



NPPF: Flood Risk Assessment & Drainage Strategy

Rook Farm, Hayling Island

Gladman Developments Ltd

SHF.1132.142.HY.R.001.D



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Rook Farm, Hayling Island

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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 guidance¹, for a proposed residential development located on land at Rook Farm, Hayling Island.

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

A summary of the baseline Site condition is included below:

- The 11.77-hectare (ha) Site is comprised of three agricultural fields with an agricultural building, underlain by clayey soils and bedrock with low infiltration potential.
- The Site slopes in a southeast direction towards a series of land drains within and bounding 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 the onsite and bounding land drains.
- The risk of tidal flooding is assessed as negligible for the Site.
- The risk of groundwater flooding is assessed as negligible above ground but low below ground.
- The risk of surface water flooding is assessed as negligible for most of the Site, with areas of low risk associated with surface water ponding within the Site.
- The risk of flooding from sewers is assessed as negligible for most of the Site with an area of low risk along the reaches of the identified asset.
- Flood risk from all other sources is assessed as negligible.

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



In accordance with national planning policy and guidance, the following avoidance measures have been considered in this FRA:

- Set the surface water outfall from the proposed development at an appropriate height, above the bed-level of the receiving land drain.
- Set finished floor levels +150mm above external levels.
- Limit the number of highway crossings along the route of the land drain. 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.

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

- o Provide a 4m easement free from development along either side of the onsite and bounding land drains. This easement would provide access for inspection and maintenance purposes, including vehicle access.
- o Provide a development free easement (3m either side) of onsite Southern Water public sewer assets, or re-direct around the Site boundary.

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).

The entirety of proposed development is situated in Flood Zone 1. Subject to the above measures and the adoption of a sequential approach to development, it has been demonstrated that the proposed development would not be at risk of fluvial flooding or flooding from any other source.

Having regard to national planning policy and guidance, there is no requirement to apply the sequential test. It has also been demonstrated that the flood risks associated with the A3023 Langstone Bridge are not a development constraint, having regard to the actual risks this poses and the measures that can be taken to manage this.

Source of Flooding	Risk of Flooding	Risk Without Measures	Recommended Measures	Risk to Development with Measures
Fluvial – Land Drains	Negligible for most of the Site but low along the reaches of the onsite and bounding land drains	Negligible/Residual	Avoid and Control	Negligible
Tidal – The Solent and The Channel	Negligible for the Site	Negligible	Avoid	Negligible
Groundwater – Secondary A Aquifer	Negligible above ground but Low below ground	Negligible to Low	Avoid	Negligible
Surface Water – Poor Permeability and Site topography	Negligible for most of the Site but low where there is surface water ponding	Negligible to Low	Avoid and Control	Negligible
Sewers and Mains – Public Sewers	Negligible for most of the Site but low along the reaches of the identified asset	Negligible to Low	Avoid	Negligible
Infrastructure Failure – Pond Failure	Low	Low	Avoid	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 basin, with an outfall to onsite watercourses.

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 drainage.

1.0 Introduction

1.1 Background

- 1.1.1 Enzygo Ltd was commissioned by Gladman Developments Ltd to carry out a site-specific Flood Risk Assessment (FRA), including an outline surface water and foul drainage strategy, in support of an outline planning application for a proposed residential development. The Site is located on land at Rook Farm, Hayling Island (the 'Site').
- 1.1.2 The proposal is for up to 300 residential dwellings, with associated highways, parking, gardens, and landscaping on the 11.77-hectare (ha) Site.
- 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 FRA² 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 An FRA is required for this development, as initial screening using EA online indicative flood mapping shows the Site is in Flood Zone 1 (low risk) but is more than 1ha and is at risk of surface water flooding.
- 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

² Department for Environment, Food & Rural Affairs and Environment Agency (published March 2014 and updated April 2025). Flood Risk Assessments if You're Applying for Planning Permission [<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>].

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 161-186 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 areas⁵.
- 1.2.3 The FRA should also make allowances for climate change⁶ 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 level⁷. 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, which 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 the Site to be impacted by flooding, the impacts of the proposed development on flooding

³ Ministry of Housing, Communities & Local Government (published March 2012 and updated February 2025). 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 September 2025). 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.

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 PPG ID7.

Regional/Local Policy

1.4.2 In preparing the FRA, the following policies from the Havant Borough Core Strategy (2011)⁸:

- Policy CS15: Flood and Erosion Risk

Strategic Flood Risk Assessment (SFRA)

1.4.3 The FRA has reviewed the guidance within the Partnership for South Hampshire Level 1 Strategic Flood Risk Assessment (SFRA) report and associated mapping (2024)⁹.

1.4.4 Below is a summary of our review which justifies the requirement of site-specific assessment of all sources of flooding as part of this FRA (refer to Section 4):

- The SFRA is a Level 1 Screening study. One of the aims of the SFRA (Section 1.1.2) is “to assess the risk to an area from all sources of flooding, now and in the future, taking into account the impacts of climate change, as well as assessing the cumulative impact that land use changes and development in the area will have on flood risk”.
- The mapping of key flooding sources (fluvial, tidal, groundwater, surface water) is based on the following data sources, with caveats on limitations detailed below:
 - Fluvial and Tidal - Flood Map for Planning (Rivers and Sea)¹⁰

Fluvial: This dataset is based on a consistent standardised GIS shapefile representing the river network. Identifies the watercourse centreline, and numerous parameters e.g., type (primary river, secondary, culvert, canal), surface or below ground, main river status, name, width, flow direction. GIS shapefiles which identify the probability of river and sea flooding, including the future impacts of climate change, ignoring the presence of defences as mapped on the Environment Agency Flood Map for Planning (rivers and sea).

Tidal: Coastal Modelling – East Solent Study, Southampton Water Coastal Modelling Study, and New Forest Coastal Modelling Study. These models simulate the impact of a combination of extreme sea levels and wave overtopping. The models have been run and maximum depth and maximum hazard rating mapping produced to inform the SFRAs for each LPA.

- Groundwater - BGS Groundwater Flooding¹¹

‘Areas Susceptible to Groundwater Flooding’ is a national dataset produced by the EA which shows the proportion of 1km squares where geological and hydrogeological conditions show

⁸ <https://www.havant.gov.uk/sites/default/files/documents/ADOPTED%20CORE%20STRATEGY%20.pdf>

⁹ <https://www.havant.gov.uk/media/10028/download?inline>

¹⁰ <https://www.data.gov.uk/dataset/bed63fc1-dd26-4685-b143-2941088923b3/flood-map-for-planning-rivers-and-sea-flood-zone-3>

<https://www.data.gov.uk/dataset/cf494c44-05cd-4060-a029-35937970c9c6/flood-map-for-planning-rivers-and-sea-flood-zone-2>

¹¹ <https://www.bgs.ac.uk/datasets/groundwater-flooding/>

that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring but provides a useful tool to identify where further studies may be useful.

The BGS has produced the first national dataset on the susceptibility of groundwater flooding. Based on geological and hydrogeological information, the digital data can be used to identify areas where geological conditions could enable groundwater flooding to occur and where groundwater may come close to the ground surface. Note, it is a susceptibility set, it does not indicate hazard or risk, i.e., it does not provide any information on the depth to which groundwater flooding occurs or the likelihood of the occurrence³ of an event of a particular magnitude.

The BGS state that the dataset is suitable for use for regional or national planning purposes where the groundwater flooding information will be used along with a range of other relevant information to inform land-use planning decisions. It might also be used in conjunction with a large number of other factors, e.g., records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information, to establish relative, but not absolute, risk of groundwater flooding at a resolution of greater than a few hundred metres. The susceptibility data should not be used on its own to make planning decisions at any scale, and, in particular, should not be used to inform planning decisions at the site scale. The susceptibility data cannot be used on its own to indicate risk of groundwater flooding.

The Susceptibility to Groundwater Flooding dataset provided by the BGS can be used to identify areas where geological conditions could enable groundwater flooding to occur and where groundwater may come close to the ground surface.

- Surface Water - Risk of Flooding from Surface Water Extent¹²

The EA has undertaken modelling of surface water flood risk at a national scale and produced mapping identifying those areas at risk of surface water flooding during three annual probability events: 1 in 30 year (3.33% annual probability), 1 in 100 year (1% annual probability) and 1 in 1000 year (0.1% annual probability). The extents of the latest version of the mapping have been made available for the Level 1 SFRA as GIS layers. This mapping is referred to as 'Risk of Flooding from Surface Water' (RoFfSW). This national mapping has the following limitations: use of a single drainage rate for all urban areas, it does not show the susceptibility of individual properties to surface water flooding, the mapping has significant limitations for use in flat catchments, no explicit modelling of the interaction between the surface water network, the sewer systems and watercourses, in a number of areas modelling has not been validated due to a lack of surface water flood records, and as with all models, the ROFSW mapping is affected by a lack of, or inaccuracies, in available data.

- 1.4.5 In summary, the SFRA uses macro-scale data, which is broad-brush indicator of potential flood risk sources. Site specific FRAs should also make optimum use of readily available information, for example the mapping present in the SFRA and available on the Environment Agency website, although in some cases additional modelling or detailed calculations will need to be undertaken.

Guidance Documents / Best Practice

- 1.4.6 This FRA also considers the following flood risk and drainage guidance documents:
- Havant Borough Council Hayling Island Coastal Management Strategy¹³.
 - Hampshire County Council Preliminary Flood Risk Assessment (2011)¹⁴.

¹² <https://www.data.gov.uk/dataset/95ea1c96-f3dd-4f92-b41f-ef21603a2802/risk-of-flooding-from-surface-water-extent-3-3-percent-annual-chance>

¹³ <https://www.havant.gov.uk/coastal-partners>

¹⁴ <https://documents.hants.gov.uk/flood-water-management/watercourses/PFRAREportsavedJan2016.pdf>

- Hampshire County Council Local Flood Risk Management Strategy (LFRMS)¹⁵.
- Hampshire County Council Catchment Flood Management Plans (CFMP)¹⁶.
- Hampshire County Council Groundwater Management Plan¹⁷.
- Havant Borough Council Flood Risk Sequential Test & Exception Test – Policy Guidance for Applicants & Planning Officers¹⁸.

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.

¹⁵ <https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies>

¹⁶ <https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies>

¹⁷ <https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies>

¹⁸ <https://www.havant.gov.uk/media/9110/download?inline>

2.0 Sources of Information

2.1 Sources of Information

2.1.1 The following information was consulted:

- Ordnance Survey mapping (Drawings 001 and 002).
- Detailed topographic survey (Appendix 1).
- EA online mapping (Flood Map for Planning¹⁹, Long Term Flood Risk Assessment for Locations in England²⁰, Catchment Data Explorer²¹ and Main River Map²²).
- EA Reduction in Risk of Flooding from Rivers and Sea online mapping²³.
- Online mapping for Climate Change Allowances for Peak River Flow and Peak Rainfall in England online mapping²⁴.
- National Soils Resources Institute (NSRI): Soilsdscapes online mapping²⁵.
- British Geological Survey [BGS] Geology Viewer online mapping²⁶.
- British Geological Survey [BGS] Borehole Records online mapping²⁷.
- 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 Sites²⁸.
- River Levels UK for identifying Flood Alert and Flood Warning areas²⁹.

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 Advice³⁰ and the NPPF/PPG ID: 7 was consulted and reviewed.

2.2.4 Correspondence with the EA is included in Appendix 2.

¹⁹ <https://flood-map-for-planning.service.gov.uk/>

²⁰ <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

²¹ <http://environment.data.gov.uk/catchment-planning/>

²² <https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386>

²³ [ArcGIS - My Map](#)

²⁴ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

²⁵ <https://www.landis.org.uk/soilsdscapes/>

²⁶ <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

²⁷ <https://www.bgs.ac.uk/information-hub/borehole-records/>

²⁸ <https://magic.defra.gov.uk/magicmap.aspx>

²⁹ <https://riverlevels.uk/flood-map#.XclKwPn7RPZ>

³⁰ Environment Agency and Department for Environment, Food & Rural Affairs (published April 2012 and updated April 2025). Preparing a Flood Risk Assessment: Standing Advice [<https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>].

Lead Local Flood Authority

- 2.2.5 Hampshire 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 3.

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 and pre-development enquiry response is included in Appendix 4.

2.3 Site Walkover

- 2.3.1 Enzygo staff carried out a walkover of the Site during March 2018. 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 at Rook Farm, St. Mary's Road, Hayling Island, PO11 9DF.
- 3.1.2 The Site is centred on National Grid Reference (NGR) 471949, 099836.
- 3.1.3 The 11.77ha Site location is shown in Drawing 001 and in more detail in Drawing 002.

3.2 Land Use

- 3.2.1 The land use is comprised of three agricultural fields with an agricultural building, which is located within the south-east extent of the Site (Figures 3.1 and 3.2). The Site is bisected by a watercourse from east to west.
- 3.2.2 The Site is bounded by grassed fields with residential developments beyond to the west and north and residential developments to the east and south. Church Road is beyond to the east and St Mary's Road is beyond to the east and south.
- 3.2.3 Access to the Site can currently be achieved via gated accesses off St Mary's Road to the north-east of the Site and Rook Farm Way.
- 3.2.4 In a wider context, Hayling Island is connected to the mainland via the A3023 Langstone Bridge, as also shown in Figure 3.1

Figure 3.1: Photographs of the Site and A3023 Langstone Bridge



Pan across the Site facing east.



The A3023, connected by the Langstone Bridge from the mainland to the island.

Figure 3.2: Aerial Photograph of the Site

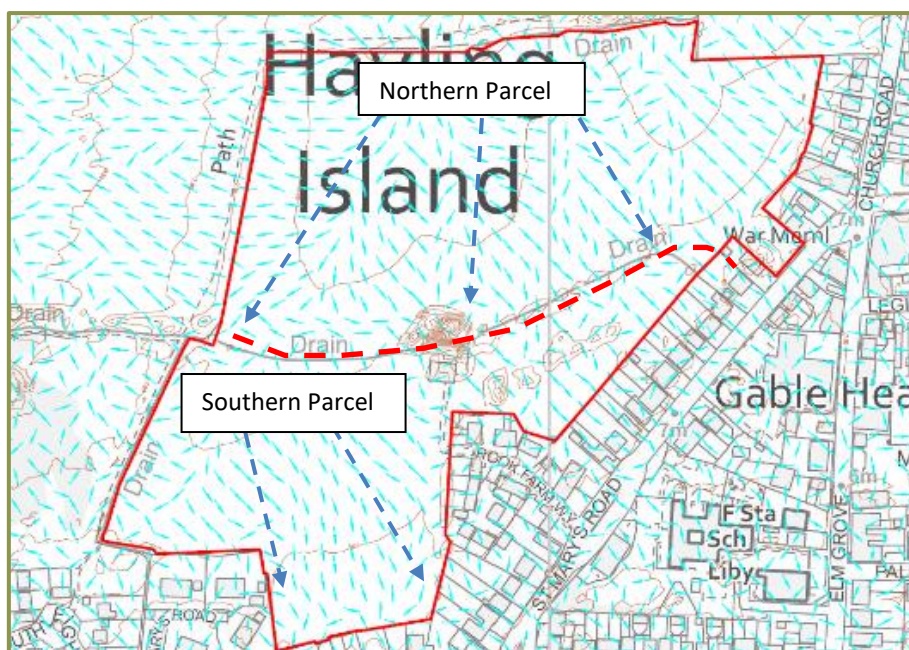


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3.3 Topographic Information

- 3.3.1 A detailed topographic survey was carried out during May 2016 and a copy is included in Appendix 1.
- 3.3.2 The northern parcel of the Site falls southwest and south. To the south it falls from 8.57 metres Above Ordnance Datum (m AOD) located along the northern central boundary to 7.84m AOD along the centre of the split between the two parcels. The fall of 0.73m over 203m gives a gradient of 1:278.
- 3.3.3 To the southwest it falls from 8.57m AOD to 7.57m AOD along the centre of the western boundary. The fall of 1m over 234m gives a gradient of 1:234.
- 3.3.4 The southern parcel of the Site falls in a south-east direction from 7.77m AOD, along the central split of the two parcels, to 6.51mAOD located in the south-east corner. The fall of 1.26m over 184m gives a gradient of 1:146.

Figure 3.3: Summary of Site Topography

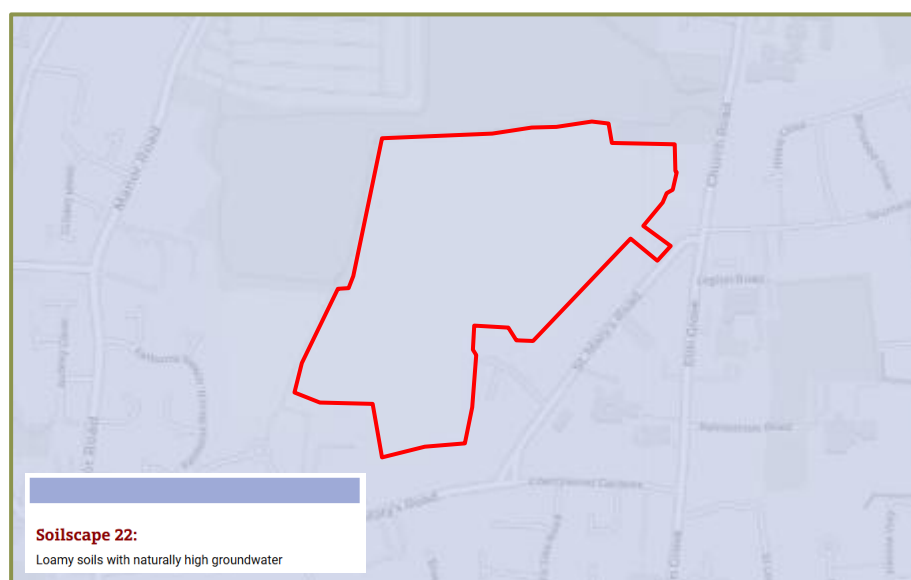


3.4 Soils and Geology

Soils Mapping

- 3.4.1 The online NSRI Soils mapping (Figure 3.4) shows the Site is underlain by loamy soils with naturally high groundwater. The soils mapping is indicative and there may be localised variation.
- 3.4.2 It is noted that there is a small area surrounding Rook Farm which has previously been developed and will likely include made ground of variable composition, location and depth.

Figure 3.4: Soils Mapping

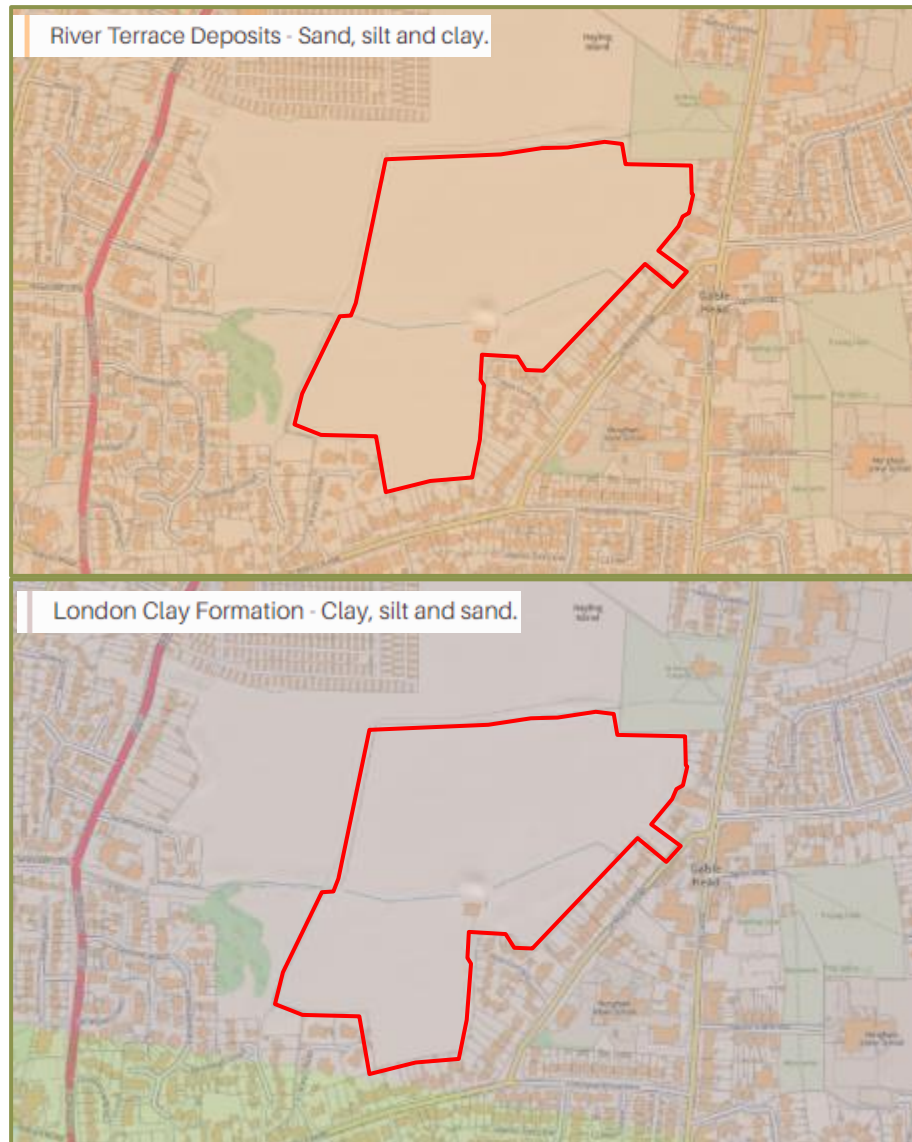


Soils Data © Cranfield University (NSRI) and for the Controller of HMSO [2025].

Geology Mapping

- 3.4.3 The online BGS Geology Viewer (Figure 3.5) shows the Site is underlain by River Terrace Deposits - sands, silts and clays (superficial deposits).
- 3.4.4 The bedrock beneath the Site is London Clay Formation - clays, silts and sands.
- 3.4.5 The geology mapping is indicative and there may be localised variation.

Figure 3.5: Geology Mapping

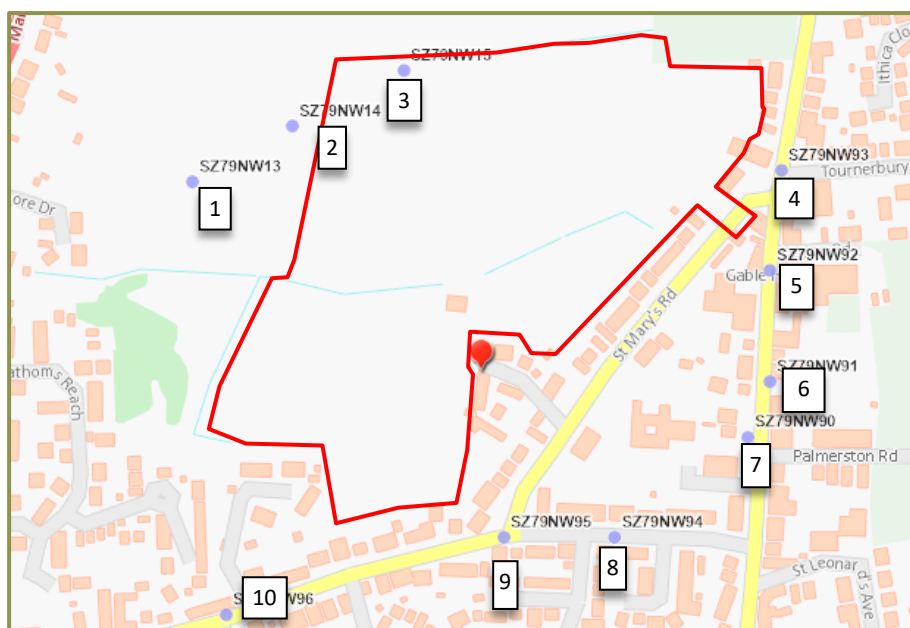


Top: Superficial deposits. Bottom: Bedrock geology. Contains British Geological Survey materials © NERC [2025].

BGS Borehole Records

- 3.4.6 The BGS Borehole Records online mapping (Figure 3.6) shows 10 boreholes located within the vicinity of the north, east and south of the Site, with one borehole in the northwest corner of the Site.
- 3.4.7 The borehole records (Appendix 5) confirm the geology as depicted by the Geology of Britain mapping (Table 3.1) with the addition of Brickearth (superficial windblown deposits) of varying depth, upon raised beach deposits.

Figure 3.6: Borehole Mapping



Contains British Geological Survey materials © NERC [2025].

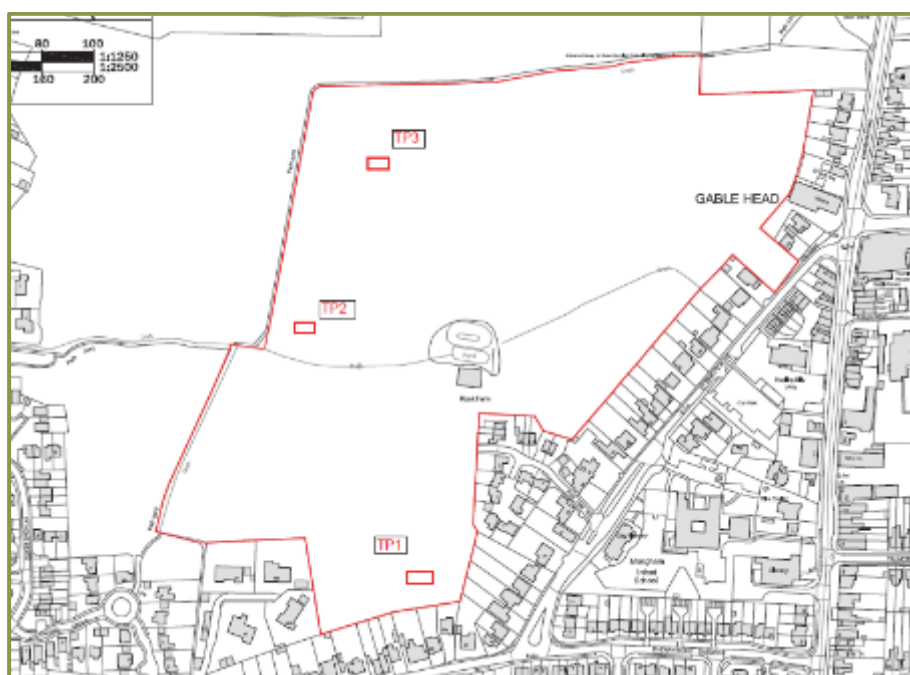
Table 3.1: BGS Borehole Data

Reference	Layout	Summary of Strata	Depth (m bgl)	Groundwater Depth (m bgl)
SZ79NW13	1	Brickearth, Raised Beach, London Clay	4.3	2.1
SZ79NW14	2	Brickearth, Raised Beach, London Clay	4.3	2.6
SZ79NW15	3	Raised Beach, London Clay	6.7	3
SZ79NW93	4	Brickearth, Raised Beach, London Clay	2.9	1.9
SZ79NW92	5	Brickearth, Raised beach, London Clay	3.1	1.6
SZ79NW91	6	Brickearth and Raised beach, London Clay	4.0	1
SZ79NW90	7	Brickearth, Raised Beach	4.0	1
SZ79NW94	8	Brickearth, Raised Beach	3.4	0.9
SZ79NW95	9	Brickearth, Raised Beach	3.1	1.1
SZ79NW96	10	Brickearth, Raised Beach	3.4	1.7

Contains British Geological Survey materials © NERC [2025].

Soakaway Testing

- 3.4.8 Soakaway testing was undertaken in accordance with DG 365 'Soakaway Design' methodology guidance, during November 2016. A copy of the Soakaway Test Results is included in Appendix 6.
- 3.4.9 A total of three soakaway test pits were established across the Site, in the north, south and centre of the Site (Figure 3.7).
- 3.4.10 The soakaway testing recorded clay of varying depth (0.5m -2.7m bgl) upon gravel and then sand below.

Figure 3.7: Trial Pit Location Plan**Table 3.2: Soakaway Data**

Trial Pit	Depth (m bgl)	Soil Infiltration Rate (m/s)			Comments
		Test 1	Test 2	Test 3	
TP1	3.0	Insufficient uptake	-	-	Groundwater 2.7m bgl. Clay and gravel deposits. Pit stable.
TP2	3.0	2.05E-06	2.08E-06	2.38E-06	Groundwater 2.56m bgl. Clay, sand and gravel deposits. Pit stable.
TP3	3.0	1.00E-05	2.79E-05	3.06E-05	Groundwater N/A. Clay, gravel and sand deposits. Pit stable.

3.5 Hydrogeology

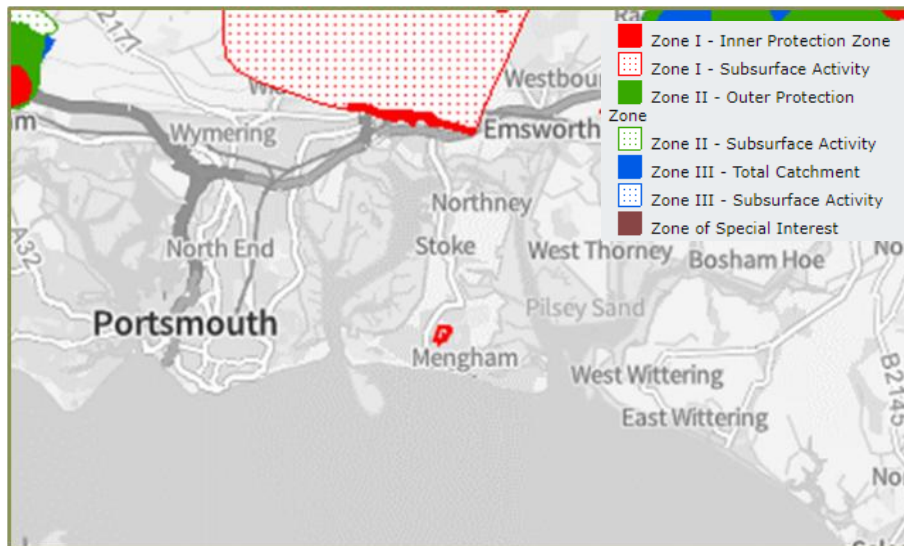
Infiltration Potential

- 3.5.1 The SuDS Infiltration Potential Mapping (Drawing 005) shows the Site is in the mapped extent indicative of moderate potential, which is likely to be associated with the underlying superficial deposits.
- 3.5.2 The clayey soils and geology are indicative of low infiltration potential.
- 3.5.3 Groundwater ingress was encountered in all ten nearby borehole records between depths of 0.9m bgl and 3m bgl.
- 3.5.4 Soakaway testing demonstrated low infiltration potential in 2 of the three trial pits. Groundwater ingress was encountered in two of the trial pits at depths of 2.56m and 2.7m bgl.

Defra Magic Map

- 3.5.5 The online Defra Magic Map mapping (Figure 3.8) shows the Site is not located in a groundwater Source Protection Zone (SPZ).

