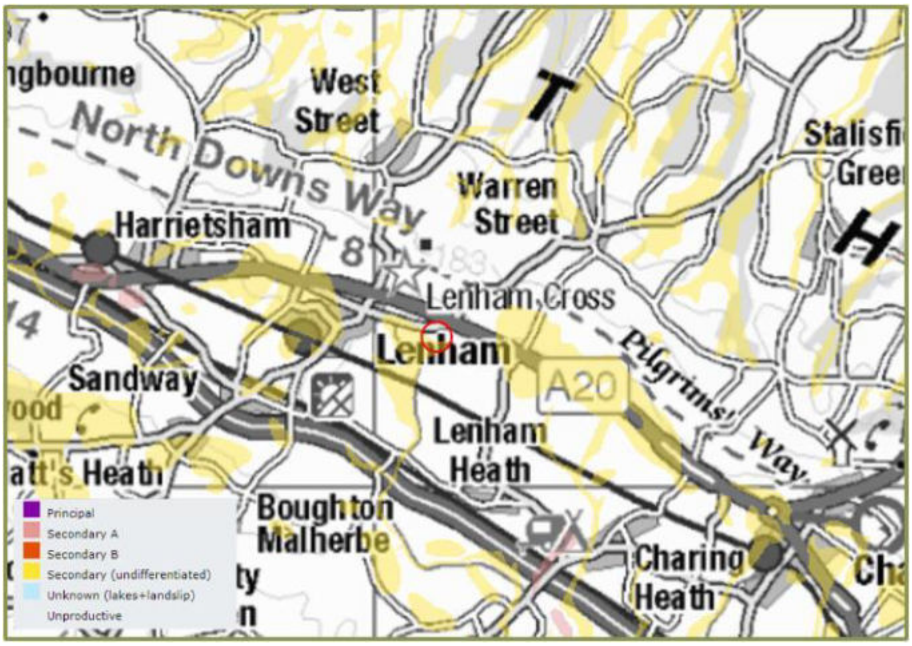
3.5.2 Defra Magic Map online mapping (Figure 3.6) shows the Site is not in a groundwater Source Protection Zone (SPZ).

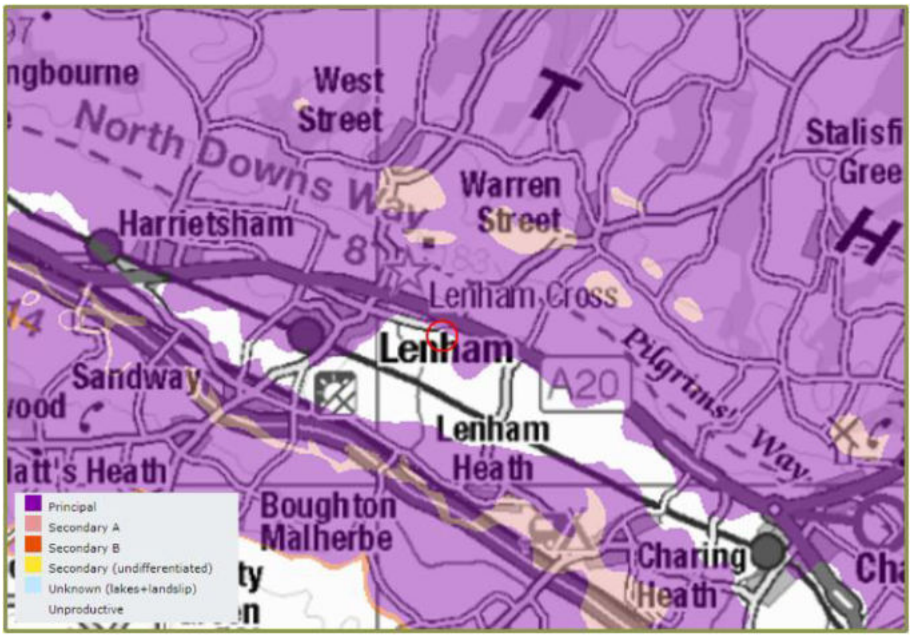
Figure 3.6 Source Protection Zone Map



3.5.3 The north-east of the northern land parcel is located above a Principal Aquifer - bedrock designation (Figure 3.7). The southern land parcel is located above a Secondary Undifferentiated Aquifer - superficial designation. Indirect inputs of clean surface water to groundwater are permissible, for example where the base of the soakaway is above the water table and there is an unsaturated zone in the aquifer unit.

Figure 3.7: Aquifer Designation Map (continues over page)





Top: Aquifer Designation (superficial deposits). Bottom: Aquifer Designation (bedrock). From Magic Map. Contains Environment Agency information © Environment Agency and database right [2024].

3.6 Catchment Hydrology

OS Mapping and Topographic Survey

Watercourse 1

3.6.1 OS mapping shows an unnamed watercourse ('Watercourse 1') originating from a pond ('Pond 1'), just outside the northern boundary. Watercourse 1 conveys flows south-east, along the field boundary of South 1 and South 2 (Figure 3.8). Watercourse 1 exits the Site along the south-eastern boundary. Further downstream (approx. 70m south east of the Site boundary) the watercourse appears to enter a culvert and discharge into Watercourse 3. Watercourse 1 has a bed level of 106.21mAOD where it enters the Site and 102.12mAOD where it leaves the Site. This is a fall of 4.69 over approximately 210m (1:45).

Watercourse 2

3.6.2 A second unnamed watercourse ('Watercourse 2') conveys flows south-east, along the field boundary of South 2 and South 3 (Figure 3.8). Watercourse 2 then conveys flow south along the eastern boundary of South 3, where it is culverted (Ø300mm circular) for approximately 10m. The watercourse conveys flow south towards the railway, turning east along the railway track embankment where it joins a third watercourse ('Watercourse 3'). Watercourse 2 has a bed level of 101.77mAOD where it enters the Site and 97.44mAOD where it leaves the Site. This is a fall of 4.33m over approximately 185m (1:43).

Watercourse 3

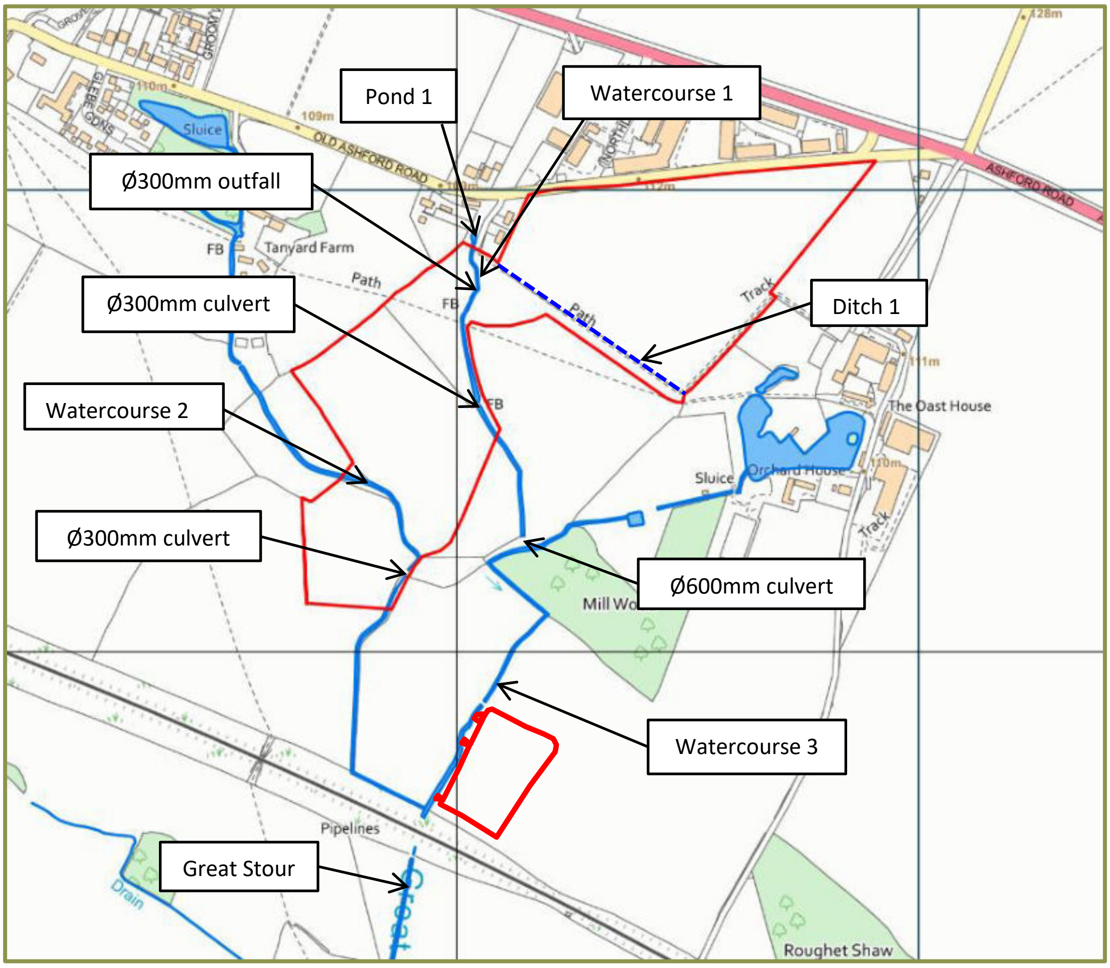
Watercourse 3 originates from a pond approximately 140m to the south-east of the Site. The watercourse conveys flows south-west along the boundary of Mill Wood and then south towards the railway track, where it is joined by Watercourse 2 (Figure 3.8). The watercourse is culverted for approximately 40m beneath the railway, where it becomes the Great Stour. Watercourse 3 was not picked up on the topographic survey.

Ditch 1

3.6.3 The topographic survey identified a ditch (hereafter referred to as 'Ditch 1') along the southern boundary of the northern land parcel, which is not shown on OS mapping.

3.6.4 The above identified watercourses are classified as 'ordinary watercourses', where flood risk work is carried out by the local drainage authority/riparian landowner.

Figure 3.8: Map of Watercourses



Site Walkover Observations

3.6.5 The Site walkover confirmed the presence of the watercourses shown on OS mapping and the topographic survey. Below is a summary of the walkover observations.

Watercourse 1

3.6.6 Pond 1 at the head of Watercourse 1 was not seen during the walkover.

3.6.7 Watercourse 1 has an approximate 2m bed width, 4m bank width and 1m depth towards the northern extent of the southern land parcel. The watercourse enters the Site from beneath a fence. The channel was heavily overgrown with vegetation (Figure 3.9). At the upstream reach, a Ø300mm outfall into Watercourse 1 on the eastern bank was seen but at the time of the walkover there was no outfall flow (Figure 3.10).

3.6.8 In the south-east corner of South 1, an informal footbridge (railway sleepers) provides a crossing over Watercourse 1 (Figure 3.11). The watercourse conveys flow beneath a farm access track within a Ø300mm culvert.

3.6.9 Where Watercourse 1 exits the Site, its channel is less vegetated and has an approximate 1.0m bed width, 8.0m bank width and 1.5m depth (Figure 3.9).

3.6.10 Approximately 70m south-east of the Site, Watercourse 1 enters a Ø600mm culvert for approximately 10m, before outfalling into Watercourse 3 (Figure 3.10). The culvert inlet had a large amount of debris partly blocking it.

Figure 3.9: Watercourse 1

Top: *Looking downstream at northern corner of southern land parcel.* ***Bottom:*** *Watercourse 1 at southern corner of the southern land parcel.*

Figure 3.10: Culverts

Top left: *Ø300mm culvert outfalling into Watercourse 1.* ***Top Right:*** *Ø300mm culvert conveying flow beneath farm access track along Watercourse 1.* ***Bottom left:*** *Ø600mm culvert inlet into Watercourse 3.* ***Bottom Right:*** *Ø600mm culvert outfall into Watercourse 3.*

Figure 3.11: Footbridge

Informal footbridge across Watercourse 1.

Watercourse 2

3.6.11 Watercourse 2 has an approximate 2m bed width, 3 m bank width and 0.75m depth. The channel was overgrown with vegetation at the time of walkover (Figure 3.12)- and was conveying flow south-east.

3.6.12 In the southern corner of South 3 the watercourse enters a Ø300mm culvert beneath a farm access track. The culvert was observed to be heavily vegetated (Figure 3.13)

Figure 3.12: Watercourse 2

View looking downstream along Watercourse 2.

Figure 3.13: Culvert

***Left:** Inlet**. Right:** Outlet*

Watercourse 3

3.6.13 Watercourse 3 conveys flow west approximately 140m south-west of the Site. Upstream from a Ø600mm culvert (outfall from Watercourse 1), the watercourse was seen to have shallow flow and was moderately vegetated (Figure 3.14). The flow continues south towards the railway line where it is culverted beneath the railway embankment. The culvert was inaccessible at the time of the walkover.

Figure 3.14: Watercourse 3

Top: *Watercourse 3 - Upstream of Watercourse 1 outfall.* ***Bottom:*** *Watercourse 3 - Downstream of Watercourse 1 outfall.*

Ditch 1

3.6.14 Ditch 1 has an approximate 1m bed width and 3m bank width. The channel was mostly dry, with wet areas towards the northwest of the ditch. The ditch was overgrown with vegetation at the time of walkover (Figure 3.15). The ditch appears unconnected to any watercourses and It is assumed the ditch captures overland flows and the water infiltrates over time.

