



CFA CIVILS LIMITED

CIVIL ENGINEERING CONSULTANTS

Harrisfield, Blackmoor Road, Mawdesley, Lancashire, L40 2QF

Tel: 01257 754154 Mob: 07836 550449

Email: engineers@cfa-civils.co.uk

DRAINAGE STRATEGY & FLOOD RISK ASSESSMENT

FOR

PROPOSED RESIDENTIAL DEVELOPMENT

ON

LAND AT GERRARDS LANE HALEWOOD L26 5QA

ON BEHALF OF

ABBEY PRESTIGE HOMES [NW] Limited

CFC20061

Rev 0

June 2021

CONTENTS

1.0 INTRODUCTION

2.0 EXISTING SITE & FLOOD RISK

- 2.1 Site Location
- 2.2 Site Description and Topography
- 2.3 Existing Site and Area Drainage
- 2.4 Ground Conditions
- 2.5 Existing Flood Risk
 - 2.5.1 Fluvial Flooding
 - 2.5.2 Surface Water Flooding
 - 2.5.3 Reservoir Flooding
 - 2.5.4 Groundwater Flooding
 - 2.5.5 Flood Alerts and Warnings

3.0 PROPOSED SITE DRAINAGE & FUTURE FLOOD RISK

- 3.1 Proposed Works
- 3.2 Climate Change
- 3.3 Drainage Strategy
 - 3.3.1 Surface Water
 - 3.3.1.1 Infiltration
 - 3.3.1.2 Surface Water Bodies
 - 3.3.2 Foul Water
- 3.4 Design
 - 3.4.1 Surface Water
 - 3.4.2 Foul Water
- 3.5 Future Flood Risk

4.0 FUTURE MAINTENANCE

- 4.1 Permeable Surfaces
- 4.2 Site Drainage

5.0 CONCLUSION

APPENDIX A Location Plan and Aerial Image

APPENDIX B Topographical Survey

APPENDIX C Soil Type from Soilscales Web-Site

APPENDIX D EA Flood Map for Planning Report & Long-term Risk Mapping

APPENDIX E Proposed Site Plan

APPENDIX F Greenfield Runoff Estimation

1.0 INTRODUCTION

CFA Civils Ltd is appointed by Abbey Prestige Homes [NW] Ltd to determine a drainage scheme in support of a planning application for a residential development on land at Gerrards Lane, Halewood, L26 5QA.

This report sets out a drainage strategy for the proposal in accordance with the National Planning Policy Framework and Building Regulations Approved Document H3 in respect of foul and surface water drainage of the site, and comments on flood risks for the proposal referencing the guidance contained within the National Planning Policy Framework and Flood Risk & Coastal Change Guidance.

2.0 EXISTING SITE & FLOOD RISK

2.1 Site Location

The site is centred on NGR 344334, 386950, and is situated to the north-west of Gerrards Lane near its junction with North End Lane, approximately 1km north-west of Halewood Village.

A location plan indicating the red edged application site is contained within Appendix A to this report.

2.2 Site Description and Topography

The red-edged site has an area of approximately 0.673Ha, comprising a former haulage yard which has the benefit of an extant planning approval for a residential development. As a result of that permission, the erection of two dwellings was commenced within the last eight years, with one brought up to ground floor slab level only; and the other with floor slab placed and a partially-clad, timber-framed shell erected. However, this structure has very recently been completely destroyed by fire.

The land fronts onto Gerrards Lane which forms its south-eastern boundary; North End Lane runs along the north-eastern edge of the site; a residential curtilage [The Coachhouse] is located to the south-west; and a wooded area wraps around the western and northern site boundaries. The site is enclosed along Gerrards Lane by a sandstone wall.

An aerial image of the site and its immediate surroundings is contained within Appendix A to this report.

The land slopes generally in line with Gerrards Lane which falls steadily towards the north-east by approximately 1.5m across the site frontage.

A topographical survey of the site is contained in Appendix B to this report.

2.3 Existing Site and Area Drainage

The development land lies within the western catchment of Netherley Brook which flows from Huyton to the north, before becoming Ditton Brook which discharges into the Lower River Mersey at Hale Bank approximately 6km to the south-east.

Historical mapping dating back to 1892 indicates there were no watercourses within the red-edged site boundary.

However, a recent drainage inspection has confirmed the presence of a 225mm diameter pipe running from an existing manhole within the site, located behind the stone boundary wall, in an easterly direction across Gerrards Lane before turning along the edge of the woodland opposite the end of North End Lane. This pipe connects into a network of open watercourses which eventually discharge into Netherley Brook to the east.

United Utilities' sewer records indicate that there are no public sewers crossing or in close proximity to the site. The nearest sewerage network is more than 200m to the south-west within the higher ground beyond Lydiate Lane.

Foul water discharges from the neighbouring properties are drained to septic tanks or wastewater treatment plants.

2.4 Ground Conditions

Soil mapping from “Soilscapes” web-site by Cranfield Soil & Agrifood Institute confirms the soil type in the vicinity of the application site as “Slowly permeable seasonably wet slightly acid but base-rich loamy and clayey soils”.