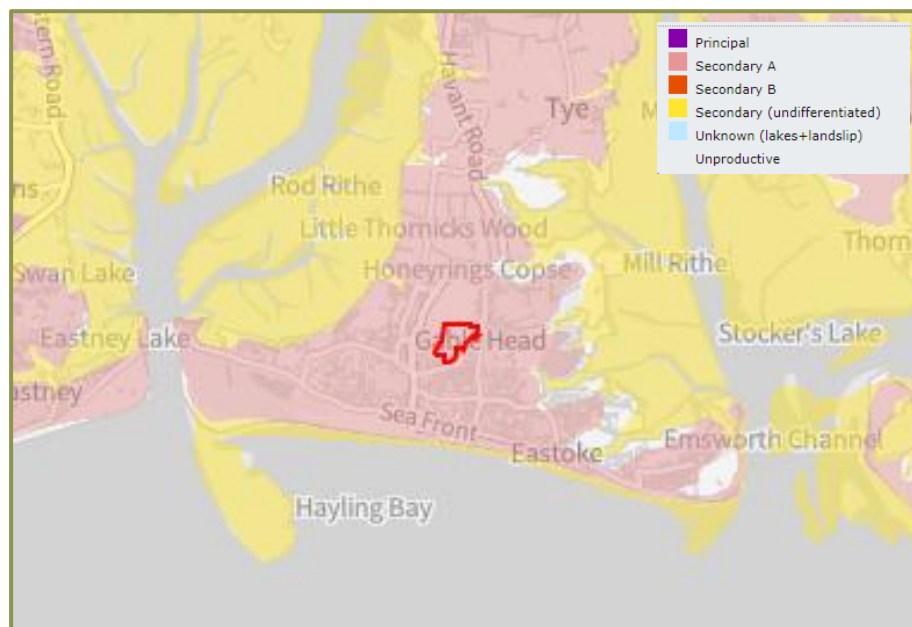
Figure 3.8: Source Protection Zone Map

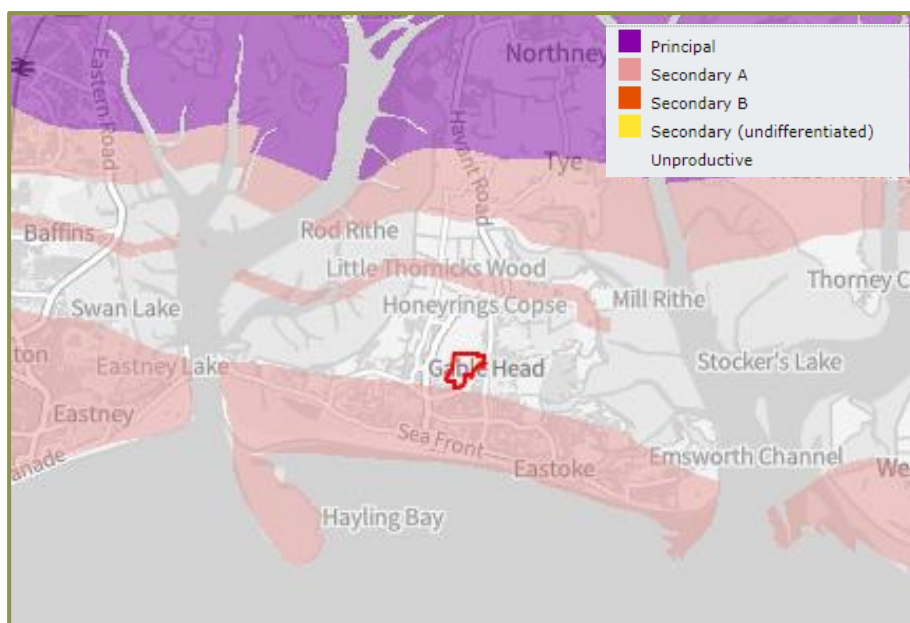


From Magic Map. Contains EA information © EA and database right [2025].

- 3.5.6 The Site is not located above a Principal Aquifer (bedrock designation) nor any other bedrock aquifers. The Site is located above a Secondary A Aquifer (superficial drift) (Figure 3.9).

Figure 3.9: Aquifer Designation Map





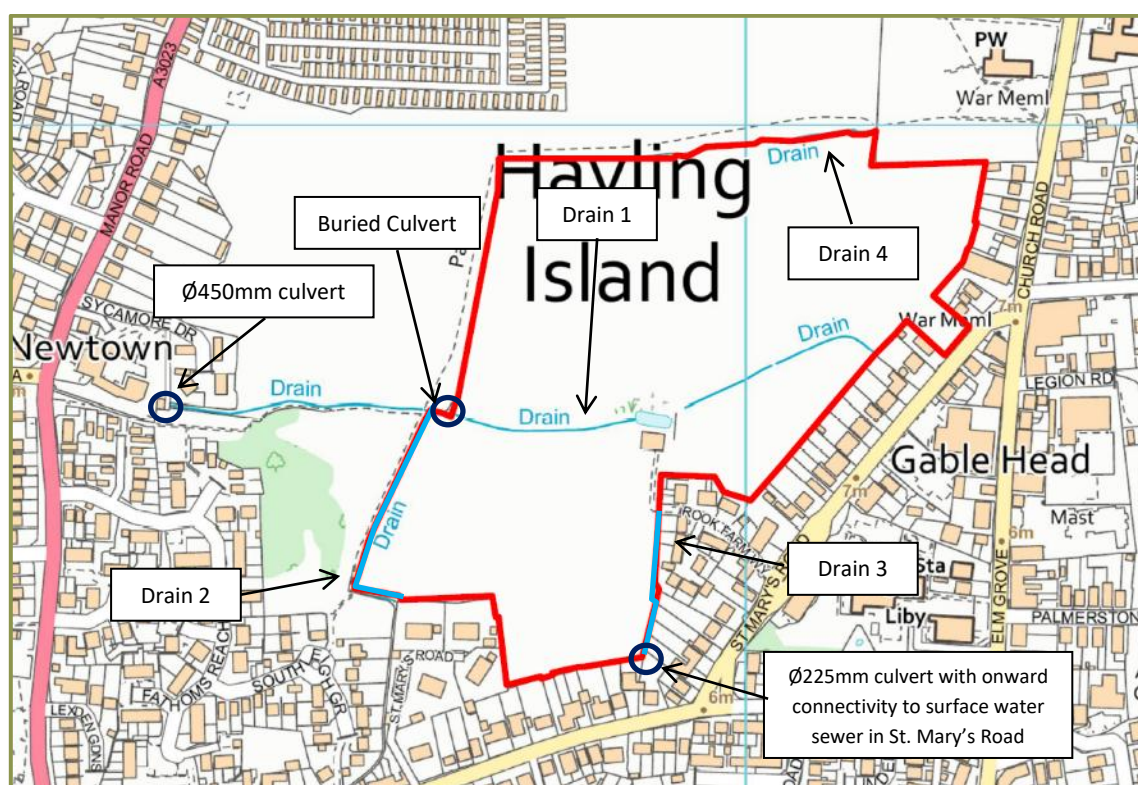
Top: Aquifer Designation (superficial deposits). Bottom: Aquifer Designation (bedrock). From Magic Map. Contains EA information © EA and database right [2025].

3.6 Catchment Hydrology

OS Mapping and Site Walkover Observations

- 3.6.1 OS mapping (Figure 3.10) shows a network of land drains within the Site boundary.
- 3.6.2 'Drain 1' conveys flows west through the centre of the Site. 'Drain 2' conveys flows north along the southwestern boundary and outfalls to Drain 1. 'Drain 3' conveys flows south along the southeastern boundary of the Site and 'Drain 4' is located along the northern boundary of the Site.

Figure 3.10: Map of Watercourses



Land Drain Network

- 3.6.3 Drain 1 conveys flow east to west, bisecting the Site and was carrying low flow (150mm) during the walkover (Figure 3.11). Drain 1 conveyed flow west, entering a pond within the centre of the Site. It continued to flow west from the pond and entered a Ø450mm culvert. It is assumed that this connects into the surface water sewer in Manor Road to the west of the Site.
- 3.6.4 Drain 2 was a small informal dry ditch which fell to the north and outfalled into Drain 1 (Figure 3.11).
- 3.6.5 Drain 3 was observed during the walkover despite not appearing on OS mapping (Figure 3.11). It was carrying low flows and was heavily vegetated. Two Ø225mm culverts were observed to be outfalling into the land drain halfway along its reach. Drain 2 outfalls from a Ø225mm culvert at the head of its reach and conveys flows south into a partially collapsed Ø150mm culvert, which is assumed to convey flow into the public surface water sewer in St. Mary's Road.
- 3.6.6 Drain 4 was a small informal dry ditch along the northern boundary which had no wider connectivity (Figure 3.11).

Figure 3.11: Land Drain Network

Top Left: Drain 4. Top Right: Drain 1 Ø450mm culvert outfall. Bottom Left: Drain 2 facing downstream. Bottom Right: Drain 3 looking downstream.

CCTV Survey

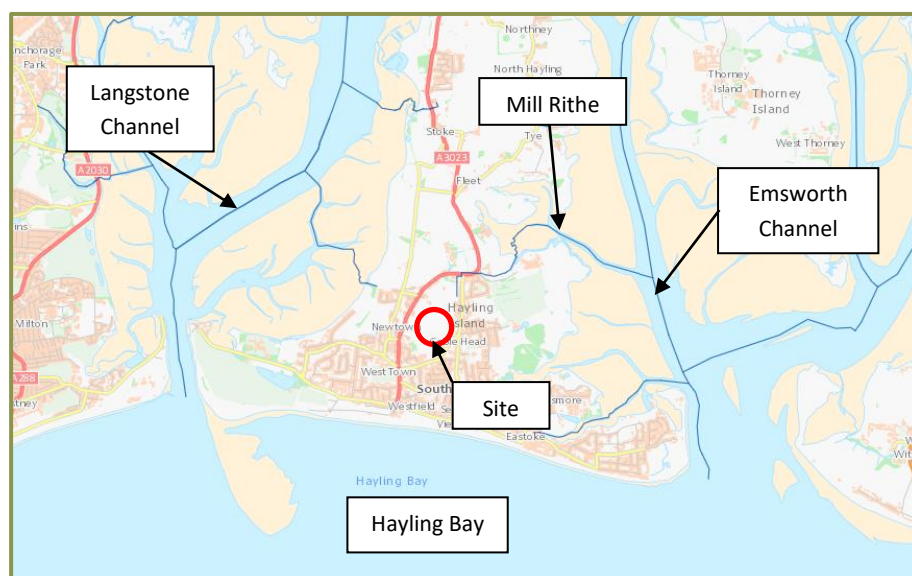
- 3.6.7 A CCTV survey was carried out during May 2018 to investigate and confirm the onward connectivity of Drain 3.
- 3.6.8 The survey confirmed that Drain 3 connects to the surface water sewer within St. Mary's Road to the south of the Site. A copy of the CCTV survey is included in Appendix 7.

Main River Map

- 3.6.9 The Environment Agency online main river map (Figure 3.12) identifies Mill Rithe conveying flow in an easterly direction 350m to the north of the Site at its nearest point. Mill Rithe is a tributary of Emsworth Channel.
- 3.6.10 Langstone Channel conveys flows southwards approximately 1.1km to the west of the Site at its closest point. An unnamed tributary of Langstone Channel conveys flow northwest approximately 800m to the northwest of the Site.

- 3.6.11 The above watercourses are 'main rivers', which are watercourses where flood risk work is carried out by the Environment Agency.
- 3.6.12 All these main rivers discharge to Hayling Bay (sea).
- 3.6.13 The land drains are classified as 'an ordinary watercourse', where flood risk work is carried out by the local drainage authority/riparian landowner.

Figure 3.13: Main River Map

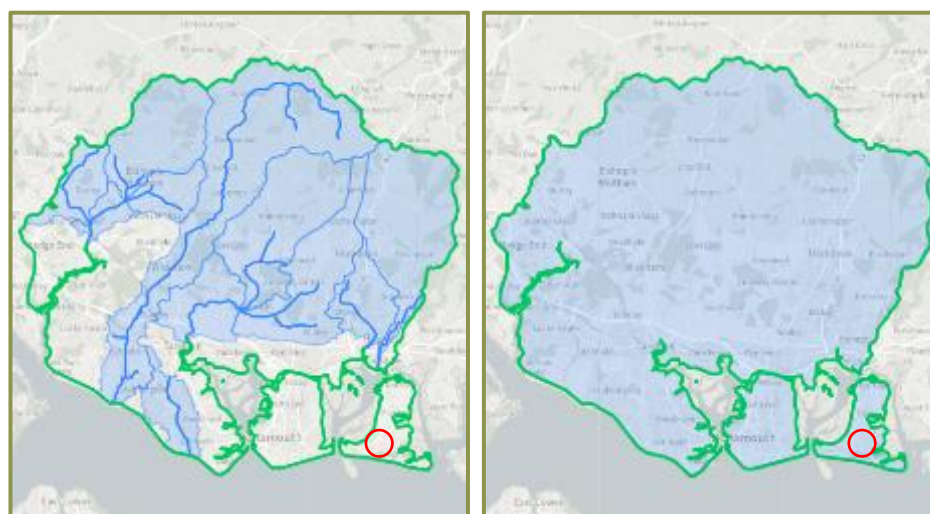


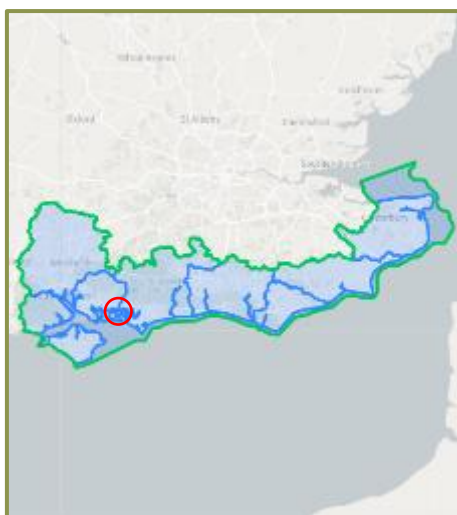
Contains EA information © EA and database right [2025].

EA Catchment Data Explorer Mapping

- 3.6.14 The Site does not reside within a water body, but it is within the East Hampshire Rivers Operational Catchment (Figure 3.14), East Hampshire Management Catchment, and South West River Basin District.

Figure 3.14: Catchment Data Explorer





Top Left: East Hampshire Rivers Operational Catchment. Top Right: East Hampshire Management Catchment. Bottom: South West River Basin District. Contains EA information © EA and database right [2025].

3.7 Sewerage Assets

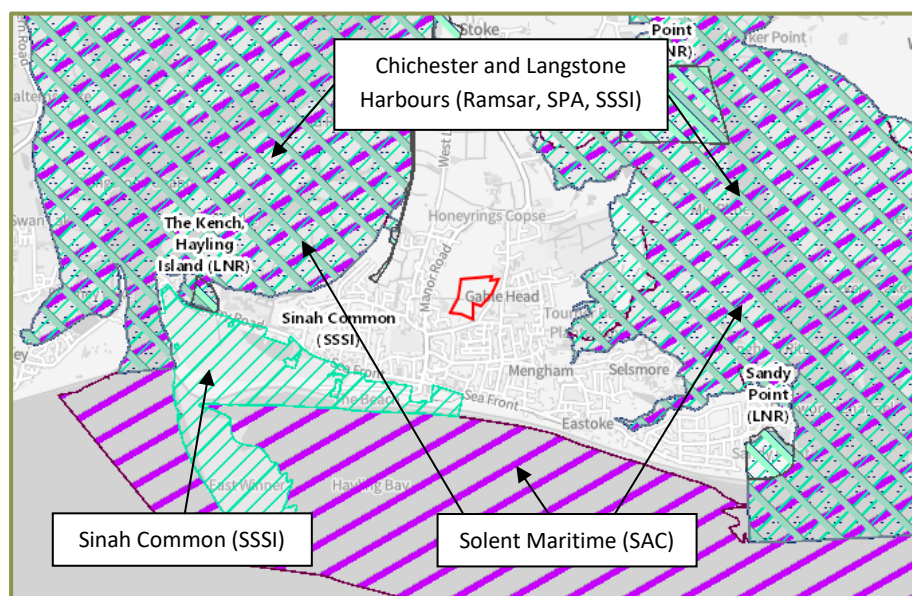
Public Assets

- 3.7.1 Southern Water asset plans (Appendix 4) show there is a Ø525mm public foul sewer conveying flows northeast through the northwest corner of the Site.
- 3.7.2 A separate surface water and foul sewer network serves the residential dwellings to the east and south of the Site. There is a Ø225mm public surface water sewer conveying flow east within Rook Farm Way 15m to the east of the Site. The surface water sewer joins a Ø225mm surface water sewer in St Mary's Road and conveys flow southwest. The surface water sewers converge at a point to the south of the Site with connectivity from here not apparent. This is deemed to be incorrectly depicted and Southern Water confirmed verbally that their plans are not always accurate. As such it is likely the network drains to the east to Church Road before conveying flow south and outfalling into the Solent.

3.8 Designated Sites

- 3.8.1 The online Defra Magic Map mapping (Figure 3.14) shows the nearest designated sites are:
- Chichester and Langstone Harbours (Ramsar and Special Protection Area [SPA] and Site of Special Scientific Interest [SSSI])) located north, east and west of the Site, nearest point is 820m east.
 - Solent Maritime (Special Area of Conservation [SAC]) located north, south, east and west of the Site, nearest point is 1km south.
 - Solent and Dorest Coast Special Protection Area (SPA) approximately 900m to the south of the Site.
 - Sinah Common (SSSI) located 750m south of the Site.

Figure 3.15: Designated Sites



From Magic Map. Contains EA information © EA and database right [2025].

4.0 Assessment of Flood Risk Sources

4.1 Potential Sources of Flooding

- 4.1.1 A summary of the potential sources of flooding and source is summarised in Table 4.1. Each source of flooding and level of risk is then assessed in further detail below.

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	Land Drainage Network	Environment Agency consultation response/data (Appendix 2) and Environment Agency Flood Zone mapping (Drawing 003).
Tidal	No	The Solent and The Channel	Environment Agency consultation response/data (Appendix 2) and Environment Agency Flood Zone mapping (Drawing 003).
Groundwater	Yes	Secondary A Aquifer	Geosmart Groundwater (Drawing 004), BGS Borehole Records (Appendix 5), and Soakaway Test Results (Appendix 6).
Surface Water	Yes	Poor permeability and Site topography	Environment Agency Complex Surface Water Flood Mapping (Drawings 006.1 to 006.4).
Sewers and Mains	Yes	Public sewers	Southern Water asset plans (Appendix 4)
Infrastructure Failure	Yes	Pond failure	OS mapping (Drawings 001 to 002) and Environment Agency online mapping: Long Term Flood Risk Assessment for Locations in England.

4.2 Fluvial Flooding

EA 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 Flood Zone mapping (Drawing 003) shows the Site is in Flood Zone 1, which is land outside the 1 in 1000-year 0.1% Annual Exceedance Probability (AEP)) extent of fluvial (river) flooding, at 'low' risk.
- 4.2.3 The updated mapping which includes climate change up to the year 2125 (i.e. lifetime of the development), shows the Site and immediate vicinity remains in Flood Zone 1.

Flood History

- 4.2.4 The Environment Agency online historic flood map shows they hold no records of flooding within or surrounding the Site.
- 4.2.5 The Hayling Island Emergency Plan outlines that parts of Hayling Island have flooded historically, including access/egress to the island.
- 4.2.6 Correspondence with the Environment Agency (Appendix 2) confirmed no historical fluvial flooding incidents within the Site boundary or immediate vicinity. The nearest record of flooding is on the northern extents of Church Road during October 2000.

Flood Defences

- 4.2.7 The Environment Agency Reduction in Risk of Flooding from Rivers and Sea online mapping shows the Site does not benefit from fluvial flood defences.

Flood Warning Service

- 4.2.8 The River Levels UK website (Figure 4.1) shows the Site does not benefit from flood warnings. The access/egress to Hayling Island does however benefit from flood warnings.

Figure 4.1: Flood Warning Areas



River Levels UK [2025].

Flood Risk Summary

- 4.2.9 The risk of fluvial flooding is assessed as negligible. There is however a residual risk of fluvial flooding from the onsite and bounding land drains.
- 4.2.10 Measures required for residual fluvial flooding are discussed in Section 5.

4.3 Tidal Flooding

EA Flood Zone Mapping

- 4.3.1 The Environment Agency online flood map shows the Site and Site access/egress is located within Flood Zone 1; outside the 1 in 1000-year probability of tidal (sea) flooding (0.1% Annual Exceedance Probability [AEP]). The Site is assessed as being at 'low' risk of tidal flooding.
- 4.3.2 Access to Hayling Island from the mainland is served by the A3023 Langstone Bridge. The Environment Agency online flood map shows areas of the A3023, north and south of Langstone are within Flood Zones 2 and 3. Flood Zone 2 is land located between the extents of the 1 in 200-year and 1 in 1000-year (<1% to >0.5% AEP) risk of tidal flooding. Flood Zone 3 is land located within the extent of the 1 in 200-year (>0.5% AEP) risk of tidal flooding.
- 4.3.3 SFRA (February 2025) mapping shows the bridge is defended to a crest tide level up to the 1000-year return event. This was mapped to be the case in the year 2007 and in 2115.

Flood Defences

- 4.3.4 The Environment Agency Reduction in Risk of Flooding from Rivers and Sea online mapping shows the Site does benefit from tidal flood defences surrounding Hayling Island in the form of Engineered High Ground and Coastal Embankments.
- 4.3.5 The online mapping also shows defences north and south of the access/egress A3023 in the form of Engineered High Ground, Embankments and Bridge Abutment with unknown levels of protection.
- 4.3.6 Correspondence with the Environment Agency (Appendix 2) confirmed the coastal flood defences surrounding Hayling Island in the form of Engineered High Ground and Embankments. Some of these defences offer protection up to the 1 in 25-year and 50-year tidal flood events.

Flood Risk Summary

- 4.3.7 The risk of tidal flooding is assessed as negligible for the Site and low for access/egress to Hayling Island.
- 4.3.8 Measures required for tidal flooding are discussed in Section 5.

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.

Geosmart Groundwater Flood Risk Map

- 4.4.2 The Geosmart 1 in 100-year groundwater flood risk map (Drawing 004) shows the Site is at negligible risk of groundwater flooding and falls within Risk Class 4 (Table 4.2).
- 4.4.3 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.

Borehole Records and Soakaway Testing Results

- 4.4.1 BGS online borehole mapping recorded groundwater ingress at depths between 0.9m and 3m bgl in the superficial deposits.
- 4.4.2 Soakaway testing encountered groundwater ingress at depths between 2.56m and 2.7m bgl.
- 4.4.3 The borehole records and soakaway testing support the presence of shallow groundwater beneath the Site.
- 4.4.4 The records of groundwater beneath the Site are likely associated with perched groundwater within the River Terrace superficial deposits.

Flood Risk Summary

- 4.4.5 The risk of groundwater flooding is assessed as negligible above ground but low below ground.
- 4.4.6 Measures required for 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.

EA Online Surface Water Flood Mapping

- 4.5.2 The EA Complex Surface Water Flood Mapping (Drawings 006.1 to 006.2) shows most of the Site is located outside the mapped extent of surface water flooding. There are however some areas of surface water ponding in the centre of the Site, along the route of Drain 1, and at the southeastern boundary of the Site.
- 4.5.3 There is Highway Drainage along the extent of St Marys Road (Figure 4.3) the capacity of which will not have been accounted for and assessed by the mapping, which will likely address the flooding in its entirety or mean it will be much less than shown.
- 4.5.4 The areas of ponding along the southeastern boundary is at 'Low' (0.1 to 1% AEP) to 'High' (1%) chance of flooding between 2040 to 2060. A summary of the results is below:
- 20cm Flood Depth: 'Low' to High' chance.
 - 30cm Flood Depth: 'Low' to 'High' chance.
 - 60cm Flood Depth: 'Very Low' chance.
 - 90cm Flood Depth: 'Very Low' chance.

Figure 4.2: EA Surface Water Flood Mapping

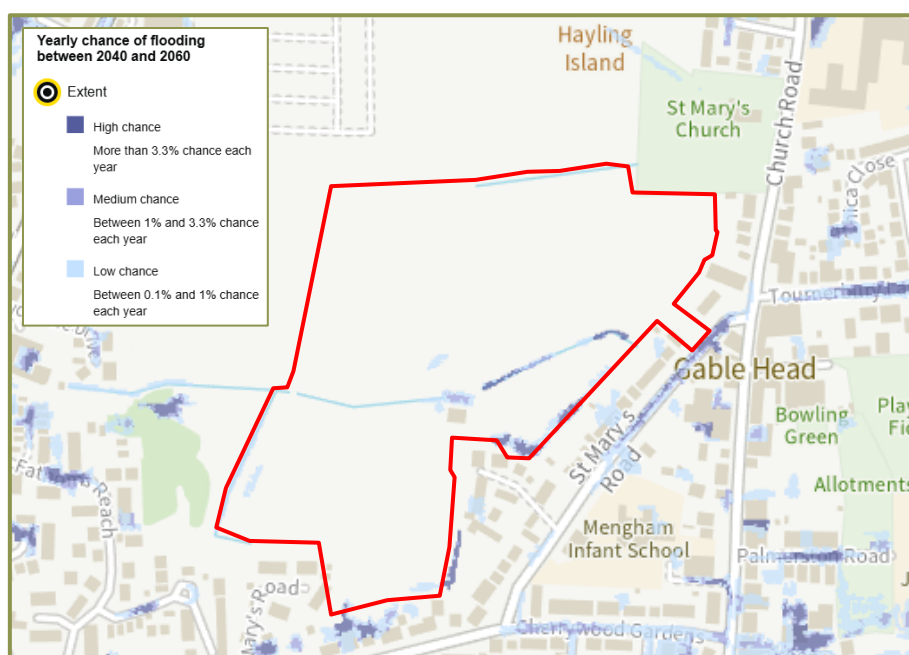


Figure 4.3: Highway Drainage along St Marys Road

Image taken from Google Street View

Flood Risk

- 4.5.5 The risk of surface water flooding is assessed as negligible for most of the Site, with areas of low risk associated with surface water ponding within the Site and along St Marys Road.
- 4.5.6 Measures required for 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 adoptable sewers are built to have a minimum design standard up to and including the 1 in 30-year rainfall 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).

Asset Plans

- 4.6.3 Southern Water asset plans (Appendix 4) show there is a Ø525mm public foul sewer orientated southwest to northeast beneath/within the northwest corner of the Site. Any surcharged flows would be shallow (<150mm) and would shed overland, following the localised topography (Drawing 007).
- 4.6.4 The COMMERCIALDW Drainage and Water Enquiry (Appendix 4) reported no sewer flooding incidents located within the Site.

Flood Risk

- 4.6.5 The risk of flooding from sewers is assessed as negligible for most of the Site with an area of low risk along the reaches of the identified asset.
- 4.6.6 Measures required for sewer flooding are discussed in Section 5.

4.7 Flooding from Infrastructure Failure

Reservoir Failure

- 4.7.1 The Environment Agency online flood mapping shows the Site is outside the extent of flooding sourced from reservoirs. The risk of flooding from reservoirs is assessed as negligible.

Pond

- 4.7.2 A pond has been identified in the centre of the Site. The pond is small and not impounded but is associated with residual fluvial flooding as the drain flows through it. 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. There is however a residual risk of fluvial flooding from the onsite and bounding land drains.
- The risk of tidal flooding is assessed as negligible for the Site.
- The risk of groundwater flooding is assessed as negligible above ground but low below ground.
- The risk of surface water flooding is assessed as negligible for most of the Site, with areas of low risk associated with surface water ponding within the Site.
- The risk of flooding from sewers is assessed as negligible for most of the Site with an area of low risk along the reaches of the identified asset.
- Flood risk from all other sources is assessed as negligible.

5.3 Decision Making Process

5.3.1 Section 14 of the NPPF details the overarching requirements of national planning policy relating to development and flood risk. In doing so, it seeks to adopt a sequential, risk-based approach to development, taking account of all sources of flooding.

5.3.2 Paragraph 175 of the NPPF advises that where these principles are applied to a development proposal, there is no requirement to apply the sequential test. This point should also now be read in the context of PPG ID 07-027.

5.3.3 These principles have been followed when preparing the Development proposals for the application site as follows:

Avoid

5.3.4 In the first instance, the following avoidance measures have been factored into the Development:

- Set the surface water outfall from the proposed development at an appropriate height, above the bed-level of the receiving land drain.
- Set finished floor levels +150mm above external levels.
- Limit the number of highway crossings along the route of the land drain. 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.

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 the onsite and bounding land drains. This easement would provide access for inspection and maintenance purposes, including vehicle access.
- Provide a development free easement (3m either side) of onsite Southern Water public sewer assets, or re-direct around the Site boundary.

Control

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

- Adoption of a surface water management strategy (see Section 6).
- Undertake maintenance activities to keep the land drains 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.

Manage Residual Risk

5.3.8 Following the application of the above avoidance measures, no measures to manage residual flood risks are required.

5.4 A3023 Langstone Bridge

As discussed above, the approaches to the A3023 Langstone Bridge, which provides access to/egress from Hayling Island, are identified as being at low risk of tidal flooding. However, having regard to the risks this actually poses, there are also measures that can be taken to effectively manage this issue.

- The areas north and south of the Hayling Bridge are covered by flood warnings, which have long lead up times (up to days in advance), which enable temporary bridge closure.
- Tidal flooding events are often short-lived (a matter of hours for spring tides and for storm surges), so any bridge closure would only be a short-lived event.
- The Hayling Emergency Planning Framework provides details of an emergency plan in the scenario where a flood event preventing access on and off the Island were to unfold (<https://www.havant.gov.uk/emergency-advice/emergency-advice-overview>) this includes various other means of accessing the island in the event of a bridge closure.
- The Island and Site provide a safe place of refuge and as such no access/egress to the island would not pose a risk to life.

5.5 Summary

5.5.1 Table 5.1 summarises the risk of flooding, both without and with recommended measures.

Table 5.1: Risk of Flooding and Recommended Measures

Source of Flooding	Risk of Flooding	Risk Without Measures	Recommended Measures	Risk to Development with Measures
Fluvial – Land Drains	Negligible for most of the Site but low along the reaches of the onsite and bounding land drains	Negligible/Residual	Avoid and Control	Negligible
Tidal – The Solent and The Channel	Negligible for the Site	Negligible	Avoid	Negligible
Groundwater – Secondary A Aquifer	Negligible above ground but Low below ground	Negligible to Low	Avoid	Negligible
Surface Water – Poor Permeability and Site topography	Negligible for most of the Site but Low where there is surface water ponding	Negligible to Low	Avoid and Control	Negligible
Sewers and Mains – Public Sewers	Negligible for most of the Site but low along the reaches of the identified asset	Negligible to Low	Avoid	Negligible
Infrastructure Failure – Pond Failure	Negligible	Negligible	Avoid	Negligible

Key: Green - Negligible, Yellow - Low, Orange - Medium and Red - High; based on risk with without/with recommended measures from each flooding source.

5.6 Flood Guidance and Sequential Test

- 5.6.1 The proposal is for a residential development. The PPG ID: 7 (not included in this report) classifies the proposed use as 'more vulnerable'.
- 5.6.2 The EA Flood Zones and acceptable development types are listed in Table 5.2. All development types (including residential uses) are acceptable in Flood Zone 1 (low risk). Subject to the above measures, the Sequential Test would be passed, and the Exception Test would not be required as indicated in Table 5.3.
- 5.6.3 The entirety of proposed development is situated in Flood Zone 1. Subject to the above measures and the adoption of a sequential approach to development, it has been demonstrated that the proposed development would not be at risk of fluvial flooding or flooding from any other source.
- 5.6.4 Having regard to national planning policy and guidance, there is no requirement to apply to sequential test. It has also been demonstrated that the flood risks associated with the A3023 Langstone Bridge are not a development constraint, having regard to the actual risks this poses and the additional measures that can be taken to manage this.