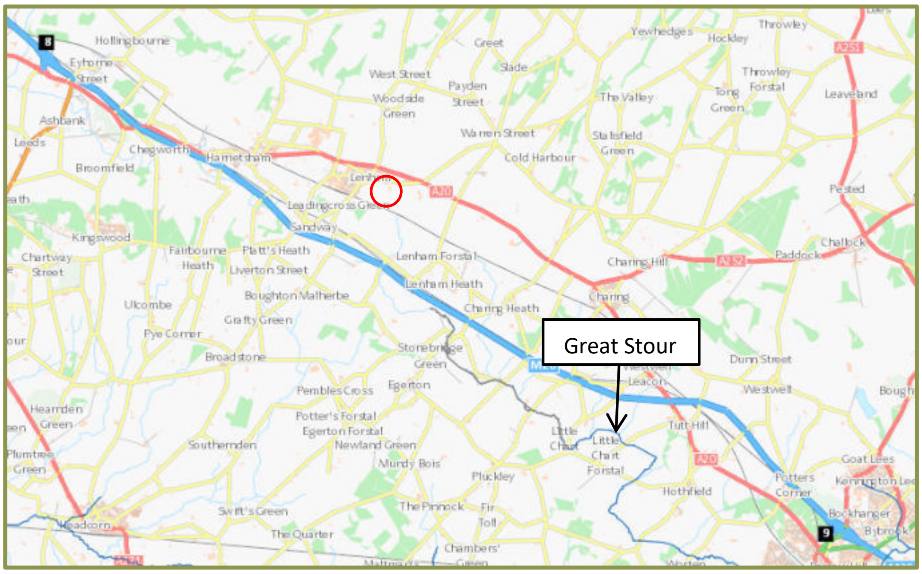
Figure 3.15: Ditch 1

View looking west along Ditch 1.

Main River Map

3.6.15 The Environment Agency online main river map (Figure 3.16) identifies the Great Stour as the closest main river (watercourses where flood risk work is carried out by the Environment Agency). The Great Stour is designated an ordinary watercourse at the Site's southern boundary and becomes main river approximately 6.8km south east of the Site, conveying flow south-east.

Figure 3.16: Main River Map

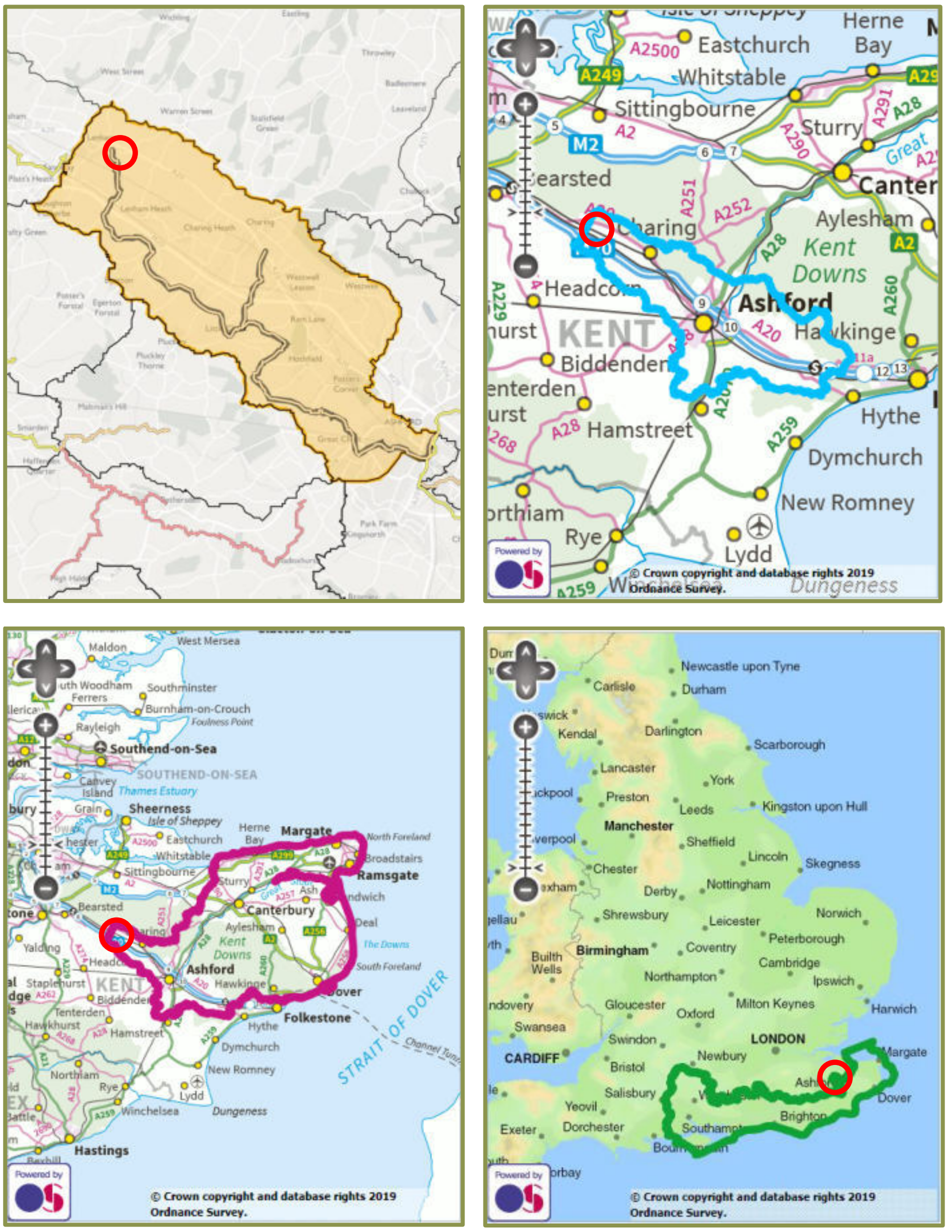


Contains Environment Agency information © Environment Agency and database right [2024].

Environment Agency Catchment Data Explorer Mapping

3.6.16 The Site is in the Upper Great Stour Catchment (Figure 3.17), which is in the Stour Upper Operational Catchment, Stour Management Catchment and South East River Basin District.

Figure 3.17: Catchment Data Explorer



Top Left: *Upper Great Stour Catchment.* ***Top Right:*** *Stour Upper Operational Catchments.* ***Bottom Left:*** *Stour Management Catchment.* ***Bottom Right:*** *South East River Basin District. Contains Environment Agency information © Environment Agency and database right [2024].*

3.7 Sewerage Assets

3.7.1 Southern Water asset plans show a Ø225mm public foul sewer conveying flows south-east approximately 80m to the south-west of the Site. There are no surface water or combined sewers within the vicinity of the Site.

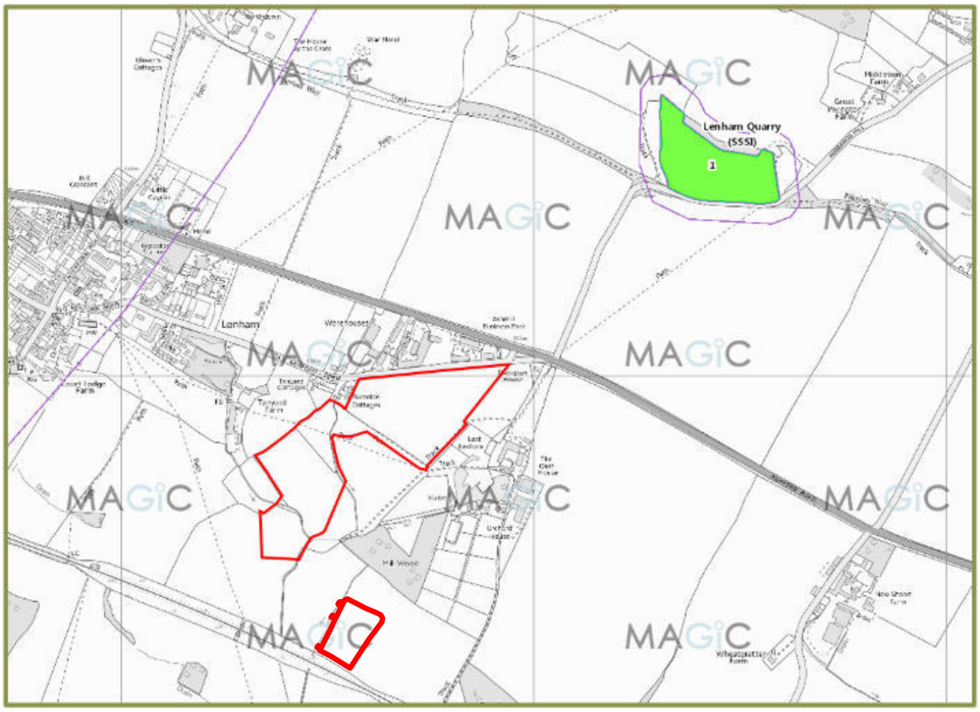
3.8 Designated Sites

3.8.1 The nearest designated site is Lenham Quarry, a Site of Special Scientific Interest (SSSI), approximately 580m to the north-east (Figure 3.18). The designated site does not have a hydrological connectivity to the Site since the Site falls (drains) south towards the Great Stour.

3.8.2 The proposed development could impact on downstream designated sites on the River Stour and the potential effects of the development on those designated sites is assessed in the accompanying Nutrient Neutral Assessment (Marian Carter Limited, June 2022).

3.8.3 The Site and wider area are in a Nitrate Vulnerable Zone (NVZ). Development of the Site would include a SuDS to manage surface water runoff. The use of SuDS would improve the water quality of surface water runoff, thereby offer a betterment to existing conditions. A separate treatment wetland on Watercourse 3 is proposed to mitigate nutrient (nitrogen and phosphorus) loads from the development to ensure it is nutrient neutral in accordance with current (February 2022) Natural England (NE) guidance. A proposed wetland treatment scheme designed by Enzygo is reported in Report SHF.1528.004.HY.R005A June 2022.

Figure 3.18: Designated Sites



From Magic Map. Contains Environment Agency information © Environment Agency and database right.

4.0 Flood Risk Assessment

4.1 Potential Sources of Flooding

4.1.1 A summary of the potential sources of flooding and the potential risk posed by each source at the Site is presented in Table 4.1. Each source of flooding and level of risk is then assessed in further detail.

Table 4.1: Potential Risk Posed by Flooding Sources

Flooding Source	Potential Flood Risk at Application Site (Yes/No)	Potential Source	Data Sources
Fluvial	Yes	Watercourses 1, 2 and 3	Environment Agency online flood mapping, JBA Flooding from Rivers (Drawing 0004.2), OS Mapping and SWMP mapping.
Tidal	No	None identified	Environment Agency online flood mapping, OS Mapping and SWMP mapping.
Groundwater	Yes	Principal Aquifer - bedrock designation and Secondary Undifferentiated Aquifer - superficial designation	SWMP, BGS mapping (Drawing 0003) and Geosmart Groundwater (Drawing 0005).
Surface Water	Yes	Poor permeability and Site topography	SWMP, JBA Surface Water Flooding (Drawing 0004.1) and Environment Agency Complex mapping (Drawings 0007.1 to 0007.4).
Sewer	No	None identified	Southern Water asset plans.
Infrastructure Failure	Yes	Pond	Environment Agency online flood mapping.

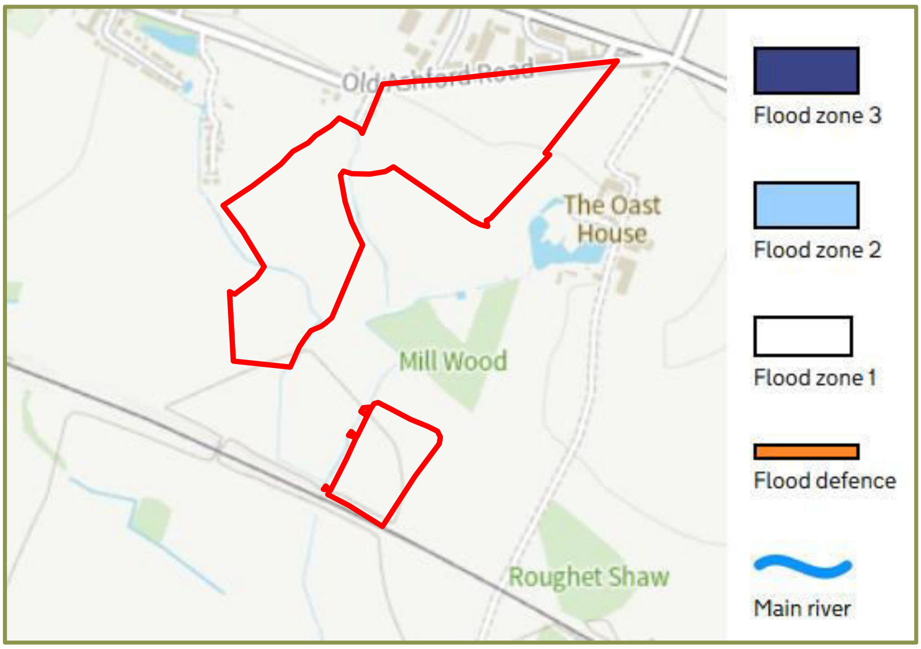
4.2 Fluvial Flooding

Environment Agency Flood Zone Mapping

4.2.1 The Environment Agency Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, since these can be breached, overtopped and may not be in existence for the lifetime of a development.

4.2.2 The Environment Agency online flood map (Figure 4.1) and correspondence (Appendix 6) shows the Site is located within Flood Zone 1; outside the 1 in 1000-year probability of fluvial (river) flooding (0.1% Annual Exceedance Probability [AEP]), at 'low' risk.

Figure 4.1: Environment Agency Online Flood Map



Contains Environment Agency information © Environment Agency and database right [2024].

SFRA Mapping

4.2.3 SFRA mapping (Appendix 7) shows the Site is located in Flood Zone 1.

Flood History

4.2.4 Environment Agency correspondence, SFRA mapping (Appendix 7) and SWMP mapping (Appendix 8) shows that there have been no historical fluvial flooding events within the Site boundary or immediate vicinity.

Flood Defences

4.2.5 Environment Agency online flood mapping and SFRA mapping (Appendix 7) shows that the Site does not benefit from flood defences.

Flood Warning Service

4.2.6 Environment Agency online flood mapping and SFRA mapping (Appendix 7) shows the Site is not located within an area which receives flood warnings.

JBA Flooding from Rivers

4.2.7 JBA mapping (Drawing 0004.2) shows the Site is outside the mapped outline of flooding from rivers.

Geological Indicators of Flooding

4.2.8 The Geological Indicators of Flooding mapping (Drawing 0006) shows that there is geology associated flooding along the routes of the onsite watercourses.