An extract from this mapping is contained in Appendix C to this report.

The British Geological Survey Drift and Solid Maps show the underlying strata to be Boulder Clay over Permo-Triassic Lower Mottled Sandstone.

The existence of a number of watercourses in the area of the site, and the presence of a number of ponds close to the site would seem to support this analysis.

2.5 Existing Flood Risk

2.5.1 Fluvial Flooding

Flood zones are defined as follows:

Flood Zone 1 - Land having a less than 1 in 1000 annual probability of flooding from fluvial or tidal sources in any year [$<0.1\%$];

Flood Zone 2 - Land having between a 1 in 100 and 1 in 1000 annual probability of flooding from fluvial sources in any year [$1\% - 0.1\%$ AEP]; or land having between a 1 in 200 and 1 in 1000 annual probability of flooding from tidal sources in any year [$0.5\% - 0.1\%$ AEP];

Flood Zone 3 - Land having a 1 in 100 or greater annual probability of flooding from fluvial or tidal sources in any year [$>1\%$ AEP]; or land having a 1 in 200 or greater annual probability of flooding from tidal sources in any year [$>0.5\%$ AEP].

The site is indicated on the current Flood Map for Planning as being entirely within Flood Zone 1.

A copy of the Flood Map for Planning and Long-term Risk Mapping is contained in Appendix D to this report.

2.5.2 Surface Water Flooding

Whilst the Environment Agency Long-term Flood Risk mapping indicates that the majority of the site is not within an area at potential risk of flooding from surface water flooding, it does show an intermittent narrow line close to the rear of the site as being at low risk from surface water flooding to a depth of less than 300mm.

The updated Flood Map for Surface Water uses a simplified approach over large geographical areas to assess flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- 1 in 30 (3.3%)
- 1 in 100 (1%)
- 1 in 1000 (0.1%).

Due to the modelling techniques used, the mapping picks out depressions in the ground surface and simulates some flow along natural drainage channels, rivers, low areas in floodplains, and flow paths between buildings.

Although the maps appear to show flooding from ordinary watercourses, they should not be taken as definitive mapping of flood risk from these as the conveyance effect of ordinary watercourses or drainage channels is not explicitly modelled.

So, whilst the Environment Agency mapping shows pathways, this takes no account of the existing drainage and in practice there is a very low risk.

Extracts from the Flood Maps for Planning are contained within Appendix D to this report.

2.5.3 Reservoir Flooding

The Reservoir Flood Map indicates the site is not within an area at potential risk of flooding from reservoirs.

2.5.4 Groundwater Flooding

As described in Section 2.4 above, soil mapping from “Soilscapes” website by Cranfield Soil & Agrifood Institute confirms the soil type in the vicinity of the application site as “Slowly permeable seasonably wet

slightly acid but base-rich loamy and clayey soils”, and the BGS mapping indicates Boulder Clay over Sandstone.

Thus, flood risk from this source is considered to be negligible.

2.5.5 Flood Alerts and Warnings

The red-edged site is not within an area covered by the Environment Agency’s Flood Alert or Warning Services.

3.0 PROPOSED SITE DRAINAGE & FUTURE FLOOD RISK

3.1 Proposed Works

The current planning application proposes the erection of nine detached dwellings with integral garages, private drives and gardens. The development will be served from a new access road, off Gerrards Lane.

The proposed new dwellings on the site will have a total roof area of approximately 0.159Ha. Ground floor levels will be set a minimum of 300mm above the existing ground levels locally.

The shared access road has an area of 0.053Ha.

The proposed site plan is contained within Appendix E to this report.

3.2 Climate Change

The National Planning Policy Framework (NPPF) sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

The assessment of future flood risk to the site takes into account climate change guidance given in "Flood Risk Assessments: Climate Change Allowances" published by The Environment Agency in February 2016 and most recently updated in July 2020.

The selection of climate change allowance should reflect the lifespan of the proposed development. A residential development could reasonably be expected to have a lifespan of up to 100 years, and as such a climate change allowance in the range of 20 - 40% [Table 2: Central - Upper End] should be applied to peak rainfall intensities when calculating surface water run-off impacts for this type of development.

3.3 Drainage Strategy

In accordance with the National Planning Policy Framework and Building Regulations, the site should be drained on a separate system with foul water draining to the public sewer where reasonably practical and surface water draining in the most sustainable way.

The chosen strategy should demonstrate that the site will be safe from flooding; not increase flood risk elsewhere when compared to the pre-development run-off rates; and should seek to avoid pumped systems.

3.3.1 Surface Water

Planning Practice Guidance outlines the hierarchy to be investigated when considering a surface water drainage strategy, in the following order of priority:

- Into the ground (infiltration);
- To a surface water body;
- To a surface water sewer, highway drain, or another drainage system;
- To a combined sewer.

3.3.1.1 Infiltration

Desk-top mapping described in Section 2.5 above indicates the underlying natural ground conditions to be boulder clay with impeded drainage. In addition, there are a number of ponds and drainage ditches in the vicinity of the site.