Table 5.2: EA 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 30 (3.33%) 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 EA, 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 2 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 Surface Water Drainage

6.1 Introduction

- 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 development can lead to problems elsewhere in a catchment, particularly flooding downstream, and the replacement of permeable vegetated areas by low-permeability roofs, roads and other paved surfaces will increase the speed, volume, and peak flow of surface water runoff. So, the NPPF and associated guidance require an FRA for all proposed development of 1ha or more outside the floodplain in Flood Zone 1.
- 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 management should build in enough 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 land use is comprised of three agricultural fields.
- 6.2.2 The Site is underlain by low permeable (clayey) soils and bedrock. Drainage is predominantly via overland flow, following the topography of the Site (southeast) to the topographic low point, with a small amount of infiltration to bedrock, and throughflow to watercourse.

6.3 Developable and Impermeable Areas

- 6.3.1 An allowance of 55% impermeable area (inclusive of 10% for urban creep) was applied to the 7.53ha developable area. The existing and proposed impermeable areas are summarised in Table 6.1.
- 6.3.2 The proposed development will increase the impermeable surfaces and so increase the amount of runoff.

Table 6.1: Impermeable Area

Area	Existing Buildings and Hardstanding	Proposed Buildings and Hardstanding	Difference
Area (ha)	0.02	4.27	+4.25
Percentage of Total Site Area (%)	0.17	36.28	+36.11

6.4 Greenfield Runoff Rates

- 6.4.1 An assessment of greenfield runoff rates was undertaken to determine the attenuation requirements for the proposed development.
- 6.4.2 The runoff rates were calculated using the HRWallingford UKSuDS online tool, with FEH method inputs (descriptors obtained from the FEH webservice³¹). This is a recommended methodology for Sites up to 50ha in area and the approach is in line with the current 'industry best practice' guidelines as outlined in the Interim Code of Practice for SuDS³², and EA Report SC030219 - Rainfall runoff management for developments.
- 6.4.3 The following parameters were used in the runoff calculations:
- Developable Area: 7.53ha
 - Average Annual Rainfall (SAAR): 686mm/year
 - Region No.: 7
 - BFIHOST19: 0.682
- 6.4.4 BFIHOST was updated to BFIHOST19 (November 2019) since a number of issues were identified with BFIHOST, which including a tendency to underestimate BFI in clay-dominated catchments.
- 6.4.5 BFIHOST19 is the baseflow index developed using the Hydrology of Soil Types (HOST) classification and is the baseflow proportion of the flow on average. It is estimated based on the daily mean flow data. Baseflow comprises water entering the watercourse through shallow subsurface flow and groundwater flow (mechanisms other than direct surface runoff); hence permeable soils and geology tend to yield a higher baseflow.
- 6.4.6 The Soilsmap online soils map viewer and Geology of Britain online map viewer identified the following, which were confirmed by soakaway testing trial pit logs (Appendix 6):
- Soils: Loamy soils with naturally high groundwater
 - Superficial Deposits: River Terrace Deposits – sand, silt and clay
 - Bedrock: London Clay Formation – clay, silt and sand
- 6.4.7 BFIHOST19 value assigned by the FEH webservice is considered to replicate on-site conditions.
- 6.4.8 Table 6.2 shows the calculated greenfield runoff rates. Runoff calculations are included in Appendix 8.

³¹ Centre for Ecology and Hydrology, Flood Estimation Handbook Web Service [<https://fehweb.ceh.ac.uk/>].

³² Office of the Deputy Prime Minister, National SuDS Working Group (July 2004) Interim Code of Practice for Sustainable Drainage Systems [https://www.susdrain.org/files/resources/other-guidance/nswg_icop_for_suds_0704.pdf].

Table 6.2: Greenfield Runoff Rates

Annual Probability (Return Period, Years)	Greenfield Runoff (l/s)
QBAR	12.5
100% (1)	10.6
3.33% (30)	28.6
1% (100)	39.7
1% Plus Climate Change	57.6

Note: 45% climate change added. The 1 in 1-year, 30-year and 100-year annual probability events are of importance to the Water Companies and the EA when looking at sewage discharge and flood risk.

6.5 Surface Water Management Strategy

Hierarchy of Discharge

6.5.1 In accordance with requirement H3 of the Building Regulations 2010³³ 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 infiltration potential into the clayey soils and geology.

Soakaway testing was undertaken during November 2016. Soakaway Testing Results is included in Appendix 6. Findings show that infiltration-based SuDS would not be feasible due to low infiltration rates and high groundwater.

- 2. A watercourse:** Drain 1 conveys flows west through the centre of the Site. Drain 3 conveys flows south along the southeastern boundary of the Site.
- 3. A sewer:** There are public surface water sewers within St. Mary's Road to the east/south and Manor Road to the west.

6.5.2 The potential route to discharge surface water from the proposed development will be by outfall to Drain 1 for the northern parcel and outfall to Drain 3 for the southern parcel. It is noted that Drain 3 connects into the surface water sewer in St Marys Road to the south of the Site (confirmed via CCTV survey).

6.6 Sustainable Drainage Options (SuDS)

Choice of SuDS Options

6.6.1 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.

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

³³ Office of the Deputy Prime Minister, The Building Regulations 2010, amended 2021
[\[https://www.gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h\]](https://www.gov.uk/government/publications/drainage-and-waste-disposal-approved-document-h)

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.

6.6.3 A hierarchy of SuDS techniques is identified³⁴:

- 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).
- 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.

6.6.4 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.
- Replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

SuDS Maintenance

6.6.5 Two detention basins will form the main attenuation features within the development Site.

6.6.6 Maintenance of the SuDS features would be in line with the SuDS Manual (CIRIA C753, 2015), as detailed in Figure 6.1. 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 a number of them would be

³⁴ CIRIA (2004) Report C609, Sustainable Drainage Systems – Hydraulic, Structural and Water Quality advice.

appointed to its board. This will ensure maintenance throughout the lifetime of the development.

- 6.6.7 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 within 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 reseedling 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

Drainage Design Summary

- 6.6.8 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.
- 6.6.9 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.
- 6.6.10 Surface water will be directed to onsite detention basins, positioned to mimic existing catchments with a pumped connection to the land drains. The northern basin will outfall to Drain 1, and the southern basin will outfall to Drain 3.
- 6.6.11 A surface water drainage layout is in Drawing ENZ-XX-XX-DR-D-0101.

Attenuation Requirements

6.6.12 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.

6.6.13 The following input parameters were assumed in the calculations:

- Impermeable Area: 4.14ha (35.2%);
- Cv (proportion of rainfall forming surface water runoff): 75% summer, 84% winter;
- Infiltration losses: n/a;
- With outfall: QBAR (Table 6.2).

6.6.14 The attenuation volume for the 1 in 100-year event (plus climate change) is:

- Northern Basin: 1668m³
- Southern Basin: 1657m³

6.6.15 The discharge rates for the basins are:

- Northern Basin: 6.25/s
- Southern Basin: 6.25l/s

6.6.16 Attenuation calculations are included in Appendix 8. The calculated runoff rates and attenuation volumes will be reviewed at detailed design stage.

6.7 Exceedance Routes

6.7.1 The detention basins 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 the split 12.5l/s restricted 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 (southeast) towards Drain 3, as per existing conditions (Drawing 007).

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

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 development, located on a 11.77ha Site on land at Rook Farm, St. Mary's Road, Hayling Island.

7.2 Flood Risk

7.2.1 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 the onsite and bounding land drains.
- The risk of tidal flooding is assessed as negligible for the Site.
- The risk of groundwater flooding is assessed as negligible above ground but low below ground.
- The risk of surface water flooding is assessed as negligible for most of the Site, with areas of low risk associated with surface water ponding within the Site.
- The risk of flooding from sewers is assessed as negligible for most of the Site with an area of low risk along the reaches of the identified asset.
- Flood risk from all other sources is assessed as negligible.

7.3 Measures

7.3.1 Flood risk from identified sources can be reduced to a negligible or low and acceptable level, adopting the principles of the following approach:



7.3.2 The following avoidance measures have been taken into account in conjunction with the Development proposals:

- Set the surface water outfall from the proposed development at an appropriate height, above the bed-level of the receiving land drain.
- Set finished floor levels +150mm above external levels.
- Limit the number of highway crossings along the route of the land drain. 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.
- Provide a 4m easement free from development along either side of the onsite and bounding land drains. This easement would provide access for inspection and maintenance purposes, including vehicle access.
- Provide a development free easement (3m either side) of onsite Southern Water public sewer assets, or re-direct around the Site boundary.

- 7.3.3 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.

7.4 Flood Guidance

- 7.4.1 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).
- 7.4.2 The entirety of proposed development is situated in Flood Zone 1. Subject to the above measures and the adoption of a sequential approach to development, it has been demonstrated that the proposed development would not be at risk of fluvial flooding or flooding from any other source.
- 7.4.3 Having regard to national planning policy and guidance, there is no requirement to apply to sequential test. It has also been demonstrated that the flood risks associated with the A3023 Langstone Bridge are not a development constraint, having regard to the actual risks this poses and the measures that can be taken to manage this.

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 appropriate management.
- 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.
- 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 two detention basins designed to maintain runoff at pre-development rates, with an outfall to onsite watercourses.

7.6 Conclusion

- 7.6.1 This FRA demonstrates 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 therefore not be precluded on the grounds of flood risk, as well as surface water and foul drainage.



KEY:

● Site Location

P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project

St Mary's Road, Hayling Island

Client

Gladman Developments Ltd

Drawing Title

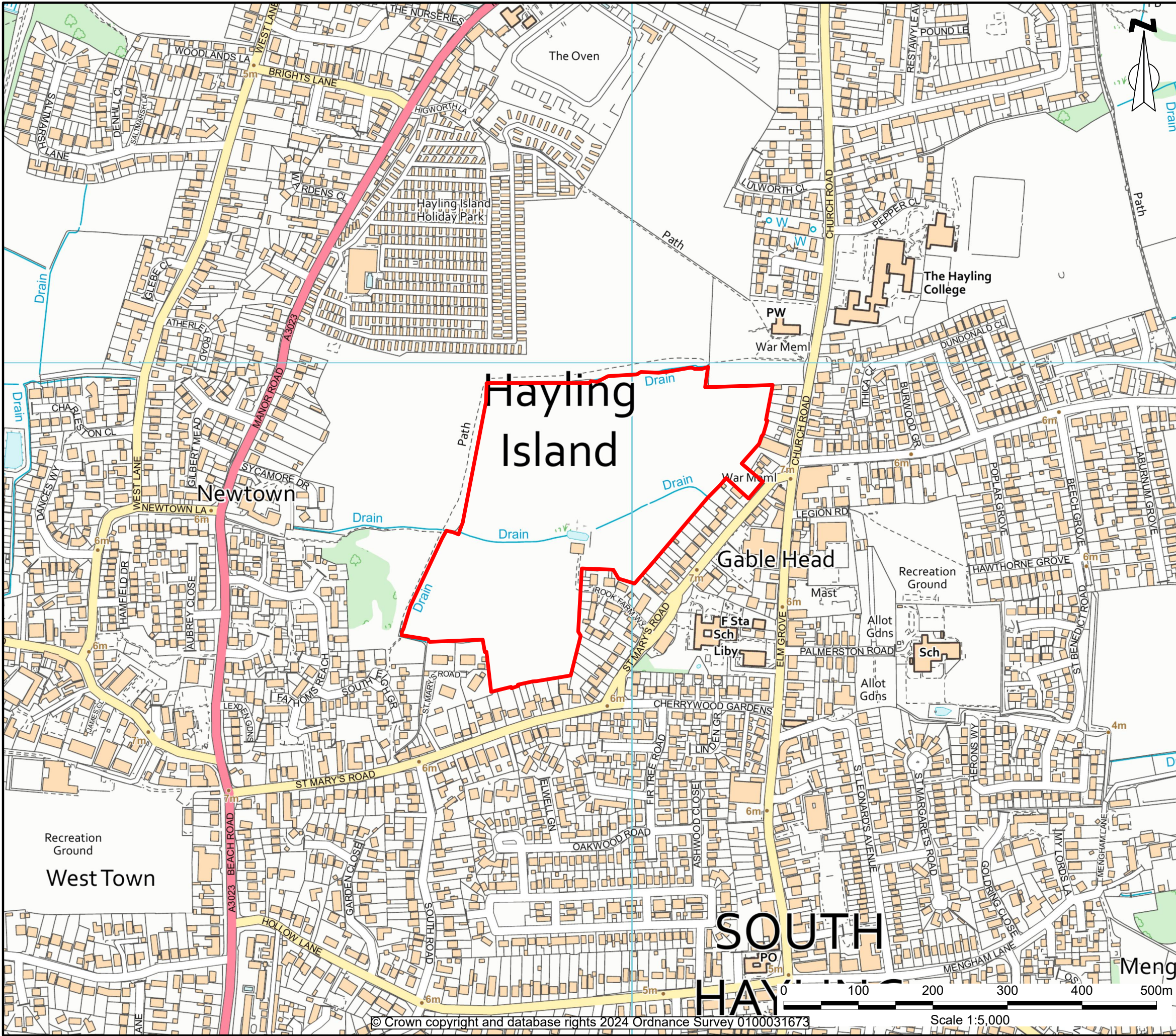
Site Location Plan

Scale	Date	Status
1:20,000@A3	26.01.24	Preliminary

DWG No.	Revision
SHF1132142-ENZ-XX-XX-DR-Y-0001	P01

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KEY:

Site Boundary

Surface Water Features

P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project
St Mary's Road, Hayling Island

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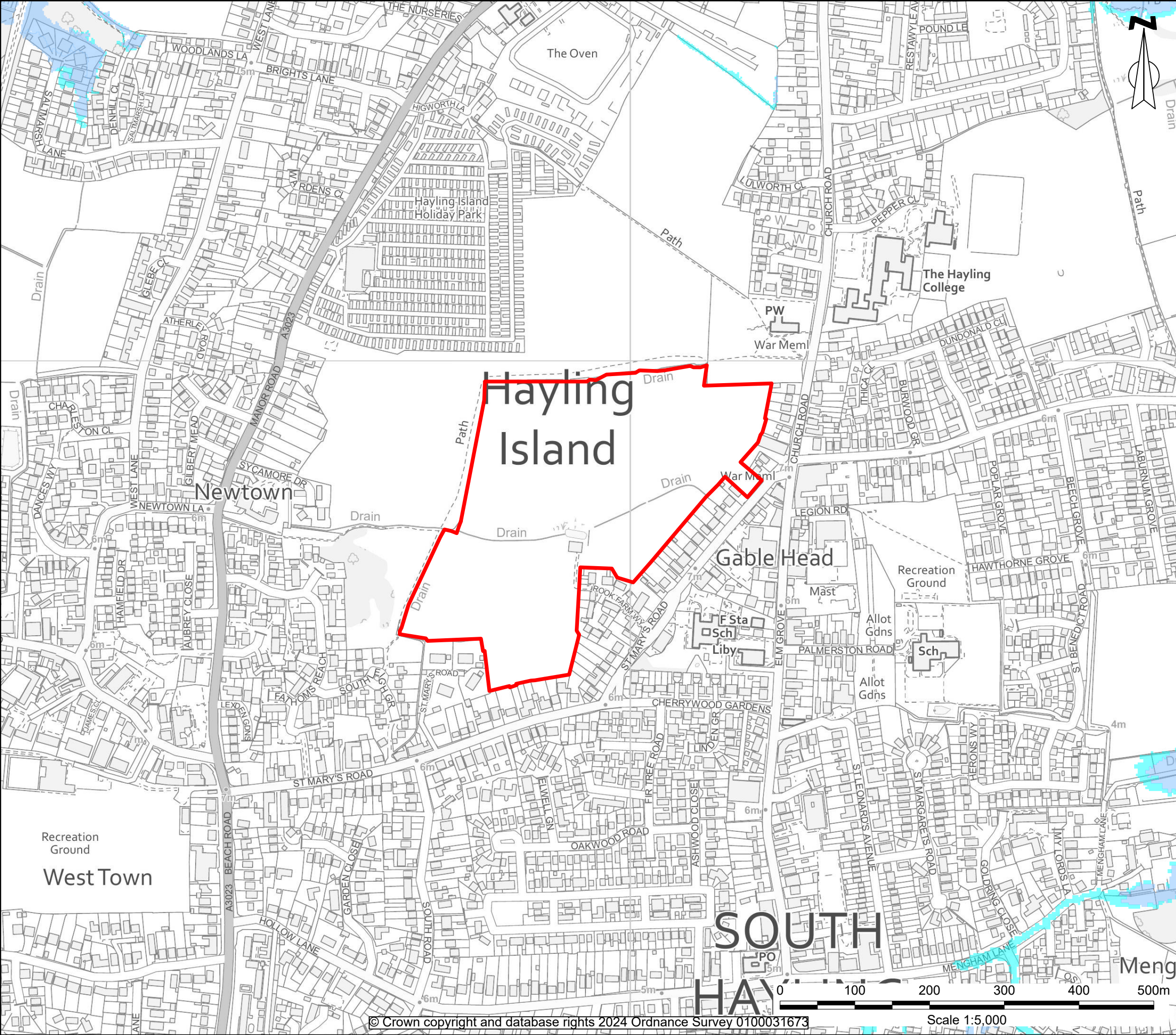
Drawing Title
Surface Water Features

Scale 1:5,000@A3	Date 26.01.24	Status Preliminary
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DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0002	Revision P01
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KEY:

- Site Boundary
- Flood Zone 3
- Flood Zone 2
- Flood Zone 1

P02	14.05.25	Updated Flood Zones added	DL	EO	EO
P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project
Rook Farm, Hayling Island

Client
Gladman Developments Ltd

Drawing Title
EA Flood Zones

Scale 1:5,000@A3	Date 26.01.24	Status Preliminary
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DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0003	Revision P02
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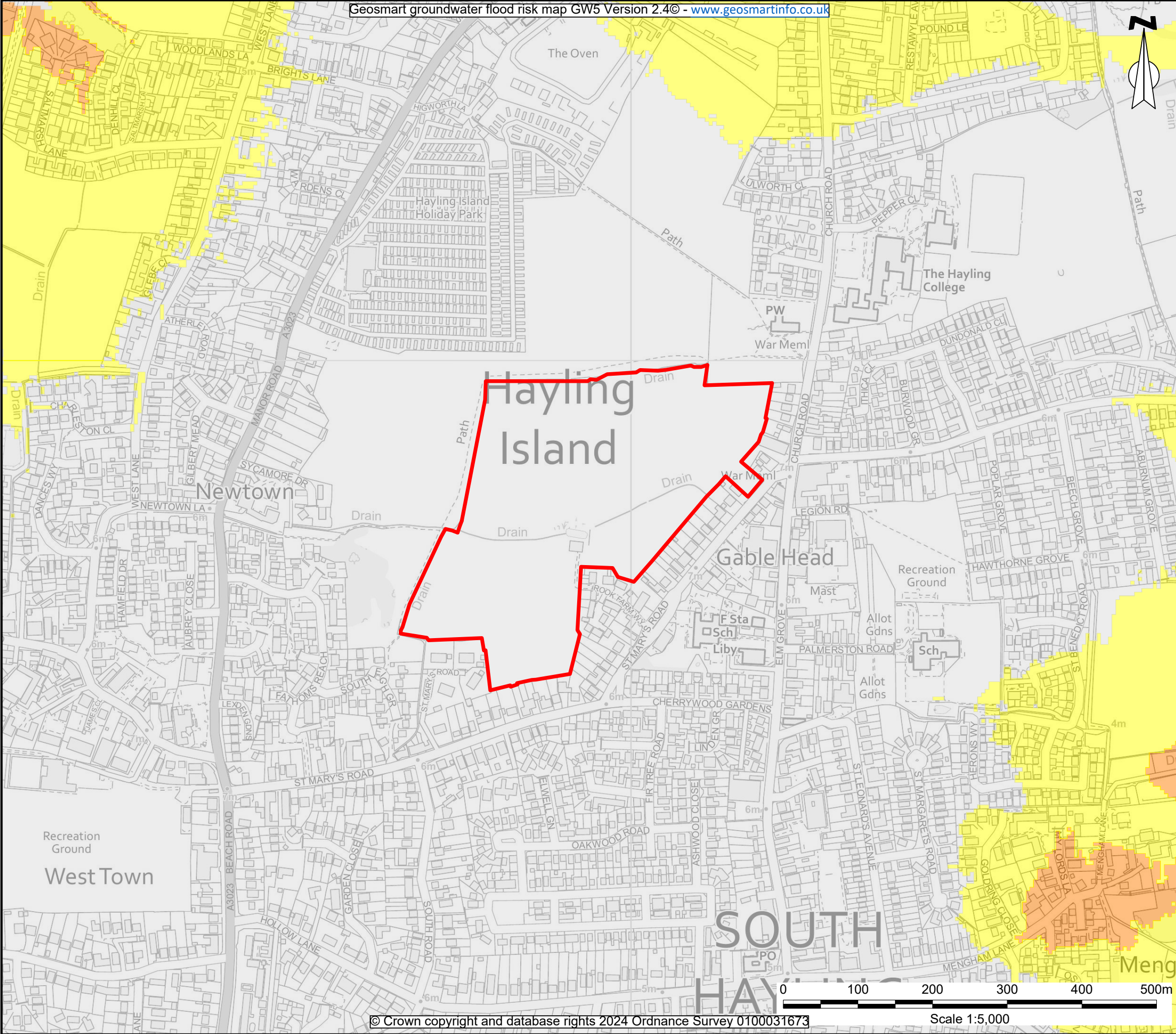


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Scale 1:5,000



Geosmart groundwater flood risk map GW5 Version 2.4© - www.geosmartinfo.co.uk

KEY:

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

P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project
St Mary's Road, Hayling Island

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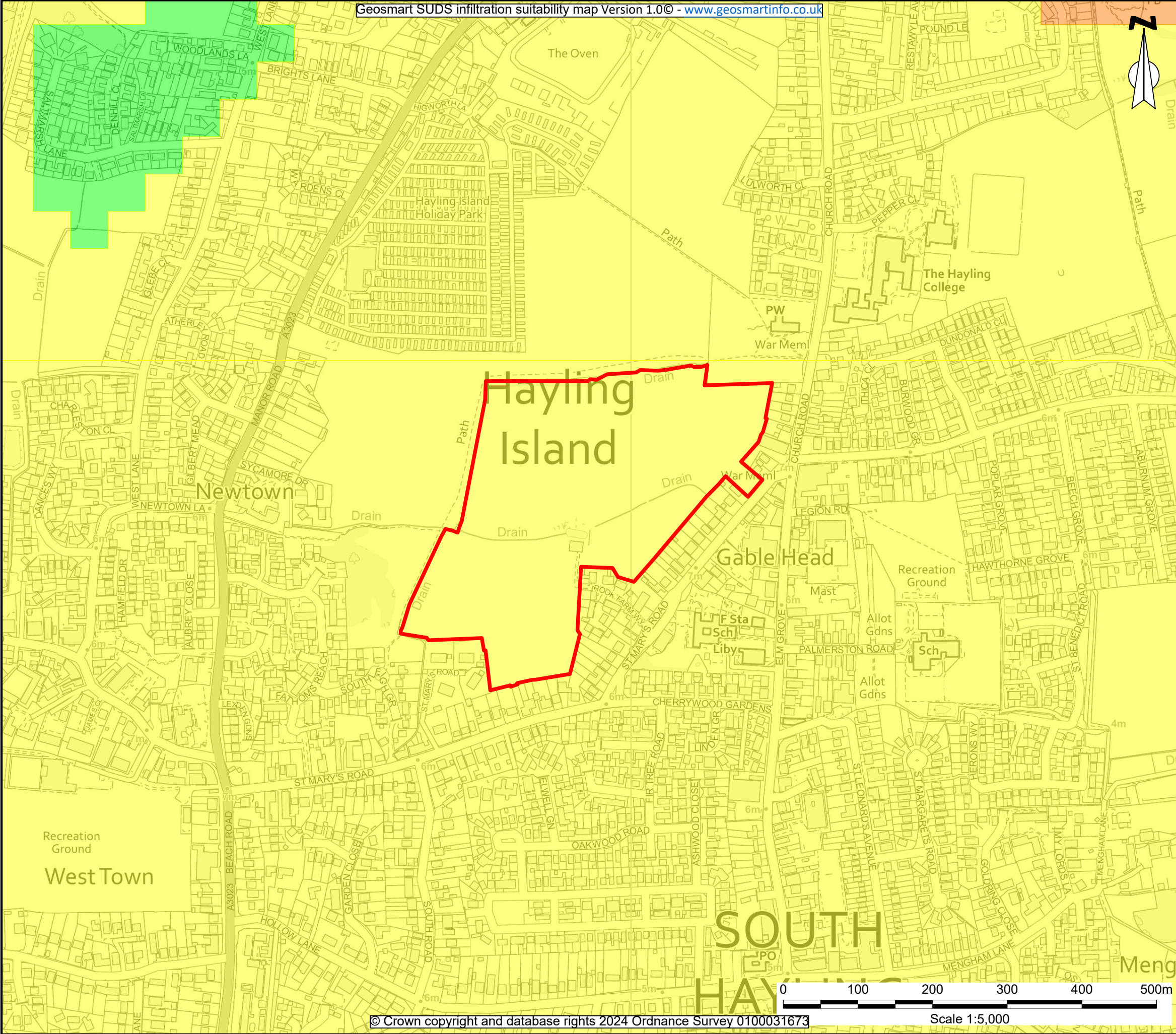
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Groundwater Flood Risk

Scale 1:5,000@A3	Date 26.01.24	Status Preliminary
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DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0004	Revision P01
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KEY:

- Site Boundary
- High Potential
- Moderate Potential
- Low Potential

P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project
St Mary's Road, Hayling Island

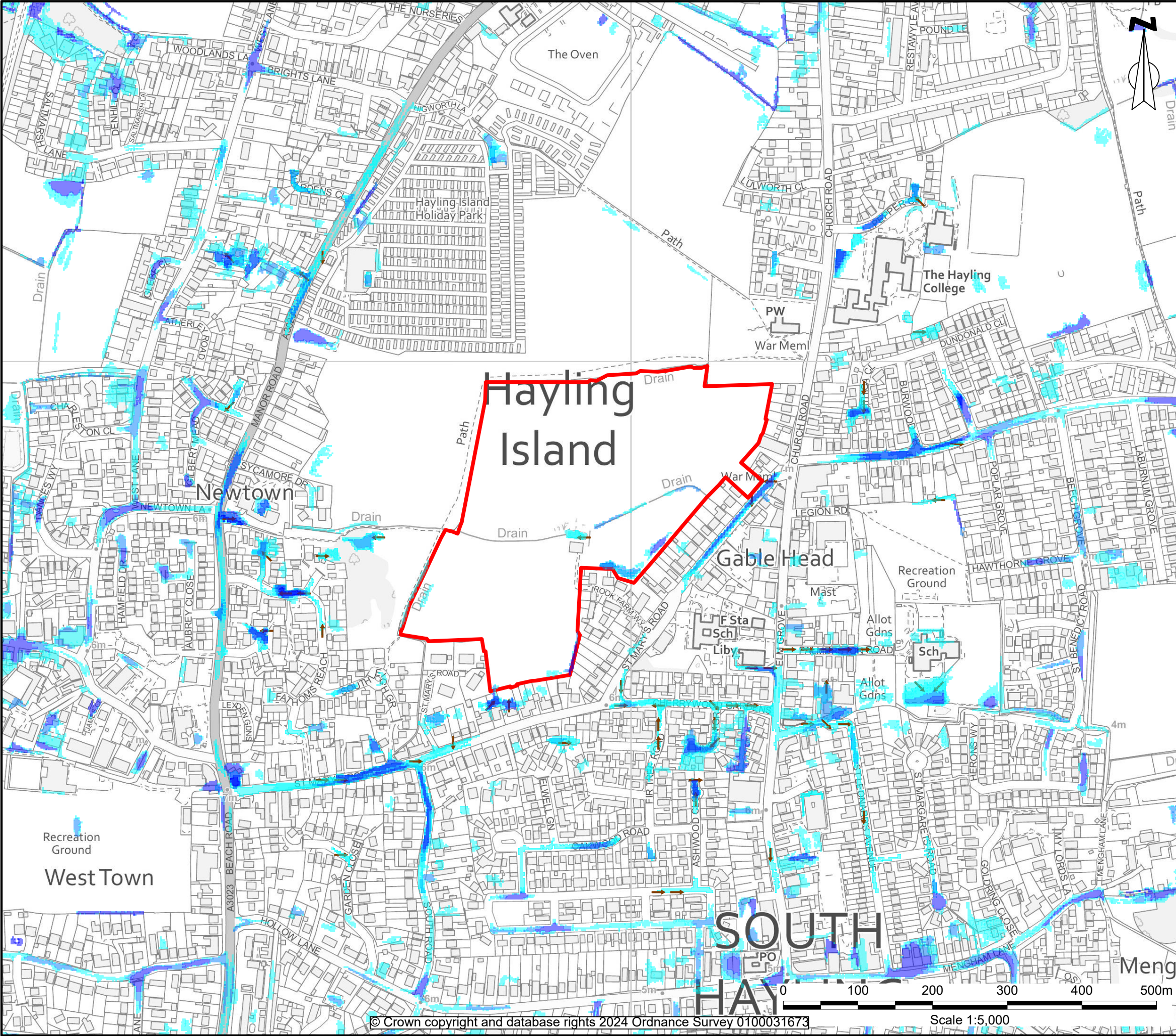
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Drawing Title
SuDS Infiltration Potential

Scale 1:5,000@A3	Date 26.01.24	Status Preliminary
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DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0005	Revision P01
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KEY:

- Site Boundary
- 30 Year Extent
- 100 Year Extent
- 1000 Year Extent
- Flow Direction

P02	14.04.25	Surface Water Outlines updated	DL	EO	EO
P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project
Rook Farm, Hayling Island