Summary Flood Risk

4.2.9 The risk of fluvial flooding is assessed as negligible for most of the Site, with a residual risk from Watercourse 1 and 2. Residual flood risk mitigation from this source is described in Section 5.

4.3 Tidal Flooding

4.3.1 SWMP mapping (Appendix 8) shows there are no recorded tidal flooding incidents within the Lenham and Warren Street area.

4.3.2 OS Mapping shows the Site is not located close to tidally affected flooding sources and so the flood risk from this source is assessed as negligible.

4.4 Groundwater Flooding

Introduction

4.4.1 Groundwater flooding occurs when subsurface water emerges either at surface or in made ground or in subsurface structures such as basements and services ducts. It occurs as diffuse seepage, emergence from new point source springs or an increase in flow from existing springs. It results from aquifer recharge from infiltrating rainfall, from sinking streams entering aquifers from adjacent non-aquifers, or from high river levels or tides driving water through near surface deposits. It tends to occur with a delay following rainfall and can last for several weeks or months. Groundwater flooding or shallow water tables also prevent or reduce infiltration and so can worsen surface water flooding.

Flood History

4.4.2 SWMP mapping (Appendix 8) shows there are no recorded groundwater flooding incidents within the Lenham and Warren Street area.

4.4.3 LLFA correspondence shows the locale has been known to suffer from groundwater flooding. Between February and April 2014, there was groundwater flooding for an extended period, which affected Old Ashford Road, Northdown Close and adjacent residential and commercial property. However, flood risk to Northdown Close was reduced by the installation of an overflow into the nearby watercourse culvert from the existing highway soakaways in June 2016.

SFRA Mapping

4.4.4 SFRA mapping (Appendix 7) shows the north of the Site has groundwater between 0.5m and 5m below the ground surface.

BGS Groundwater Flooding Susceptibility Map

4.4.1 The BGS Groundwater Flooding Susceptibility Map (Drawing 0003) shows most of the Site is in the mapped extent of groundwater flooding.

4.4.2 The north-east extent of the northern parcel is within the mapped extent of limited potential for groundwater flooding to occur. The risk of groundwater flooding is likely to be associated with the chalk bedrock geology. However, soakaway testing encountered the clayey weathered layer with low infiltration potential, therefore it is unlikely that groundwater would rise to the surface.

4.4.3 The southern extent of the northern parcel, north-west/central and southernmost extent of the southern parcel are located within the mapped extent for potential for groundwater flooding to occur at the surface. The risk of groundwater flooding is associated with sandy / gravelly / clayey superficial deposits. However, soakaway testing encountered the clayey weathered layer with low infiltration potential, therefore it is unlikely that groundwater would rise to the surface.

4.4.4 The BGS mapping is coarse and should be superseded by the Geosmart groundwater flood risk map.

Geosmart Groundwater Flood Risk Map

4.4.5 The Geosmart 1 in 100-year groundwater flood risk map (Drawing 0005) shows that the Site is at negligible risk of groundwater flooding and falls within Risk Class 4 (Table 4.2).

4.4.6 Mapped classes combine understanding of likelihood, model and data uncertainty, and possible severity. Likelihood is ranked according to whether we expect groundwater flooding at a site due to extreme elevated groundwater levels with an annual probability of occurrence greater than 1%, considering model and data uncertainty. Severity relates to expectations of the amount of property damage or other harm that groundwater flooding at that location might cause (Table 4.2).

Table 4.2: Groundwater Flood Risk Classification

Risk Class	Probability of Groundwater Flooding	Effect
4: Negligible	Annual probability less than 1%.	Negligible unless unusually sensitive use.
3: Low	Annual probability greater than 1%.	Remote possibility of damage to property or harm to sensitive receptors Flooding likely to be limited to seepages and waterlogged ground, damage to basements and subsurface infrastructure, and should pose no significant risk to life. Surface water flooding may be worsened.
2: Moderate	Annual probability greater than 1%.	Significant possibility of damage to property or harm to other sensitive receptors at or near this location. flooding is likely to be in the form of shallow pools or streams. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.
1: High	Annual probability greater than 1%.	Groundwater flooding will occur which could lead to damage to property or harm to other sensitive receptors at or near this location. Flooding may result in damage to property, road or rail closures and, in exceptional cases, may pose a risk to life. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.

Flood Risk

4.4.7 The risk of groundwater flooding is assessed as negligible at the surface but low risk for below ground infrastructure.

4.4.8 Mitigation measures against groundwater flooding are discussed in Section 5.

4.5 Surface Water Flooding

Introduction

4.5.1 Surface water flooding occurs following rainfall on ground where infiltration rates are less than the rainfall precipitation rate. This can occur when either:

- Soils or ground materials are naturally of low permeability or have been compacted (infiltration excess runoff);
- Soils or ground materials are saturated from previous rainfall either directly or from upslope (saturation excess runoff and return flow) or from high groundwater levels.

Flood History

4.5.2 SWMP mapping (Appendix 8) shows there were 15 recorded flood events between 2008 and 2012. Ten of these events were a result of surface water flooding. The nearest of which were on Ashford Road, however exact location were not recorded.

4.5.3 LLFA correspondence reported surface water flooding on Northdown Close on 26th February 2013. Northdown Close is located on the opposite side of Old Ashford Road to the Site. The surface water flowed from fields north of the A20. There is potential this could have flowed into the Site if highway drainage in the Old Ashford Road exceeded its capacity, however this was not recorded. A second surface water flooding event was reported on 29th May 2018, where there was external property flooding off Old Ashford Road. This was a result of very intense rainfall across Kent.

Site Walkover Observations

4.5.4 During the Site walkover, two areas of surface water flooding were seen: the first in the southern corner of the northern parcel and the second in the southern corner of South 2. Surface water ponding is likely to be associated with topographic low points and compacted ground from agricultural vehicles or cattle poaching.

Figure 4.2: Surface Water Flooding

Top: Surface water ponding within the northern parcel. Bottom: Surface water ponding within the southern parcel.

SFRA Mapping

4.5.5 SFRA mapping (Appendix 7) shows areas of the Site are at risk of surface water flooding associated with the 1 in 30 year, 100 year and 1000 year events. The Site is also at risk of surface water flooding during up to the 100-year +40% climate change event.

JBA Surface Water Flood Map

4.5.6 The JBA Surface Water Flood Map (Drawing 0004.1) shows most of the Site is located outside the mapped extent of surface water flooding. There are however two surface water flow pathways within the Site, which are along the reaches of Watercourse 1 and 2 and are likely to be representative of fluvial flooding. The surface water flow pathways are associated with the 1 in 75-year, 200-year and 1000-year events.

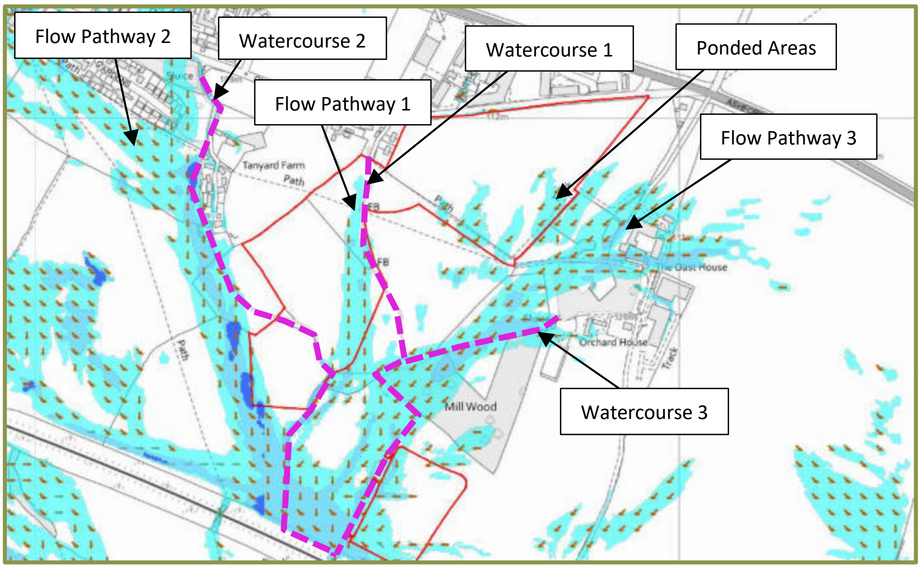
4.5.7 A third surface water pathway, conveying flows south, is located to the west of the Site, which is associated with the 1 in 75-year, 200-year and 1000-year events. The flow pathway conveys flows south through the south-west corner of South 3. The flow pathway initially follows the route of Watercourse 2 but appears to deviate from the channel course. It is likely that the flow pathway is associated with fluvial flooding and conveyed along the channel. However, the ground model is likely to be too course to capture the channel profile detail and represent the conveyance capacity.

4.5.8 The JBA Surface Water Flood mapping is superseded by the more detailed Environment Agency Complex Surface Water Flood mapping.

Environment Agency Complex Surface Water Flood Mapping

4.5.9 The Environment Agency Complex Surface Water Flood Mapping (Figure 4.3 and Drawings 0007.1 to 0007.4) shows there are surface water flow pathways and ponding within the Site boundary. Below is an analysis of each flow pathway and ponded areas.

Figure 4.3: Surface Water Flood Mapping



Flow Pathway 1

4.5.10 Flow Pathway 1 conveys flows south through the eastern extent of the southern parcel. The flow pathway originates within the northern extent of the southern parcel and flood outline is mostly associated with the 1 in 1000-year event.

4.5.11 Flood depths are up to 0.15m during the extreme 1 in 1000-year event. The flood velocity is mostly up 1.00m/s. The flood hazard is 'low' (0.50-0.75).

4.5.12 The flow pathway is likely to be generated by the low permeability (clayey) soils and Site topography. The flow pathway towards the northern reach is aligned adjacent to/west of Watercourse 1.

4.5.13 Based on Site walkover observations and a review of the detailed topographic survey, the Site falls towards Watercourse 1. It is likely that overland flow would shed into Watercourse 1 and be conveyed within channel.

Channel Capacity

- *Catchment Delineation*

4.5.14 The FEH Web Service was reviewed and found a 0.74km^2 catchment up to a point at the Ø600mm culvert crossing (Figure 4.4).

Figure 4.4: Watercourse 1 Catchment @ Ø600mm Culvert Crossing

- *Peak Flows*

4.5.15 The Revitalised Flood Hydrograph 2 (ReFH2) method was used to generate peak flows within the catchment.

4.5.16 Table 4.3 provides a summary of peak flows for a range of return periods. In line with climate change guidance ('Flood Risk Assessments – Climate Change allowances'), 105% (higher central allowance) and 45% (upper end allowance) has been added to the 1 in 100-year peak flow, to meet the requirements of the South East River Basin District.

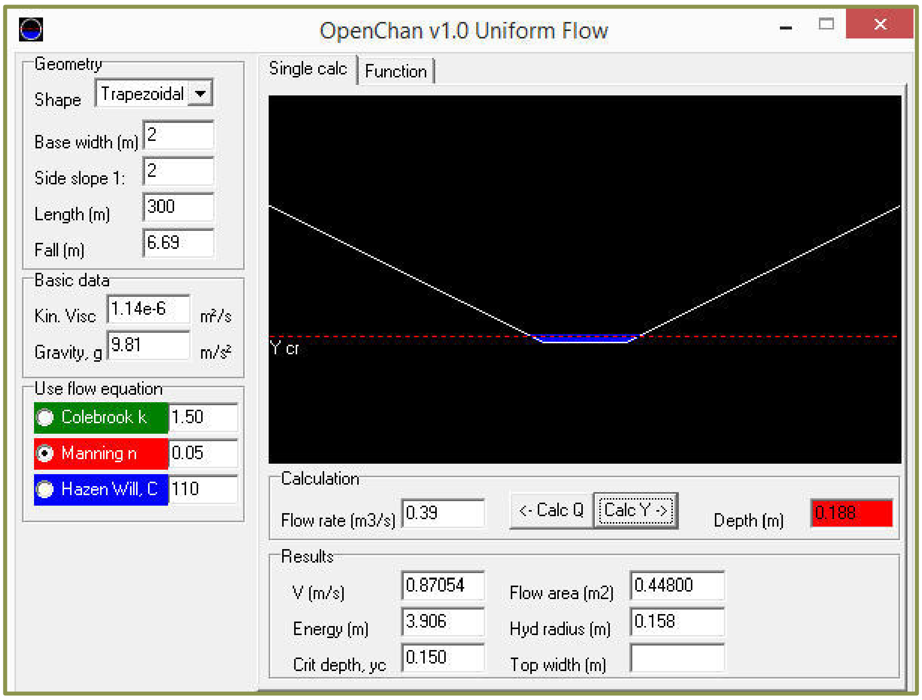
Table 4.3: Peak Flows

Annual Probability (Return Period, years)	ReFH2 Method (m^3/s) @ Ø600mm Culvert Crossing
100% (1yr)	0.05
50% (2yr)	0.06
10% (10yr)	0.10
2% (50yr)	0.16
1% (100yr)	0.19
1% + 45%CC	0.28
1% + 105%CC	0.39
0.1% (1000yr)	0.36

- *Channel Capacity Check*

4.5.17 A flow conveyance calculation, using open channel flow software, was undertaken for Watercourse 1 for the approximate 300m downstream reach. The calculations were based on a trapezoidal channel (average bed width = 2m, side slope = 1:2), a Mannings 'n' value of 0.05 (Non-maintained, clear bottom, weed on side – Figure 1), a fall of 6.69m over a 300m distance (a 1:45 gradient). The 1 in 100-year plus 105% Climate Change flow was inputted ($0.39m^3/s$ – worst case scenario), which shows the channel can convey the flow within the channel with a depth 0.19m. An extract showing the Open Channel calculations is included below within Figure 4.5. Flow Pathway 1 would be conveyed within channel instead of shedding across the Site.

