CD6.1

enzygo
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NPPF: Flood Risk Assessment & Outline Drainage Strategy

Halterworth Lane, Romsey

Gladman Developments Ltd

SHF.1132.258.HY.R.001.D

'Experience and expertise working in union'

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Halterworth Lane, Romsey

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Executive Summary

This report presents a Flood Risk Assessment in accordance with the National Planning Policy Framework and National Planning Practice Guidance: Flood Risk and Coastal Change ID: 7 guidance, for a proposed residential development located on land east of Halterworth Lane, Romsey, Hampshire.

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

Flood risk from identified sources can be mitigated to a negligible level through the following approach:

- No below surface habitable buildings (i.e. basements).
- Set finished floor levels above external levels.
- Adoption of a surface water management strategy.
- Provide a development free easement along onsite public foul water sewer assets, or re-direct around the Site boundary.

Flooding Source	Potential Source	Probability and Consequence / Impact Without Mitigation	Consequence & Impact with Mitigation
Fluvial	Tadburn Lake	Negligible	Negligible
Tidal	None identified	Negligible	Negligible
Groundwater	Secondary A Aquifer	Low below ground but Negligible above ground	Negligible
Surface Water	Site Topography	Negligible for most of the Site but Low where there is surface water ponding	Negligible
Sewers and Mains	Public Sewers	Negligible for most of the Site but Low along overland flow pathways	Negligible
Infrastructure Failure	None identified	Negligible	Negligible

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). Given that the proposed residential uses are solely located in Flood Zone 1, the Sequential Test Is not required (which is in accordance with the recent Court of Appeal judgement [Case No: C-2023-000087, dated 17th January 2024] – Appendix 8). Other potential sources of flooding have been considered and found to be negligible or low and can be managed using the above mitigation measures.

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 (25.7l/s [QBAR]) and appropriately sized detention basins, with an outfall to the nearby public surface water sewer, as agreed with Southern Water. The northern parcel will

discharge to the surface water sewer along Jenner Way and the southern parcel will discharge to the surface water sewer along Benedict Close.

It is proposed that foul flows will discharge to Halterworth Lane via a pumped connection.

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

1.0 Introduction

1.1 Background

1.1.1 Enzygo Ltd was commissioned by 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 application for a proposed residential development. The Site is located on land east of Halterworth Lane, Romsey, Hampshire (the 'Site').

1.1.2 The proposal is for demolition of existing buildings and the erection of up to 270 dwellings, including affordable housing, with land for the potential future expansion of Halterworth Primary School, public open space, structural planting and landscaping, sustainable drainage system (SuDS) and vehicular access points. All matters reserved except for means of access.

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

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

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

1.1.5 In England, planning applications for development need an FRA[1] 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.
- Land in Flood Zone 1 identified in a strategic flood risk assessment as being at increased flood risk in future.

1.1.6 An FRA is required for this development, as initial screening using Environment Agency 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] Department for Environment, Food & Rural Affairs and Environment Agency (published March 2014 and update February 2017). Flood Risk Assessments if You're Applying for Planning Permission [https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications].

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

1.2 Scope

1.2.1 Government policy on development and flood risk is set out in the National Planning Policy Framework (NPPF) [2] and is supported by National Planning Practice Guidance: Flood Risk and Coastal Change [NPPG ID7] [3].

1.2.2 NPPF paragraphs 158-179 set out the need for an appropriate assessment of flood risk at all levels of the planning process and require the application of a sequential risk-based approach to assess the suitability of land for development in flood risk areas.

1.2.3 The FRA should also make allowances for climate change [4] to minimise vulnerability and provide resilience to flooding and coastal change in the future. The allowances are predictions of anticipated change in:

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

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

1.2.5 Site-specific FRAs are categorised according to level. 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 mitigation measures. Level 3 assessments are more detailed quantitative studies, for example modelling to establish flood levels at a site in the absence of Environment Agency 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 and foul 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

[2] Ministry of Housing, Communities & Local Government (published March 2012 and updated December 2023). National Planning Policy Framework [https://www.gov.uk/government/publications/national-planning-policy-framework--2].
[3] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (published March 2014 and updated August 2022). Planning Practice Guidance ID7-030-20140306; Flood Risk & Coastal Change [https://www.gov.uk/guidance/flood-risk-and-coastal-change].
[4] 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].

elsewhere near the Site, and the proposed measures that could be incorporated into the development to mitigate the identified risks.

1.4 Planning Context

National Policy

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

Regional/Local Policy

1.4.2 The FRA considers the following policies within the Test Valley Borough Council Local Plan (2011 to 2029)[5]:

- Policy E7: Water Management – *Development will be permitted provided that it complies with national policy and guidance in relation to flood risk, and it does not risk the quality of groundwater.*

1.4.3 This FRA also considers the following flood risk and drainage guidance documents:

- Test Valley Borough Council Local Development Scheme (2022)[6].
- Test Valley Borough Council Strategic Flood Risk Assessment (SFRA) and associated mapping[7].

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 flood risk to the existing site and proposed development.
- Section 5 details the proposed mitigation measures against identified flooding sources.
- Section 6 assesses the surface water drainage requirements of the proposed development.
- Section 7 presents a summary and conclusions.

[5] https://www.testvalley.gov.uk/planning-and-building/planningpolicy/local-development-framework/dpd
[6] https://www.testvalley.gov.uk/planning-and-building/planningpolicy/lds
[7] https://www.testvalley.gov.uk/assets/attach/2619/tvbc-sfra-main-report.pdf

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).
- Environment Agency online mapping (Flood Map for Planning[8], Long Term Flood Risk Assessment for Locations in England[9], Catchment Data Explorer[10] and Main River Map[11]).
- Environment Agency Reduction in Risk of Flooding from Rivers and Sea online mapping[12].
- Online mapping for Climate Change Allowances for Peak River Flow and Peak Rainfall in England online mapping[13].
- National Soils Resources Institute (NSRI): Soilscapes online mapping[14].
- British Geological Survey [BGS] Geology Viewer online mapping[15].
- British Geological Survey [BGS] Borehole Records online mapping[16].
- Landmark's Promap: Flood Data package (see Drawings).
- Geosmart 1 in 100-year groundwater flood risk map (see Drawings).
- DEFRA's Magic Map for identifying Designated Sites[17].
- River Levels UK for identifying Flood Alert and Flood Warning areas[18].

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 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 Environment Agency Standing Advice[19] and the NPPF/PPG ID: 7 was consulted and reviewed.

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

2.2.4 Correspondence with the Environment Agency is included in Appendix 3.

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 Hampshire County Council online policies and guidance were consulted in order to inform this report. The surface water checklist and guidance were also checked.

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 2.

2.3 Site Walkover

2.3.1 Enzygo staff carried out a walkover of the Site during March 2021. 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 east of Halterworth Lane, Romsey, Hampshire, SO51 9AE.

3.1.2 The Site is centred on National Grid Reference (NGR) 437481, 121399.

3.1.3 The 12.8ha 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 two agricultural (grassed) land parcels (Figures 3.1 and 3.2), hereafter referred to as the 'northern parcel' and the 'southern parcel'.

3.2.2 The Site is bounded by residential dwellings and Halterworth Lane to the west; residential dwellings and Halterworth Primary School to the south; and agricultural land to the north and east.

3.2.3 Vehicle access is currently via a gate off Halterworth Lane along the north-west and south-west of the Site. A footpath is also oriented west to east through the northern extents.

Figure 3.1: Photographs of the Site

Left: View looking north from the southern boundary. Right: View looking north-west from the north.

Figure 3.2: Aerial Photograph of the Site

Image © 2024 Digital Globe.

3.3 Topographic Information

3.3.1 A detailed topographic survey was carried out during June 2021 and a copy is included in Appendix 1.

3.3.2 The Northern Parcel generally falls in a west/north-west direction from 39.98 metres Above Ordnance Datum (m AOD) in the south-west corner, to 36.57m AOD in the north-west corner. The fall of 3.41m over 290m gives a gradient of 1:85.

3.3.3 The Southern Parcel generally falls west/south-west from 39.78m AOD along the eastern boundary, to 38.12m AOD along the south-west boundary. The fall of 1.66m over 313m gives a gradient of 1:189.