Client
Gladman Developments Ltd

Drawing Title
EA Risk of Flooding from Surface Water

Scale 1:5,000@A3	Date 26.01.24	Status Preliminary
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DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0006.1	Revision P02
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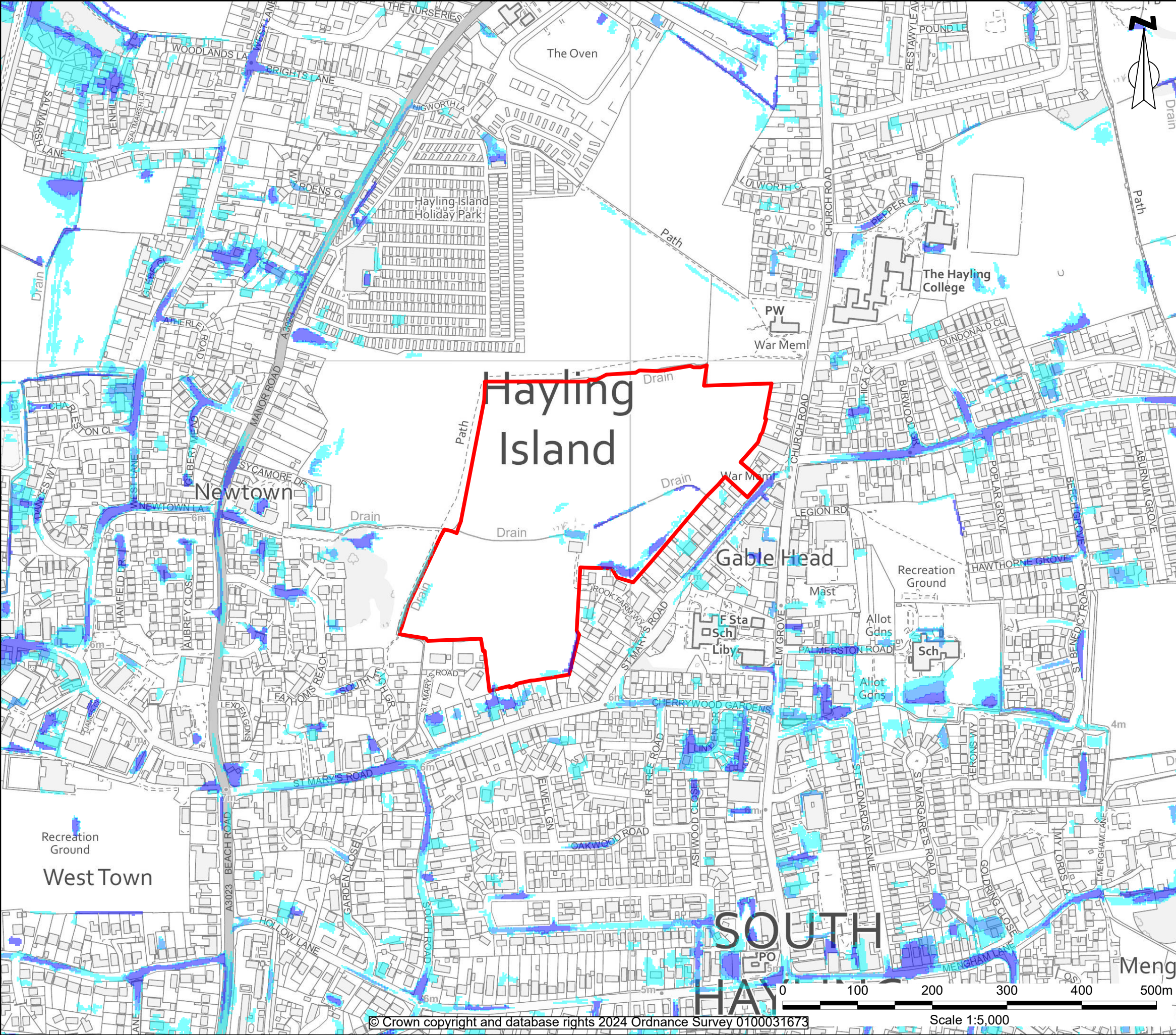


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Scale 1:5,000



KEY:

- Site Boundary
- 30 Year Extent
- 100 Year Extent
- 1000 Year Extent
- Flow Direction

P02	14.04.25	Surface Water Outlines updated	DL	EO	EO
P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project
Rook Farm, Hayling Island

Client
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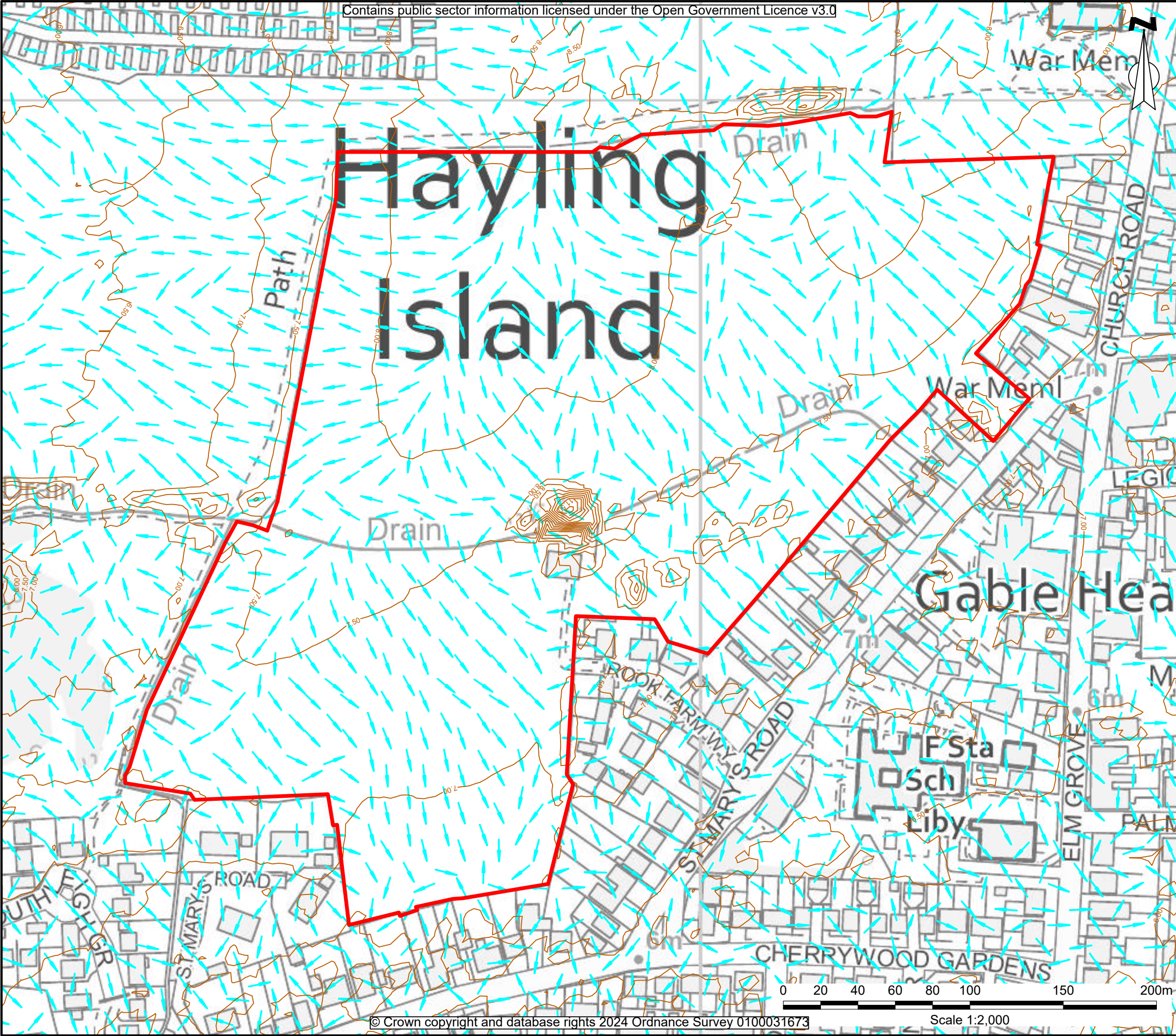
Drawing Title
EA Risk of Flooding from Surface Water +CC

Scale 1:5,000@A3	Date 26.01.24	Status Preliminary
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DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0006.2	Revision P02
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KEY:

- Site Boundary
- Contours
- Surface Water Flow Path

Notes:

Ground Model Specification:
1m DTM LIDAR Data

P01	26.01.24	Issued for comment / approval	LW	DL	DL
Rev	Date	Description	DRA	CHK	APP

Project
St Mary's Road, Hayling Island

Client
Gladman Developments Ltd

Drawing Title
Flow Pathway Analysis

Scale 1:2,000@A3	Date 26.01.24	Status Preliminary
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DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0007	Revision P01
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Surface Water Pumping Station
Tanker access required
15m standoff required from
habitable dwellings (TBC with
Southern Water)
Dual Station

**Surface Water Attenuation Basin
(Northern Basin)**
Designed for 1 in 100yr+45%CC
Attenuation Volume: 1668m³
Top of Bank: 6.800
Max Water Level: 6.500
Bed Level: 5.000
Freeboard: 0.300
Basin Banks: 1:4
Discharge Rate: 6.25l/s (QBAR)

Surface Water Outfall
Surface water to outfall
to the existing
watercourse

**Surface Water
Pumping Station**
Tanker access required
15m standoff required
from habitable
dwellings (TBC with
Southern Water)

Surface Water Outfall
Surface water to outfall
to the existing
watercourse

**Surface Water Attenuation Basin
(Southern Basin)**
Designed for 1 in 100yr+45%CC
Attenuation Volume: 1657m³
Top of Bank: 6.400
Max Water Level: 6.100
Bed Level: 4.600
Freeboard: 300mm
Basin Banks: 1:4
Discharge Rate: 6.25l/s

Key

- Site Boundary
- Attenuation Basin
- Surface Water Headwall
- Surface Water Rising Main

P04	04/07/25	Basins and PS positions amended	RB	RB	EOC
P03	19/06/25	Discharge rates amended	RB	RB	EOC
P02	03/06/25	Pumping stations added to layout and basins updated.	RB	RB	EOC
P01	22/05/24	First Issue	DL	RB	EOC
Rev	Date	Description	DRA	CHK	APP

Project
Rook Farm, Hayling Island

Client
Gladman Developments Ltd

Drawing Title
Outline Surface Water Drainage Strategy

Scale 1:2,000@A3 **Date** 22.05.24 **Status** Preliminary

DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0101 **Revision** P04



BRISTOL 01454 269 237	MANCHESTER 0161 413 6444	SHEFFIELD 0114 321 5151
CARDIFF 02920 023 700	www.enzygo.com hello@enzygo.com	CAMBRIDGE 01799 542 473



Key

Site Boundary

Foul Water Sewer

Foul Water Manhole

Foul Water Pumping Station
Tanker access required
15m standoff required from
habitable dwellings (TBC with
Southern Water). To be
incorporated into SW PS

Rising Main
Outfall

Rising Main

Foul Outfall
Outfall to Southern Water
MH1801. Upgrade of network
required to facilitate connection.
I.L.: 4.61 (According to Southern
Water maps, TBC)

Surface Water
Pumping Station

Hayling Island

P02	07/07/25	Pumping station and basin positions amended	RB	RB	EOC
P01	20/06/25	First Issue	RB	RB	EOC
Rev	Date	Description	DRA	CHK	APP

Project
Rook Farm, Hayling Island

Client
Gladman Developments Ltd

Drawing Title
Outline Foul Water Drainage Strategy

Scale 1:2,000@A3	Date 20.06.25	Status Preliminary
----------------------------	-------------------------	------------------------------

DWG No. SHF1132142-ENZ-XX-XX-DR-Y-0102	Revision P02
--	------------------------



BRISTOL 01454 269 237	MANCHESTER 0161 413 6444	SHEFFIELD 0114 321 5151
CARDIFF 02920 023 700	www.enzygo.com hello@enzygo.com	CAMBRIDGE 01799 542 473

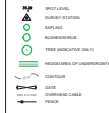
Appendix 1 – Topographic Survey

NOTES

THIS SURVEY IS ORIENTED TO ORDNANCE SURVEY GRID NORTH. THE SURVEY IS TO A PLANE GRID. HORIZONTAL MEASUREMENTS TAKEN FROM THIS SURVEY WILL BE GROUND DISTANCES.

ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM GENERATED BY ACTIVE GP NETWORK.

LEGEND



ABBREVIATIONS

[illegible]

STATION CO-ORDINATES

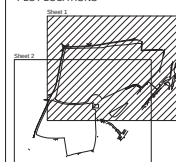
STATION	EASTING	NORTHING	LEVEL	DESCRIPTION
STW50	472308.38	104208.54	4.88	Survey Nail
STW51	472308.28	104210.34	5.31	Survey Nail
STW52	472308.88	104208.72	5.06	Survey Nail
STW53	472311.80	104801.75	5.83	Survey Nail
STW54	472316.42	104802.58	5.73	Survey Nail
STW55	472308.57	104813.92	5.72	Survey Nail
STW56	472308.48	104808.32	7.08	Survey Nail
STW57	472307.70	104820.02	7.71	Survey Nail
STW58	472311.83	104808.16	6.87	Survey Nail

TREE SCHEDULE

Year	Country	Employed (M)	Unemployed (M)
1990	USA	107.76	108
1991	USA	107.90	107
1992	USA	107.99	7
1993	USA	108.00	108
1994	USA	108.00	108
1995	USA	108.00	108
1996	USA	108.00	108
1997	USA	107.93	108
1998	USA	108.00	108
1999	USA	108.00	108
2000	USA	108.00	108
2001	USA	108.00	108
2002	USA	108.00	108
2003	USA	108.00	108
2004	USA	108.00	108
2005	USA	108.00	108
2006	USA	108.00	108
2007	USA	108.00	108
2008	USA	108.00	108
2009	USA	108.00	108
2010	USA	108.00	108
2011	USA	108.00	108
2012	USA	108.00	108
2013	USA	108.00	108
2014	USA	108.00	108
2015	USA	108.00	108
2016	USA	108.00	108
2017	USA	108.00	108
2018	USA	108.00	108
2019	USA	108.00	108
2020	USA	108.00	108
2021	USA	108.00	108
2022	USA	108.00	108
2023	USA	108.00	108
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2031	USA	108.00	108
2032	USA	108.00	108
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2074	USA	108.00	108
2075	USA	108.00	108
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2077	USA	108.00	108
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2092	USA	108.00	108
2093	USA	108.00	108
2094	USA	108.00	108
2095	USA	108.00	108
2096	USA	108.00	108
2097	USA	108.00	108
2098	USA	108.00	108
2099	USA	108.00	108
2100	USA	108.00	108

TREE DIAMETER MEASURED APPROXIMATELY 1.5M ABOVE GROUND LEVEL. TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE GENERALIZED CANOPY SIZE. TREE BOLT MAY NOT SIT CENTRALLY TO THE CANOPY. TREE HEIGHT

PLOT LOCATIONS



***Sheet 3 is Langstone Bridge to the North of the site

Rev	Date	Revision notes	B
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DO NOT

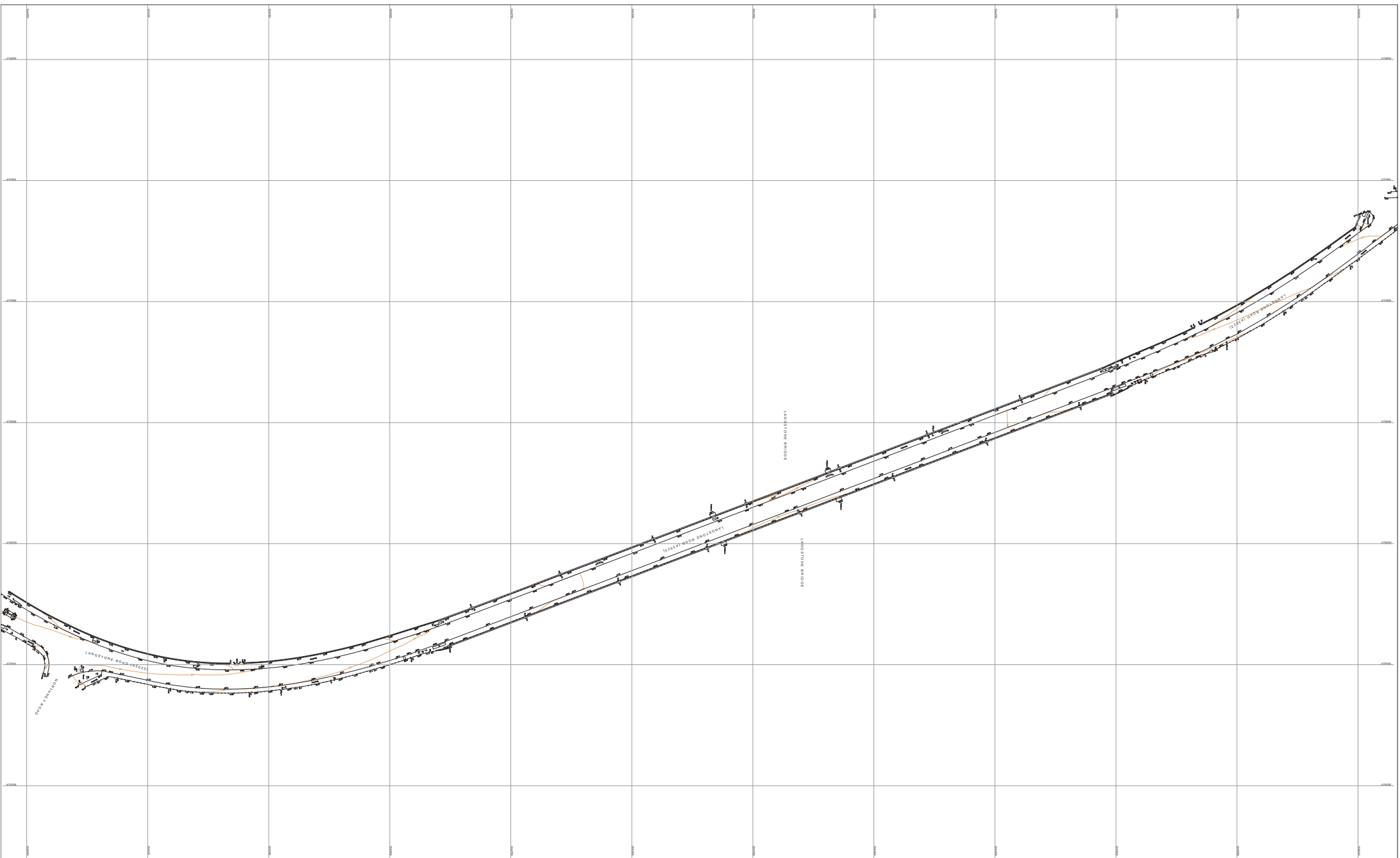
INFORMATION

ST MARY'S ROAD, HAYLING ISLAND

Title
TOPOGRAPHICAL SURVEY
AS OF 26.04.15
SHEET 1 OF 3



Drawn By	Publish Date	Scale(s)	Sheet Size
JW	09.05.16	1:500	A0
Project no.	Drawing no.	Revision	
2016-026	Topo 01_2D		



NOTES

444. LUNGLIS PRELAW TO CIRCUMFERENCE SLAVEY DOWNSIDE CORNER WITH 447.5V GPT
RE PAPER.

LEGEND

- [illegible]

ABBREVIATIONS

- | Abbreviation | Full Name | Location | Year |
|--------------|------------------|---------------|------|
| AA | Alaska | Juneau | 1966 |
| AK | Alaska | Barrow | 1966 |
| AR | Arkansas | Fayetteville | 1966 |
| AS | Alaska | Sitka | 1966 |
| AT | Alaska | Thule | 1966 |
| AV | Alaska | Valdez | 1966 |
| BA | Bahamas | Nassau | 1966 |
| BB | Bahamas | Bahamas | 1966 |
| BC | British Columbia | Vancouver | 1966 |
| BD | Bahamas | Dominican | 1966 |
| BE | Bahamas | Ensenada | 1966 |
| BF | Bahamas | Farmington | 1966 |
| BH | Bahamas | Honolulu | 1966 |
| BI | Bahamas | Indianapolis | 1966 |
| BJ | Bahamas | Jersey City | 1966 |
| BK | Bahamas | Kansas City | 1966 |
| BL | Bahamas | Los Angeles | 1966 |
| BM | Bahamas | Miami | 1966 |
| BN | Bahamas | New York | 1966 |
| BO | Bahamas | Oakland | 1966 |
| BP | Bahamas | Pasadena | 1966 |
| BQ | Bahamas | Portland | 1966 |
| BR | Bahamas | Reno | 1966 |
| BS | Bahamas | San Francisco | 1966 |
| BT | Bahamas | Tampa | 1966 |
| BV | Bahamas | Vancouver | 1966 |
| BW | Bahamas | Washington | 1966 |
| BX | Bahamas | Seattle | 1966 |
| BY | Bahamas | San Diego | 1966 |
| BZ | Bahamas | San Jose | 1966 |
| CA | California | San Francisco | 1966 |
| CB | California | Bakersfield | 1966 |
| CC | California | Chico | 1966 |
| CD | California | Del Mar | 1966 |
| CE | California | Emeryville | 1966 |
| CF | California | Farmington | 1966 |
| CG | California | Glendale | 1966 |
| CH | California | Honolulu | 1966 |
| CI | California | Indianapolis | 1966 |
| CJ | California | Jersey City | 1966 |
| CK | California | Kansas City | 1966 |
| CL | California | Los Angeles | 1966 |
| CM | California | Miami | 1966 |
| CN | California | New York | 1966 |
| CO | California | Oakland | 1966 |
| CP | California | Pasadena | 1966 |
| CQ | California | Portland | 1966 |
| CR | California | Reno | 1966 |
| CS | California | San Francisco | 1966 |
| CT | California | Tampa | 1966 |
| CV | California | Vancouver | 1966 |
| CW | California | Washington | 1966 |
| CX | California | Seattle | 1966 |
| CY | California | San Diego | 1966 |
| CZ | California | San Jose | 1966 |
| DA | California | San Francisco | 1966 |
| DB | California | Bakersfield | 1966 |
| DC | California | Chico | 1966 |
| DD | California | Del Mar | 1966 |
| DE | California | Emeryville | 1966 |
| DF | California | Farmington | 1966 |
| DG | California | Glendale | 1966 |
| DH | California | Honolulu | 1966 |
| DI | California | Indianapolis | 1966 |
| DJ | California | Jersey City | 1966 |
| DK | California | Kansas City | 1966 |
| DL | California | Los Angeles | 1966 |
| DM | California | Miami | 1966 |
| DN | California | New York | 1966 |
| DO | California | Oakland | 1966 |
| DP | California | Pasadena | 1966 |
| DQ | California | Portland | 1966 |
| DR | California | Reno | 1966 |
| DS | California | San Francisco | 1966 |
| DT | California | Tampa | 1966 |
| DV | California | Vancouver | 1966 |
| DW | California | Washington | 1966 |
| DX | California | Seattle | 1966 |
| DY | California | San Diego | 1966 |
| DZ | California | San Jose | 1966 |
| EA | California | San Francisco | 1966 |
| EB | California | Bakersfield | 1966 |
| EC | California | Chico | 1966 |
| ED | California | Del Mar | 1966 |
| EE | California | Emeryville | 1966 |
| EF | California | Farmington | 1966 |
| EG | California | Glendale | 1966 |
| EH | California | Honolulu | 1966 |
| EI | California | Indianapolis | 1966 |
| EJ | California | Jersey City | 1966 |
| EK | California | Kansas City | 1966 |
| EL | California | Los Angeles | 1966 |
| EM | California | Miami | 1966 |
| EN | California | New York | 1966 |
| EO | California | Oakland | 1966 |
| EP | California | Pasadena | 1966 |
| EQ | California | Portland | 1966 |
| ER | California | Reno | 1966 |
| ES | California | San Francisco | 1966 |
| ET | California | Tampa | 1966 |
| EV | California | Vancouver | 1966 |
| EW | California | Washington | 1966 |
| EX | California | Seattle | 1966 |
| EY | California | San | |

STATION CO-ORDINATES

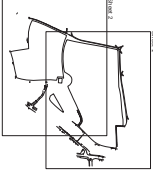
[illegible]

TREE SCHEDULE

Year	Area	Population	Population Density
2011	0.35	28	24
2012	0.35	3	7
2013	0.35	30	6
2014	0.35	20	38
2015	1.2	20	38
2016	0.35	20	25
2017	0.35	26	25
2018	0.35	26	24
2019	0.35	26	24
2020	0.35	26	24
2021	1.4	20	36
2022	0.35	0	0
2023	0.35	20	0
2024	0.35	20	0
2025	0.35	20	0
2026	0.35	20	0
2027	0.35	20	0
2028	0.35	20	0
2029	0.35	20	0
2030	0.35	20	0

WELL (GRADE) WILL BE GRADED APPROXIMATELY 1.5M ABOVE GROUND LEVEL. THIS WILL PROVIDE ADEQUATE DRAINAGE AND PREVENT FLOODING OF THE CONCRETE DRAINAGE DRAINAGE. WELL BOXES MAY NOT BE INSTALLED TO THE CANOPY. WELL HEADS WILL BE INSTALLED AT APPROXIMATE GROUND LEVEL.

PLOT LOCATIONS



Sheet 3 is Langton Bridge to the North of the site

DATE	DRAWN BY		DATE	SCALE	BY
	COURT HOUSE				
INFORMATION					
ST. MARY'S ROAD, HAYLING ISLAND					
TOPOGRAPIHICAL SURVEY					
AS OF 26.04.15					
SHEET 3 OF 3					

Appendix 2 – Environment Agency Correspondence

Flood risk assessment data

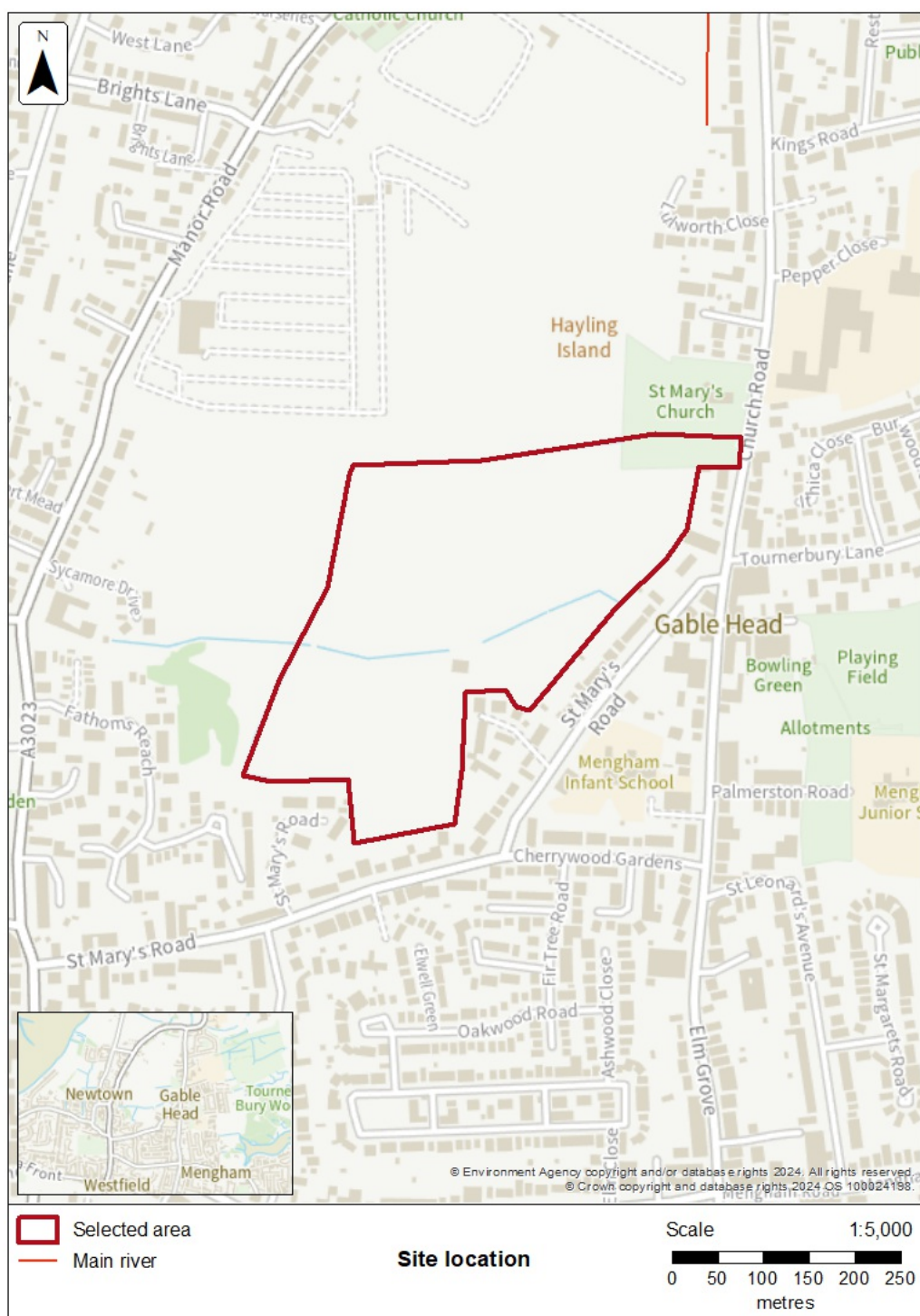
Location of site: 471932 / 99815 (shown as easting and northing coordinates)

Document created on: 24 January 2024

This information was previously known as a product 4.

Customer reference number: SSD/342982

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



How to use this information

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

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

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- historic flooding
- flood defences and attributes
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

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

About the models used

Model name: Hayling Island 2018 - East Solent Model

Scenario(s): Defended tidal, defences removed tidal, defended climate change tidal, defences removed climate change tidal

Date: 1 July 2018

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

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

Metres above ordnance datum (mAOD)

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

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 1.