Figure 4.5: Channel Conveyance Calculation

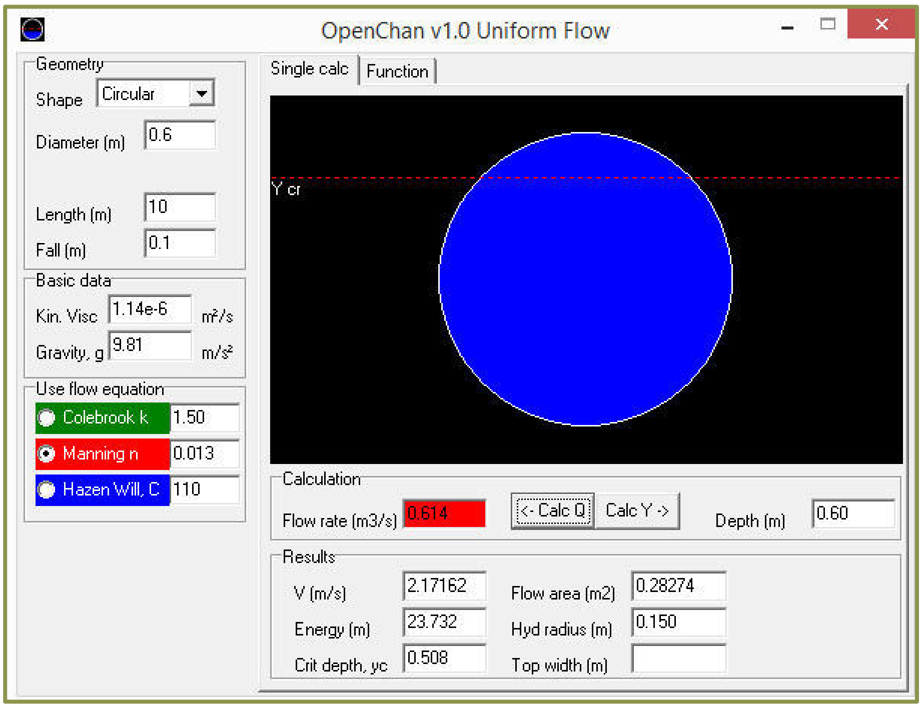


- *Culvert Capacity Check*

4.5.18 A flow conveyance calculation using open channel flow software was undertaken for the Ø600mm culvert crossing, based on a full-bore scenario (i.e. 0.6m depth). The length was input as 10m for the access track (taken from google earth) with a conservative fall of 0.1m. A manning's 'n' roughness coefficient of 0.013 appropriate for a concrete culvert was applied.

4.5.19 The open channel calculation (Figure 4.4) shows that the culvert can convey 0.61m^3/s, which is in excess of the extreme 1 in 100-year plus 105% climate change peak flow (0.39m^3/s – worst case scenario). The culvert would therefore not surcharge and cause flooding within the Site boundary. An extract showing the Open Channel calculation is included in Figure 4.6.

Figure 4.6: Culvert Capacity Calculation – Ø600mm Culvert Crossing



Flow Pathway 2

4.5.20 Flow Pathway 2 conveys flows south, within land located to the west of the Site. The flow pathway passes through the south-west corner of South 3.

4.5.21 The flow pathway originates within land to the north-west of the Site and is associated with the 1 in 30, 100 and 1000-year event. Flood depths are up to 0.30m during the extreme 1 in 1000-year event. The flood velocity is up 2.00m/s. The flood hazard is mostly 'low' (0.50-0.75).

4.5.22 The flow pathway is likely to be generated by hardstanding areas associated with development within the upper reach of the flow pathway and the low permeable (clayey) soils and topography of the contributing catchment.

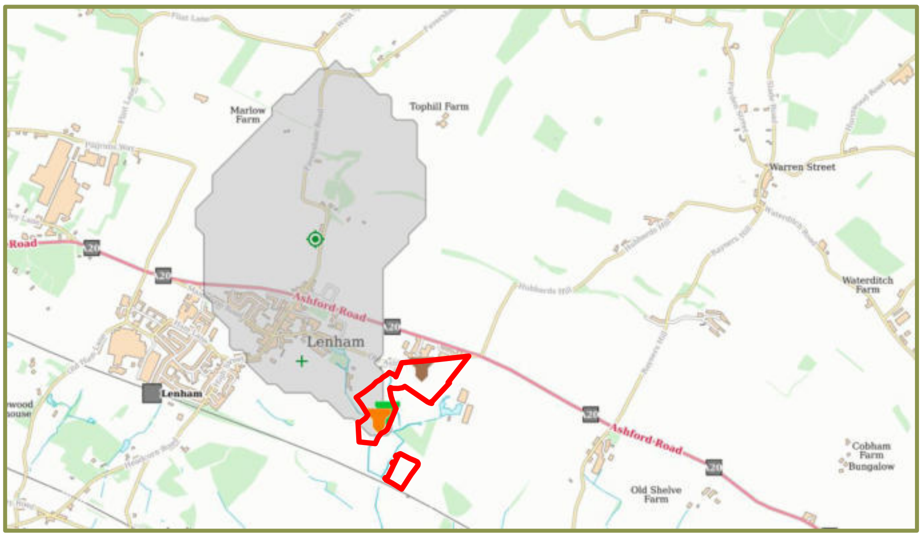
4.5.23 The flow pathway initially follows the route of Watercourse 2 but appears to deviate south, away from the channel reach. It is likely that the flow pathway is associated with fluvial flooding and is conveyed along the route of the channel. However, the ground model is likely to be too course to capture the channel profile detail and represent the conveyance capacity

Channel Capacity Check

- *Catchment Delineation*

4.5.24 The FEH Web Service was reviewed and found a 1.89km^2 catchment up to a point at the Ø300mm culvert outfall (Figure 4.7).

Figure 4.7: Watercourse 2 Catchment @ Ø300mm Culvert Crossing



- *Peak Flows*

4.5.25 The Revitalised Flood Hydrograph 2 (ReFH2) method was used to generate peak flows within the catchment.

4.5.26 Table 4.4 provides a summary of peak flows for a range of return periods. In line with climate change guidance ('Flood Risk Assessments – Climate Change allowances'), 105% (higher central allowance) and 45% (upper end allowance) has been added to the 1 in 100-year peak flow, to meet the requirements of the South East River Basin District.

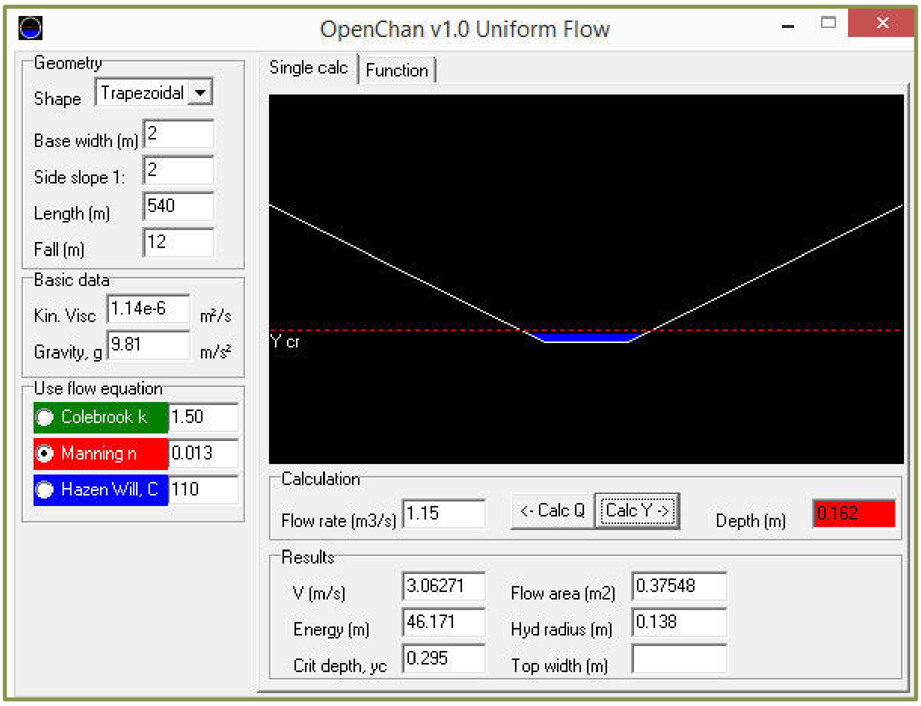
Table 4.4: Peak Flows

Annual Probability (Return Period, years)	ReFH2 Method (m^3/s) @ Ø300mm Culvert Crossing
100% (1yr)	0.16
50% (2yr)	0.18
10% (10yr)	0.32
2% (50yr)	0.47
1% (100yr)	0.56
1% + 45%CC	0.81
1% + 105%CC	1.15
0.1% (1000yr)	1.03

- *Channel Capacity Check*

4.5.27 A flow conveyance calculation, using open channel flow software, was undertaken for Watercourse 2 for the approximate 540m reach. The calculations were based on a trapezoidal channel (average bed width = 2m, side slope = 1:2), a Mannings 'n' value of 0.05 (Non-maintained, clear bottom, weed on side – Figure 1), a fall of 12m over a 540m distance (a 1:43 gradient). The 100-year +105% CC flow was inputted (1.15m^3/s) which shows the channel can convey the flow within the channel with a depth 0.16m. An extract showing the Open Channel calculations is included below within Figure 4.8. Flow Pathway 1 would be conveyed within channel instead of shedding across the Site.

Figure 4.8: Channel Conveyance Calculation



- *Culvert Capacity Check*

4.5.28 A flow conveyance calculation using open channel flow software was undertaken for the Ø300mm culvert crossing, based on a full-bore scenario (i.e. 0.3m depth). The length was input as 5.5m for the access track with a fall of 0.66m (taken from topographic survey). A manning's 'n' roughness coefficient of 0.013 appropriate for a concrete culvert was applied.

4.5.29 The open channel calculation (Figure 4.9) shows that the culvert can convey 0.335m^3/s, which is in excess of the 1 in 10-year peak flow (0.32m^3/s). In events in excess of the 1 in 10-year event there would be some backing-up of water, but after a period would spill over the top of the access road and back into the channel. There would therefore be a negligible amount of out of bank flows (localised flooding) before returning to channel.

Figure 4.9: Culvert Capacity Calculation – Ø300mm Culvert Crossing

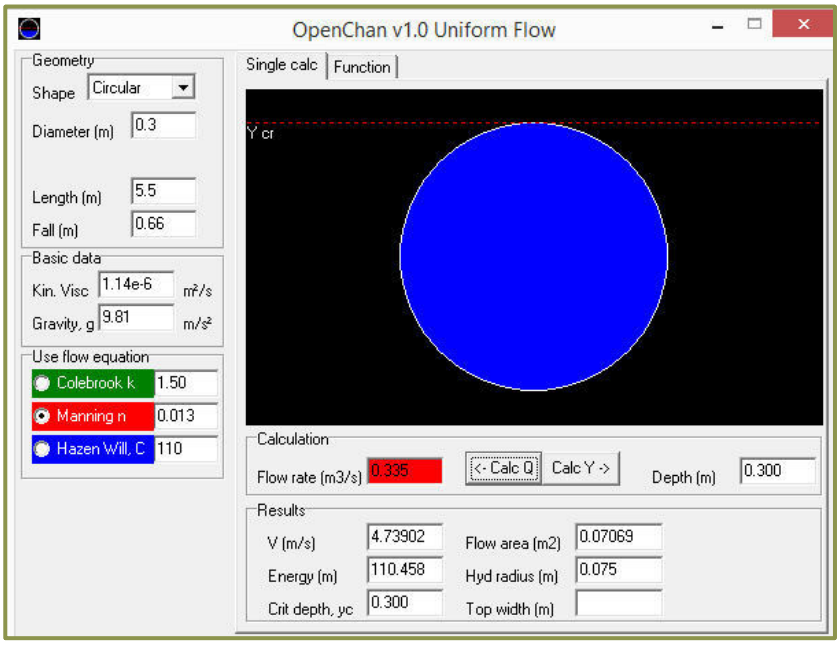
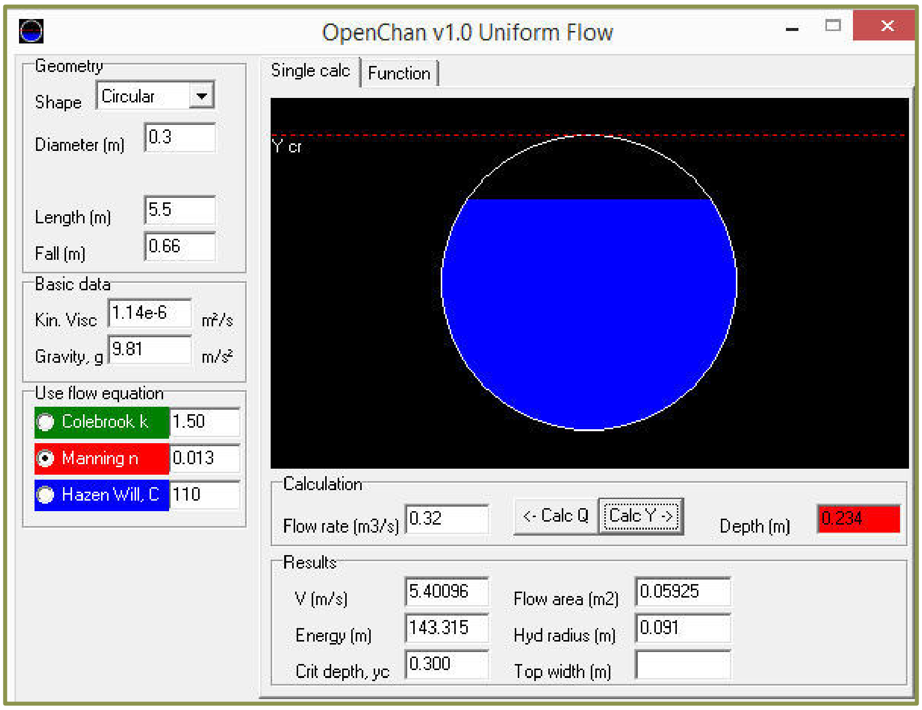


Figure 4.10: 10 Year Peak Flow within culvert



4.5.30 The above demonstrates the surface water flooding associated with watercourses 1 and 2 would be conveyed within the channel and as such is incorrectly depicted by the surface water flood mapping.