Figure 3.3: Summary of Site Topography

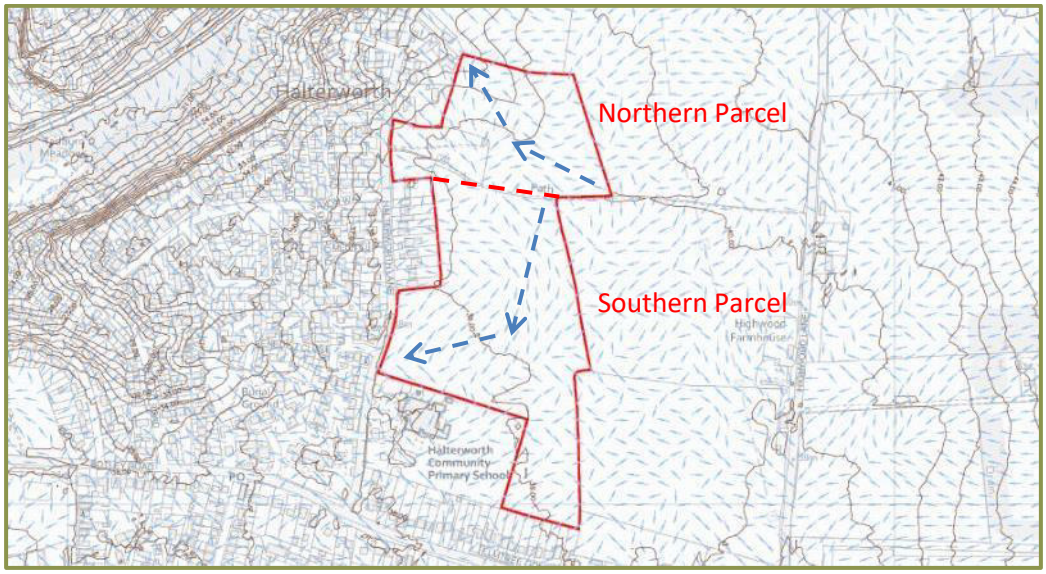


Table 3.1: Summary of Site Topography

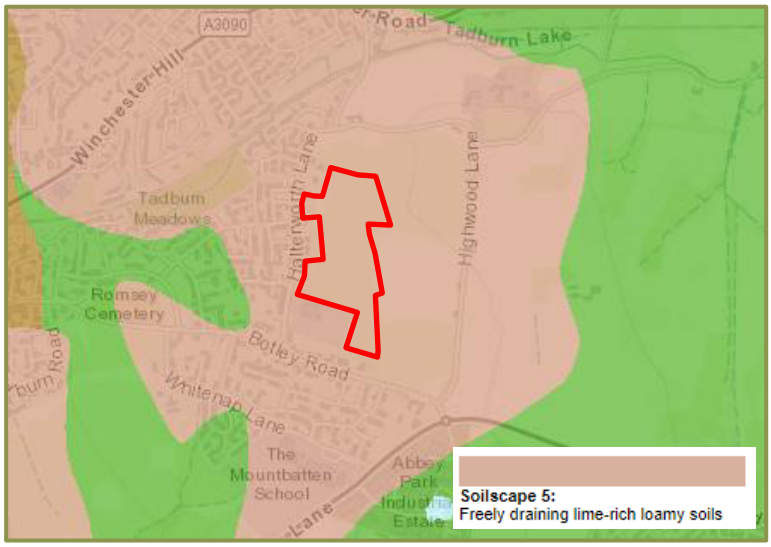
Land Parcel Reference	Direction of Fall	Maximum Elevation (m AOD)	Minimum Elevation (m AOD)	Distance (m)	Average Gradient Across Land Parcel
Northern	West/north-west	39.98	36.57	290	1:85
Southern	South/south-west	39.78	38.12	313	1:189

3.4 Soils and Geology

Soils Mapping

3.4.1 The online NSRI Soilscapes mapping (Figure 3.4) shows the Site is underlain by freely draining loamy soils.

Figure 3.4: Soils Mapping



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

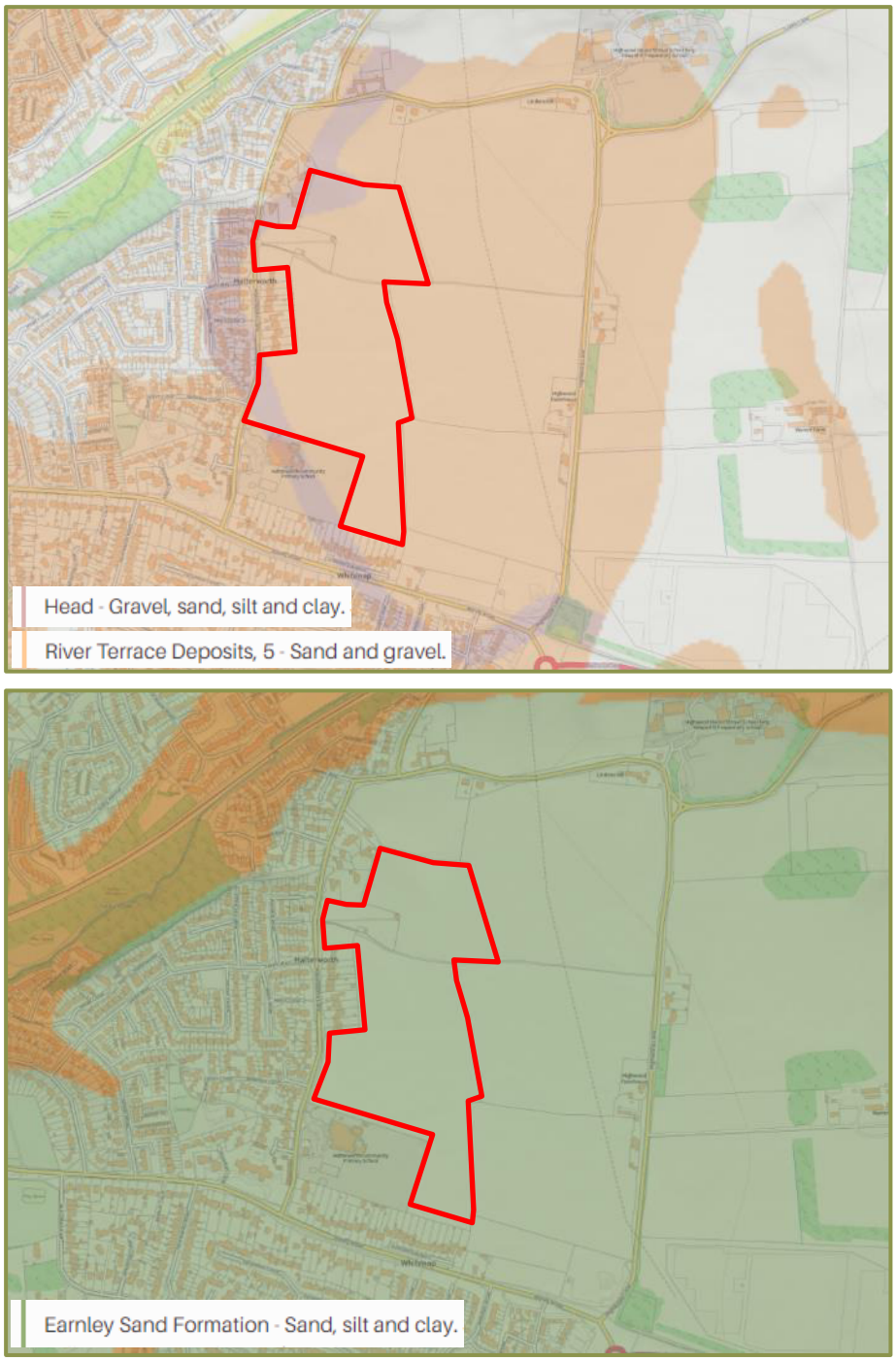
Geology Mapping

3.4.2 The online BGS Geology Viewer (Figure 3.5) shows most of the Site is underlain by River Terrace Deposits 5 - sand and gravel (superficial deposits). The south-west and north-west corners of the Site are underlain by a small band of Head - Gravel, sand, silt and clay.

3.4.3 The bedrock beneath the entire Site is Earnley Sand Formation - Sand, silt, and clay.

3.4.4 The geology mapping is indicative and there may be localised variation.

Figure 3.5: Geology Mapping

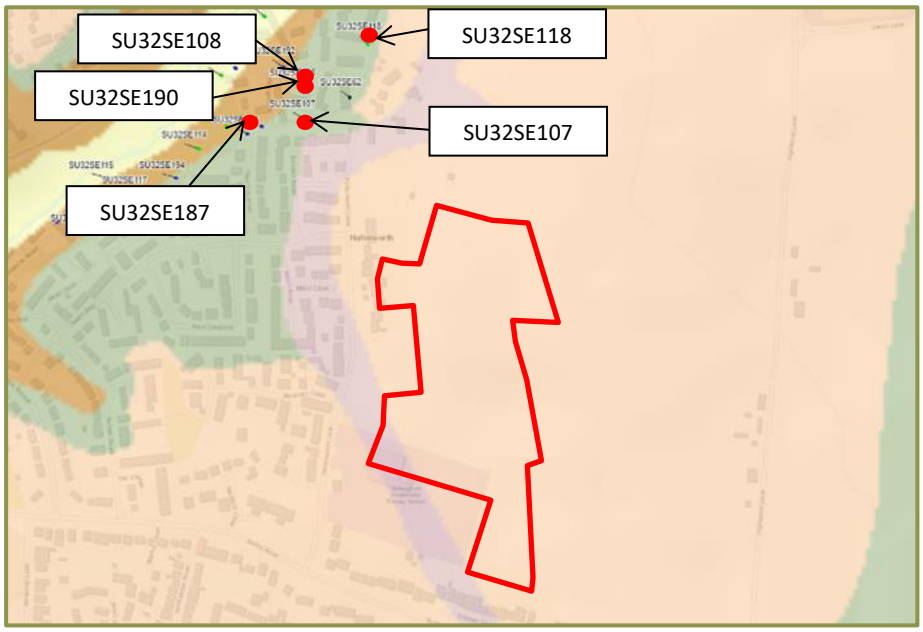


Top: Superficial deposits. Bottom: Bedrock geology. Contains British Geological Survey materials © NERC [2024].

BGS Borehole Records

3.4.5 The BGS Borehole Records online mapping (Figure 3.6) shows there are no historical boreholes located within the same mapped geology of the Site. There are however five borehole records within the same bedrock to the west of the Site, albeit in different superficial deposits. As such, only the groundwater depth has been noted (Table 3.2).