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

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

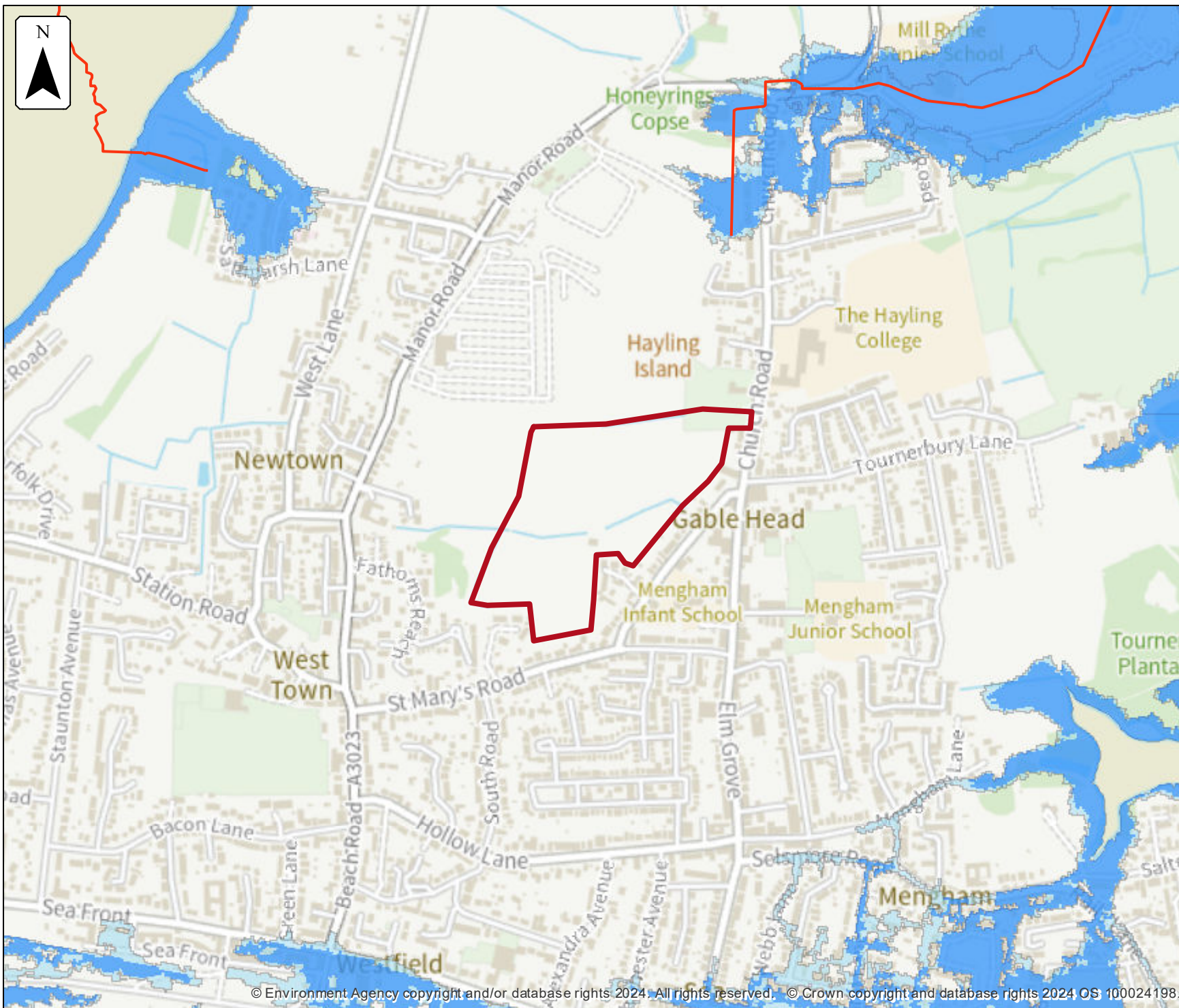
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

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

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

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

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



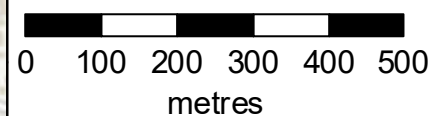
Flood map for planning

Location (easting/northing)
471932/99815

Scale
1:10,000

Created
23 Jan 2024

-  Selected area
-  Main river
-  Flood zone 3
-  Flood zone 2



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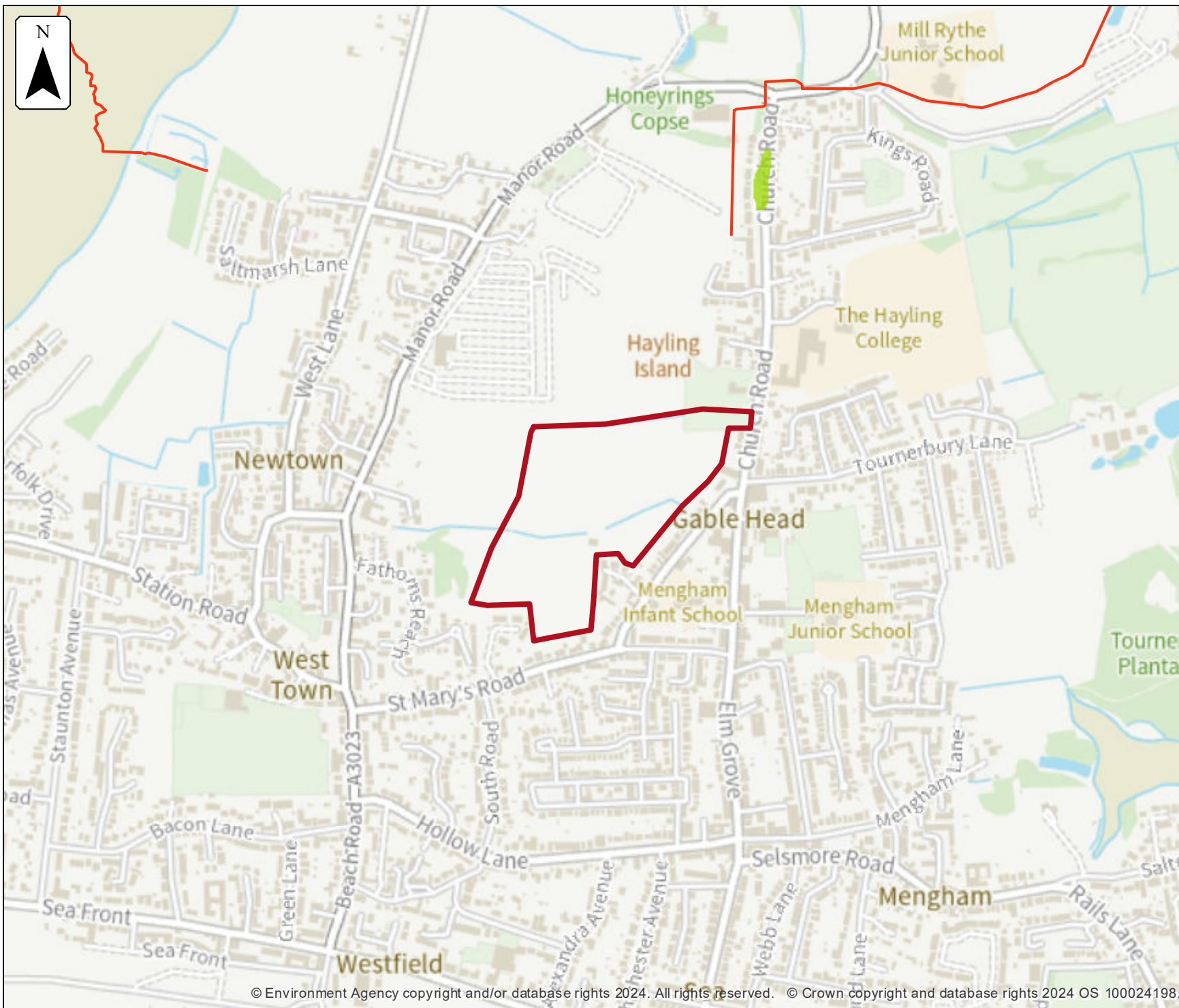
Historic flooding

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

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

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

[Download recorded flood outlines in GIS format](#)



Historic flood map

Location (easting/northing)
471932/99815

Scale
1:10,000

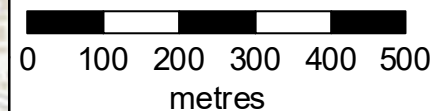
Created
23 Jan 2024

 Selected area

 Main river

Date of flood event

 October, 2000



Historic flood event data

Start date	End date	Source of flood	Cause of flood	Affects location
30 October 2000	30 October 2000	unknown	unknown	No

Flood defences and attributes

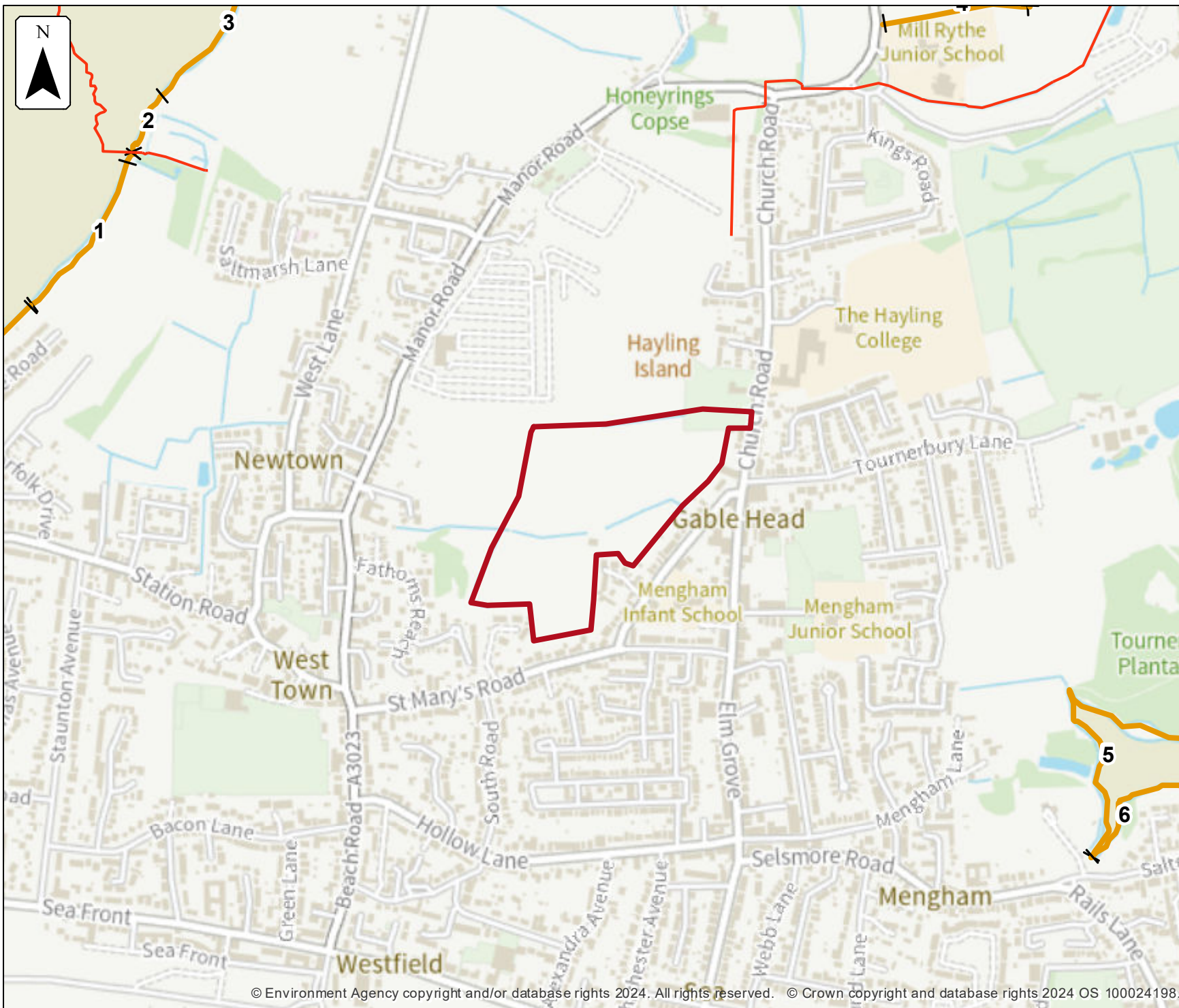
The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is in mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk



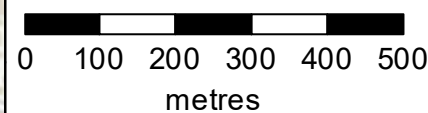
Flood defences

Location (easting/northing)
471932/99815

Scale
1:10,000

Created
23 Jan 2024

-  Selected area
-  Main river
-  Flood defence



Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	459738	Engineered High Ground					4.40
2	45739	Embankment	25	Fair	3.46	3.48	2.95
3	459642	Engineered High Ground					4.15
4	391996	Embankment		Fair	3.20	3.20	3.20
5	180014	Embankment	25				2.40
6	180015	Embankment	50				3.40

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

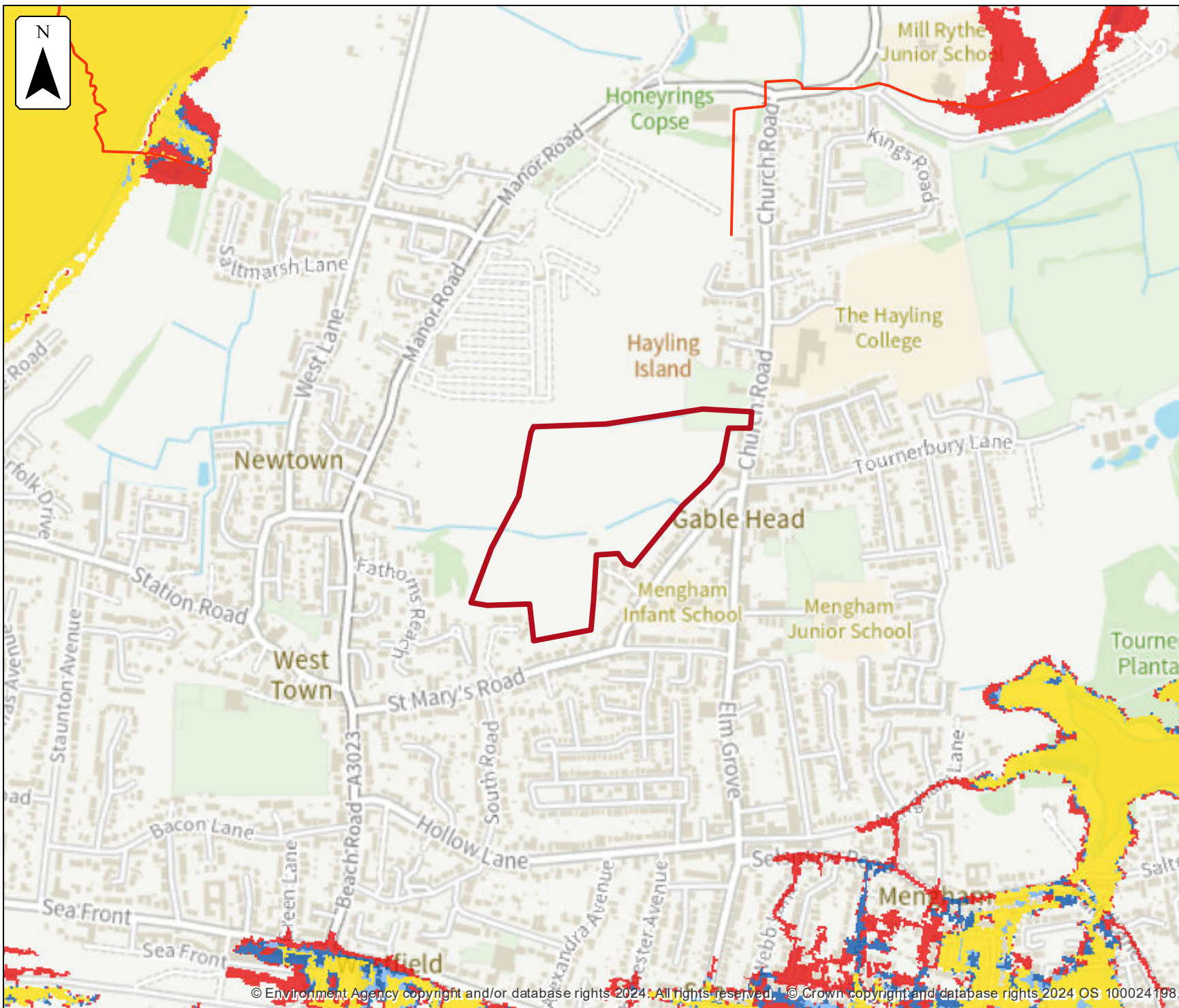
The climate change data included in the models may not include the latest [flood risk assessment climate change allowances](#). Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled tidal: risk of flooding from the sea where there are flood defences
- Defences removed modelled tidal: risk of flooding from the sea where flood defences have been removed
- Defended climate change modelled tidal: risk of flooding from the sea where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled tidal: risk of flooding from the sea where flood defences have been removed, including estimated impact of climate change



Defended modelled tidal extent

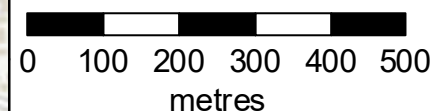
Location (easting/northing)
471932/99815

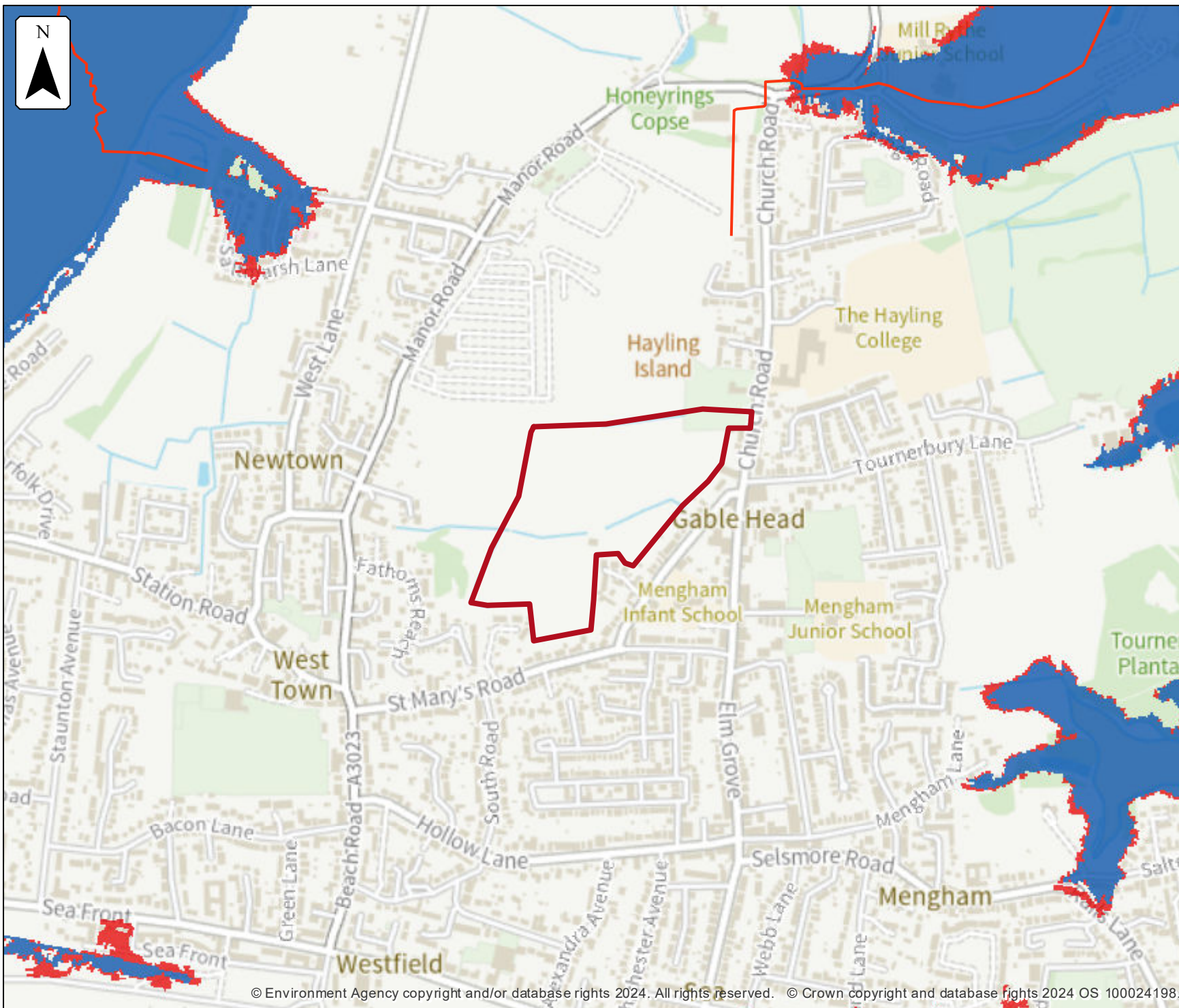
Scale Created
1:10,000 23 Jan 2024

Model name
**Hayling Island 2018
East Solent Model**

- Selected area
- Main river
- Modelled flood extent
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

Flood extents may not be visible where they overlap other return periods





Defences removed modelled tidal extent

Location (easting/northing)
471932/99815

Scale Created
1:10,000 23 Jan 2024

Model name
**Hayling Island 2018
East Solent Model**

 Selected area

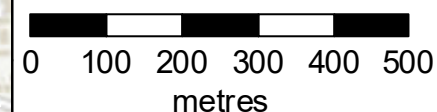
 Main river

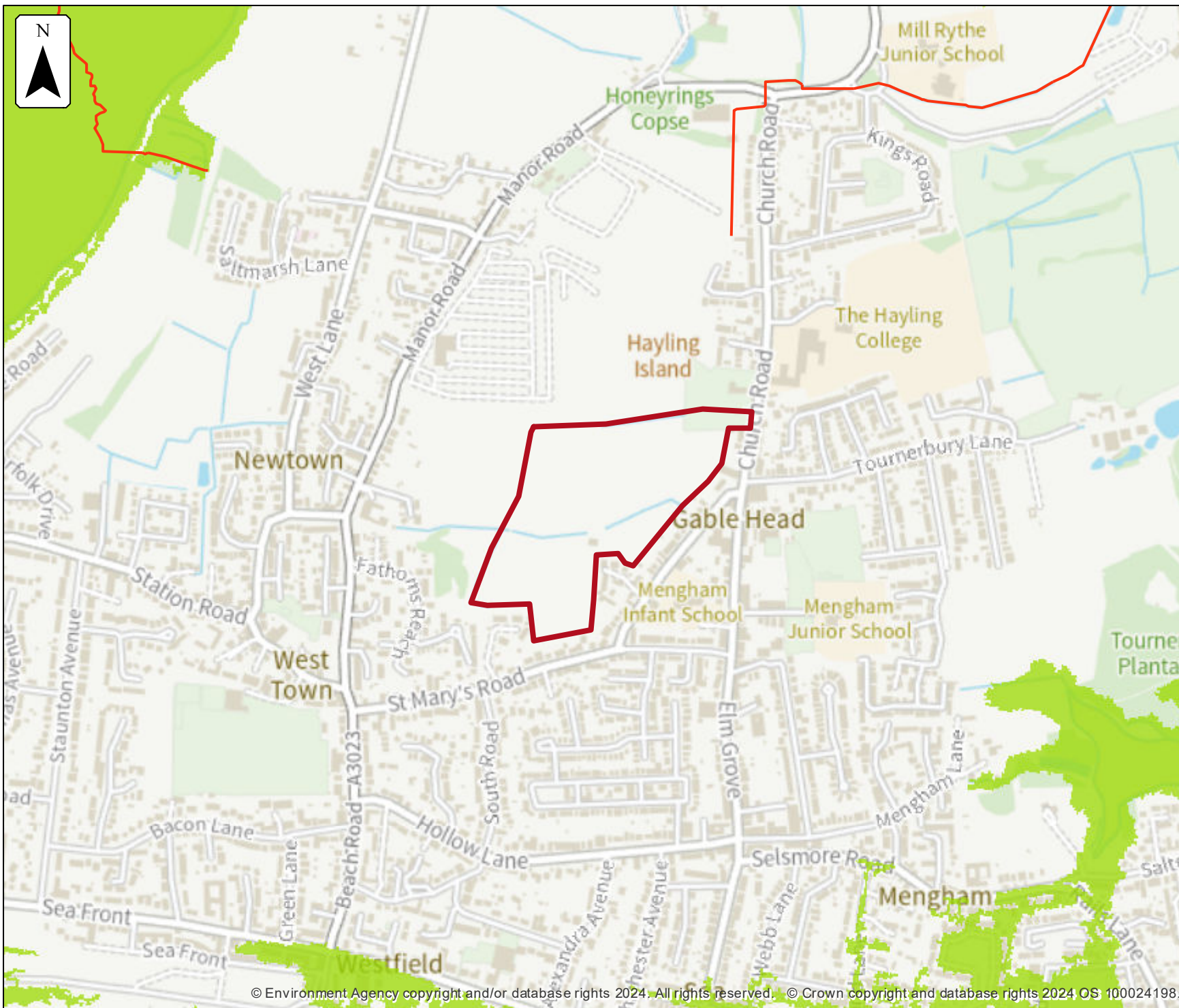
Modelled flood extent

 0.5% AEP

 0.1% AEP

Flood extents may not be
visible where they overlap
other return periods





Defended climate change modelled tidal extent

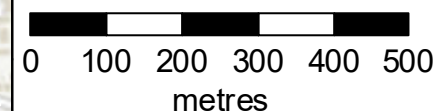
Location (easting/northing)
471932/99815

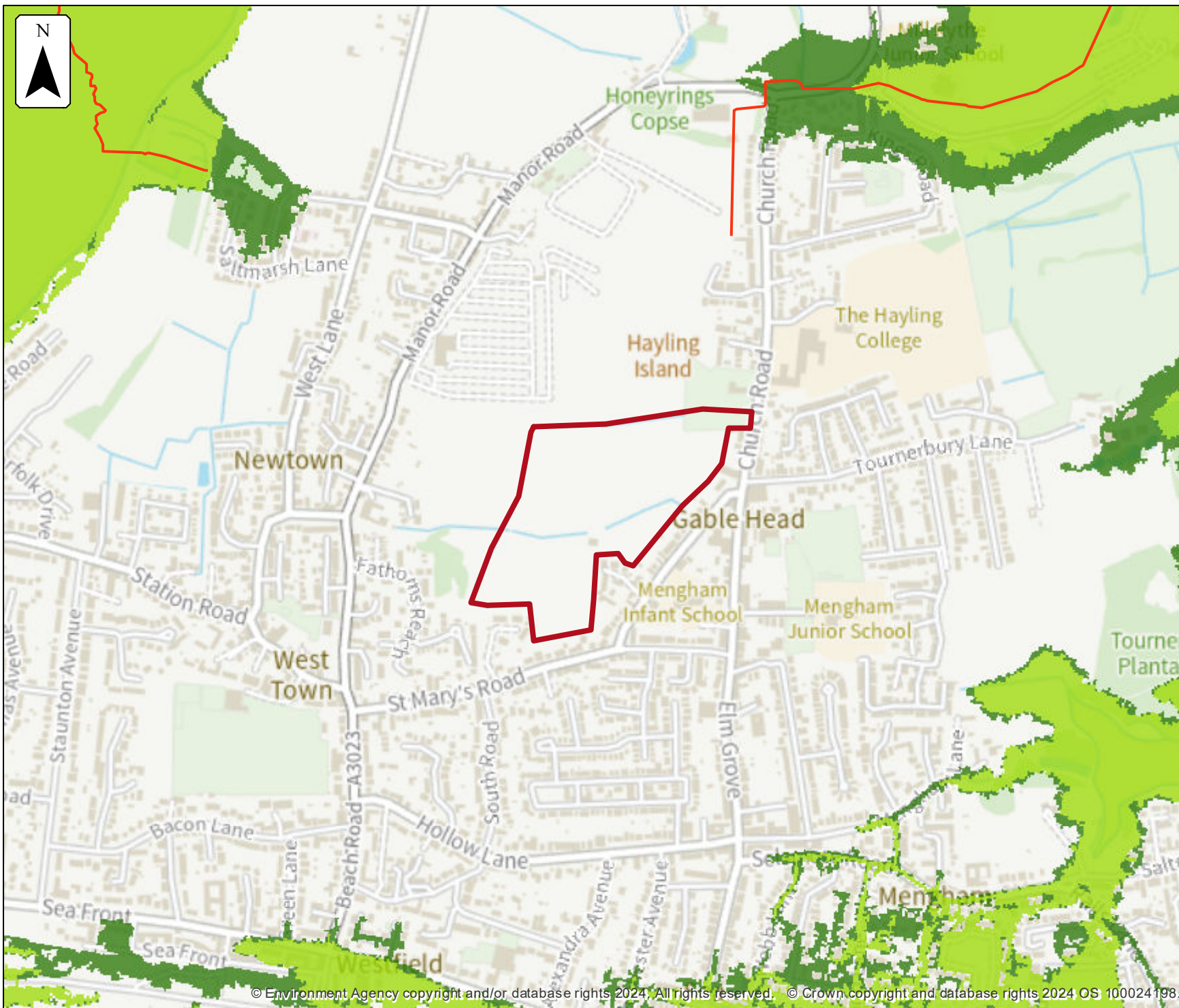
Scale Created
1:10,000 23 Jan 2024

Model name
**Hayling Island 2018
East Solent Model**

-  Selected area
-  Main river
- Modelled flood extent
-  0.5% AEP (+90mm)

Flood extents may not be
visible where they overlap
other return periods





**Defended
climate change
modelled tidal extent**

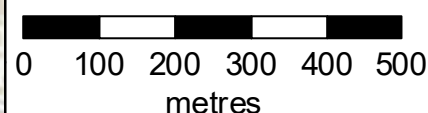
Location (easting/northing)
471932/99815

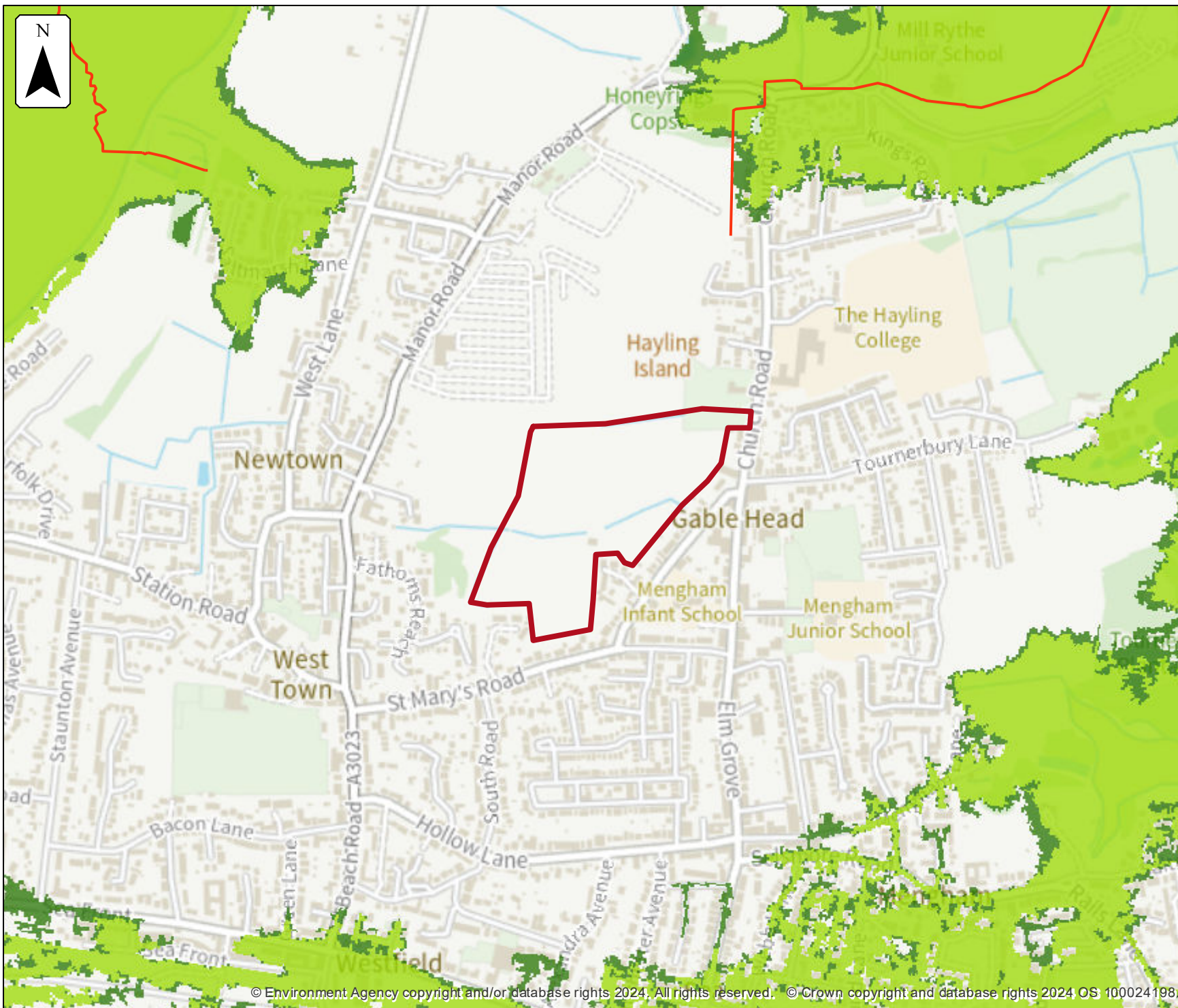
Scale Created
1:10,000 23 Jan 2024

Model name
**Hayling Island 2018
East Solent Model**

-  Selected area
-  Main river
- Modelled flood extent
 -  0.5% AEP (+320mm)
 -  0.1% AEP (+320mm)

Flood extents may not be
visible where they overlap
other return periods





Defended climate change modelled tidal extent

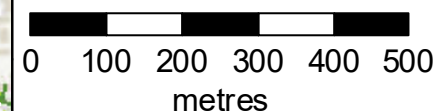
Location (easting/northing)
471932/99815