Flow Pathway 3

4.5.31 Flow Pathway 3 conveys flows south-west, within land located to the east/south-east of the Site.

4.5.32 The flow pathway is associated with the 1 in 30, 100 and 1000-year event. Flood depths are mostly up to 0.30m during the extreme 1 in 1000-year event. The flood velocity is up 2.00m/s. The flood hazard is mostly 'low' (0.50-0.75).

4.5.33 The flow pathway is likely to be generated by low permeable (clayey) soils and topography of the contributing catchment.

4.5.34 The flow pathway initially follows the route of Watercourse 3 and is likely to be representative of fluvial flooding.

Ponded Areas

4.5.35 There are areas of surface water ponding within the southern extent of the northern parcel. The flood outline is associated with the 1 in 1000-year events. Flood depths are up to 0.15m during the extreme 1 in 1000-year event. The flood velocity is up to 1.00m/s. The flood hazard is 'low' (0.50-0.75). The ponded areas are associated with topographic low points.

Flood Risk

4.5.36 The risk of surface water flooding is assessed as negligible for most of the Site, with an area of low- high risk along the length of Watercourse 1 and 2.

4.5.37 Mitigation measures against surface water flooding are discussed in Section 5.

4.6 Sewer Flooding

Introduction

4.6.1 Sewer flooding occurs when urban drainage networks become overwhelmed after heavy or prolonged rainfall due to restrictions or blockage in the sewer network or if the volume of water draining into the system exceeds the sewer design capacity.

4.6.2 New sewers are built to the guidelines within Sewers for Adoption[22] and have a design standard to the 1 in 30-year flood event. Older sewers were not designed to any standard. Modern sewer systems will only surcharge during rainstorm events with a return period greater than 1 in 30-years (e.g., 1 in 100-years).

Flood History

4.6.3 SWMP table (Appendix 8) shows there were 2 recorded flood events between 2008 and 2012 from sewer flooding in Lenham. However, the flood incidents were not near the Site.

COMMERCIALDW Drainage and Water Enquiry

4.6.4 There are no public sewers located within the Site boundary. From a review of COMMERCIALDW Drainage and Water Enquiry (Appendix 5), there are no recorded sewer flooding incidents located within the Site.

Flood Risk

4.6.5 The risk of flooding from sewers is assessed as negligible.

[22] WRC (2012) Sewers for Adoption 7th Edition.

4.7 Flooding from Infrastructure Failure

Reservoir

4.7.1 The Environment Agency online flood mapping and SFRA mapping (Appendix 7) shows the Site is located outside the extent of flooding sourced from reservoirs. The risk of flooding from reservoirs is assessed as negligible.

Pond

4.7.2 A pond was identified to the north of the Site, associated with Watercourse 1. The pond was not evident during the walkover. The risk of flooding from pond failure is assessed as negligible.

5.0 Planning and Flood Risk

5.1 Introduction

5.1.1 The main steps to be followed in addressing flood risk are set out below:

5.2 Assess

5.2.1 As per Paragraph: 003 Reference ID: 7-003-20220825 (Revision date: 25 08 2022) of NPPG ID7, we have prepared a site-specific FRA to assess flood risk from all sources to the Development. A summary is included below:

- The risk of fluvial flooding is assessed as negligible for most of the Site, with a residual risk from Watercourse 1 and 2
- The risk of groundwater flooding is assessed as negligible at the surface but low risk for below ground infrastructure.
- The risk of surface water flooding is assessed as negligible for most of the Site, with an area of low- high risk along the length of Watercourse 1 and 2.
- Flood risk from all other sources is assessed as negligible.

5.3 Decision Making Process

5.3.1 As per Paragraph: 004 Reference ID: 7-004-20220825 (Revision date: 25 08 2022) of NPPG ID7, where an assessment shows that flood risk is a consideration for a plan or development proposal, the process is set out below:

Avoid

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

5.3.3 As per the National flood risk standing advice for local planning authorities ('*When development is exempt from the sequential test*')[23],

"A development is exempt from the sequential test if it is a:

- *Householder development like residential extensions, conservatories or loft conversions*
- *Small non-domestic extensions with a footprint of less than 250 square metres*
- *Change of use (except changes of use to a caravan, camping or chalet site, or to a mobile home or park home site)*

A development is also exempt from the sequential test if it is a development on a site allocated in the development plan through the sequential test and:

[23] https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities#:~:text=A%20development%20is%20exempt%20from,extensions%2C%20conservatories%20or%20loft%20conversions

- *The proposal is consistent with site's allocated use*
- *There have been no significant changes to the known level of flood risk to the site, now or in the future, which would have affected the outcome of the test*

***You may not need a sequential test if development can be laid out so that only elements such as public open space, biodiversity and amenity areas are located in areas at risk of any source of current or future flooding.*"**

5.3.4 Subject to the below avoidance measures, the Sequential Test is not required:

- Sequentially develop the Site, limiting the built development outside the mapped extent of surface water flooding not born of the Site (i.e. surface water which accumulates and then flows in pathways into the Site) which would be less than the 4m easement provided for inspection and maintenance. See 'Control' below for measures to deal with surface water born of the Site catchment.
- Set the surface water outfall from the proposed development at an appropriate height (i.e. +300mm) above the bed level of the receiving watercourse.
- Set finished floor levels a minimum of +300mm above external levels for dwellings located closest to watercourses, grading back to +150mm for dwellings located further away.
- It is recommended that the number of highway crossings along the route of Watercourse 1 and 2 is kept to a minimum. Culvert crossings would need to be sized to convey the 1 in 100-year plus climate change event, with a freeboard allowance; i.e. vertically avoiding areas of flooding for all internal access roads..
- No below surface habitable buildings (i.e., basements).
- Lined attenuation to prevent groundwater ingress.

5.3.5 Further to the above, the following measures are recommended in line with statutory requirements / following best practice:

- Provide a 4m easement free from development along either side of onsite watercourses. This easement would provide access for inspection and maintenance purposes, including vehicle access.

Control

5.3.6 We recommend the following control measures to manage the risk of flooding to and from the development:

- Adoption of a surface water management strategy. The surface water management strategy would intercept, attenuate and discharge surface water runoff generated within the Site boundary (which contributed to Flow Pathway 1) at a controlled rate, which would restrict flow within the banks of Watercourse 1.
- Undertake maintenance activities to keep the watercourses clear from debris and overgrown vegetation to maintain the conveyance of the channels.

Mitigate

5.3.7 Based on the above avoidance measures, no mitigation measures are proposed.

5.4 Summary of Flood Risk

5.4.1 Table 5.1 summarises the probability and level of risk, both with and without mitigation measures.

Table 5.1: Probability and Consequences of All Sources of Flooding

Source of Flooding	Risk of Flooding	Risk Without Measures	Recommended Measures	Risk to Development with Measures
Fluvial - Watercourses 1, 2 and 3	Negligible for most of the Site but residual flooding from Watercourses 1 and 2.	Residual	Avoid and Control	Negligible
Tidal - None identified	Negligible	Negligible	N/A	Negligible
Groundwater - Principal Aquifer - bedrock designation and Secondary Undifferentiated Aquifer - superficial designation	Negligible above ground and low below ground.	Negligible to low	Avoid and Control	Negligible
Surface Water - Poor permeability and Site topography	Negligible for most of the Site, with an area of low to high risk associated with flow pathways and ponding.	Negligible to high	Avoid and Control	Negligible
Sewers and Mains - None identified	Negligible	Negligible	N/A	Negligible
Infrastructure Failure - Pond	Negligible	Negligible	N/A	Negligible

Key: Green - Negligible, Yellow - Low, Orange - Medium and Red - High; based on consequence and impact with mitigation from each flooding source.

5.5 Flood Guidance and Sequential Test

5.5.1 The proposal is for residential with associated sports/ playing pitches and equipped play area. Table 2 of PPG ID: 7 (not included in this report) classifies the proposed uses as 'more vulnerable' and 'water compatible' respectively.

5.5.2 The Environment Agency Flood Zones and acceptable development types are listed in Table 5.2. All development types (including more vulnerable and water compatible uses) are acceptable in Flood Zone 1 (low risk). Subject to the above mitigation measures, the Sequential Test would be passed and the Exception Test would not be required as indicated in Table 5.3.

Table 5.2: Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land use
Zone 1	Low	Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).	All development types generally acceptable.
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year.	Most development type are generally acceptable.
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.	Some development types not acceptable.
Zone 3b	'Functional Floodplain'	Land where water must flow or be stored in times of flood. SFRAs should identify this zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).	Some development types not acceptable.

Note: *The Flood Zones are the current best information on the extent of the extreme flood from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. The identified risk of fluvial flooding is highlighted green.*

Table 5.3: Vulnerability and Flood Zone 'Compatibility' as Identified in Table 3 of PPG ID: 7

Flood Risk Vulnerability classification (see Table 1 of PPG ID: 7)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Yes	Exception test required	Yes	Yes
Zone 3a	Exception test required	Yes	No	Exception test required	Yes
Zone 3b 'Functional Floodplain'	Exception test required	Yes	No	No	No

Key: *Yes: Development is appropriate, No: Development should not be permitted.*
The identified risk of fluvial flooding is highlighted green.

6.0 Site Drainage

6.1 Surface Water Drainage

6.1.1 Consideration of flood issues is not confined to the floodplain. This is recognised in the NPPF and associated guidance where all proposed development of 1ha or more in Flood Zone 1 and so outside the floodplain nevertheless requires an FRA. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in a catchment, particularly flooding downstream; and replacing permeable vegetated areas with low permeability roofs, roads and other paved areas will increase the speed, volume, and peak flow of surface water runoff.

6.1.2 A surface water management strategy for the development is proposed to manage and reduce the flood risk posed by surface water runoff from the Site. The developer will be required to ensure that any scheme for surface water should build in sufficient capacity for the entire Site.

6.1.3 The surface water drainage arrangements for any development Site should be such that the volume and peak flow rates of surface water leaving a developed Site are no greater than the rates prior to the proposed development unless specific off-Site arrangements are made and result in the same net effect.

6.1.4 An assessment of the surface water runoff rates was undertaken to determine the surface water options and attenuation requirements for the Site.

6.2 Existing Drainage System

6.2.1 The 13.45ha Site land use comprises two agricultural (arable and grassland) land parcels and a subsidiary site to the south east proposed for a water treatment wetland.

6.2.2 The Site is underlain by low permeability soils and bedrock with shallow groundwater, demonstrated through soakaway testing. Drainage is predominantly via overland flow, following the topography of the Site (south) towards the topographic low points (Watercourses 1 and 2) as shown on the surface water flood extents mapping, with a small amount of infiltration to bedrock, and throughflow to watercourse.

6.3 Developable and Impermeable Areas

6.3.1 The proposal is for residential, sports/ playing pitches and equipped play area development.

i. Residential Element

6.3.2 The residential element of the Site has been split into 2 areas for the purpose of the drainage strategy. The area in the northeast of the Site is ‘Residential Area 1’ and the remaining residential area is ‘Residential Area 2’.

6.3.3 A figure of 55% impermeable area (inclusive of 10% for urban creep) was applied to the 0.904ha developable area associated with Residential Area 1, and the 2.946ha developable area associated with Residential Area 2. It has been assumed that the car park is permeable (i.e., permeable paving or gravel area). The existing and proposed impermeable areas are shown in Table 6.1.

ii. Sports Pavilion and Car Parking

6.3.4 It is assumed that the sports pitches and equipped areas will be comprised of permeable materials and as such do not contribute to impermeable areas. A figure of 100% impermeable area has been applied to the sport pavilion and associated car parking.

Table 6.1: Impermeable Area

Area	Existing Buildings and Hardstanding	Proposed Residential Area 1 Impermeable Area	Proposed Residential Area 2 Impermeable Area	Proposed Sports Pavilion and Car Park	Difference
Area (ha)	0	0.497	1.623	0.450	+2.57
Percentage of Total Site Area (%)	0	3.70	12.07	3.35	19.12

6.3.5 The proposed development will increase the impermeable surfaces and therefore increase the amount of runoff.

6.4 Greenfield Runoff Rates

6.4.1 An assessment of greenfield runoff rates was undertaken to determine the attenuation requirements for the proposed residential element of the development.

6.4.2 The runoff rates were calculated using HR Wallingford design software using the current 'industry best practice' guidelines as outlined in the Interim Code of Practice for SuDS[24], and the Environment Agency Report SC030219 – Rainfall runoff management for developments. This is a recommended methodology for Sites up to 50ha in area.

6.4.3 The following parameters were used in the runoff calculations:

- Developable Area: 3.85ha;
- Average Annual Rainfall (SAAR): 743mm/year;
- BFI Host: 0.693;
- Region No.: 7

6.4.4 Table 6.2 shows the calculated greenfield runoff rates. Extracts from HR Wallingford calculations are included in Appendix 9.

[24] Office of the Deputy Prime Minister, National SuDS Working Group, July 2004, Interim Code of Practice for sustainable drainage systems.

Table 6.2: Greenfield Runoff Rates

Annual Probability (Return Period, years)	Greenfield Runoff (l/s)
QBAR	7.38
100% (1)	6.27
3.33% (30)	16.97
1% (100)	23.53
1% Plus Climate Change	34.12

Note: *45% added to the data to account for long-term climate change as stated in 'Flood Risk Assessment: Climate Change Allowance'. The 1 in 2-year, 30-year and 100-year annual probability events are of importance to the Water Companies and the Environment Agency when looking at sewage discharge and flood risk.*

6.5 Sustainable Drainage Options (SuDS)

Feasibility of SuDS

6.5.1 Soakaway testing was undertaken during March 2019. A copy of the Infiltration Test Report is included in Appendix 6. It shows that infiltration-based SuDS would not be feasible due to low infiltration rates and shallow groundwater.