Figure 3.6: Borehole Mapping



Contains British Geological Survey materials © NERC [2024].

Table 3.2: BGS Borehole Data

Reference	Depth (m bgl)	Groundwater Depth (m bgl)
SU32SE107	10.95	16
SU32SE108	10	2.4
SU32SE118	10	1.3
SU32SE187	5.7	1.00 - 3.00
SU32SE190	2.5	Not Encountered

Contains British Geological Survey materials © NERC [2024].

Soakaway Testing

3.4.6 Soakaway testing was undertaken in accordance with DG365 'Soakaway Design' methodology guidance, during October 2023. A copy of the Soakaway Testing Results is included in Appendix 5.

3.4.7 A total of nine soakaway test pits and three boreholes were established across the Site, with focus on the topographic low points, where SuDS attenuation features would be positioned (Figure 3.7).

3.4.8 The borehole records confirm the soils and geology as depicted by the soils and geology mapping.

Figure 3.7: Trial Pit Location Plan

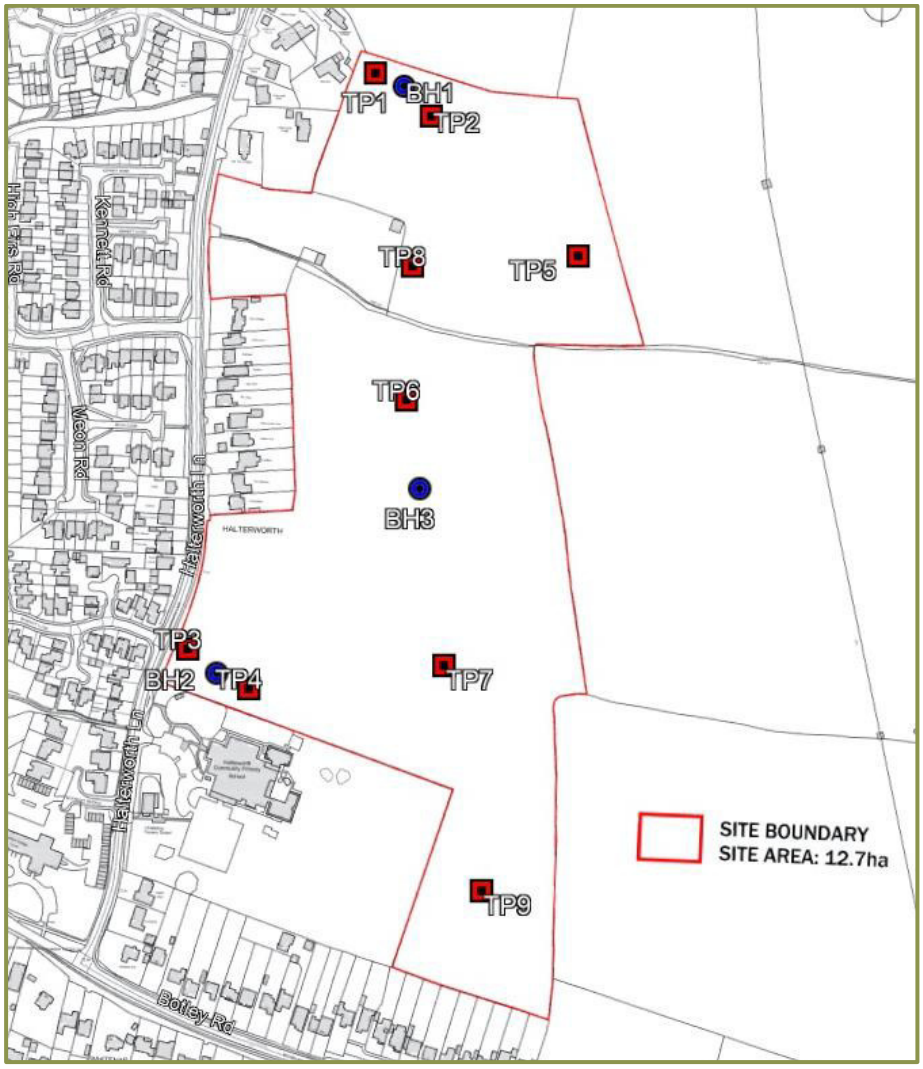


Table 3.3: Soakaway Data

Trial Pit	Depth (m bgl)	Soil Infiltration Rate (m/s)			Comments
		Test 1	Test 2	Test 3	
TP1	1.6	1.37E-04	1.43E-04	1.37E-04	Perched Groundwater at 1.5m bgl. Sand and sandstone deposits. Pit stable. Soil Horizon 0.3m.
TP2	1.5	n/a	n/a	n/a	Perched groundwater 1.2m - Pit unstable. Sandstone gravel and sand deposits. Water strike and pit collapse led to no infiltration calculations.
TP3	1.7	9.64E-04	6.46E-04	5.79E-04	Groundwater N/A. Sandstone gravel, clay and sand deposits with mudstone, siltstone and sandstone. Pit stable. Soil Horizon 0.25m.
TP4	1.6	4.09E-04	3.58E-04	2.63E-04	Groundwater N/A. Sandstone gravel, clay and sand deposits with mudstone, siltstone

					and sandstone. Pit stable. Soil Horizon 0.3m.
TP5	1.7	n/a	n/a	n/a	Groundwater N/A. Sandstone gravel, clay and sand deposits with mudstone, siltstone and sandstone. Pit stable. Soil Horizon 0.3m.
TP6	1.8	2.70E-05	2.23E-05	1.80E-05	Groundwater N/A. Sandstone gravel, clay and sand deposits with mudstone, siltstone and sandstone. Pit stable. Soil Horizon 0.2m.
TP7	1.6	1.52E-04	1.13E-04	1.00E-04	Groundwater N/A. Sandstone gravel, clay and sand deposits with mudstone, siltstone and sandstone. Pit stable. Soil Horizon 0.25m.
TP8	1.8	n/a	n/a	n/a	Groundwater N/A. Sandstone gravel, clay and sand deposits with mudstone, siltstone and sandstone. Pit stable. Soil Horizon 0.3m.
TP9	1.6	1.78E-04	1.43E-04	1.37E-04	Groundwater N/A. sandstone gravel, sand and silty sand. Pit stable. Soil Horizon 0.2m.
BH1	12	Test not run	n/a	n/a	Perched groundwater at 3m bgl, groundwater table at 12m bgl. Silty sand, gravel, clay, sand. Soil Horizon 0.4m.
BH2	7	2.82E-07	n/a	n/a	Perched groundwater at 4m bgl, groundwater table struck at 9m bgl. Sands and clays, mudstone, siltstone, sandstone. Pit stable. Tests 2 and 3 had insufficient uptake to calculate infiltration.
BH3	9	3.88e-07	n/a	n/a	Perched groundwater 4m bgl. Groundwater at 9.2m bgl. Sands, clays, and limestone gravel. Pit stable. Tests 2 and 3 had insufficient uptake to calculate infiltration.

3.5 Hydrogeology

Infiltration Potential

3.5.1 The SuDS Infiltration Potential Mapping (Drawing 005) shows most of the Site is in the mapped extent indicative of high potential. The north-west and south-west corners of the Site are in the mapped extent of moderate infiltration. The south-east corner is in the mapped extent of low infiltration potential.

3.5.2 The freely draining soils are indicative of high infiltration potential, but the infiltration potential of the bedrock is dependent on the composition of the sandstone and groundwater levels.

3.5.3 The north-west corner and south-east corners of the Site are within the mapped extent of moderate potential. The south-east corner is within the mapped extent of low potential.

3.5.4 Shallow soakaway testing demonstrated infiltration to be viable across most of the Site, with three successful runs undertaken in accordance with DG: 365 in TP1, TP3, TP4, TP6, TP7 and TP9.

3.5.5 Groundwater was encountered in BH1, BH2, BH3 and TP2. The initial groundwater was struck at depths of between 1.2-4m bgl, but it is noted that this is perched groundwater within the

superficial deposits. The groundwater table was encountered between 9-12m bgl. This was then followed up with groundwater monitoring.

Groundwater Monitoring

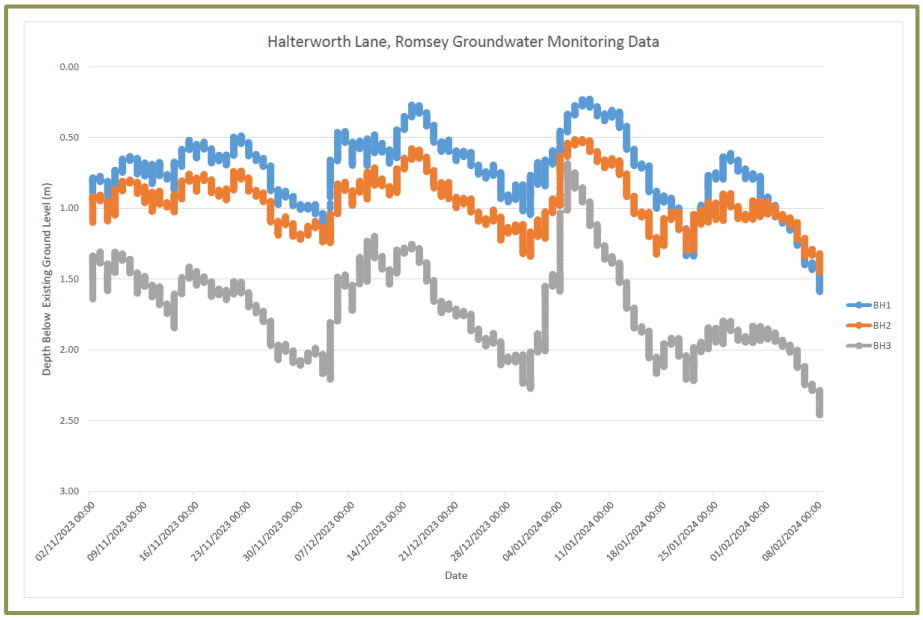
3.5.6 Groundwater monitoring was undertaken between November 2023 to April 2024 and a report is included in Appendix 6.