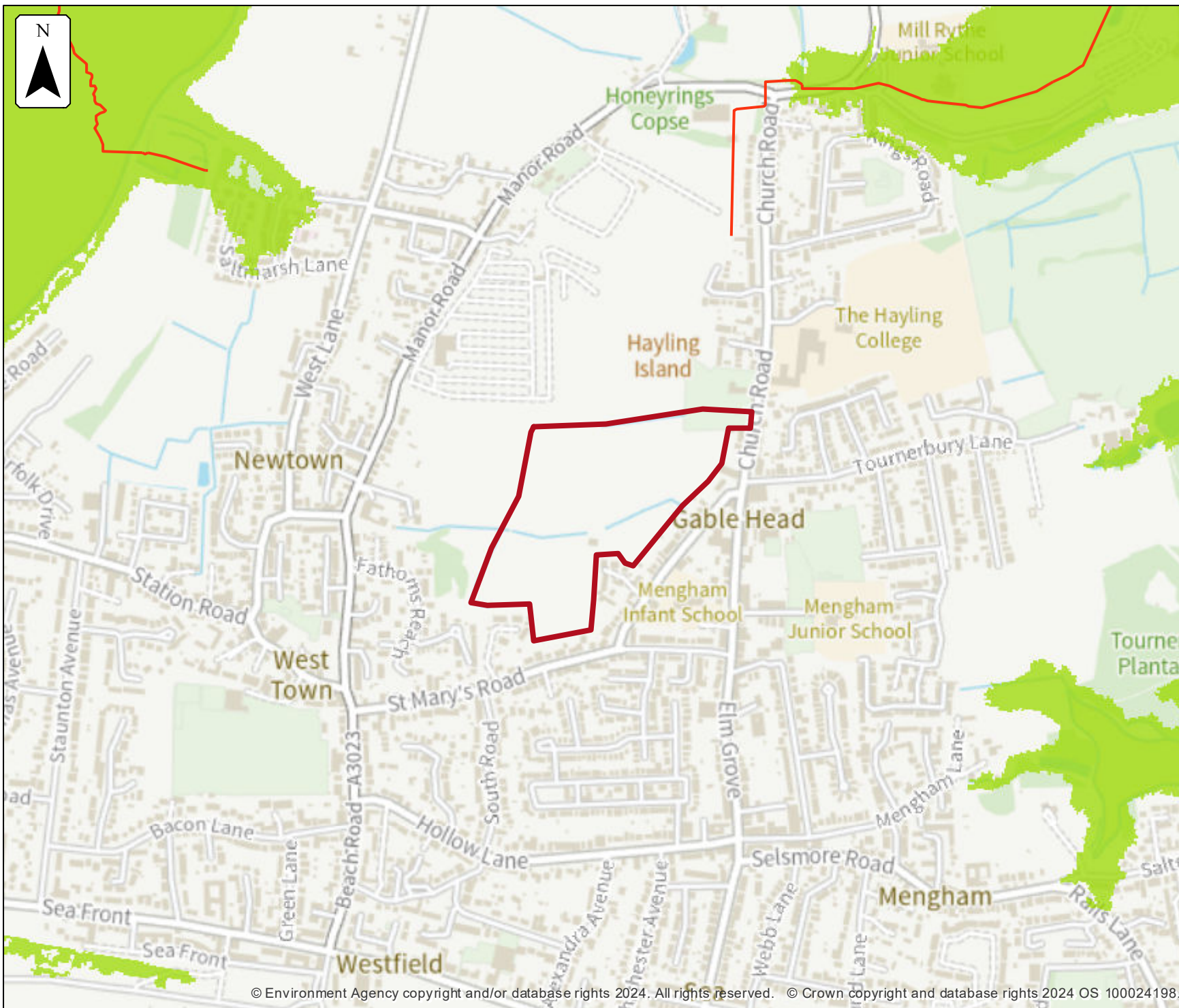
Scale Created
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Model name
**Hayling Island 2018
East Solent Model**

- Selected area
- Main river
- Modelled flood extent
 - 0.5% AEP (+744mm)
 - 0.1% AEP (+744mm)

Flood extents may not be
visible where they overlap
other return periods





Defences removed climate change modelled tidal extent

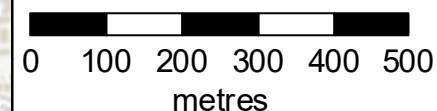
Location (easting/northing)
471932/99815

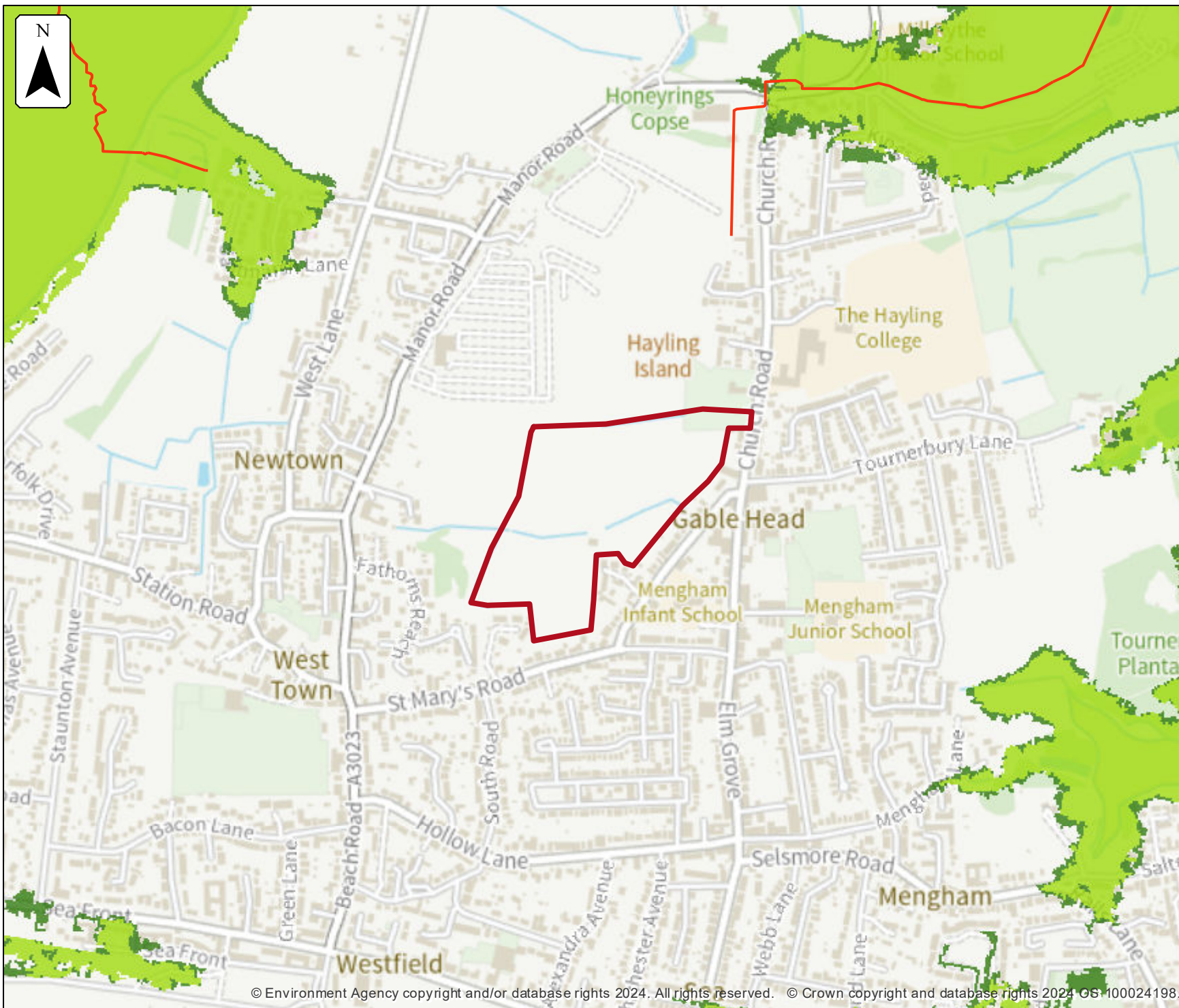
Scale Created
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Model name
**Hayling Island 2018
East Solent Model**

-  Selected area
-  Main river
- Modelled flood extent
-  0.5% AEP (+90mm)

Flood extents may not be
visible where they overlap
other return periods





Defences removed climate change modelled tidal extent

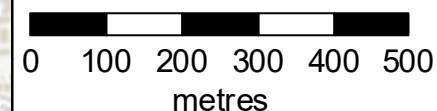
Location (easting/northing)
471932/99815

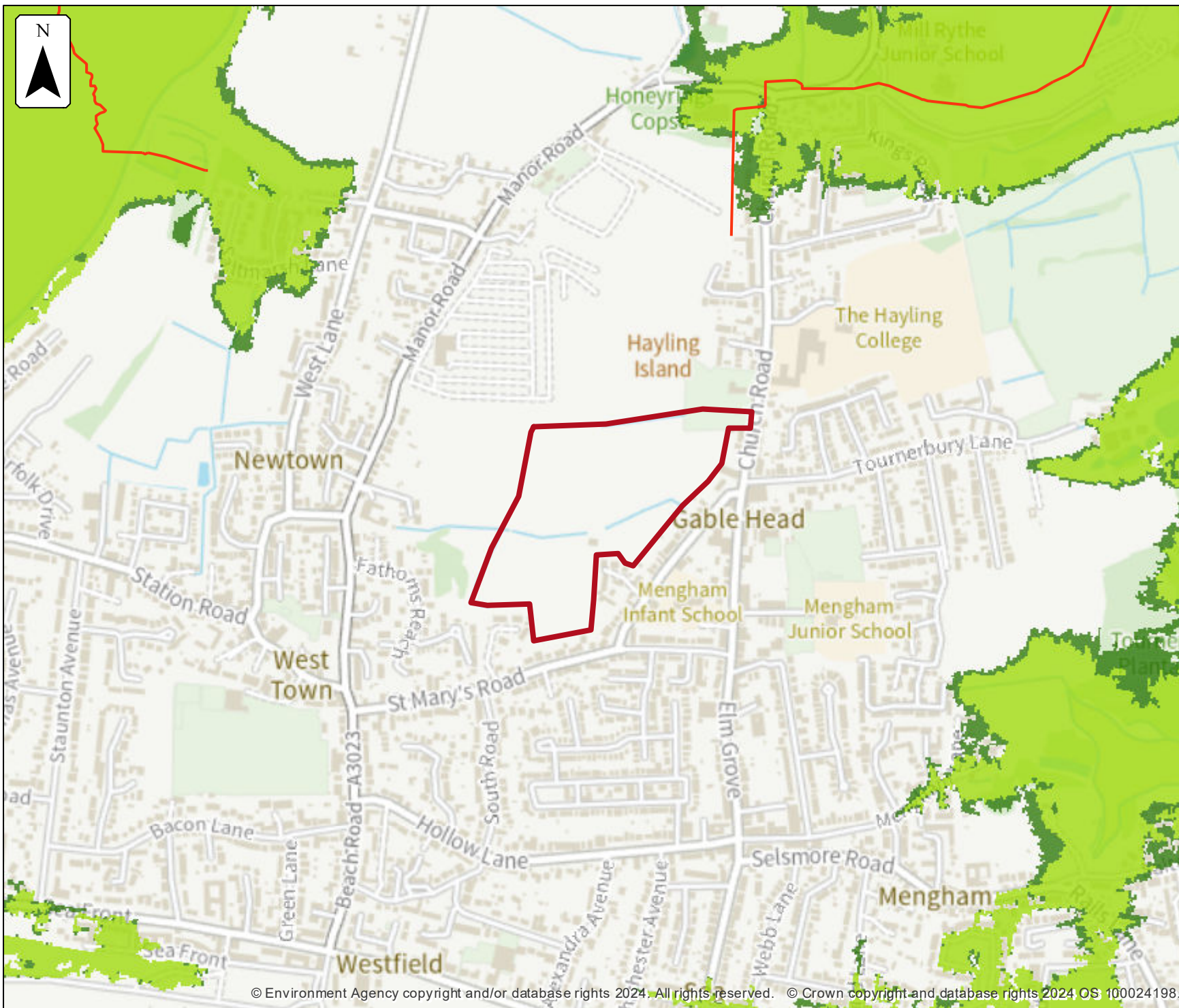
Scale Created
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Model name
**Hayling Island 2018
East Solent Model**

-  Selected area
-  Main river
- Modelled flood extent
 -  0.5% AEP (+320mm)
 -  0.1% AEP (+320mm)

Flood extents may not be
visible where they overlap
other return periods





**Defences removed
climate change
modelled tidal extent**

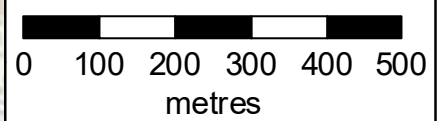
Location (easting/northing)
471932/99815

Scale Created
1:10,000 23 Jan 2024

Model name
**Hayling Island 2018
East Solent Model**

- Selected area
- Main river
- Modelled flood extent
 - 0.5% AEP (+744mm)
 - 0.1% AEP (+744mm)

Flood extents may not be visible where they overlap other return periods



Strategic flood risk assessments

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

This should give you information about:

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

About this data

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

Flood risk activity permits

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

[Find out more about flood risk activity permits](#)

Help and advice

Contact the Solent and South Downs Environment Agency team at ssdenquiries@environment-agency.gov.uk for:

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

Appendix 3 – Hampshire County Council Correspondence

Dani Lister

From: FWM Statutory SWM Consultee mailbox <SWM.Consultee@hants.gov.uk>
Sent: 18 January 2024 13:44
To: Dani Lister
Subject: RE: SHF.1132.142 - FRA Consultation

Dear Dani

Thank you for your email.

I have reviewed the site on our systems and can find no additional records of flooding in the vicinity of the site.

For up-to-date surface water drainage advice, please refer to the guidance and checklist available at:

<https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/planning>

Where ordinary watercourses exist on or adjacent to the site, it may be necessary to consider information here:

<https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/changewatercourse>

Regards

Tom Callaway

Senior Flood and Water Management Project Officer
Flood and Water Management

thomas.callaway@hants.gov.uk
www.hants.gov.uk

From: Dani Lister <dani.lister@enzygo.com>
Sent: Thursday, January 18, 2024 12:36 PM
To: FWM Statutory SWM Consultee mailbox <SWM.Consultee@hants.gov.uk>
Subject: SHF.1132.142 - FRA Consultation

Caution: This is an external email and could contain malicious content. Do not open any links or attachments if you were not expecting them. If the e-mail looks suspicious, please report via the 'Report Phishing' Button found on your toolbar.

To whom it may concern,

Enzygo Ltd previously contacted you regarding the below Site and we were wondering if the attached information still stands. Site Description is below, and previous response is attached.

Our Reference: SHF.1132.142 – St. Mary's Road, Hayling Island

Location: Land off Mary's Road, Hayling Island, PO11 9DF [NGR: 471911, 099841]

To whom it may concern,

Introduction

We have been commissioned to undertake a Flood Risk Assessment [FRA] for a proposed full planning application for a residential development, located on land [11.81-hectares] off St. Mary's Road, Hayling Island, PO11 9DF.

Ordnance Survey mapping shows a network of land drains within the Site boundary ['ordinary watercourses']. One of these watercourses conveys flows west through the centre of the Site, another flows along the northern boundary and a third is along the southwestern boundary.

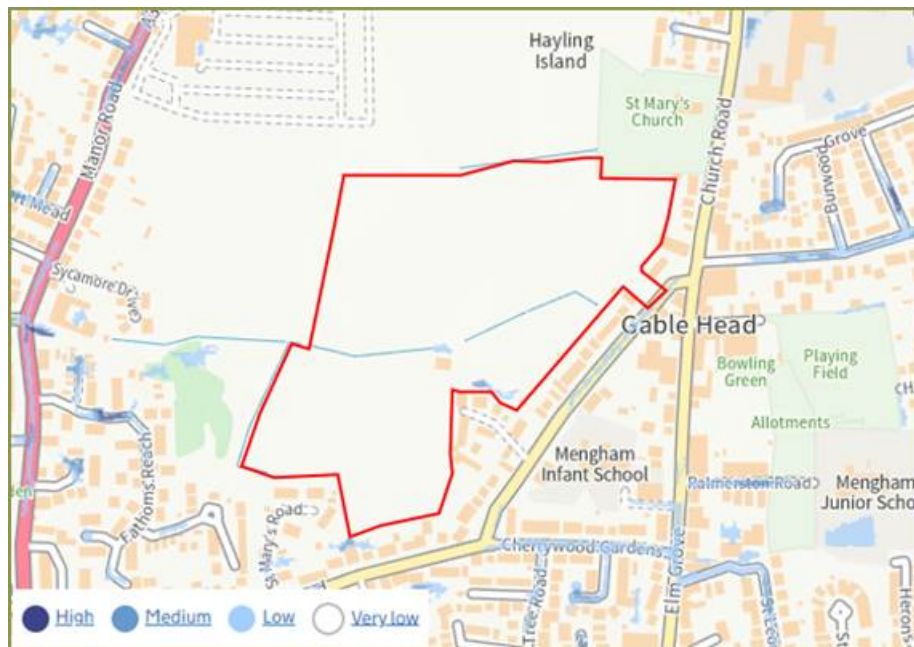
Environment Agency online mapping flood map [Figure 2] shows the Site is located in Flood Zone 1; which is land outside the 1 in 1000-year [0.1% Annual Exceedance Probability [AEP]] extent of fluvial [river] flooding, at 'low' risk.

Figure 1: Flood Map for Planning



Environment Agency online surface water mapping [Figure 2] shows the Site is mostly located outside the mapped extent of surface water flooding. There is a negligible amount of surface water ponding along the eastern boundary of the Site.

Figure 2: Surface Water Mapping



Data Request

Could you provide us with flooding data? In relation to the Site we would require clarification on the following points. Please note we are consulting with both the Environment Agency and Lead Local Flood Authority [LLFA].

Flood Risk

- Can you confirm the Flood Zone within the Site boundary as described above?
- Do you have any records of historic flooding events on this Site, either from fluvial, surface water, groundwater, sewers or infrastructure failure sources? If you are aware of historical flooding at the Site, can you please provide us with details of these historical flood events where it is available, including flood levels, estimated return periods, photographs, and other such data as may be relevant to our study?

Drainage

- Do you have any information on drainage within the Site and in the local area, including any known drainage problems?
- The proposal is for a development of a greenfield Site. Please could you indicate the maximum allowable discharge rate?
- What level of allowance for climate change would be required when considering surface water attenuation?
- Please can you also indicate to us whether you are aware of any relevant environmentally sensitive receptors [such as aquatic wildlife in receiving watercourses, etc.] in the area around the Site that we should be aware of when preparing the surface water drainage strategy?

Closure

We trust that the details presented herein are self-explanatory and clear. If, for any reason you should have any queries or comments, please do not hesitate to contact me.

Best Regards

Dani Lister BA (Hons), MA, GradCIWEM
Consultant Hydrologist

Phone: 0114 321 5151

Email: dani.lister@enzygo.com

Web: enzygo.com

Air Quality | Landscape | Hydrology | Permitting | Ecology | Geo-environmental | Noise | Transport | Planning | Arboriculture



**Enzygo Ltd, Enzygo GeoEnvironmental Ltd, Brown2Green Associates Ltd,
Offices in Bristol, Cardiff, Cambridge, Sheffield & Manchester**

Registered Office: Gresham House, 5-7 Pauls Street, Leeds, England, LS1 2JG
Registered in England & Wales registered number: 06525159 VAT number: 283 2596 77



At Enzygo Ltd we merit any and all comments received from our clients, take pride in providing an excellent service and place value on our ability to correct error. Should you wish to comment on any aspect of the service that I personally, or Enzygo Ltd as a whole, have given you, please reply through my e-mail address above, or email hello@enzygo.com (in confidence - if appropriate).

Please consider the environment before printing this email

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: +44 (0) 114 321 5151
: dani.lister@enzygo.com
: www.enzygo.com

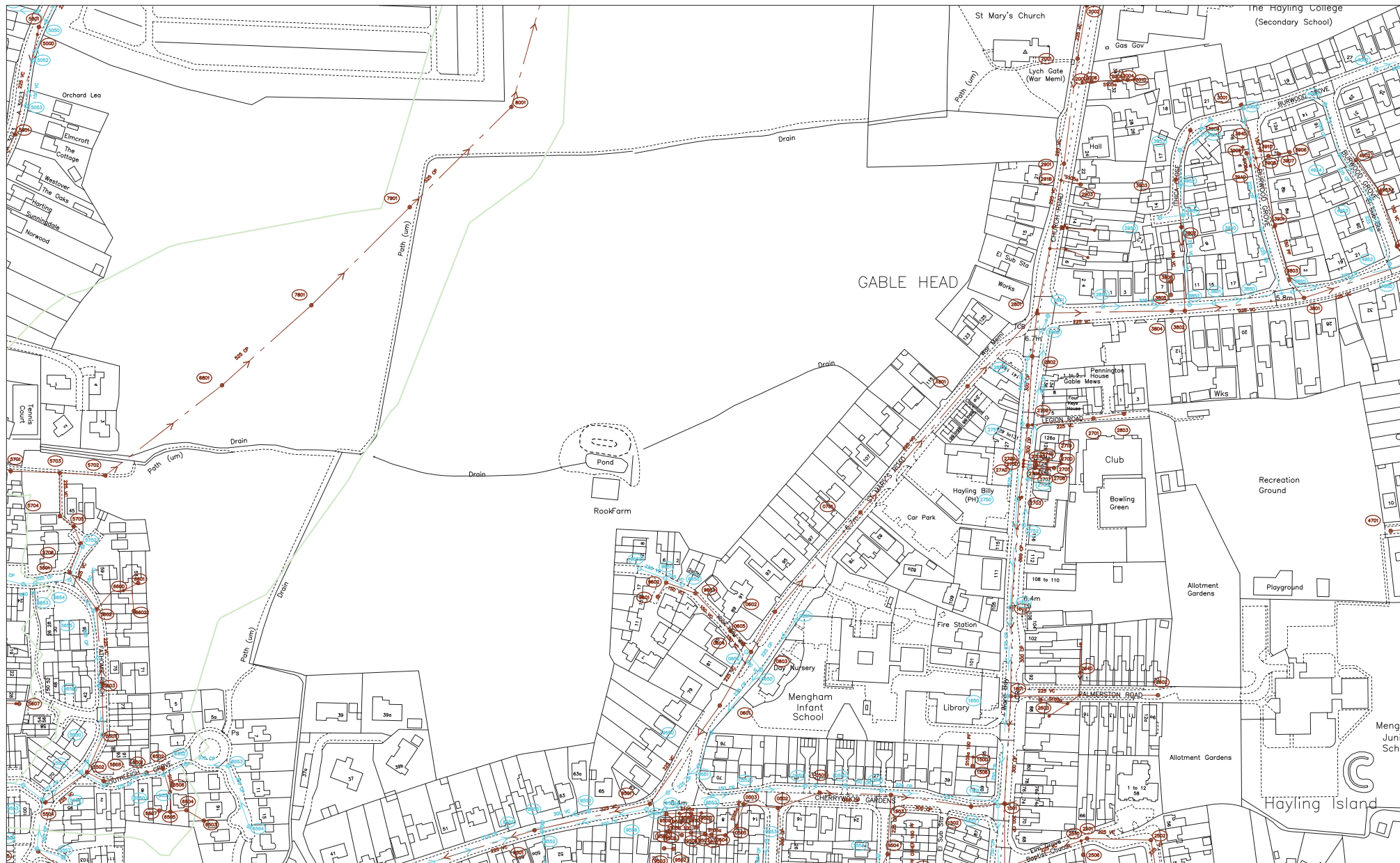
Registered Office: Gresham House, 5-7 St. Pauls Street, Leeds, England, LS1 2JG
Registered in England & Wales registered number: 06525159 VAT number: 283 259677

At Enzygo Ltd & Enzygo Geoenvironmental Ltd we merit any and all comments received from our clients, take pride in providing an excellent service and place value on our ability to correct error. Should you wish to comment on any aspect of the service that I personally, or Enzygo Ltd & Enzygo Geoenvironmental Ltd as a whole, have given you, please reply through my e-mail address above, or email hello@enzygo.com (in confidence - if appropriate).

Appendix 4 – Southern Water Correspondence

SEWER RECORDS PAGE 1 OF 2

100076



99498

471524

O.S. REF.

SZ7199NE

Title: Land off St Marys Road

Drawn by: mondaln

Scale: 1:2500

Date: 04/04/2016

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.

The actual positions should be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

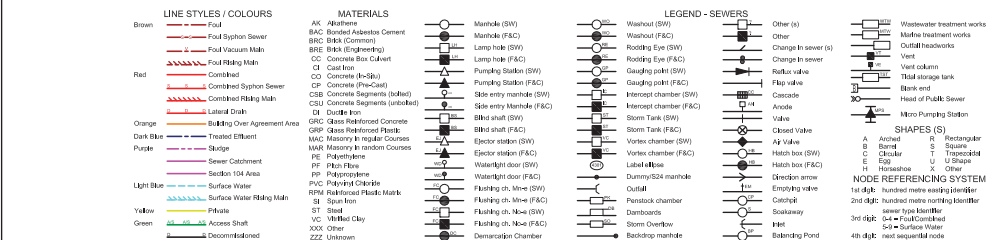


Southern Water

472466

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0501X	6.33	4.16	300	CP	CIRC	2752X	6.88	5.96	225	VC	CIRC	5053X	5.84	5.05	150	VC	CIRC	9552X	6.32	5.48	225	CP	CIRC
0502X	6.24	4.28	300	CP	CIRC	2753X	6.98	5.73	300	CP	CIRC	5501X	7.16	5.53	225	VC	CIRC	9553X	6.36	5.65	150	CP	CIRC
0503X	6.27	4.47	225	CP	CIRC	27ADX			300	CP	CIRC	5502X	7.29	5.67	225	VC	CIRC	9554X	6.327		150	CP	CIRC
0504X			UNKN	PF	CIRC	2801Y	6.81	4.27	225	VC	CIRC	5503X	7.32	5.81	150	VC	CIRC	9555X	6.36	5.23	300	VC	CIRC
0505X			UNKN	PF	CIRC	2801X	6.81	4.22	300	CP	CIRC	5504X	7.29	5.92	225	VC	CIRC	9556X	6.38	5.4	300	CP	CIRC
0550X	6.35	5.34	150	CP	CIRC	2802X	6.78		300	CP	CIRC	5505X	7.01	5.65	150	VC	CIRC	9601X	7.555		150	VC	CIRC
0551X	6.39	5.45	150	CP	CIRC	2803X	6.44	4.96	225	VC	CIRC	5550X	7.15	4.52	525	CP	CIRC	9602X	7.526		150	VC	CIRC
0552X	6.37	5.57	150	CP	CIRC	2850X	6.22	4.8	225	CP	CIRC	5551X	7.26	4.61	525	CP	CIRC	9603Y	7.062		150	VC	CIRC
0553X	6.34	5.46	225	CP	CIRC	2851X	6.74	5.18	600	CP	CIRC	5552X	7.36	4.82	375	CP	CIRC	9603X	7.062	5.747	150	VC	CIRC
0601X	6.49	4.9	225	VC	CIRC	2853X	6.76	5	600	CP	CIRC	5553X	7.32	4.74	375	CP	CIRC	9650X	7.544	6.46	225	VC	CIRC
0602X	6.75	5.75	225	VC	CIRC	285DX			600	CP	CIRC	5555X	7.25	5.04	225	VC	CIRC	9651X	7.537	6.401	225	VC	CIRC
0602Y	6.75	5.75	225	VC	CIRC	2901X	7.28		225	VC	CIRC	5556X	7.01	4.87	300	CP	CIRC						
0603X	6.693		225	VC	CIRC	2902X			UNKN	UNKN	CIRC	5557X	7.01	5.13	300	CP	CIRC						
0605X	6.693	5.522	150	VC	CIRC	2903X			UNKN	UNKN	CIRC	5601X	6.35	5.02	225	VC	CIRC						
0650X	6.781	5.76	225	CP	CIRC	2905X			UNKN	UNKN	CIRC	5602X	6.76	5.18	225	VC	CIRC						
0651X	6.85	6.06	225	CP	CIRC	290DX			UNKN	UNKN	CIRC	5603X	6.92	5.43	225	VC	CIRC						
0652X	6.589	6.18	150	VC	CIRC	291BX			225	VC	CIRC	5607X			225	UNKN	CIRC						
0701X	6.67	4.88	225	VC	CIRC	291DX			225	VC	CIRC	5651X	6.18	3.6	675	CP	CIRC						
1501X	6.17	3.12	300	CP	CIRC	292DX			UNKN	UNKN	CIRC	5653X	6.15	3.67	600	CP	CIRC						
1502X	6.2	3.57	300	CP	CIRC	293DX			UNKN	UNKN	CIRC	5654X	6.33	4.19	525	CP	CIRC						
1503X	6.28	3.96	300	CP	CIRC	294DX			225	VC	CIRC	5655X	6.71	4.21	525	CP	CIRC						
1504X	6.22	4.25	225	CP	CIRC	2950X	6.17	4.75	225	VC	CIRC	5656X	6.92	4.36	525	CP	CIRC						
150DX			100	PF	CIRC	3001X	6.87	5.13	150	PF	CIRC	5701X	6.27	4.31	525	CP	CIRC						
1550X	6.34	5.25	225	CP	CIRC	3050X	6.9	5.76	225	CP	CIRC	5702X	6.61	4.13	525	CP	CIRC						
1551X	6.24	4.67	225	CP	CIRC	3801X	5.95	3.67	225	VC	CIRC	5703X	6.48	4.24	525	CP	CIRC						
1552X	6.17	3.92	750	CP	CIRC	3802X	5.89	3.99	225	VC	CIRC	5704X	6.61	4.81	225	VC	CIRC						
1553X	6.21	5.14	225	CP	CIRC	3803X	5.93	4.13	225	VC	CIRC	5705X	6.74	4.92	225	VC	CIRC						
1601X	6.29	3.39	300	CP	CIRC	3804X			225	VC	CIRC	5706X	6.47	4.95	225	VC	CIRC						
1602X	6.58	3.56	300	CP	CIRC	3806X			UNKN	UNKN	CIRC	5752X	6.5	5.11	150	VC	CIRC						
1650X	6.26	4.21	750	CP	CIRC	3850X	5.83	4.25	375	CP	CIRC	5901X	5.8	2.9	225	VC	CIRC						
1651X	6.56	4.46	675	CP	CIRC	3851X	5.86	4.58	300	CP	CIRC	6501X	7.16	6.16	150	VC	CIRC						
1801X	6.67	4.61	225	VC	CIRC	3852X	5.8	4.66	225	CP	CIRC	6502X	7.2	6.3	150	VC	CIRC						
2001X	7.57	5.27	225	VC	CIRC	385DX			300	CP	CIRC	6503X			100	RPM	CIRC						
2002Y	7.65	5.51	150	VC	CIRC	3901X	6.19	4.46	150	PF	CIRC	6504X			100	RPM	CIRC						
2002X	7.65	5.49	225	VC	CIRC	3902X	6.58	4.85	150	VC	CIRC	6505X			100	RPM	CIRC						
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2005X			UNKN	UNKN	CIRC	3904X	6.72	5.38	150	VC	CIRC	6507X			UNKN	UNKN	CIRC						
2006X			UNKN	UNKN	CIRC	3906X			UNKN	UNKN	CIRC	6550X	7.15	4.89	375	CP	CIRC						
201DX			UNKN	UNKN	CIRC	3907X			UNKN	UNKN	CIRC	6551X	7.2	4.98	375	CP	CIRC						
2501X	5.83	3.78	225	VC	CIRC	3908X			UNKN	UNKN	CIRC	6552X	7.41	5.03	375	CP	CIRC						
2502X	5.89	4.01	225	VC	CIRC	3909X			UNKN	UNKN	CIRC	6553X	7.2	5.11	375	CP	CIRC						
2506X			UNKN	UNKN	CIRC	391DX			150	PF	CIRC	6554X	6.65	5.29	300	CP	CIRC						
250DX			UNKN	UNKN	CIRC	394DX			UNKN	UNKN	CIRC	6601X			UNKN	UNKN	CIRC						
251DX			225	VC	CIRC	3950X	6.23	5.37	225	CP	CIRC	6602X			UNKN	UNKN	CIRC						
2602X			225	VC	CIRC	3951X	6.23	4.77	225	VC	CIRC	6801X			UNKN	UNKN	CIRC						
2603X			UNKN	UNKN	CIRC	3952X	6.51	4.72	225	VC	CIRC	6801X	6.45	3.91	525	CP	CIRC						
260DX			UNKN	UNKN	CIRC	3953X	6.68	4.9	225	VC	CIRC	7801X	6.51	3.87	525	CP	CIRC						
262DX			UNKN	UNKN	CIRC	3954X	6.84	5.04	225	VC	CIRC	7901X	7.15	3.79	525	CP	CIRC						
263DX			225	VC	CIRC	4052X	6.61	5.61	225	VC	CIRC	8001X	8.24	3.69	525	CP	CIRC						
264DX			UNKN	UNKN	CIRC	4053X	6.49	5.59	150	CP	CIRC	8501X	6.48	4.44	225	VC	CIRC						
2701X			225	VC	CIRC	4701X	6.01	4.33	175	VC	CIRC	8550X	6.39	5.07	300	CP	CIRC						
2702X	6.93	3.94	300	CP	CIRC	485DX			375	CP	CIRC	8551X	6.46	4.96	300	CP	CIRC						
2703X	6.95	3.81	300	CP	CIRC	4902X	6.09		150	VC	CIRC	8552X	6.38	5.81	150	VC	CIRC						
2704X			UNKN	UNKN	CIRC	4903X	5.89	4.85	150	VC	CIRC	9501X	6.37	4.65	225	VC	CIRC						
2705X			UNKN	UNKN	CIRC	4904X	6.05		150	VC	CIRC	9503X			100	PF	CIRC						
2706X			UNKN	UNKN	CIRC	4906X	5.91	3.46	225	VC	CIRC	9505X			100	PF	CIRC						
2707X			UNKN	UNKN	CIRC	4952X	5.87	4.75	150	VC	CIRC	9506X			UNKN	UNKN	CIRC						
2708X			UNKN	UNKN	CIRC	4953X	5.82	5.16	225	CP	CIRC	9507X			UNKN	UNKN	CIRC						
270DX			UNKN	UNKN	CIRC	4954X	6.27	5.33	225	CP	CIRC	9508X			UNKN	UNKN	CIRC						
271DX			UNKN	UNKN	CIRC	5001X	5.48	3.08	225	VC	CIRC	950DX			100	PF	CIRC						
272DX			300	CP	CIRC	500DX			225	VC	CIRC	9510X			UNKN	UNKN	CIRC						
273DX			300	CP	CIRC	5050Y	5.33	4.84	150	VC	CIRC	9511X			UNKN	UNKN	CIRC						
274DX			UNKN	UNKN	CIRC	5050X	5.33	4.55	375	CP	CIRC	951DX			UNKN	UNKN	CIRC						
2750X	6.91	4.66	675	CP	CIRC	5051X	5.48	4.48	375	CP	CIRC	9550X	6.46	5.67	225	CP	CIRC						
2751X	6.92	4.84	675	CP	CIRC	5052X	5.58	4.97	225	VC	CIRC	9551X	6.38	5.58	225	CP	CIRC						