SuDS Options

6.5.2 Sustainable water management measures should be used to control the surface water runoff from the proposed development Site, thereby managing the flood risk to the Site and surrounding areas from surface water runoff. These measures will also improve the quality of water discharged from the Site.

6.5.3 Current guidance promotes sustainable water management using SuDS. Options applicable to this Site are identified in Table 6.3.

Table 6.3: SuDS Options

Green roofs	Infiltration basins
Water butts	Detention basins
Permeable paving	Oversized pipes
Rainwater harvesting	Brown roofs
Filter strips	Swales
Wetland Areas	Cellular Storage

Note: *SuDS appropriate to the development are highlighted green.*

6.5.4 A hierarchy of SuDS techniques is identified[25]:

1. **Prevention** – the use of good Site design and housekeeping measures on individual Sites to prevent runoff and pollution (e.g. minimise areas of hard standing).

[25] CIRIA (2004) Report C609, Sustainable Drainage Systems – Hydraulic, Structural and Water Quality advice.

2. **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
3. **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole Site).
4. **Regional Control** – management of runoff from several Sites, typically in a detention pond or wetland.

6.5.5 Using SuDS as opposed to conventional drainage systems provides several benefits by:

- reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream
- reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed Sites
- improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources
- reducing potable water demand through rainwater harvesting
- improving amenity through the provision of public open spaces and wildlife habitat; and
- replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

SuDS Maintenance

6.5.6 A detention basin will form the main attenuation feature within the development Site.

6.5.7 Maintenance of the SuDS features would be in line with the SuDS Manual (CIRIA C753, 2015), as detailed in Figure 6.1. The maintenance would be undertaken by a private maintenance company.

6.5.8 It is standard for SuDS features within a new development to be maintained by a private maintenance company unless the council adopt it. If the maintenance company goes into administration, the Site will be contracted to a new maintenance company. Residents will pay a surcharge to the maintenance company and several would be appointed to its board. This will ensure maintenance throughout the lifetime of the development.

6.5.9 Details of other SuDS features and maintenance would be considered further at detailed design, when a detailed layout has been produced. The level of detail provided in this FRA should be sufficient at outline stage to demonstrate that SuDS would be deliverable.

Figure 6.1: Detention Basin Operation and Maintenance Requirements (Table 22.1 of the SuDS Manual)

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

6.6 Surface Water Management Strategy

Hierarchy of Discharge

6.6.1 In accordance with requirement H3 of the Building Regulations 2010[26] rainwater runoff must discharge to one of the following, listed in order of priority:

1. **An adequate soakaway or some other adequate infiltration system:** The use of infiltration-based SuDs is not feasible due to low recorded infiltration and shallow groundwater.
2. **A watercourse:** Watercourse 1 and 2 convey flows south, through the Site.
3. **A sewer:** There are no public surface water or combined sewers located within the Site boundary or immediate vicinity.

[26] Office of the Deputy Prime Minister, The Building Regulations 2010, amended 2021.

6.6.2 The potential route to discharge from the existing Site is by two outfalls to Watercourse 1.

Drainage Design

6.6.3 Surface water runoff would be directed to the drainage system through drainage gullies located around the perimeter of the buildings and through contouring of the hardstanding areas.

6.6.4 Landscaped areas should be incorporated into the layout where possible, and the associated gardens of each unit will allow a proportion of the rainfall to infiltrate into the soil substrate.

i. Residential Element

6.6.5 Surface water will be directed to two detention basins, positioned to achieve a gravity fed connection to Watercourse 1. An indicative drainage layout is in Drawing 0008.

ii. Sports Pavilion and Car Park

6.6.6 Surface water will be directed to a detention basin / geocellular storage / permeable paving to be determined at detailed design. The attenuation feature would be positioned to achieve a gravity fed connection to watercourse. A detention basin is included in Drawing 0008 to exemplify the approximate size of storage required.

Attenuation Requirements

i. Residential Area 1

6.6.7 Attenuation storage is required to reduce the post-application surface water runoff from the Site to calculated greenfield runoff rates, up to and including the 1 in 100-year (+45%CC) rainfall event, assuming no infiltration losses.

6.6.8 The following input parameters were assumed in the calculations:

- Impermeable Area: 0.497ha;
- Cv (proportion of rainfall forming surface water runoff): 75% summer, 84% winter;
- Infiltration losses: 0.00m/hour;
- With outfall: 3.3l/s (Residential Area 1+ Residential Area 2 = QBAR) (Table 6.2).

6.6.9 The attenuation volume for the 1 in 100-year event (plus climate change) is 437.4m^3.

6.6.10 Microdrainage calculations are included in Appendix 10. The calculated runoff rates and attenuation volumes will be reviewed at detailed design stage.

ii. Residential Area 2

6.6.11 Attenuation storage is required to reduce the post-application surface water runoff from the Site to calculated greenfield runoff rates, up to and including the 1 in 100-year (+45%CC) rainfall event, assuming no infiltration losses.

6.6.12 The following input parameters were assumed in the calculations:

- Impermeable Area: 1.623ha;
- Cv (proportion of rainfall forming surface water runoff): 75% summer, 84% winter;
- Infiltration losses: 0.00m/hour;
- With outfall: 4.1l/s (Residential Area 1+ Residential Area 2 = QBAR) (Table 6.2).

6.6.13 The attenuation volume for the 1 in 100-year event (plus climate change) is 1922.6m^3.

6.6.14 Microdrainage calculations are included in Appendix 10. The calculated runoff rates and attenuation volumes will be reviewed at detailed design stage.

iii. Sports/Playing Pitches and Equipped Play Area

6.6.15 Attenuation storage is required to reduce the post-application surface water runoff from the Site to calculated greenfield runoff rates, up to and including the 1 in 100-year (+45%CC) rainfall event, assuming no infiltration losses.

6.6.16 The following input parameters were assumed in the calculations:

- Impermeable Area: 0.450ha;
- Cv (proportion of rainfall forming surface water runoff): 75% summer, 84% winter;
- Infiltration losses: 0.00m/hour;
- With outfall: at minimum 2l/s.

6.6.17 The attenuation volume for the 1 in 100-year event (plus climate change) is 434.5m^3.

6.6.18 Microdrainage calculations are included in Appendix 10. The calculated runoff rates and attenuation volumes will be reviewed at detailed design stage.

6.7 Exceedance Routes

6.7.1 The detention basin will be designed with a capacity up to a 1 in 100-year (plus 45% climate change) event, with a +300mm freeboard allowance, based on complex controls discharge rate. This provides a betterment (reduction) in runoff when compared to existing undeveloped conditions, where runoff is uncontrolled across all return periods.

6.7.2 A storm event in excess of this design standard would be extreme and would cause the detention basin to overtop (with no sudden deluge) and would then shed overland following the topography (south) towards the Watercourse 3 to the south of the Site.

6.7.3 Finished floor levels of new dwellings will be set above external levels, which will mitigate the residual risk of overtopping.

6.8 Foul Drainage

6.8.1 The Site is not currently served by a foul drainage network.

6.8.2 It is proposed that foul flow is discharged to the Ø225mm public foul sewer conveying flows south-east, approximately 80m south-west of the Site (within the same land ownership). The topography of the site should allow for a gravity fed connection however the cover and invert levels of the preferred discharge point were not available so would need to be confirmed at detailed design stage.

6.8.3 In accordance with Sewers for Adoption (7th Edition), peak foul water discharge from a residential development is 4,000 litres per property per day. Using this method, peak foul flows are estimated to be 4.6l/s from the 100-unit residential development. The calculated foul flow rate will be reviewed at detailed design stage.

6.8.4 All foul sewerage should be designed in accordance with Building Regulations Part H. In areas where sewers are to be adopted by Southern Water, sewerage should be designed in accordance with Sewers for Adoption (7th Edition) and supplemented with additional standards provided by Southern Water. An application to enter into a Section 104 agreement for sewer adoption must be made in writing to Southern Water prior to any works commencing on Site. A connection point should be agreed with Southern Water.

7.0 Summary and Conclusions

7.1 Introduction

7.1.1 A site-specific Flood Risk Assessment (FRA) has been undertaken for a proposed residential led development, located on a 13.45ha Site on land south of Old Ashford Road, Lenham.

7.2 Flood Risk

7.2.1 The risk of fluvial flooding is assessed as negligible from available data. There is, however, a residual risk of fluvial flooding from onsite watercourses.

7.2.2 The risk of groundwater flooding is assessed as negligible at the surface but low risk below ground.

7.2.3 The risk of surface water flooding is assessed as negligible for most of the Site, with an area of low risk associated with the surface water flow pathways and ponded areas.

7.3 Measures

7.3.1 Flood risk can be avoided or controlled to a negligible level through the following approach:

- Provide an easement free from development along either side of onsite watercourses. This easement would provide access for inspection and maintenance purposes.
- It is recommended that the number of highway crossings along the route of onsite watercourses are kept to a minimum. Culvert crossings would need to be sized to convey peak flows with a freeboard allowance. Vertical avoidance of flood levels would be provided by adequate conveyance.
- Undertake maintenance activities to keep the watercourses clear from debris and overgrown vegetation to maintain the conveyance of the channels.
- Set finished floor levels a maximum +300mm above external levels in areas near onsite watercourses.
- Set the surface water outfall from the proposed development above the bed level of the receiving watercourse.
- No below surface habitable buildings (i.e., basements).
- Adoption of a surface water management strategy.
- Lined pond to prevent groundwater ingress
- Sequentially develop the Site, limiting the built development outside the mapped extent of surface water flooding generated external to the Site catchment, which would be covered by the 4m easement provided for inspection and maintenance.

7.4 Flood Guidance

7.4.1 The proposed residential and sports/ playing pitches and equipped play area use is classified as more vulnerable and water compatible respectively. More vulnerable and water compatible uses are considered acceptable in terms of flood risk in Flood Zone 1. Subject to the implementation of the above measures to avoid and control the assessed flood risks, the Sequential Test would be passed, and the Exception Test would not be required.

7.5 Site Drainage

Surface Water

7.5.1 The proposed development will increase the area of impermeable surfaces and therefore increase the amount of runoff without mitigation.

7.5.2 Surface water runoff from the Site will be restricted to greenfield rate (QBAR), which offers a betterment to existing conditions with uncontrolled runoff across all return periods, inclusive of the requirements to deal with long term storage.

7.5.3 Surface water runoff from the proposed development would be attenuated on-site up to and including the 1 in 100-year event, plus 45% climate change.

7.5.4 A SuDS drainage scheme is proposed to manage excess runoff from the development, comprising of detention basins designed to discharge at restricted rates, with an outfall to watercourse.

Foul Water

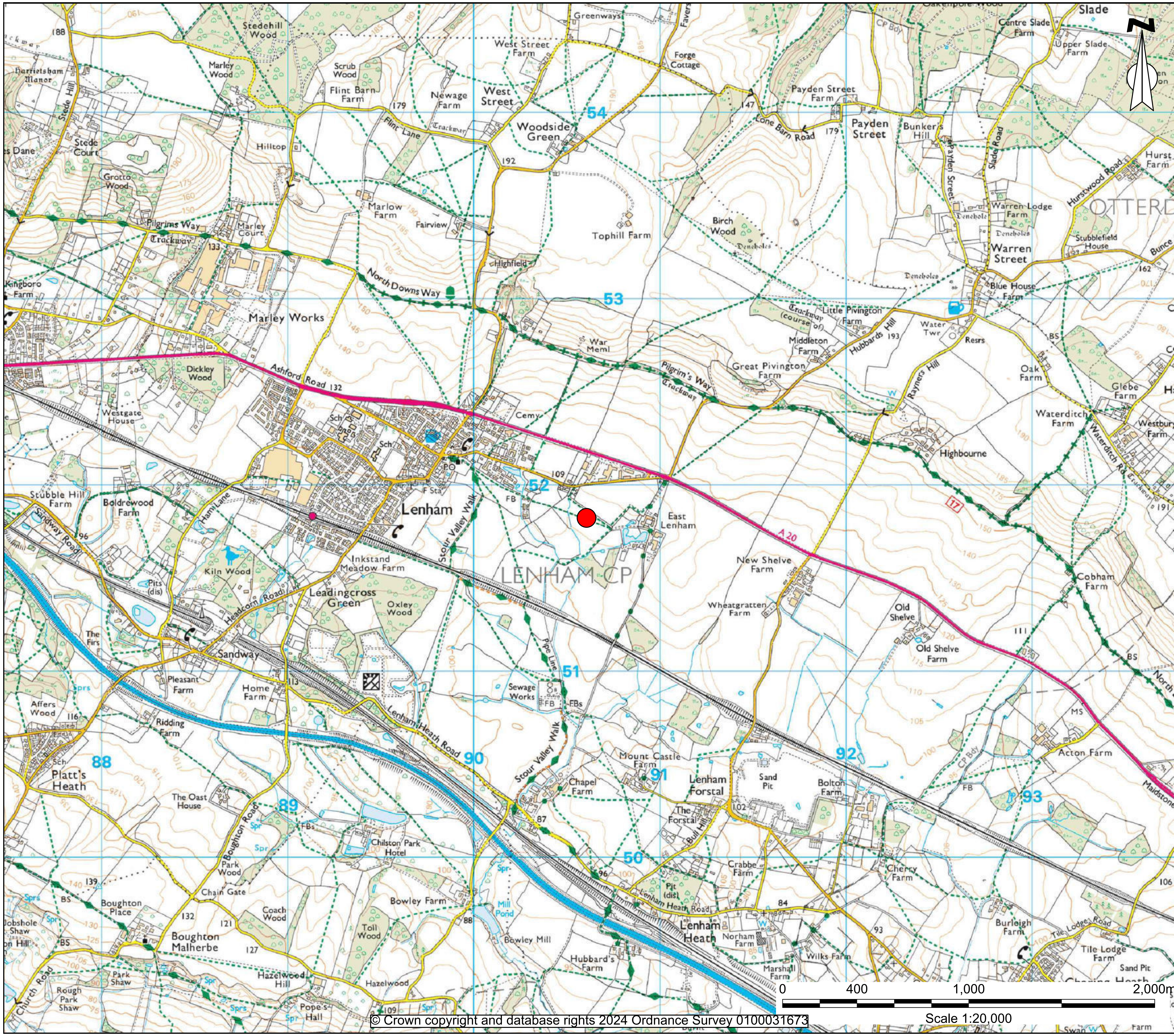
7.5.5 It is proposed that foul flows will discharge to a Ø225mm public foul drain to the southwest of the Site. Foul flows have been calculated at 4.6 l/s.