3.5.7 A location plan of the monitoring wells is included in Figure 3.7 and groundwater monitoring results are included in Figure 3.8.

3.5.8 Three monitoring wells were established across the Site, taking into consideration the topographic low points and position of the proposed developable area/SuDS attenuation features.

3.5.9 The results show that in BH1 groundwater was encountered between 0.23m and 1.59m bgl. In BH2 groundwater was encountered between depths of 0.51m and 1.45m bgl and in BH3 groundwater was encountered between 0.69m and 2.46m bgl.

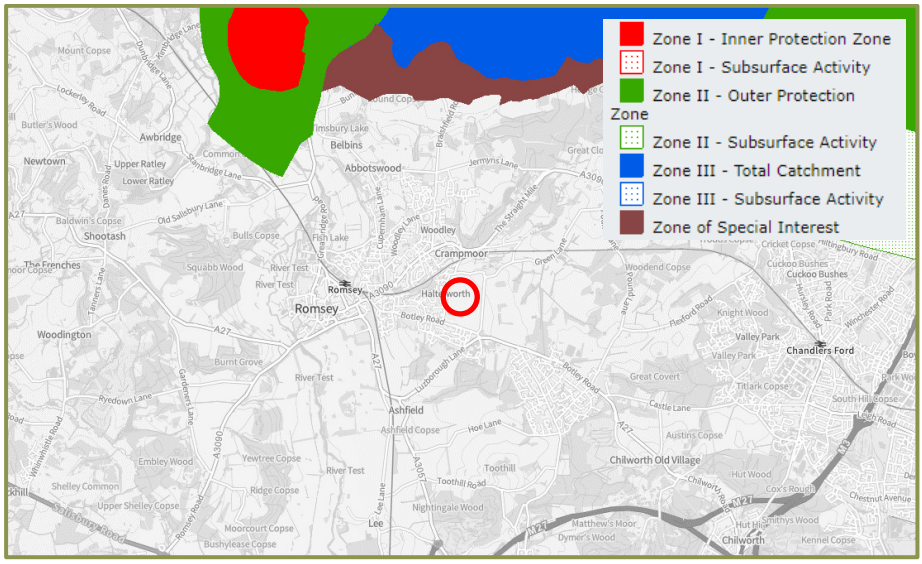
Figure 3.8: Groundwater Monitoring Results



Defra Magic Map

3.5.10 The online Defra Magic Map mapping (Figure 3.9) shows the Site is not located in a groundwater Source Protection Zone (SPZ).

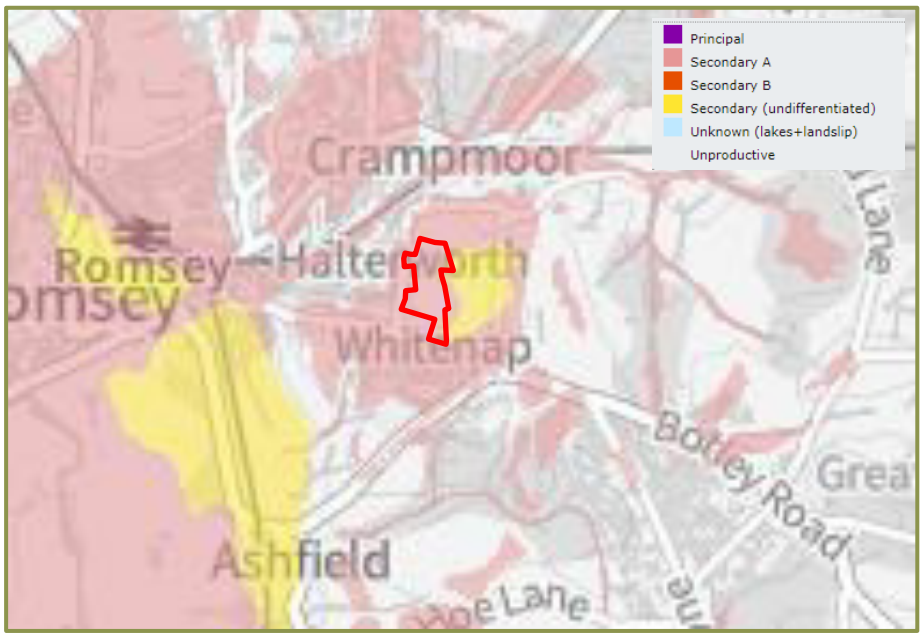
Figure 3.9: Source Protection Zone Map

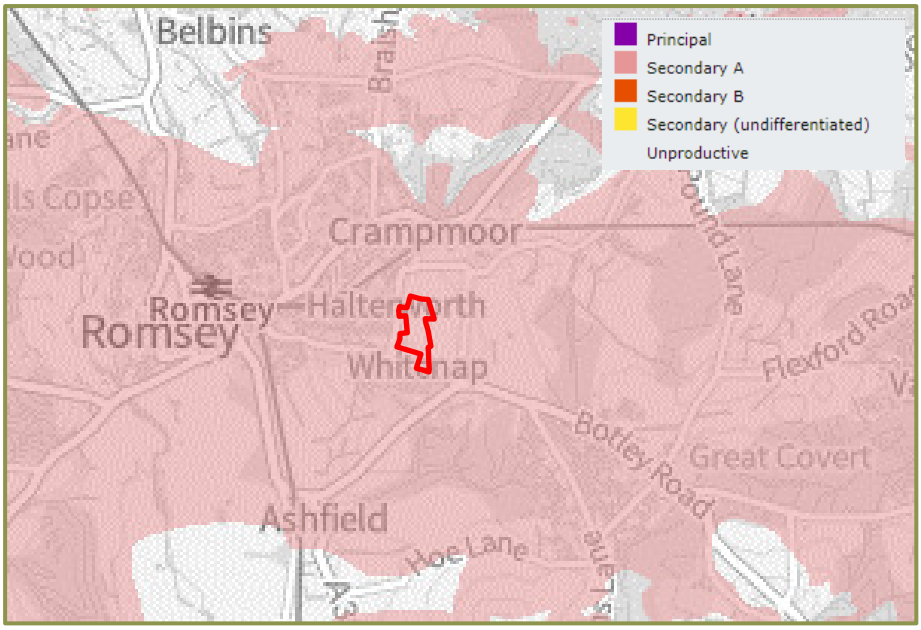


From Magic Map. Contains Environment Agency information © Environment Agency and database right [2024].

3.5.11 The Site is not located above a Principal Aquifer (bedrock designation) (Figure 3.10). The Site is however located above a Secondary A Aquifer (bedrock designation) and a Secondary A Aquifer (superficial drift). The eastern boundary is above a Secondary Undifferentiated Aquifer (superficial drift).

Figure 3.10: Aquifer Designation Map





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

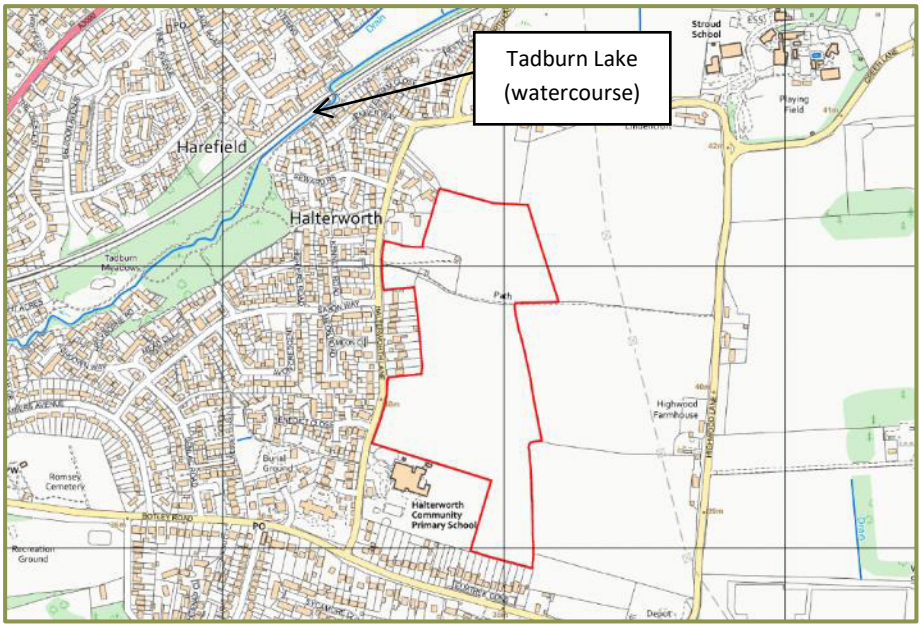
3.6 Catchment Hydrology

OS Mapping and Site Walkover Observations

3.6.1 OS mapping (Figure 3.11) shows Tadburn Lake (watercourse) conveying flows south-west, approximately 250m north-west of the Site at its closest point.