Controllable Valve			Flow Control			Inlet-Outfall	
Manhole							
BIF Bifurcation	Cascade	CP Catchpit	Head Of Public Sewer	IC Interceptor Chamber	Manhole	S Soakaway	WO Washout
Outfall Headworks		Overflow Chamber		Pipe Bridge		Pumping Station	
Outfall Headworks	CSO Combined Sewer Overflow	EMO Emergency Overflow	Pipe Bridge	Micro Pumping Station	Pumping Station		
Sewer Level Monitor		Storage		Treatment Works		Weir	
Sewer Level Monitor	Storm Tank	Tidal Storage Tank	Treatment Works	Weir	Wastewater Site		
Wastewater Pipe				Wastewater Use		Developer Services	
Culverted Water Course	Syphon	Tank Sewer	Trunk Sewer	Foul	Combined	Build Over Agreement	Section 104
Drain	Vacuum Main	Decommissioned Pipe	Sludge	Treated Effluent	Surface Water	Catchment	Sub-Catchment
Outfall			Private				
Overflow							
Rising Main							
Sewer							

Map Title: SW Print

Printed By: Roopa.Giriappa

Date Printed: 09/02/2024

Map Scale: 750

The positions of pipes on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on-site





Controllable Valve			Flow Control			Inlet-Outfall	
Manhole							
BIF Bifurcation	Cascade	CP Catchpit	Head Of Public Sewer	IC Interceptor Chamber	Manhole	S Soakaway	WO Washout
Outfall Headworks		Overflow Chamber		Pipe Bridge		Pumping Station	
Outfall Headworks	CSO Combined Sewer Overflow	EMO Emergency Overflow	Pipe Bridge	Micro Pumping Station	Pumping Station		
Sewer Level Monitor		Storage		Treatment Works		Weir	
Sewer Level Monitor	Storm Tank	Tidal Storage Tank	Treatment Works	Weir	Wastewater Site		
Wastewater Pipe				Wastewater Use		Developer Services	
Culverted Water Course	Syphon	Tank Sewer	Trunk Sewer	Foul	Combined	Build Over Agreement	Section 104
Drain	Vacuum Main	Decommissioned Pipe	Sludge	Treated Effluent	Surface Water	Catchment	Sub-Catchment
Outfall			Private				
Overflow							
Rising Main							
Sewer							

Map Title: SW Print

Printed By: Roopa.Giriappa

Date Printed: 09/02/2024

Map Scale: 750

The positions of pipes on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on-site





Dani Lister
ENZYGO LTD
Offices 3-4, Samuel House
5 Fox Valley Way
Sheffield
South Yorkshire
S36 2AA

Your ref
20197

Our ref
DSA000043058

Date
30 May 2025

Contact
Tel 0330 303 0119

Dear Miss Lister,

Level 1 Capacity Check Enquiry: Rook Farm, PO11 9DF.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

The enquiry has been reassessed to determine the capacity available for 1.35 l/s at manhole reference SZ72991802 (gravity) and 6.0 l/s at manhole reference SZ1999602 (pumped).

There is currently inadequate capacity within the foul sewerage network to accommodate a foul flow of 1.35 l/s (gravity) and 6.0 l/s (pumped) for the above development at manhole reference SZ72991802 and SZ1999602. The proposed development would increase flows to the public sewerage system which may increase the risk of flooding to existing properties and land. Additional off-site sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development. Southern Water has a duty to provide Network capacity from the point of practical connection (point of equivalent or larger diameter pipe) funded by the New Infrastructure Charge.

Southern Water aim to provide this within 24 months following the date that planning has been granted for developments not identified as strategic sites in our current business plan. Strategic sites are larger developments and will often take longer than 24 months for a full solution to be provided.

The nearest point where capacity is currently available is at Budds Farm Havant WwTW. Rights are not issued for a direct connection to Wastewater Treatment Works (WTW). Please note that connection to the WTW will have to be agreed by Southern Water Services before being carried out.

Please note: the assessment has also been carried out for 50% and 20% of the proposed flow rates which have proved insufficient capacity and indicates DG5s are present, along with flooding detriment and level detriment.

New Infrastructure Charging

Please note as of 1st April 2018 we have moved to the “New Connections Services Charging Arrangements”. We understand that this may cause uncertainty for customers, particularly where they may have already committed to a development based on previous charging arrangements. We have worked with our stakeholders and Water UK to agree a set of principles by which we will base our charges. Please read through our new charging arrangement documents available at the following link: [Connecting Charging Arrangements - Southern Water](#)

Alternatively, New Appointees and Variations (NAVs), also known as ‘inset’ companies, can provide new connection services or take ownership of the new water and wastewater connection infrastructure provided for a new development. NAVs are appointed by Ofwat and replace the regional water company. It is for the developer to choose whether to use a NAV or the regional water company to supply services for new sites, according to certain legal criteria.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter. **Any revisions in flow rate or alternative point of connection will require a new Pre-Planning Application to be submitted.**

Please get in touch via the Get Connected customer dashboard if you have any queries.

Should it be necessary to contact us please quote our above reference number in all communications relating to this application by email at southernwaterplanning@southernwater.co.uk

Yours sincerely,

Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development

Appendix 5 – BGS Borehole Records

Geo-Testing Services Ltd

Borehole Record

DEPTH (m)	O.O. Level	Type & No of Sample	Boring Details			Legend	Description
			Penetration	Lining	Water		
0.61	6.234						TARMAC - HARDCORE
		D					FIRM SANDY BROWN MOTTLED CLAY.
1.67	5.174	D	Brickwork		S.W.L.		STIFF BROWN/ GREY CLAY
2.28	4.564						FINE BROWN/ GREY SAND
3.66	3.184	U/274 D	prob Southwestern Bedst S(LC)		2.44		
			BORE HOLE TERMINATED.				

U. Undisturbed D. Disturbed W. Water B. BULK

Sheet No 42 of 57

British Geological Survey

British Geological Survey

British Geological Survey

Borehole Record

Borehole No 2/16 Operator R.C.

Type of Boring S+A Weight _____ Drop _____

Diameter of Boring 152 mm Standing Water Level 5.039 m.O.D.

DEPTH (m)	O.D. Level	Type & No of Sample	Boring Details			Legend	Description
			Penetration	Lining	Water		
0.76	6.159						TOP SOIL + FILL MATERIAL
		D	Brickwork		S.W.L.		SOFT TO FIRM BROWN MOTTLED CLAY
2.28	4.639	U/274 D	Brickwork				FINE LIGHT BROWN SAND
3.66	3.259		BOREHOLE TERMINATED				

U. Undisturbed
D. Disturbed
W. Water
B. BULK

1

7172 7947

Sheet No 30 of 57

British Geological Survey

British Geological Survey

British Geological Survey

Borehole Record

Date started _____ Finished _____

Operator R.C.

Type of Penetration Test _____

Weight _____ Drop _____

Standing Water Level 4.963m.O.A.

DEPTH (m)	O.D. Level	Type & No of Sample	Boring Details			Legend	Description
			Penetration	Lining	Water		
0.61	6.063	D					TOP SOIL
1.83	4.843	D	Brickearth		3. m/s		STIFF SANDY BROWN MOTTLED CLAY
2.44	4.233	UP 44					FIRM BROWN FINE SANDY CLAY WITH SOME SMALL FLINTS
3.35	3.323	D	Raised Beach		2.7 m/s		FINE BROWN SAND WITH SMALL MED. FLINTS.
BORE HOLE TERMINATED							

U. Undisturbed D. Disturbed W. Water B. BULK

FOUNDATION ENGINEERING
Ltd.

British Geological Survey

BOREHOLE LOG

British Geological Survey

SZ 79 NW/13

British Geological Survey

71699986

331

LOCATION : Hayling Island

BOREHOLE No. : 101

BOREHOLE DIA. : 6"

GROUND LEVEL :

DATE (Start) : 5.7.62.

WATER LEVEL : 7'-0"

Dates	Description	Thickness	Depth	Sample	Remarks
			0'-0"		
Brickentk	Firm brown sandy clay	6'-0"		1	
			6'-0"	2	
Raised Beach	Grey/brown sandy clayey gravel	2'-0"		3	
			8'-0"		
	Grey silty clay	3'-0"			
LC	Brown compact sand	1'-6"	11'-0"	4	
	Grey sandy clay with flints.	1'-6"	12'-6"		
			14'-0"	5	
					End of borehole
R.F.W.					
22/1/83					

BOREHOLE SCALE : 1" = 5' • : DISTURBED SAMPLE ! : UNDISTURBED SAMPLE + : STANDARD PENETRATION TEST

FOUNDATION ENGINEERING
Ltd.

British Geological Survey

BOREHOLE LOG

British Geological Survey

SZ 79 NW/14

British Geological Survey

LOCATION : *Hayling Island*

BOREHOLE No. : *100.* *71789991*

BOREHOLE DIA. : *12"*

GROUND LEVEL :

DATE (Start) : *16.7.62.*

WATER LEVEL : *8'-6"*

Dates	Description	Thickness	Depth	Sample	Remarks
	<i>Topsoil</i>	<i>2'-6"</i>	<i>0'-0"</i>		
			<i>2'-6"</i>	<i>1</i>	
<i>Brickwork</i>	<i>soft brown sandy clay</i>	<i>4'-6"</i>			
			<i>7'-0"</i>	<i>2</i>	
<i>Raised</i>	<i>Brown sandy clayey gravel</i>	<i>2'-0"</i>	<i>9'-0"</i>	<i>3</i>	
<i>Bench</i>	<i>Brown sandy gravel</i>	<i>4'-0"</i>			
			<i>13'-0"</i>	<i>4</i>	
<i>LC</i>	<i>soft brown silty clay</i>	<i>1'-0"</i>	<i>14'-0"</i>		<i>End of borehole.</i>
<i>R.T.W.</i>					
<i>27.10.83</i>					

BOREHOLE SCALE : 1" = 5' • : DISTURBED SAMPLE I : UNDISTURBED SAMPLE + : STANDARD PENETRATION TEST

LOCATION : Hayling Island

BOREHOLE No. : 119.

331

BOREHOLE DIA. : 6"

GROUND LEVEL :

DATE (Start) : 4.7.62.

WATER LEVEL : 10'-0"

Dates	Description	Thickness	Depth	Sample	Remarks
			0'-0"		
				1	
				+	34 blows for 6in.
Raised Beach	Compact sandy gravel	12'-0"		2	
				+	37 blows for 6in.
			12'-0"	3	
	Firm brown silty clay	3'-0"			
			15'-0"	4	
	Compact brown sand.	2'-0"			
LC			17'-0"	5	
	Firm grey clayey silt.	5'-0"			
			22'-0"	6	
					End of borehole.
27.11.81					

Geo-Testing Services Ltd

Borehole Record

Date started _____ Finished _____

Operator P.C.

Type of Penetration Test

Weight _____ Drop _____

Standing Water Level 5.229m. OK

U. Undisturbed D. Disturbed W. Water B Bulk

52 79 NH/91
7221 9968

British Geological Survey
Geo-Testing Services Ltd

Sheet No 45 of 57

Borehole Record

Contract HAYLING ISLAND Date started _____ Finished _____
Borehole No 2/14 Operator R.C.
Ordinance Datum Level 6600 Type of Penetration Test _____
Type of Boring S+A Weight _____ Drop _____
Diameter of Boring 152 mm Standing Water Level 5570m.O.D.

DEPTH (m)	O.D. Level	Type & No of Sample	Boring Details			Legend	Description
			Penetration	Lining	Water		
0.76	5840						TOPSOIL & FILL MATERIAL
		D			S.W.L.		SOFT TO FIRM BROWN/GREY SANDY CLAY WITH SOME SMALL FLINTS
2.13	4970	D	Brickwork & Raised Beach				VERY SANDY BROWN GREY CLAY WITH SOME FLINTS
2.44	4160	D					FINE BROWN SAND.
		U/305	Bracklesham Beds s/lc				
3.96	2640	D					
			BOREHOLE TERMINATED				

U. Undisturbed D. Disturbed W. Water B. BULK

Appendix 6 – Soakaway Testing Results

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

**Borehole
Number****WS101****In Situ Permeability Type**

Falling Head

Test No.

1

Ground Level (mOD)**Client**

Gladman Developments Ltd

**Job
Number**

LKC 16 1109

Location**Dates**

03-Nov-16

Engineer

LKC

Sheet

1/7

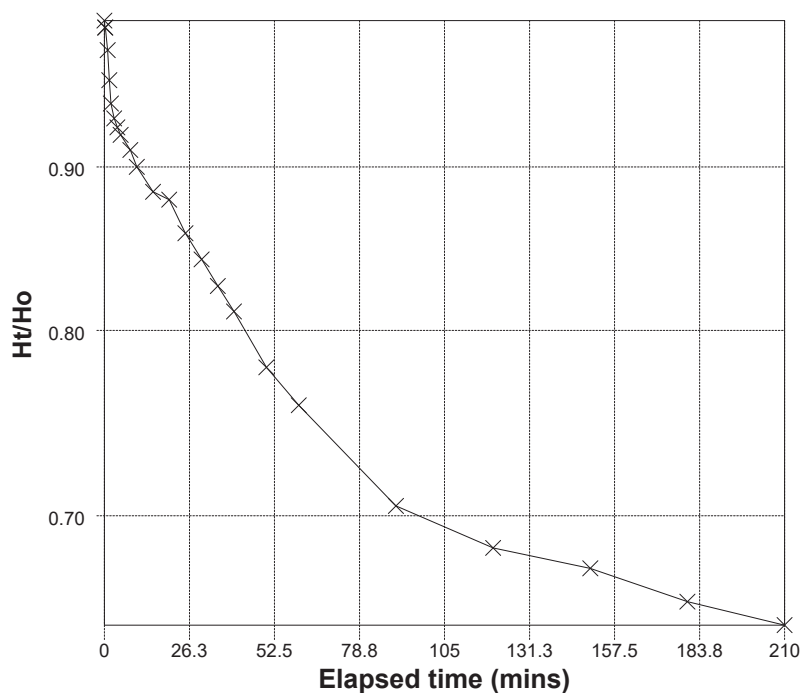
Height of casing above ground level:	0.00 m
Depth to Base of Borehole:	3.00 m bgl
Depth to Base of Casing:	1.00 m bgl
Depth to equilibrium water level:	1.90 m btoc
Test Length L:	2.00 m
Diameter of Test Length D:	0.10 m
Area of Test Section:	0.0079 m ²
Intake Factor F:	3.4060
(after condition D, figure 6, BS 5930)	

PERMEABILITY (after Hvorslev, 1951)**Basic Time Lag Analysis**The value T when $H_t/H_o = 0.37$ is the basic time lag, T

T =

k = ms-1

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	0.000	1.900	1.000
0.2	0.010	1.890	0.995
0.3	0.010	1.890	0.995
1.0	0.040	1.860	0.979
1.5	0.080	1.820	0.958
2.0	0.110	1.790	0.942
3.0	0.130	1.770	0.932
4.0	0.140	1.760	0.926
5.0	0.150	1.750	0.921
8.0	0.170	1.730	0.911
10.0	0.190	1.710	0.900
15.0	0.220	1.680	0.884
20.0	0.230	1.670	0.879
25.0	0.270	1.630	0.858
30.0	0.300	1.600	0.842
35.0	0.330	1.570	0.826
40.0	0.360	1.540	0.811
50.0	0.420	1.480	0.779
60.0	0.460	1.440	0.758
90.0	0.560	1.340	0.705
120.0	0.600	1.300	0.684
150.0	0.620	1.280	0.674
180.0	0.650	1.250	0.658
210.0	0.670	1.230	0.647

**Remarks****Key:** bgl = Below Ground Level btoc = Below Top of Casing



In Situ Permeability Type Falling Head	Test No. 1	Ground Level (mOD)	Client Gladman Developments Ltd	Job Number LKC 16 1109
	Location	Dates 03-Nov-16	Engineer LKC	Sheet 2/7

Height of casing above ground level:	0.00 m
Depth to Base of Borehole:	3.00 m bgl
Depth to Base of Casing:	1.00 m bgl
Depth to equilibrium water level:	2.56 m btoc
Test Length L:	2.00 m
Diameter of Test Length D:	0.10 m
Area of Test Section:	0.0079 m ²
Intake Factor F: (after condition D, figure 6, BS 5930)	3.4060

PERMEABILITY (after Hvorslev, 1951)

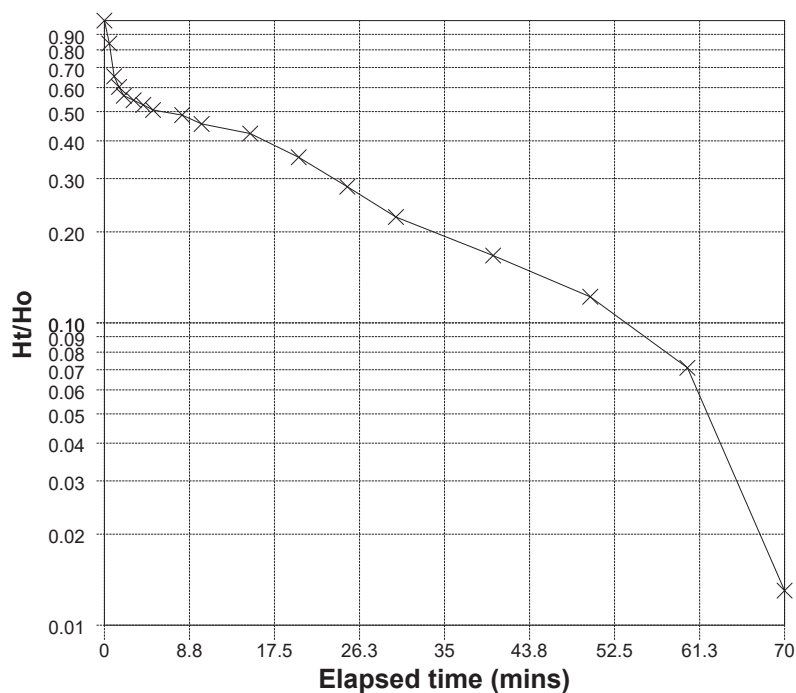
Basic Time Lag Analysis

The value T when $H_t/H_o = 0.37$ is the basic time lag, T

T = 18.79

k = 2.05E-06 ms⁻¹

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	1.000	1.560	1.000
0.5	1.250	1.310	0.840
1.0	1.540	1.020	0.654
1.5	1.620	0.940	0.603
2.0	1.680	0.880	0.564
3.0	1.710	0.850	0.545
4.0	1.740	0.820	0.526
5.0	1.770	0.790	0.506
8.0	1.800	0.760	0.487
10.0	1.850	0.710	0.455
15.0	1.900	0.660	0.423
20.0	2.010	0.550	0.353
25.0	2.120	0.440	0.282
30.0	2.210	0.350	0.224
40.0	2.300	0.260	0.167
50.0	2.370	0.190	0.122
60.0	2.450	0.110	0.071
70.0	2.580	-0.020	0.013



Remarks

Key: bgl = Below Ground Level btoc = Below Top of Casing

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

**Borehole
Number****WS102****In Situ Permeability Type**

Falling Head

Test No.

2

Ground Level (mOD)**Client**

Gladman Developments Ltd

**Job
Number**

LKC 16 1109

Location**Dates**

03-Nov-16

Engineer

LKC

Sheet

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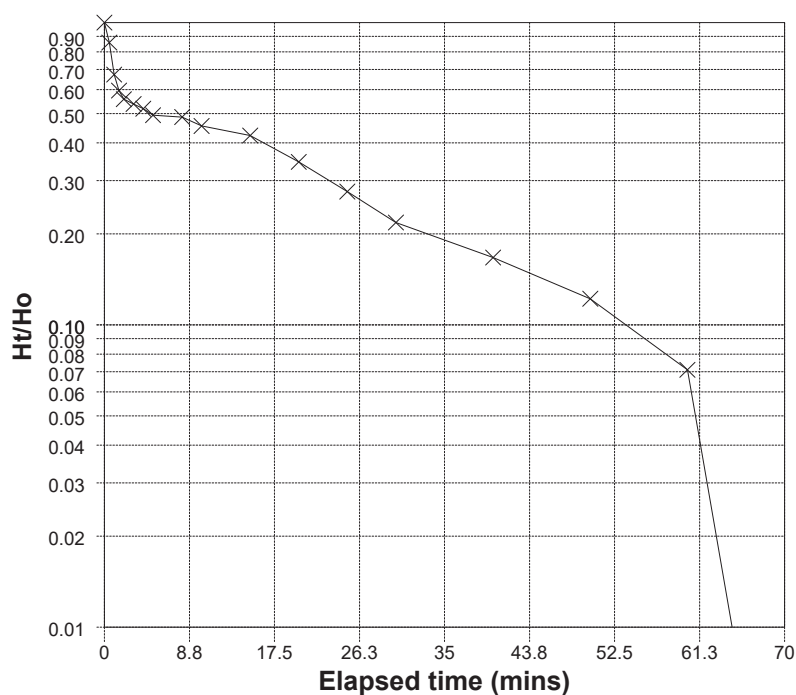
Height of casing above ground level:	0.00 m
Depth to Base of Borehole:	3.00 m bgl
Depth to Base of Casing:	1.00 m bgl
Depth to equilibrium water level:	2.56 m btoc
Test Length L:	2.00 m
Diameter of Test Length D:	0.10 m
Area of Test Section:	0.0079 m ²
Intake Factor F:	3.4060
(after condition D, figure 6, BS 5930)	

PERMEABILITY (after Hvorslev, 1951)**Basic Time Lag Analysis**The value T when $H_t/H_o = 0.37$ is the basic time lag, T

T = 18.44

k = 2.08E-06 ms⁻¹

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	1.000	1.560	1.000
0.5	1.220	1.340	0.859
1.0	1.510	1.050	0.673
1.5	1.630	0.930	0.596
2.0	1.690	0.870	0.558
3.0	1.720	0.840	0.538
4.0	1.750	0.810	0.519
5.0	1.790	0.770	0.494
8.0	1.800	0.760	0.487
10.0	1.850	0.710	0.455
15.0	1.900	0.660	0.423
20.0	2.020	0.540	0.346
25.0	2.130	0.430	0.276
30.0	2.220	0.340	0.218
40.0	2.300	0.260	0.167
50.0	2.370	0.190	0.122
60.0	2.450	0.110	0.071
70.0	2.560	0.000	0.000

**Remarks****Key:** bgl = Below Ground Level btoc = Below Top of Casing

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

Borehole**Number****WS102****In Situ Permeability Type**

Falling Head

Test No.

3

Ground Level (mOD)**Client**

Gladman Developments Ltd

Job**Number**

LKC 16 1109

Location**Dates**

03-Nov-16

Engineer

LKC

Sheet

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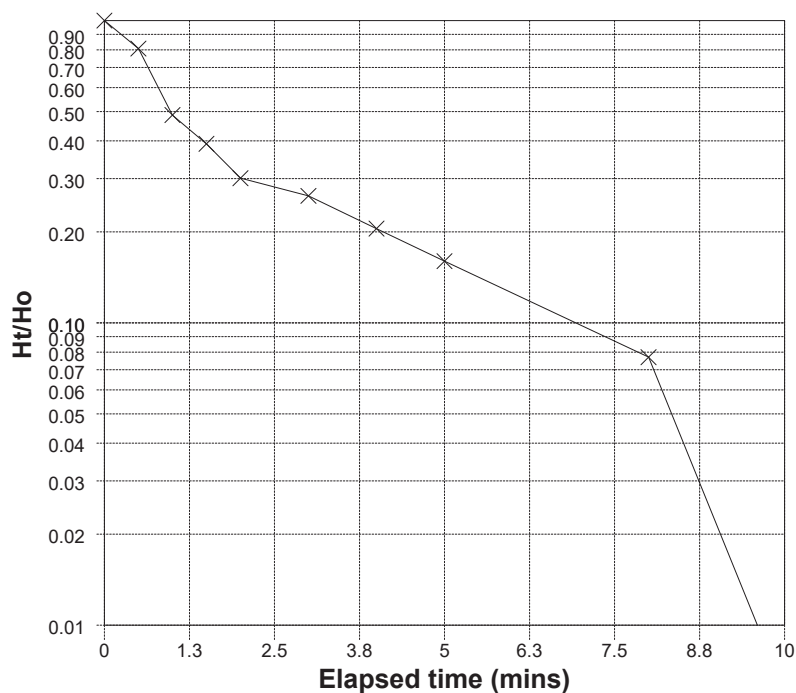
Height of casing above ground level:	0.00 m
Depth to Base of Borehole:	3.00 m bgl
Depth to Base of Casing:	1.00 m bgl
Depth to equilibrium water level:	2.56 m btoc
Test Length L:	2.00 m
Diameter of Test Length D:	0.10 m
Area of Test Section:	0.0079 m ²
Intake Factor F:	3.4060
(after condition D, figure 6, BS 5930)	

PERMEABILITY (after Hvorslev, 1951)**Basic Time Lag Analysis**The value T when $H_t/H_o = 0.37$ is the basic time lag, T

T = 1.62

k = 2.38E-05 ms⁻¹

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	1.000	1.560	1.000
0.5	1.300	1.260	0.808
1.0	1.800	0.760	0.487
1.5	1.950	0.610	0.391
2.0	2.090	0.470	0.301
3.0	2.150	0.410	0.263
4.0	2.240	0.320	0.205
5.0	2.310	0.250	0.160
8.0	2.440	0.120	0.077
10.0	2.550	0.010	0.006

**Remarks****Key:** bgl = Below Ground Level btoc = Below Top of Casing

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

**Borehole
Number****WS103****In Situ Permeability Type**

Falling Head

Test No.

1

Ground Level (mOD)**Client**

Gladman Developments Ltd

**Job
Number**

LKC 16 1109

Location**Dates**

03-Nov-16

Engineer

LKC

Sheet

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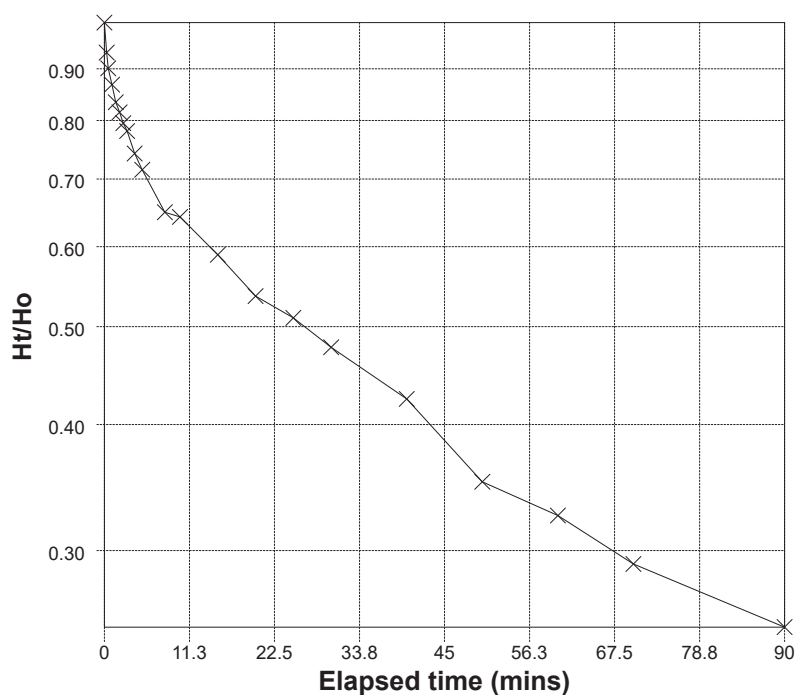
Height of casing above ground level:	0.00 m
Depth to Base of Borehole:	1.51 m bgl
Depth to Base of Casing:	1.00 m bgl
Depth to equilibrium water level:	1.51 m btoc
Test Length L:	0.51 m
Diameter of Test Length D:	0.10 m
Area of Test Section:	0.0079 m ²
Intake Factor F:	0.2750
(after condition B, figure 6, BS 5930)	

PERMEABILITY (after Hvorslev, 1951)**Basic Time Lag Analysis**The value T when $H_t/H_o = 0.37$ is the basic time lag, T

T = 47.40

k = 1.00E-05 ms⁻¹

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	0.000	1.510	1.000
0.3	0.100	1.410	0.934
0.5	0.150	1.360	0.901
1.0	0.200	1.310	0.868
1.5	0.250	1.260	0.834
2.0	0.280	1.230	0.815
2.5	0.310	1.200	0.795
3.0	0.330	1.180	0.781
4.0	0.390	1.120	0.742
5.0	0.430	1.080	0.715
8.0	0.530	0.980	0.649
10.0	0.540	0.970	0.642
15.0	0.620	0.890	0.589
20.0	0.700	0.810	0.536
25.0	0.740	0.770	0.510
30.0	0.790	0.720	0.477
40.0	0.870	0.640	0.424
50.0	0.980	0.530	0.351
60.0	1.020	0.490	0.325
70.0	1.070	0.440	0.291
90.0	1.130	0.380	0.252

**Remarks****Key:** bgl = Below Ground Level btoc = Below Top of Casing

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

Borehole**Number****WS103****In Situ Permeability Type**

Falling Head

Test No.