7.6 Conclusion

7.6.1 This FRA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of national policy and guidance.

7.6.2 The development should not therefore be precluded on the grounds of flood risk, or from surface water and foul drainage.

DRAWINGS



KEY:

Site Location (TQ 9060,5182)

P01	02/12/24	Issued for comment / approval	SD	CW	CW
Rev	Date	Description	DRA	CHK	APP

Project
Old Ashford Road, Lenham

Client
Dean Lewis Estates Ltd

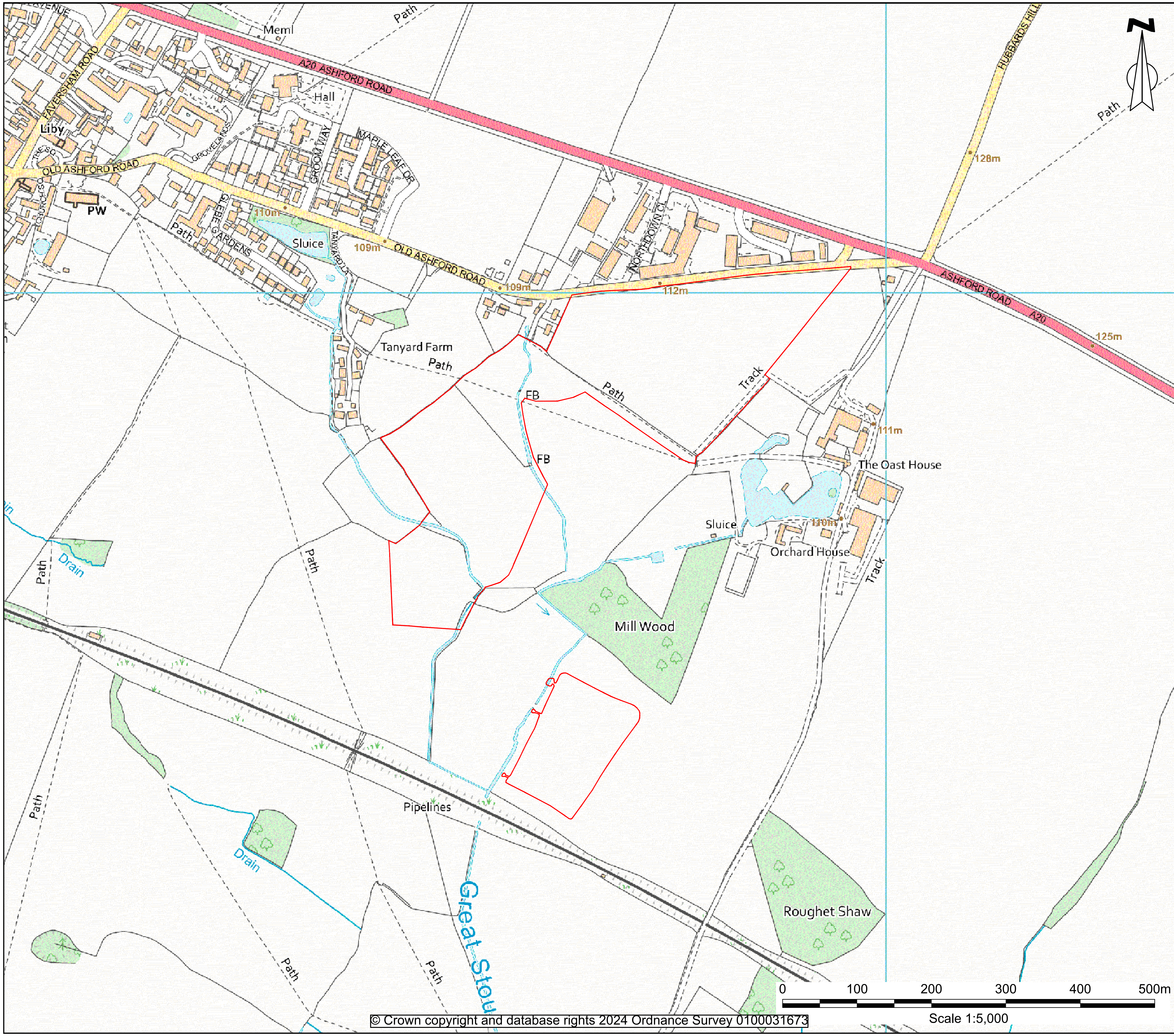
Drawing Title
Site Location Plan

Scale	Date	Status
1:20,000@A3	02/12/24	Preliminary

DWG No. SHF1528004-ENZ-XX-XX-DR-Y-0001

Revision P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
Belfast 07377673948
enzygo
@enzygo
enzygo.com
hello@enzygo.com



KEY:

- Site Boundary
- Surface Water Features

Rev	Date	Description	DRA	CHK	APP
P01	02/12/24	Issued for comment / approval	SD	CW	CW

Project
Old Ashford Road, Lenham

Client
Dean Lewis Estates Ltd

Drawing Title
Surface Water Features

Scale	Date	Status
1:5000@A3	02/12/24	Preliminary

DWG No. SHF1528004-ENZ-XX-XX-DR-Y-0002
Revision P01

Bristol
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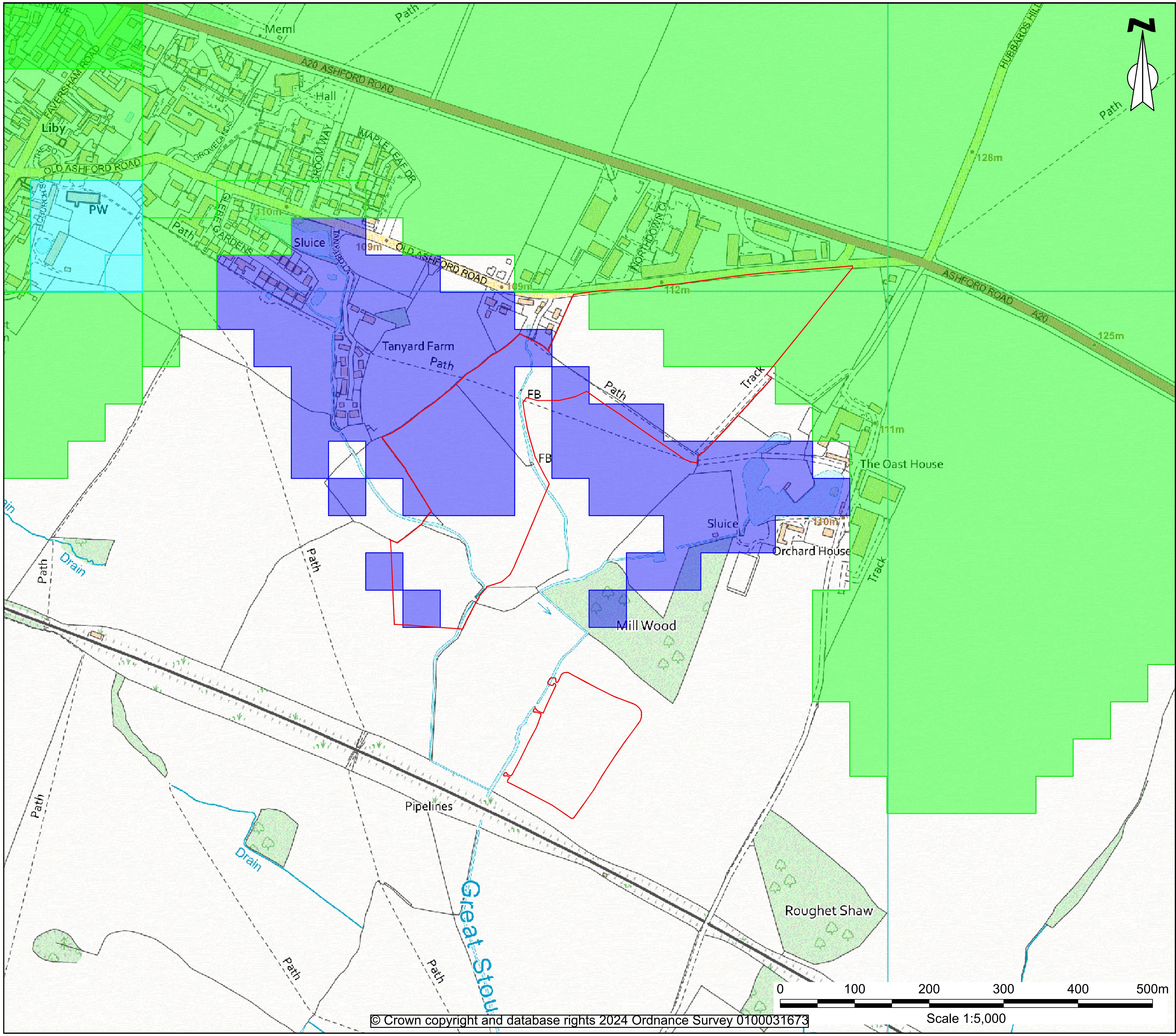
Manchester
0161 413 6444
Sheffield
0114 321 5151
Cardiff
02920 023 700
Cambridge
01799 542 473
Belfast
07377673948

enzygo
@enzygo
enzygo.com
hello@enzygo.com



KEY:

- Site Boundary
- Potential for Groundwater Flooding to Occur at Surface
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Limited Potential for Groundwater Flooding to Occur

Rev	Date	Description	DRA	CHK	APP
P01	02/12/24	Issued for comment / approval	SD	CW	CW

Project
Old Ashford Road, Lenham

Client
Dean Lewis Estates Ltd

Drawing Title
BGS Groundwater Flooding Susceptibility

Scale	**Date**	**Status**
1:5000@A3	02/12/24	Preliminary

DWG No. SHF1528004-ENZ-XX-XX-DR-Y-0003
Revision P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
Belfast 07377673948
enzygo
@enzygo
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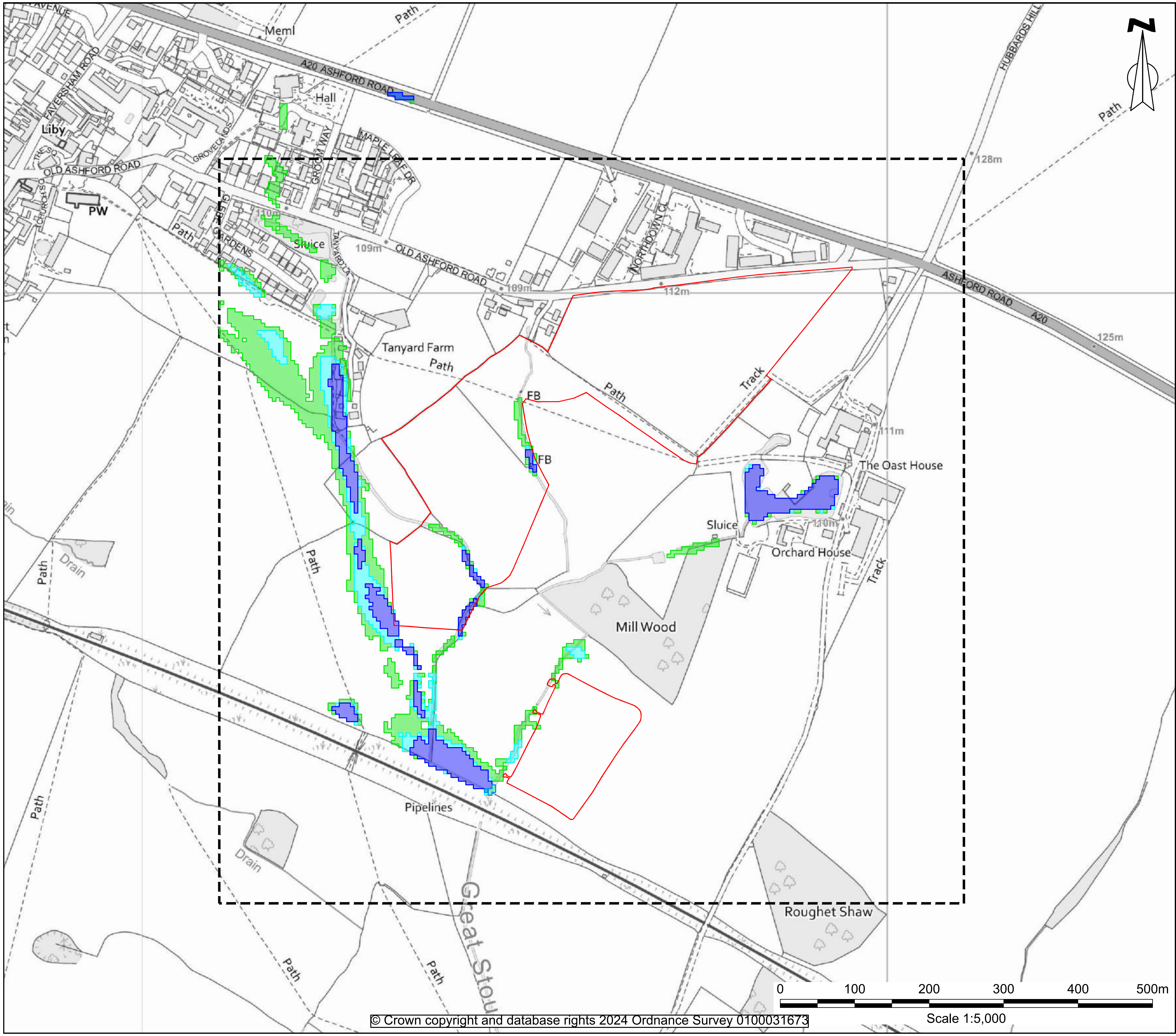