3.6.2 The Site walkover did not observe any onsite or bounding watercourses.

Figure 3.11: Map of Watercourses

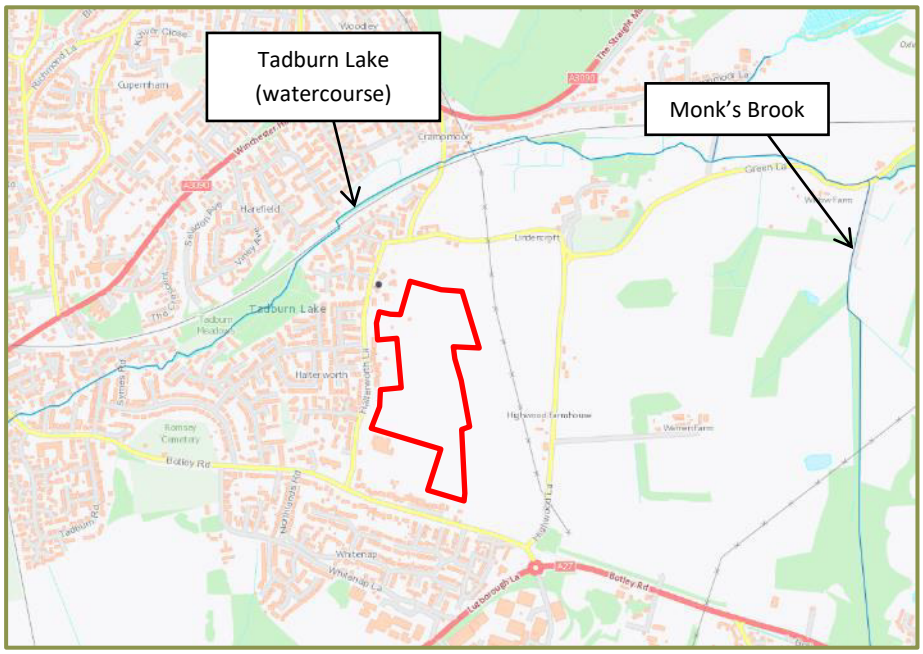


Main River Map

3.6.3 The Environment Agency online main river map (Figure 3.12) identifies the Tadburn Lake 'main river' approximately 250m north-west of the Site. Monk's Brook 'a main river' is located approximately 1.2km east of the Site. Monks Brook is a tributary of Tadburn Lake.

3.6.4 A main river is a watercourse where flood risk work is carried out by the Environment Agency.

Figure 3.12: Main River Map

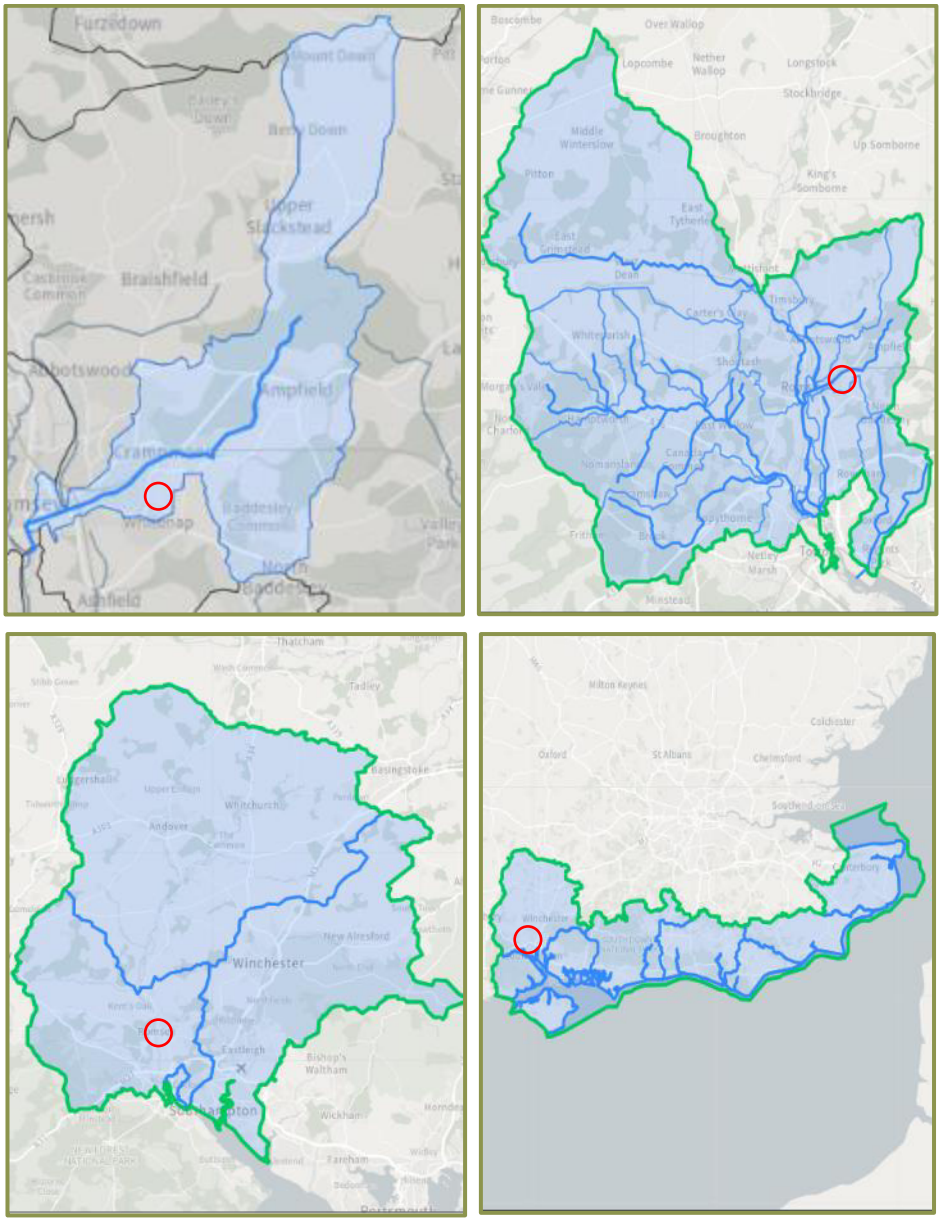


Contains Environment Agency information © Environment Agency and database right [2024].

Environment Agency Catchment Data Explorer Mapping

3.6.5 The Site resides within the Tadburn Lake Water Body (Figure 3.13), which is in the Test Lower and Southampton Streams Operational Catchment, Test and Itchen Management Catchment, and South East River Basin District.

Figure 3.13: Catchment Data Explorer



Top Left: Tadburn Lake Water Body. Top Right: Test Lower and Southampton Streams Operational Catchment. Bottom Left: Test and Itchen Management Catchment. Bottom Right: South East River Basin District. Contains Environment Agency information © Environment Agency and database right [2024].

3.7 Sewerage Assets

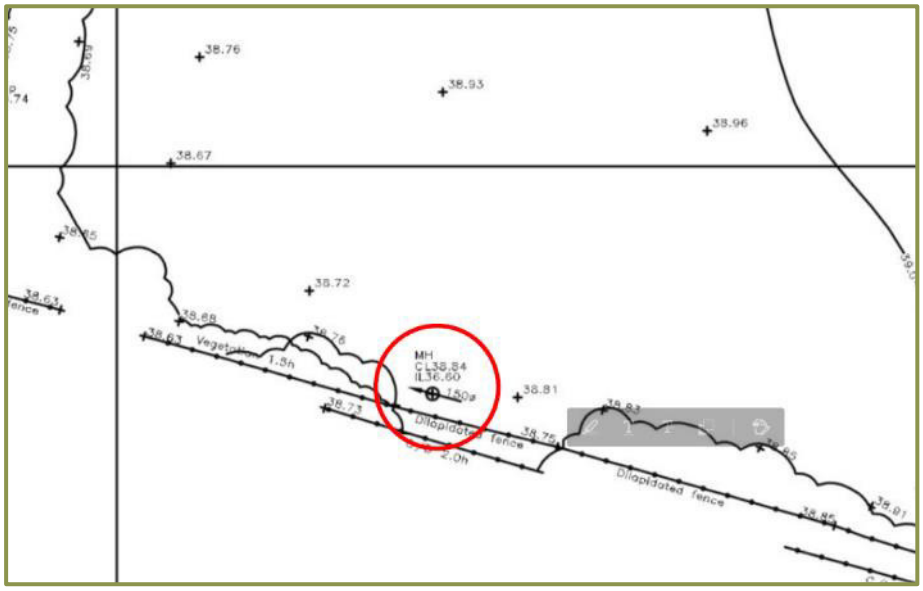
Public Assets

3.7.1 Southern Water assets plans show there is a Ø150mm public foul sewer network serving the residential dwellings to the west of the Site. The foul sewer is oriented north to south beneath Halterworth Lane.

3.7.2 The residential development west of Halterworth Lane is served by another Ø150mm public foul sewer network and a Ø150mm and Ø225mm public surface water network orientated east to west.