2

Ground Level (mOD)**Client**

Gladman Developments Ltd

Job**Number**

LKC 16 1109

Location**Dates**

03-Nov-16

Engineer

LKC

Sheet

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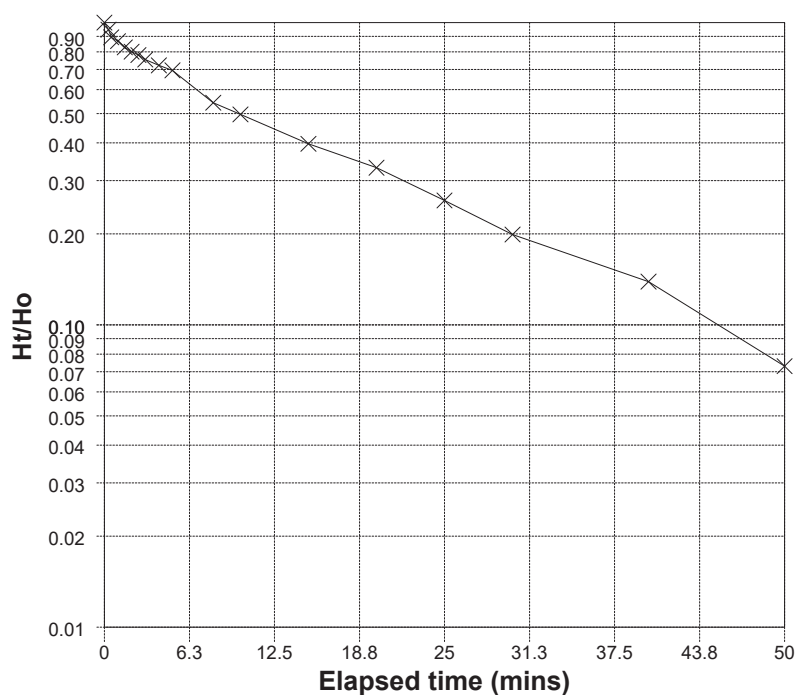
Height of casing above ground level:	0.00 m
Depth to Base of Borehole:	1.51 m bgl
Depth to Base of Casing:	1.00 m bgl
Depth to equilibrium water level:	1.51 m btoc
Test Length L:	0.51 m
Diameter of Test Length D:	0.10 m
Area of Test Section:	0.0079 m ²
Intake Factor F:	0.2750
(after condition B, figure 6, BS 5930)	

PERMEABILITY (after Hvorslev, 1951)**Basic Time Lag Analysis**The value T when $H_t/H_o = 0.37$ is the basic time lag, T

T = 17.05

k = 2.79E-05 ms⁻¹

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	0.000	1.510	1.000
0.3	0.080	1.430	0.947
0.5	0.160	1.350	0.894
1.0	0.200	1.310	0.868
1.5	0.260	1.250	0.828
2.0	0.300	1.210	0.801
2.5	0.330	1.180	0.781
3.0	0.370	1.140	0.755
4.0	0.420	1.090	0.722
5.0	0.460	1.050	0.695
8.0	0.690	0.820	0.543
10.0	0.760	0.750	0.497
15.0	0.910	0.600	0.397
20.0	1.010	0.500	0.331
25.0	1.120	0.390	0.258
30.0	1.210	0.300	0.199
40.0	1.300	0.210	0.139
50.0	1.400	0.110	0.073

**Remarks****Key:** bgl = Below Ground Level btoc = Below Top of Casing



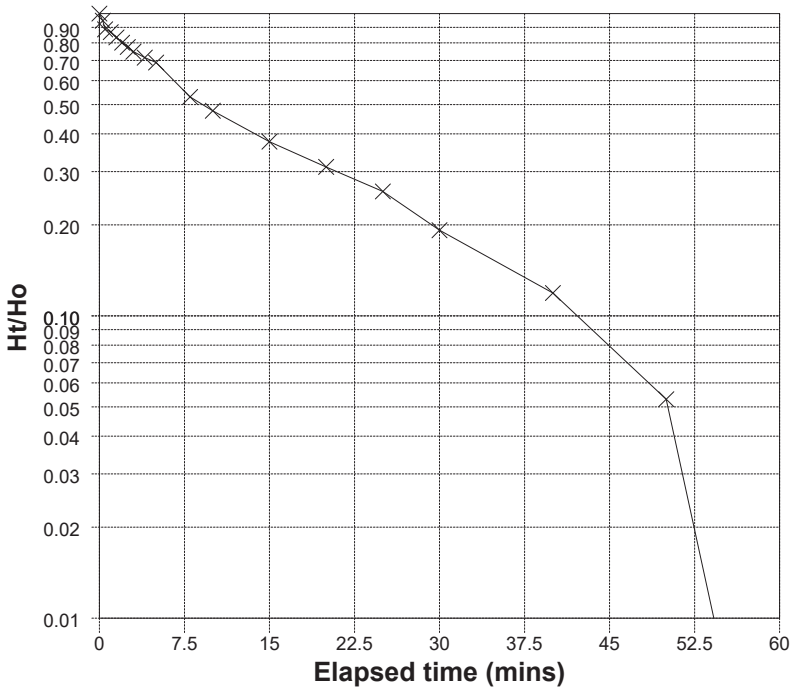
LK CONSULT LTD
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site St Marys Road, Hayling Island		Borehole Number WS103
In Situ Permeability Type Falling Head	Test No. 3	Ground Level (mOD)
	Location	Dates 03-Nov-16
		Client Gladman Developments Ltd
		Engineer LKC
		Job Number LKC 16 1109
		Sheet 7/7

Height of casing above ground level:	0.00 m
Depth to Base of Borehole:	1.51 m bgl
Depth to Base of Casing:	1.00 m bgl
Depth to equilibrium water level:	1.51 m btoc
Test Length L:	0.51 m
Diameter of Test Length D:	0.10 m
Area of Test Section:	0.0079 m ²
Intake Factor F: (after condition B, figure 6, BS 5930)	0.2750

PERMEABILITY (after Hvorslev, 1951)	
Basic Time Lag Analysis	
The value T when $H_t/H_o = 0.37$ is the basic time lag, T	
T =	15.53
k =	3.06E-05 ms ⁻¹

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	0.000	1.510	1.000
0.3	0.080	1.430	0.947
0.5	0.170	1.340	0.887
1.0	0.200	1.310	0.868
1.5	0.250	1.260	0.834
2.0	0.300	1.210	0.801
2.5	0.340	1.170	0.775
3.0	0.380	1.130	0.748
4.0	0.430	1.080	0.715
5.0	0.470	1.040	0.689
8.0	0.710	0.800	0.530
10.0	0.790	0.720	0.477
15.0	0.940	0.570	0.377
20.0	1.040	0.470	0.311
25.0	1.120	0.390	0.258
30.0	1.220	0.290	0.192
40.0	1.330	0.180	0.119
50.0	1.430	0.080	0.053
60.0	1.510	0.000	0.000



Remarks

Key: bgl = Below Ground Level btoc = Below Top of Casing

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

Number
WS101**Excavation Method**

Drive-in Windowless Sampler

Dimensions**Ground Level (mOD)****Client**

Gladman Developments Ltd

Job Number
LKC 16 1109**Location****Dates**

03-11-2016

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Dark brown to light brown mottled grey / brown silty CLAY with rare gravel of flint.		
					(2.70)			
					2.70			
					(0.30)	Wet brown sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, of flint.		
					3.00	Complete at 3.00m		

Water strike(1) at 2.70m, rose to 1.90m in 10 mins.

Remarks**Scale (approx)**

1:25

Logged By

BS

Figure No.

LKC 16 1109.WS101

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

Number
WS102**Excavation Method**

Drive-in Windowless Sampler

Dimensions**Ground Level (mOD)****Client**

Gladman Developments Ltd

Job
Number
LKC 16 1109**Location****Dates**

03-11-2016

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Dark brown slightly gravelly silty CLAY. Gravel is fine to medium, angular, of flint.		
					0.50	Brown slightly clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded, of flint.		
					(1.70)			
					2.20	Brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded, of flint.		
			Water strike(1) at 2.56m.		(0.80)			▽1
					3.00	Complete at 3.00m		

Remarks**Scale**
(approx)

1:25

Logged
By

BS

Figure No.

LKC 16 1109.WS102

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

St Marys Road, Hayling Island

Number
WS103**Excavation Method**

Drive-in Windowless Sampler

Dimensions**Ground Level (mOD)****Client**

Gladman Developments Ltd

Job Number
LKC 16 1109**Location****Dates**

03-11-2016

Engineer

LKC

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.00)	Brown silty CLAY with occasional fine to medium, angular, gravel of chalk.		
					1.00 (0.20) 1.20	Very dense brown slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, of flint and chalk in a clay matrix.		
					(1.50)	Brown SAND and GRAVEL with occasional bands of very stiff gravelly clay. Sand is fine to medium. Gravel is fine to medium, angular, of flint.		
					2.70 2.75 (0.25) 3.00	Slightly damp SAND. Sand is fine to medium.		
						Stiff silty CLAY.		
						Complete at 3.00m		

RemarksNo groundwater encountered.
Sampler refused at 3mbgl on very dense gravel.**Scale (approx)**

1:25

Logged By

BS

Figure No.

LKC 16 1109.WS103

LANES GROUP

ENZYGO LTD

31 May 2018

A large, stylized graphic of the Lanes Group Plc logo, consisting of two overlapping magenta circles. The text "Lanes Group Plc" is centered within the white space of the overlapping circles.

Lanes
Group Plc

Lanes Group plc - CCTV Report - Defect Grade Summary

The defect codes and observations used in this report are colour coded and fall into four main categories. Please refer to the descriptions below:

Structural Observations/Defects:

These codes/observations relate to the structural integrity of the drain or sewer and include defects such as cracks, fractures, moderate joint defects, holes, breaks and surface wear.

) Grade 3: Best practice suggests a medium term repair schedule is planned due to possible deterioration.

) Grade 4: Best practice suggests a repair schedule is planned in the short term to avoid potential collapse or increased damage.

) Grade 5: Best practice suggests an immediate repair schedule as the risk of collapse or further structural damage is very high.

Service Observations/Defects:

These codes/observations relate to the hydraulic efficiency of the drain or sewer, its capability to meet its service requirements, loss of capacity, potential for blockage/s and water tightness.

) Grade 3: Best practice suggests a medium term maintenance schedule is planned.

) Grade 4: Best practice suggests a repair schedule is planned in the short term to avoid potential blockages and/or flooding.

) Grade 5: Best practice suggests an immediate maintenance schedule is implemented as the risk of blockages and/or flooding is very high.

Miscellaneous Observations/Defects

These codes/observations relate to general items concerning the drain or sewer and cover changes to size, shape and materials, general remarks and photographs, vermin and abandoned surveys. These items should be considered individually by referring to the remarks presented in the section reports.

Construction Observations/Defects

These codes/observations relate to the general construction of the drain or sewer and covers connections/junctions, Lining and sealing defects, Node points and point repairs. These items should be considered individually by referring to the remarks presented in the section reports.

Thank you for choosing Lanes Group plc

CCTV reports overview

Profile Report	1
SRMReport : sNameSRMEReport	2
Inspection: 1	
Project Information	3
Section: 1, DITCH2 --- MH2	4
Section: 2, U/S --- MH1	7

/ Main sections / Inspection: 1

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Nr.	Upstream MH:	Downstream MH:	Date:	Road Name:	Diameter:	Material:	m	(m)
2	U/S	MH1	30/05/2018	ST MARYS ROAD	150 mm	Clay pipe	31.66	31.66

Pipe size: CIRCULAR 150/0 = 31.66 m (31.66 m)

Nr.	Upstream MH:	Downstream MH:	Date:	Road Name:	Diameter:	Material:	m	(m)
1	DITCH2	MH2	25/05/2018	ST MARYS ROAD	300 mm	Clay pipe	45.59	45.59

Pipe size: CIRCULAR 300/0 = 45.59 m (45.59 m)

All sections = 77.25 m (77.25 m)

Service / Operational Defects (SRM 4) / Inspection: 1

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No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Peak Score	Grade	Mean Score	Total Score
1	DITCH2X	U	STOR	CIRCULAR 300/0	25/05/2018	CLAY	45.59	45.59	3	5	4	0.44	20
2	U/SX	U	STOR	CIRCULAR 150/0	30/05/2018	PIPE	31.66	31.66	3	5	4	0.41	13

Project Information Overview: / Inspection: 1

Client: **ENZYGO LTD**
Contact Name:
Department: **SAMUEL HOUSE**
Road: **5 FOX VALLEY WAY**
Town: **SHEFFIELD**
County:
Telephone:
Fax:
Mobile:
E-mail:

Site: **ENZYGO LTD**
Contact Name:
Department: **ROOK FARM**
Road: **ST MARYS ROAD**
Town: **HAYLING ISLAND**
County: **HANTS**
Telephone:
Fax:
Mobile:
E-mail:

Contractor **LANES GROUP**
Contact Name: **MATT GRIFFITH**
Department:
Road: **PARNHAM DRIVE**
Town: **EASTLEIGH**
County: **HAMPSHIRE**
Telephone: **02380625750**
Fax:
Mobile:
E-mail: **matt.griffith@lanesgroup.co.uk**

Lanes Group - Drainage CCTV Inspection report / Inspection: 1

Date of survey: 25/05/2018	Lanes Job number: PJ298077	Method of Inspection: CCTV	CCTV Operator: M HOUSE	Weather: Dry	Section Number: 1
Main ground type: Grass	Vehicle: PK 63 KFX	Camera: Crawler	Preset: 0.4m	Cover location: Grass	Total Length (m): 45.59 m

Street/Road: ST MARYS ROAD	Flow Control: No flow control	U/S MH: DITCH2
Town/City: HAYLING ISLAND	Pre-Cleaned: Yes	U/S Depth(m): .
Postcode: PO11 9DF	Owner: Private	D/S MH : MH2
Location: Grass verge	Direction: MH2 (U/S) DITCH2	D/S Depth(m): 1.14

Asset Use: Storm	Asset Dia (mm): 300 mm
Asset type: Culvert	Asset width (mm): 0 mm
Purpose: Standard investigation	Asset shape: Circular
Asset Lining: No Lining	Asset material: Clay pipe

Comments: .

1:360	Position	Code	Observations and Remarks	Grade					
Depth: 1.14									
	0.00	WL	Water level, 5% of the vertical dimension	(Serv) 0					
	0.00	MH	Start node type, manhole, reference number : MH2	(Constr) 0	0.12 m				
	0.12	MC	Material changes, concrete	(Misc) 0					
	0.37	REM	General remark Remarks: CHANGE DIAMETER 225	(Misc) 0	0.37 m				
	0.59	RT	Roots, tap	(Serv) 4					
	1.95	RT	Roots, tap	(Serv) 4	0.59 m				
	2.77	RT	Roots, tap	(Serv) 4					
	7.96	RT	Roots, tap	(Serv) 4	1.95 m				
	40.88	H	Hole in drain/sewer, from 5 to 6 o'clock	(Struct) 4					
	45.59	MHF	Finish node type, manhole reference number: DITCH2	(Constr) 0					
Depth: .					2.77 m				
Structural Defects			Constructional Features						
Service Defects			Miscellaneous Features						
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
1	80	1.75	80	4	4	5	0.44	20	4

Observation Inspection Photographs: / Inspection: 1

City: HAYLING ISLAND	Road Name: ST MARYS ROAD	Date : 25/05/2018	Section number : 1	Asset Size(mm): 300 mm
-------------------------	-----------------------------	----------------------	-----------------------	---------------------------



Photo: 1_1_4_A.JPG
0.12m, Material changes, concrete



Photo: 1_1_7_A.JPG
0.37m, General remark



Photo: 1_1_8_A.JPG
0.59m, Roots, tap



Photo: 1_1_9_A.JPG
1.95m, Roots, tap

Observation Inspection Photographs: / Inspection: 1

City: HAYLING ISLAND	Road Name: ST MARYS ROAD	Date : 25/05/2018	Section number : 1	Asset Size(mm): 300 mm
--------------------------------	------------------------------------	-----------------------------	------------------------------	----------------------------------



Photo: 1_1_10_A.JPG
2.77m, Roots, tap



Photo: 1_1_11_A.JPG
7.96m, Roots, tap



Photo: 1_1_12_A.JPG
40.88m, Hole in drain/sewer, from 5 to 6 o'clock

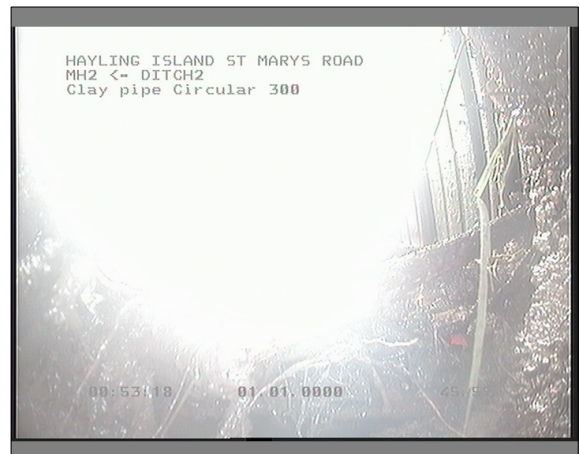


Photo: 1_1_13_A.JPG
45.59m, Finish node type, manhole reference number: DITCH2

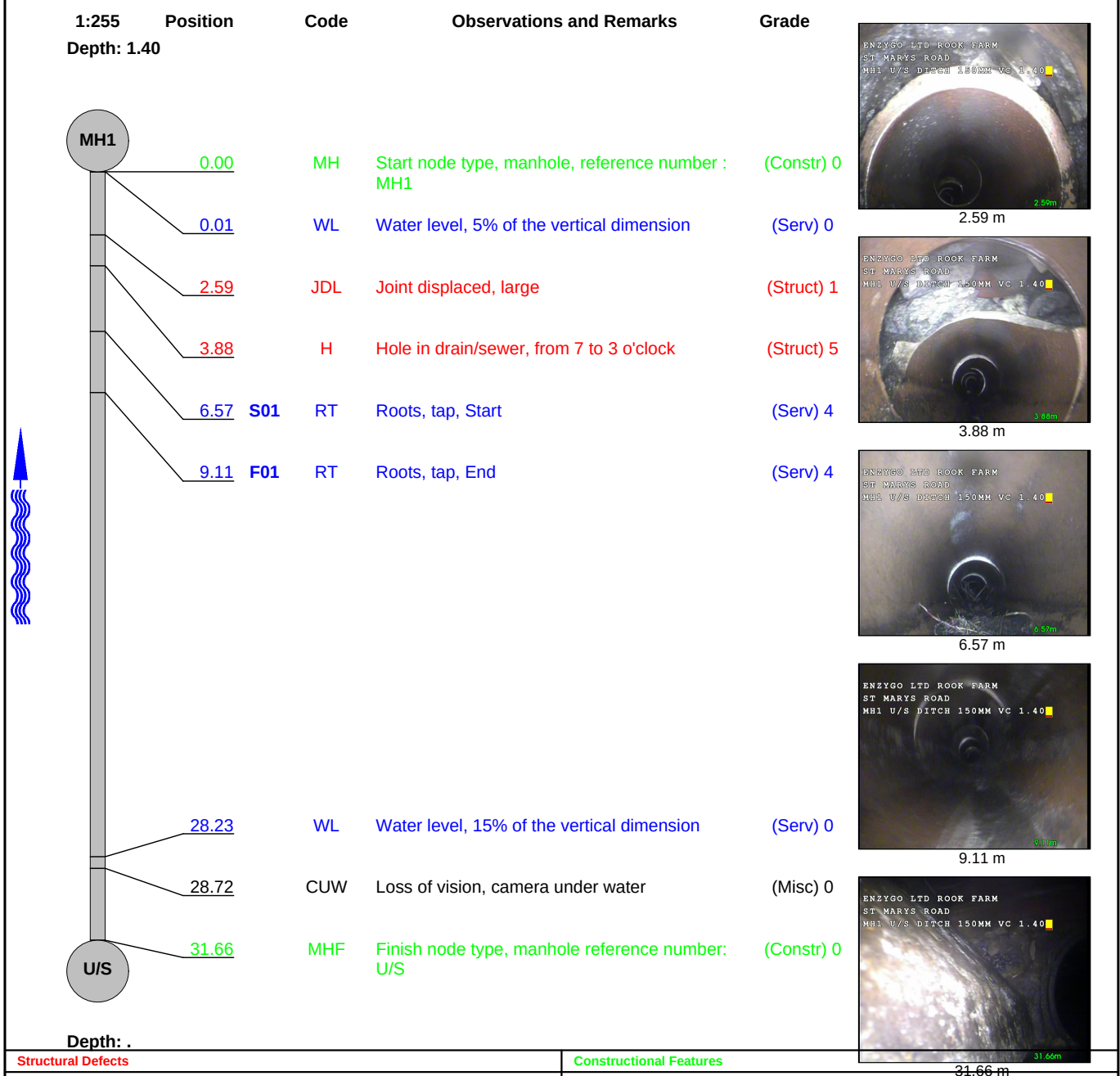
Lanes Group - Drainage CCTV Inspection report / Inspection: 1

Date of survey: 30/05/2018	Lanes Job number: PJ298077	Method of Inspection: CCTV	CCTV Operator: M HOUSE	Weather: Dry	Section Number: 2
Main ground type: Grass	Vehicle: PK 63 KFX	Camera: EX Pushrod	Preset: 0.4m	Cover location: Grass	Total Length (m): 31.66 m

Street/Road: ST MARYS ROAD	Flow Control: No flow control	U/S MH: U/S
Town/City: HAYLING ISLAND	Pre-Cleaned: Yes	U/S Depth(m): .
Postcode: PO11 9DF	Owner: Private	D/S MH : MH1
Location: Grass verge	Direction: MH1 (U/S) U/S	D/S Depth(m): 1.40

Asset Use: Storm	Asset Dia (mm): 150 mm
Asset type: Culvert	Asset width (mm): 0 mm
Purpose: Standard investigation	Asset shape: Circular
Asset Lining: No Lining	Asset material: Clay pipe

Comments: .



Structural Defects					Constructional Features				
Service Defects					Miscellaneous Features				
STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
1	165	5.21	165	5	1	5	0.41	13	4

Observation Inspection Photographs: / Inspection: 1

City: HAYLING ISLAND	Road Name: ST MARYS ROAD	Date : 30/05/2018	Section number : 2	Asset Size(mm): 150 mm
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Photo: 3_3_16_A.jpg
2.59m, Joint displaced, large

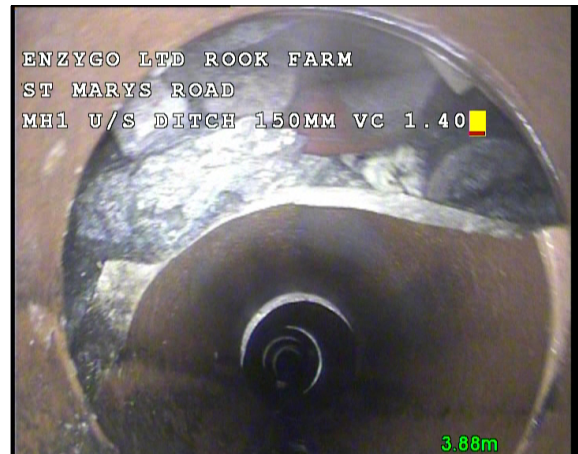


Photo: 3_3_17_A.jpg
3.88m, Hole in drain/ sewer, from 7 to 3 o'clock



Photo: 3_3_18_A.jpg
6.57m, Roots, tap, Start

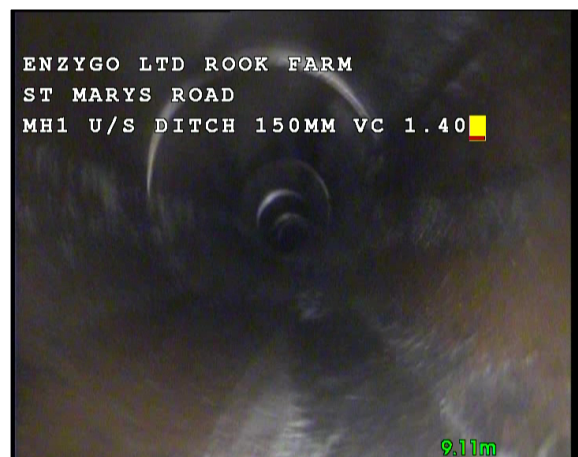


Photo: 3_3_19_A.jpg
9.11m, Roots, tap, End

Observation Inspection Photographs: / Inspection: 1

City: HAYLING ISLAND	Road Name: ST MARYS ROAD	Date : 30/05/2018	Section number : 2	Asset Size(mm): 150 mm
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Photo: 3_3_22_A.jpg
31.66m, Finish node type, manhole reference number: U/S

Appendix 8 – Drainage Calculations

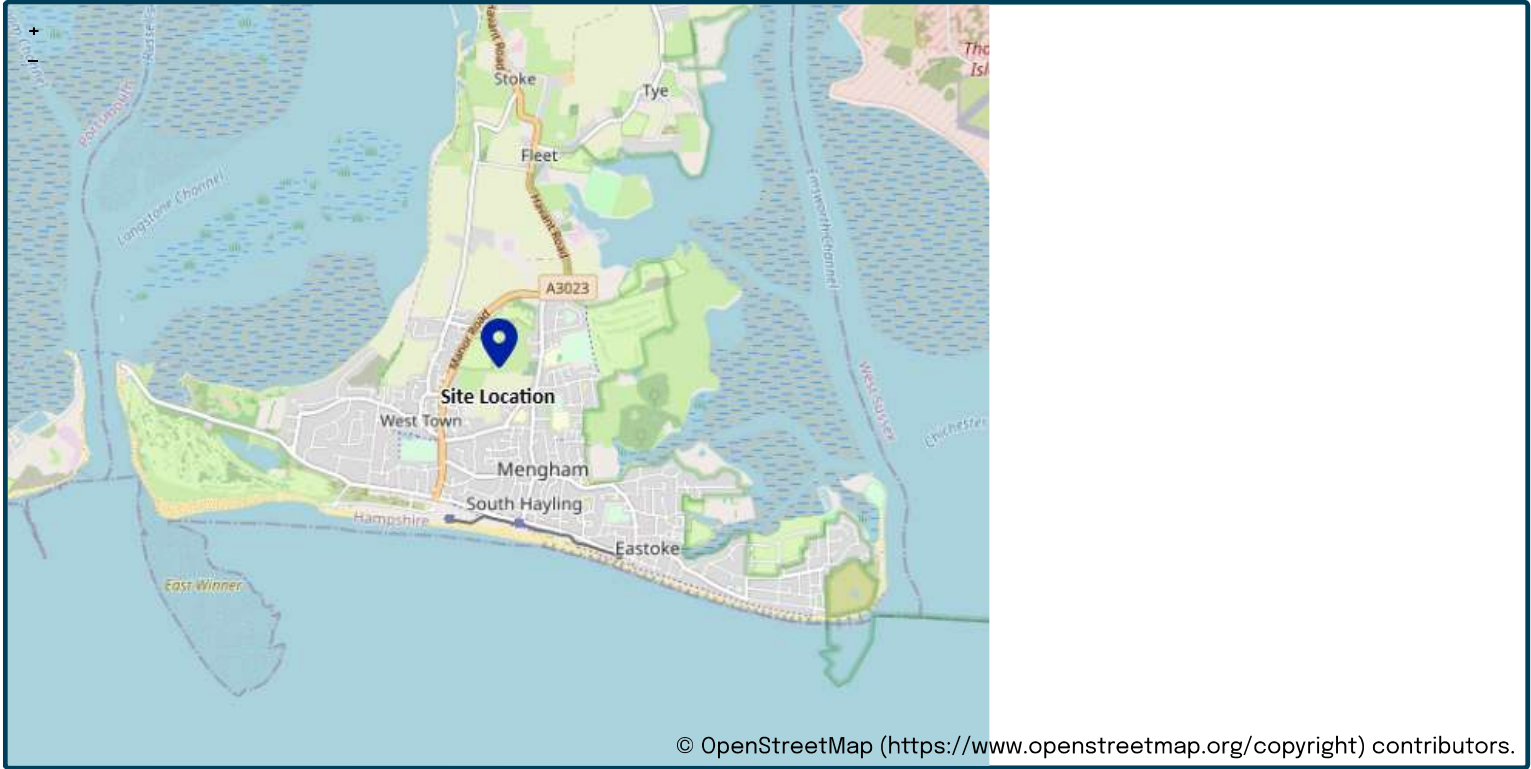
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	19/06/2025
Calculated by	Dani Lister
Reference	SHF.1132.142
Model version	2.0.1

Location

Site name	Rook Farm
Site location	Hayling Island



Site easting	471911
Site northing	99854

Site details

Total site area (ha)	7.53	ha
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Greenfield runoff

Method

Method	FEH statistical
--------	-----------------

FEH statistical

	<u>My value</u>		<u>Map value</u>
SAAR (mm)	690	mm	686
BFIHOST	0.682		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	11	l/s	
QBar (FEH statistical) (l/s)	12.5	l/s	

Growth curve factors

	<u>My value</u>		<u>Map value</u>
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	10.6	l/s
Flow rate 2 year (l/s)	11	l/s
Flow rate 10 years (l/s)	20.2	l/s
Flow rate 30 years (l/s)	28.6	l/s
Flow rate 100 years (l/s)	39.7	l/s
Flow rate 200 years (l/s)	46.6	l/s

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.0.1) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>).

The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Depth (m)
Pond	2.130	5.00	0.0	2.000	1800	2.000

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160 | 2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node Pond Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	0.000	Product Number	CTL-SHE-0113-6600-1500-6600
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.6	Min Node Diameter (mm)	1200

Node Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	0.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	796.0	0.0	1.500	1429.0	0.0	1.800	1557.0	0.0	1.801	0.0	0.0



Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Pond	1410	1.469	1.469	61.6	1659.8110	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Pond	Hydro-Brake®	6.6	557.5

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Depth (m)
Pond	2.140	5.00	0.0	2.000	1800	2.000

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160 | 2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node Pond Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	0.000	Product Number	CTL-SHE-0113-6600-1500-6600
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.6	Min Node Diameter (mm)	1200

Node Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	0.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	768.0	0.0	1.500	1442.0	0.0
			1.800	1592.0	0.0
			1.801	0.0	0.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Pond	1410	1.482	1.482	61.9	1666.7780	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Pond	Hydro-Brake®	6.6	560.5



Enzygo specialise in a wide range of technical services:

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Traffic and Transportation

Planning Services

BRISTOL

The Byre
Woodend Lane
Cromhall
Gloucestershire
GL12 8AA
Tel: 01454 269 237

SHEFFIELD

Samuel House
5 Fox Valley Way
Stocksbridge
Sheffield S36 2AA
Tel: 0114 321 5151

MANCHESTER

Ducie House
Ducie Street
Manchester
M1 2JW
Tel: 0161 413 6444

CARDIFF

Regus House
Malthouse Avenue
Cardiff Gate Business Park
CF23 8RU
Tel: 02920 023 700

Please visit our website for more information.

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