KEY:

- Site Boundary
- Search Extent
- 1 in 75 Year Surface Water Flooding
- 1 in 200 Year Surface Water Flooding
- 1 in 1000 Year Surface Water Flooding

Rev	Date	Description	DRA	CHK	APP
P01	02/12/24	Issued for comment / approval	SD	CW	CW

Project
Old Ashford Road, Lenham

Client
Dean Lewis Estates Ltd

Drawing Title
JBA Surface Water Flooding

Scale	Date	Status
1:5000@A3	02/12/24	Preliminary

DWG No. SHF1528004-ENZ-XX-XX-DR-Y-0004.1 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
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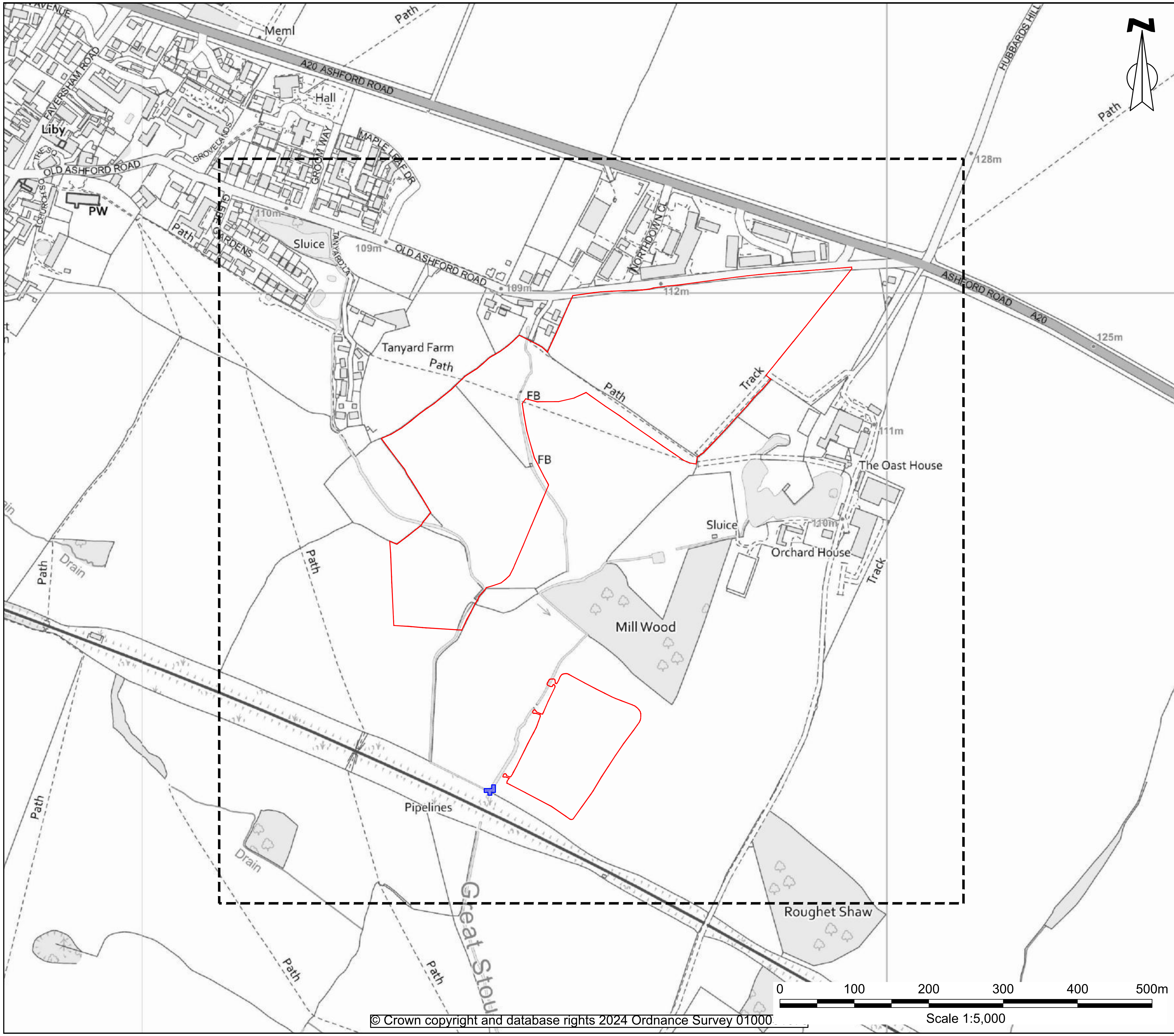

KEY:

- Site Boundary
- Search Extent
- 1 in 20 Year Flooding from Rivers
- 1 in 75 Year Flooding from Rivers
- 1 in 100 Year Flooding from Rivers
- 1 in 200 Year Flooding from Rivers
- 1 in 1000 Year Flooding from Rivers

P01	02/12/24	Issued for comment / approval	SD	CW	CW
Rev	Date	Description	DRA	CHK	APP

Project
Old Ashford Road, Lenham

Client
Dean Lewis Estates Ltd

Drawing Title
JBA Flooding from Rivers

Scale	Date	Status
1:5000@A3	02/12/24	Preliminary

DWG No. SHF1528004-ENZ-XX-XX-DR-Y-0004.2 **Revision** P01

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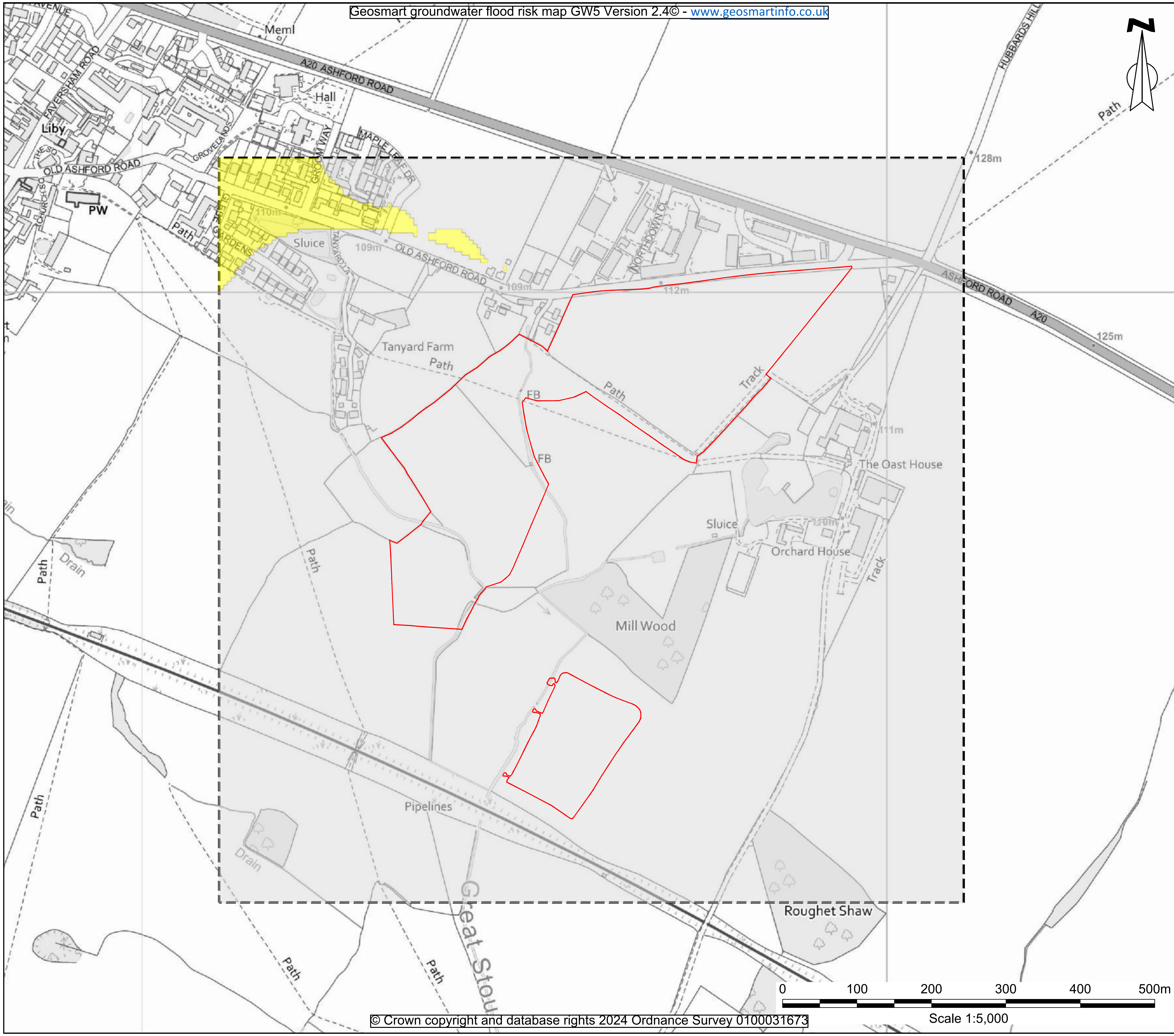

KEY:

- Site Boundary
- Search Extent
- Class 1 - High Risk
- Class 2 - Moderate Risk
- Class 3 - Low Risk
- Class 4 - Negligible Risk

Rev	Date	Description	DRA	CHK	APP
P01	02/12/24	Issued for comment / approval	SD	CW	CW

Project
Old Ashford Road, Lenham

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Dean Lewis Estates Ltd

Drawing Title
Groundwater Flood Risk Map

Scale	Date	Status
1:5000@A3	02/12/24	Preliminary

DWG No. SHF1528004-ENZ-XX-XX-DR-Y-0005 **Revision** P01

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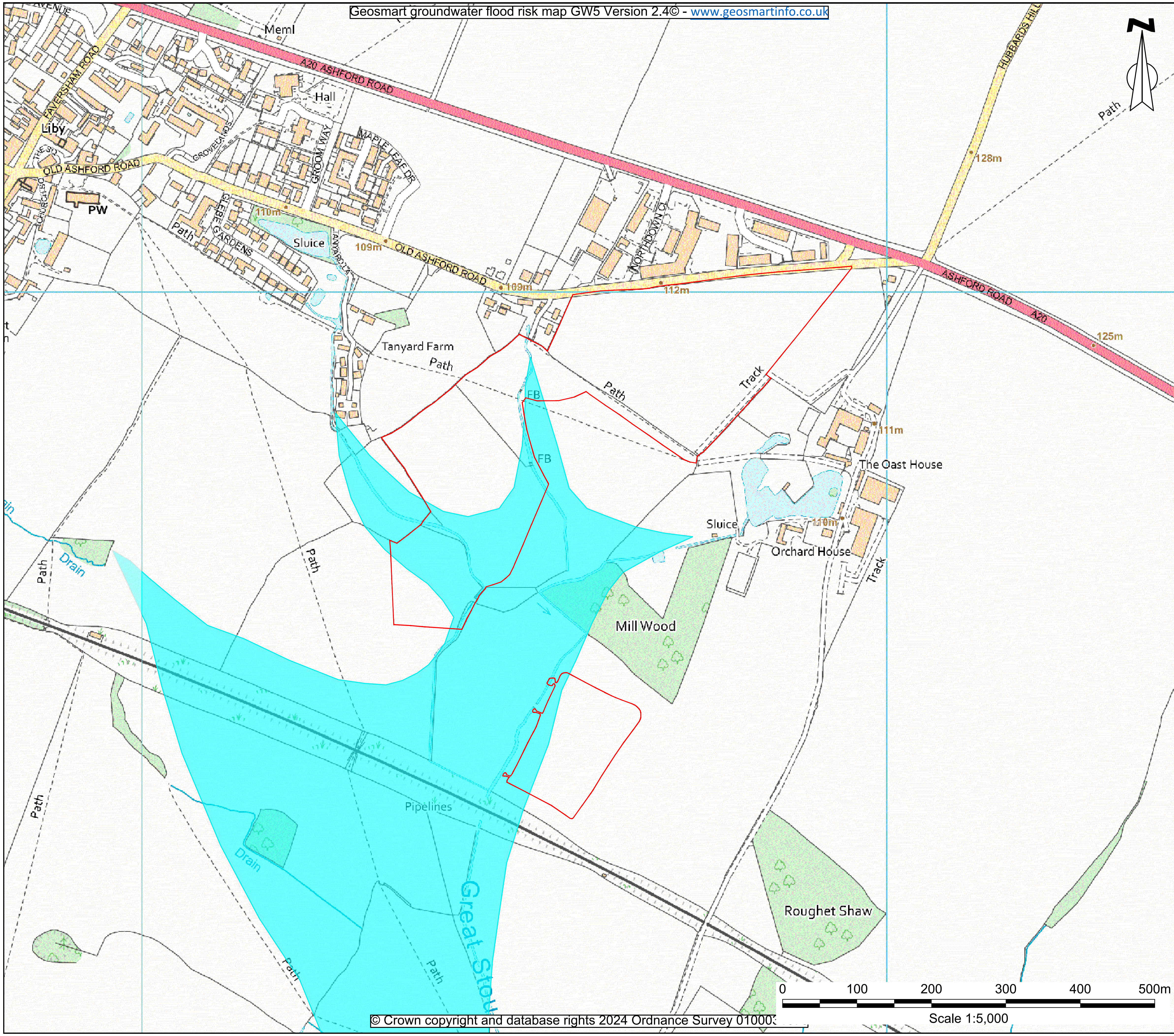

KEY:

Site Boundary

Geological Indicators of Flooding
from Inland Flooding

P01	02/12/24	Issued for comment / approval	SD	CW	CW
Rev	Date	Description	DRA	CHK	APP

Project
Old Ashford Road, Lenham

Client
Dean Lewis Estates Ltd

Drawing Title
Geological Indicators of Flooding

Scale	Date	Status
1:5000@A3	02/12/24	Preliminary

DWG No. SHF1528004-ENZ-XX-XX-DR-Y-0006
Revision P01

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