3.7.3 The residential dwellings to the south of the Site are served by a Ø150mm foul sewer. The topographic survey shows a manhole associated with this sewer (Figure 3.14), oriented north-west, just within the southern boundary of the Site.

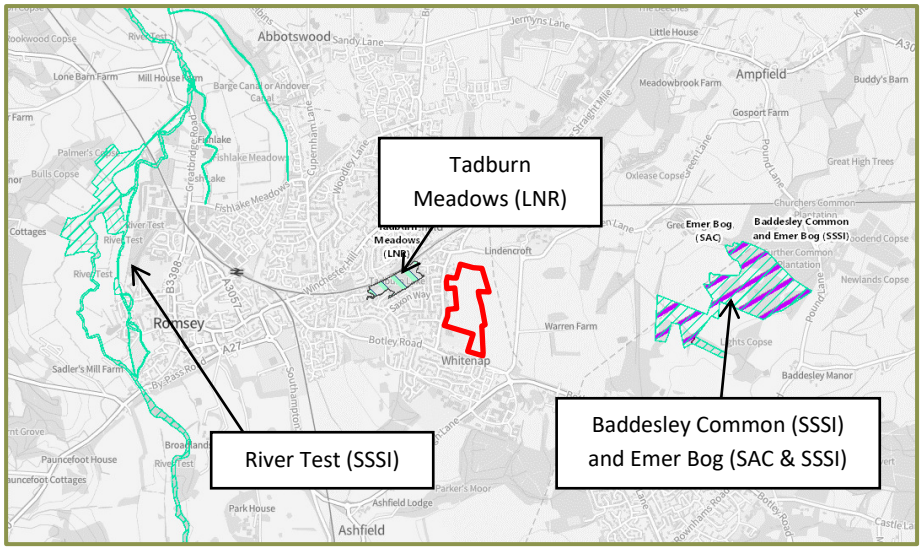
Figure 3.14: Topographic Survey Manhole



3.8 Designated Sites

3.8.1 The online Defra Magic Map mapping (Figure 3.15) shows the nearest designated sites include Tadburn Meadows (Local Nature Reserve [LNR]) located, located approximately 165m west of the Site, Baddesley Common and Emer Bog (Special Area of Conservation [SAC] & Site of Special Scientific Interest [SSSI]) located approximately 1.3km to the east of the Site, and the River Test (SSSI), located approximately 2.4km to the west of the Site. The Site is not hydrologically connected to either of these sites including downstream (from a flood risk and drainage perspective).

Figure 3.15: Designated Sites



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

4.0 Flood Risk Assessment

4.1 Potential Sources of Flooding

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

Table 4.1: Potential Risk Posed by Flooding Sources

Flooding Source	Potential Flood Risk at Application Site (Yes/No)	Potential Source	Data Sources
Fluvial	No	Tadburn Lake	Environment Agency consultation response (Appendix 3) and Environment Agency Flood Zone mapping (Drawing 003).
Tidal	No	None identified	Environment Agency consultation response (Appendix 3) and Environment Agency Flood Zone mapping (Drawing 003).
Groundwater	Yes	Secondary A Aquifer	Geosmart Groundwater (Drawing 004) and BGS Borehole Records (Appendix 4).
Surface Water	Yes	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 2), and topographic survey (Appendix 1).
Infrastructure Failure	No	None identified	OS mapping (Drawings 001 to 002) and Environment Agency online mapping: Long Term Flood Risk Assessment for Locations in England.

4.2 Fluvial Flooding

Environment Agency Flood Zone Mapping

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

4.2.2 The Environment Agency 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.

Modelled Flood Levels and Flood Outline Mapping

4.2.3 The Environment Agency provided modelled flood levels for Tadburn Lake sourced from the Romsey Model (2011). A range of return periods were provided, including the 1 in 100-year and 1000-year event, for nodes adjacent to the Site.

4.2.4 The model shows the Site is not inundated and sits at a minimum level of 36.57m AOD, which is 11.94m above the worse-case (1 in 100-year) modelled flood level.

Flood History

4.2.5 Correspondence with the Environment Agency (Appendix 3) reported no historical fluvial flooding incidents within the Site boundary or immediate vicinity.

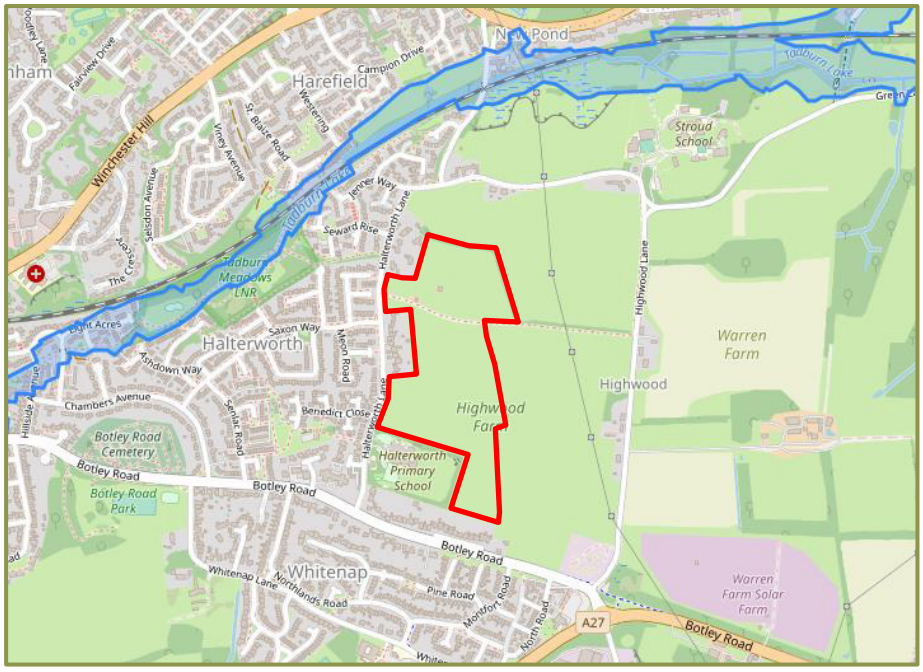
Flood Defences

4.2.6 The Environment Agency Reduction in Risk of Flooding from Rivers and Sea online mapping shows the Site does benefit from flood defences.

Flood Warning Service

4.2.7 The River Levels UK website (Figure 4.1) shows the Site is not within an area which receives flood warnings. The area along the reach of Tadburn Lake does receive flood warnings.

Figure 4.1: Flood Warning Areas



River Levels UK [2024].

Flood Risk Summary

4.2.8 The risk of fluvial flooding is assessed as negligible.

4.3 Tidal Flooding

Environment Agency Flood Zone Mapping

4.3.1 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 tidal (sea) flooding, at 'low' risk.

Flood Risk Summary

4.3.2 The risk of tidal flooding is assessed as negligible.

4.4 Groundwater Flooding

Introduction

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

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.

Risk Class	Probability of Groundwater Flooding	Effect
		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 1.3m bgl to 10.05m bgl in the bedrock deposits.

4.4.2 Soakaway testing encountered perched groundwater ingress in one pit at 1.2m bgl.

4.4.3 Groundwater monitoring encountered groundwater between 0.23m and 2.46m bgl.

Flood Risk Summary

4.4.4 The risk of groundwater flooding is assessed as low below ground in the perched groundwater but negligible above ground.

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.

Environment Agency Complex Surface Water Flood Mapping

4.5.2 The Environment Agency Complex Surface Water Flood Mapping (Drawings 006.1 to 006.4) shows most of the Site is located outside the mapped extent of surface water flooding.

4.5.3 There is an area of surface water ponding in the south-west extent of the Site associated with the 1 in 1000-year event. Flood depths are up to 0.30m, velocities are up to 0.25m/s and the hazard is assessed as 'low' (0.50-0.75). Surface water ponding is associated with a topographic low spot.

Flood Risk

4.5.4 The risk of surface water flooding is assessed as negligible for most of the Site, with an area of low risk associated with surface water ponding.

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

4.6 Sewer Flooding

Introduction

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

4.6.2 New 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 2) show there is a Ø150mm public foul sewer orientated north-west just within the southern boundary of the Site. Any surcharged flows would be shallow (<150mm) and would shed overland, following the localised topography (Drawing 007).

Flood Risk

4.6.4 The risk of flooding from sewers is assessed as negligible for most of the Site but low along the reach of the foul sewer.

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.

5.0 Flood Risk Mitigation Measures

5.1 Introduction

5.1.1 The following sources of flooding were identified:

- Groundwater flooding (below ground).
- Surface water flooding (ponding).
- Sewer flooding (surcharged flows from public assets).

5.2 Mitigation Measures

Groundwater Flooding

- No below surface habitable buildings (i.e. basements).
- Set finished floor levels a minimum of +150mm above external levels.

Surface Water Flooding

- Adoption of a surface water management strategy.
- Set finished floor levels as per above.

Sewer Flooding

- Provide a development free easement (3m either side) of onsite public foul water sewer assets, or re-direct around the Site boundary.

5.3 Sequential Approach or Sequential Test Considerations

5.3.1 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). Given that the proposed residential uses are solely located in Flood Zone 1, the Sequential Test is not required (which is in accordance with the recent Court of Appeal judgement [Case No: CA-2023-000087, dated 17th January 2024] - Appendix 8. Other potential sources of flooding have been considered and found to be negligible or low and can be managed using the above mitigation measures.

Table 5.1: Probability and Consequences of All Sources of Flooding

Flooding Source	Potential Source	Probability and Consequence / Impact Without Mitigation	Consequence & Impact With Mitigation	Sequential Approach and Sequential Test Considerations
Fluvial	Tadburn Lake	Negligible	Negligible	The Site is entirely in Flood Zone 1 (low risk), therefore the requirement for the Sequential Test is not triggered.
Tidal	None identified	Negligible	Negligible	The Site is entirely in Flood Zone 1 (low risk), therefore the requirement for the Sequential Test is not triggered.
Groundwater	Secondary A Aquifer	Low below ground but Negligible above ground	Low below ground but Negligible above ground	There is no above ground risk but low below ground risk of groundwater flooding (nearby boreholes encountered groundwater at 1.3mbgl, onsite soakaway testing encountered groundwater at depths of 1.2mbgl). However, this will be mitigated by no below surface habitable buildings and raising finished floor levels above external levels. As per the recent CoA Judgement, the Sequential Test is not applicable to this aspect.
Surface Water	Site Topography	Negligible for most of the Site but Low where there is surface water ponding	Negligible for most of the Site but Low where there is surface water ponding	There are no surface water flow pathways within or bounding the Site. There is a minor risk from surface water ponding which will be mitigated with the adoption of a surface water management strategy. As per the recent CoA Judgement, the Sequential Test is not applicable to this aspect.
Sewers and Mains	Public Sewers	Negligible for most of the Site but Low along overland flow pathways	Negligible for most of the Site but Low along overland flow pathways	There is an onsite public foul sewer in which flood risk can be mitigated through appropriately sized easements. As per the CoA Judgement, the Sequential Test is not applicable to this aspect.
Infrastructure Failure	None identified	Negligible	Negligible	The Site is located entirely outside the mapped extent of flooding sourced from reservoirs and is not in the vicinity of any ponds or highway infrastructure.

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

6.0 Site Drainage

6.1 Surface Water Drainage

6.1.1 Consideration of flood issues is not confined to the floodplain. This is recognised in the NPPF and associated guidance where all proposed development of 1ha or more in Flood Zone 1 and so outside the floodplain nevertheless requires an FRA. The alteration of natural surface water flow patterns through 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 12.8ha Site is comprised of two agricultural (grassed) land parcels.

6.2.2 The Site is underlain by freely draining loamy soils above River Terrace Deposits 5 - Sand and gravel. Drainage is predominantly via overland flow, following the topography of the Site to the topographic low points, with a small amount of infiltration to bedrock.

6.3 Developable and Impermeable Areas

6.3.1 The proposal is for an outline planning application of up to 270 dwellings on the 12.8ha Site, including affordable housing, with land for the potential future expansion of Halterworth Primary School, public open space, structural planting and landscaping, sustainable drainage system (SuDS) and vehicular access points.

6.3.2 An allowance of 55% impermeable area (inclusive of 10% urban creep) was applied to the 7.26ha residential developable area. The existing and proposed impermeable areas are shown in table 6.1.

6.3.3 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	3.99	+3.99
Percentage of Total Site Area (%)	0	31.2	+31.2

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 webservice[20]). 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 SuDS[21], and Environment Agency Report SC030219 - Rainfall runoff management for developments.

6.4.3 It is anticipated that the area for expansion of the school development will be left as open space for the time being, any future development / expansions would be served by a specific drainage system installed as part of the future works. Therefore, it has been classified as greenfield land for the purposes of this assessment.

6.4.4 The following parameters were used in the runoff calculations:

- Developable Area: 7.26ha (includes parking and access roads).
- Average Annual Rainfall (SAAR): 788mm/year
- Region No.: 7
- BFIHOST19: 0.573

6.4.5 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.

6.4.6 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.

6.4.7 The Soilscapes online soils map viewer and Geology of Britain online map viewer identified the following, which were confirmed by soakaway testing trial pit logs (Appendix 5):

- Soils: freely draining loamy soils
- Superficial Deposits: River Terrace Deposits 5 - Sand and gravel
- Bedrock: Earnley Sand Formation - Sand, silt, and clay

6.4.8 BFIHOST19 value assigned by the FEH webservice is considered to replicate on-site conditions.

[20] Centre for Ecology and Hydrology, Flood Estimation Handbook Web Service [https://fehweb.ceh.ac.uk/].
[21] 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].

6.4.9 Table 6.2 shows the calculated greenfield runoff rates. Runoff calculations are included in Appendix 7.

Table 6.2: Greenfield Runoff Rates

Annual Probability (Return Period, Years)	Greenfield Runoff (l/s)
QBAR	25.7
100% (1)	21.8
3.33% (30)	59.0
1% (100)	81.8
1% Plus Climate Change	114.5

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 Environment Agency when looking at sewage discharge and flood risk.

6.5 Sustainable Drainage Options (SuDS)

Feasibility of SuDS

6.5.1 Shallow and borehole soakaway testing was undertaken during October 2023. A copy of the soakaway testing is included in Appendix 5. Findings demonstrate good infiltration potential, however, they also demonstrated high groundwater levels across the Site. Soakaways require a 1m clearance between the base of the soakaway and the groundwater table and therefore would not be a viable means of discharge.

Choice of SuDS Options

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

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

Table 6.3: SuDS Options

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

Note: SuDS appropriate to the development are highlighted green.

6.5.4 A hierarchy of SuDS techniques is identified[22]:

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.

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

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

SuDS Maintenance

6.5.6 Two detention basins will form the main attenuation feature within the development Site.

6.5.7 Maintenance of the SuDS features would be in line with the SuDS Manual (CIRIA C753, 2015), as detailed in Figure 6.1. It is standard for SuDS features within a new development to be maintained by a private maintenance company unless the council adopt it. This will ensure maintenance throughout the lifetime of the development.

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

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

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

TABLE 22.1 Operation and maintenance requirements for detention basins

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

Drainage Design Summary

6.5.9 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.

6.5.10 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.

6.5.11 Surface water will be directed to onsite detention basins, positioned to achieve a gravity connection from the developable area and a gravity connection to surface water sewer.

6.5.1 An indicative drainage layout is included in Drawing ENZ-XX-XX-DR-D-0001.

Attenuation Requirements

6.5.2 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.

6.5.3 The Site naturally drains in two directions with a ridge line roughly in the centre of the Site. As such 55% of the catchment drains in a northerly direction and 45% in a southerly direction. This has been replicated in the drainage strategy to replicate existing conditions and provide a gravity system.

6.5.4 The following input parameters were assumed in the calculations:

- Impermeable Area: 4ha (38.2%);
  - Northern Basin: 2.2ha
  - Southern Basin: 1.8ha
- Cv (proportion of rainfall forming surface water runoff): 75% summer, 84% winter;
- Infiltration losses:
  - Northern Basin: 0m/hour.
  - Southern Basin: 0m/hour.

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

- Northern Basin: 1730m^3
- Southern Basin: 1402m^3

6.5.6 The outfall rates for the detention basins are:

- Northern Basin: 12.05l/s
- Southern Basin: 9.86l/s

6.5.7 Attenuation calculations are included in Appendix 7. The calculated runoff rates and attenuation volumes will be reviewed at detailed design stage.

6.5.8 A pre-development enquiry with Southern Water (Appendix 2) confirmed that there is adequate capacity within their system at m/h 3753 along Jenner Way (Northern Basin) and m/h 2251 along Benedict Close (Southern Basin).

6.6 Exceedance Routes

6.6.1 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 both restricted discharge rates. This provides a betterment (reduction) in runoff when compared to existing undeveloped conditions, where runoff is uncontrolled across all return periods.

6.6.2 A storm event in excess of this design standard would be extreme and would cause the detention basins to surcharge and overtop (with no sudden deluge) and would then shed overland following the topography, as per existing conditions (Drawing 007).

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

6.7 Foul Drainage

6.7.1 It is proposed that foul flow is discharged to the Ø150mm public foul sewer along Halterworth Lane at MH2503. The topography of the Site would require a pumped connection.

6.7.2 Correspondence with Southern Water confirmed that there is adequate capacity in the local sewerage network to accommodate a foul flow of 3.44l/s at manhole 2503. There is not currently capacity at manholes 2101 or 4901.

6.7.3 An outline foul drainage layout is in Drawing ENZ-XX-XX-DR-D-0001.

6.7.4 All foul sewerage should be designed in accordance with Building Regulations Part H[23]. In areas where sewers are to be adopted by Southern Water, sewerage should be designed in accordance with Design and Construction Guidance document and supplemented with additional standards provided by Southern Water. An application to enter into a Section 104 agreement for sewer adoption must be made in writing to Southern Water prior to any works commencing on Site. A connection point should be agreed with Southern Water.

[23] HM Government (published 2002 and updated October 2015) The Buildings Regulations 2010 - Drainage and Waste Disposal: Part H [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/442889/BR_PDF_AD_H_2015.pdf].

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 12.8ha Site located on land east of Halterworth Lane, Romsey, Hampshire.

7.2 Flood Risk

7.2.1 The risk of flooding is assessed as follows:

- The risk of surface water flooding is assessed as negligible for most of the Site, with an area of low risk associated with surface water ponding.
- The risk of groundwater flooding is assessed as negligible above ground but low below ground.
- The risk of flooding form sewers is assessed as negligible for most of the Site but low along the reach of the foul sewer.
- The risk of flooding from all other sources is assessed as negligible.

7.3 Mitigation Measures

7.3.1 Flood risk can be mitigated to a negligible level through the following approach:

- Set finished floor levels above external levels.
- Adoption of a surface water management strategy.
- Provide a development free easement along onsite public foul water sewer assets, or re-direct around the Site boundary.
- No below surface habitable buildings (i.e., basements).

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). Given that the proposed residential uses are solely located within Flood Zone 1, the Sequential Test is not required (which is in accordance with the recent Court of Appeal judgement [Case No: CA-2023-000087, dated 17th January 2024] - Appendix 8). Other potential sources of flooding have been considered and found to be negligible so low and can be managed using the above mitigation measures.

7.5 Site Drainage

Surface Water

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

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

an outfall to surface water sewer. This approach offers a betterment to existing conditions with uncontrolled runoff across all return periods.

7.5.3 A SuDS drainage scheme is proposed to manage excess runoff from the development, comprising detention basins, designed to maintain runoff at pre-development rates.

Foul Water

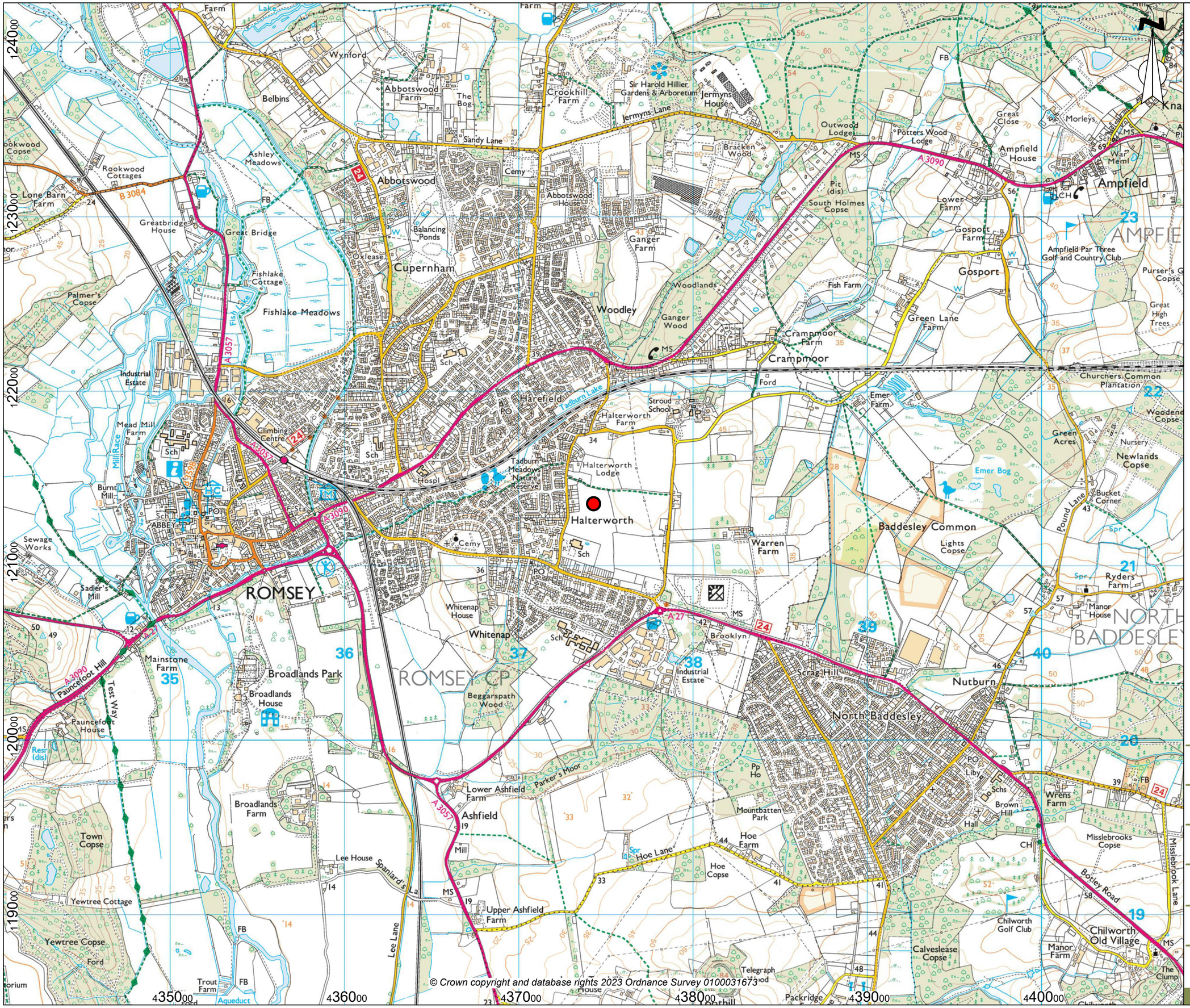
7.5.4 It is proposed that foul flows will discharge to Halterworth Lane via a pumped solution.

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.

DRAWINGS



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CLIENT: Gladman Developments Ltd

SCALE: 1:20,000@A3

PROJECT REF: SHF.1132.258

DRAWN: LW

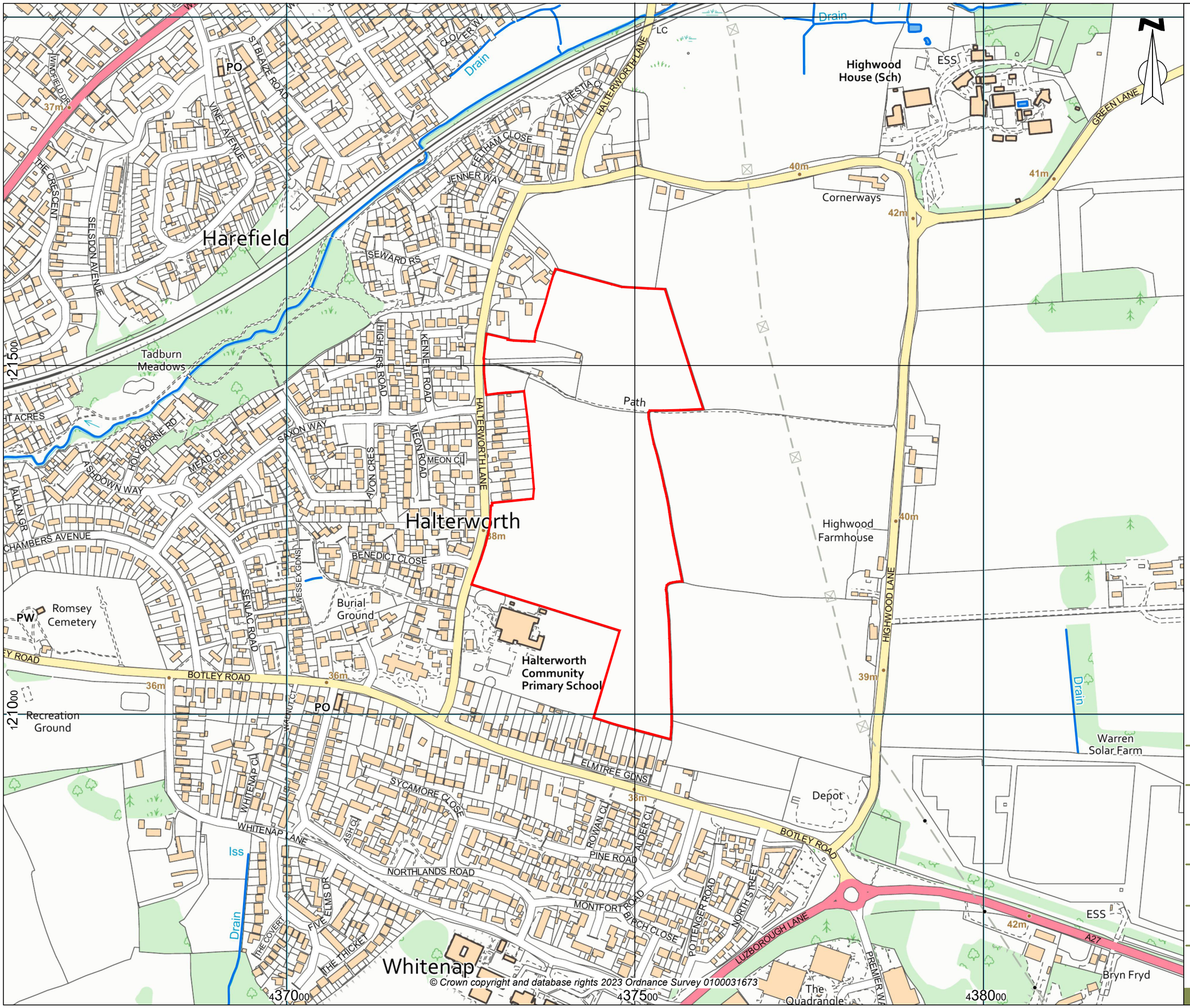
CHECKED: DA

DATE: Sept 2023

PROJECT: Halterworth Lane, Romsey

TITLE: Site Location Plan

DRAWING NO: SHF.1132.258.HY.D.001



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PROJECT REF: SHF.1132.258

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Key

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

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PROJECT: Halterworth Lane, Romsey

TITLE: Environment Agency Flood Zones

DRAWING NO: SHF.1132.258.HY.D.003