Furthermore, the site was formerly occupied by haulage yard, and a earlier ground investigation has identified that a number of contaminants may be present. It is understood that the current application proposes no wholesale removal of any made ground, rather that the site will be capped with appropriate depths of clean imported material.

Thus, for the reasons outlined, it is considered that formal soakaways would not present a viable overall solution for the drainage of surface water from the site, and this level of the drainage hierarchy is surpassed.

3.3.1.2 Surface Water Bodies

An existing pipe connecting to the downstream network of open watercourses draining to Netherley Book is present within the site.

It is proposed that all surface water from the development will be drained to this existing pipe, thus complying with the required hierarchical approach as outlined above.

3.3.2 Foul Water

There are no public sewers in the immediate vicinity of the site.

Therefore, all new foul drainage from the proposed development plots will be dealt with by a new, appropriately sized wastewater treatment plant located within the site.

3.4 Design

3.4.1 Surface Water

Whilst the existing site comprises a number of concrete slabs and, until very recently so part-constructed buildings, these structures do not currently appear to be served by any formally installed drainage network, and thus the site is considered as “Greenfield” when determining allowable peak surface water discharge rates from the proposed residential development.

The “Greenfield Runoff Estimation for Sites” tool by HR Wallingford has been utilized to calculate the greenfield rates for various rainfall events as follows:

1-year event	-	3.32 l/sec
Q_{bar} [~2.3-year event]	-	3.82 l/sec
30-year event	-	6.49 l/sec
100-year event	-	7.94 l/sec.

Calculations in support of these discharge rates are contained in Appendix F to this report.

SC030219 'Rainfall Run-off Management for Developments' states in Principle 3.3: Small sites would require impractically small controls to achieve the required flow rates where these are calculated to be less than 5 l/s. In this instance the limiting discharge for the overall site will be restricted to no more than the above run-off rates for the critical 30-year and 100-year plus climate change events; and a maximum of 5 l/s during smaller return period storms.

In order to achieve this attenuation, it is proposed to use a system comprising permeable surface materials within the new access road and private parking areas, along with rainwater from new roofs draining into a suitable depth of voided sub-base [SuddsAgg or equivalent] with a minimum 30% voids ratio, wrapped in appropriate geo-textile membranes, and an appropriately sized flow control fitted within the outlet chamber. 423

This will limit the peak discharge rates into the downstream watercourse system during critical design events discharge from the proposed development as described above.

The roofs of the dwellings will drain into appropriate trapped gullies with a built-in filter and suitably sited catchpit chambers to prevent sediment and debris from passing and discharging into the attenuation system.

The installation of all SuDS elements on the site is to be undertaken strictly in accordance with manufacturer's or material supplier's recommendations.

The controlled surface water will then be discharged into the existing pipe crossing Gerrards Lane described in Section 2.3 above.

3.4.2 Foul Water

All new foul drainage from the proposed development plots will be dealt with by an appropriately sized, wastewater treatment plant located within the site, and the treated effluent discharged to the surface water pipe described previously, downstream of the surface water attenuation control manhole.

It is understood that an Environment Agency Consent was previously granted for the site, and this will be renewed as part of the new development.

3.5 Future Flood Risk

As a residential development, the vulnerability of the site is classified in Flood Risk and Coastal Change Guidance: Table 2 as “More Vulnerable”, and is considered as appropriate in Flood Zone 1 by reference to Table 3.

Flood Maps for Planning contained in Appendix D indicate that the site is not in an area liable to flooding from Rivers & Sea or Reservoirs, and only at very low risk of flooding from Surface Water, and as slab levels will be raised above existing site levels, this risk is considered negligible.

The drainage design principles proposed will ensure that flood risk is not increased elsewhere as a result of the development.

In the event of any events in excess of the design for the surface water drainage system that might cause surface flooding within the site, this will be routed as a result of the natural falls of the land away from the dwellings towards the existing wooded area of the site, and thus mimic the existing situation.

4.0 FUTURE MAINTENANCE

The shared SuDS elements of the proposed development along with the shared access arrangements will remain as private assets.

A resident's management company, registered at Companies House, will be set up with shares being owned initially by the Developer, and upon the sale of plots, individual shares will be transferred to the new owners.

These shares will attract an annual maintenance fee, paid to the management company, who will be responsible for on-going inspections to assess asset performance and condition, along with operational costs for regular maintenance or remedial works as appropriate along with other shared responsibilities, for the lifetime of the development in accordance with the following inspection and maintenance plan.

4.1 Permeable Surfaces

Biannual inspection of all permeable surfaces should be undertaken.

Litter, leaves or other large debris should be removed, and the surfaces swept/raked as required, all in accordance with the paving/surfacing manufacturers' or suppliers' advice.

4.2 Site Drainage

It is important that the drainage infrastructure leading to the attenuation system is maintained on a regular basis as follows:

It is recommended that that all drainage is inspected / surveyed and its condition recorded by the developer immediately after the construction phase.

Subsequently, it is recommended that a quarterly inspection of all inspection chambers including the flow control, and rain water gullies is carried out for the first 12 months following occupation.

Thereafter, all chambers and rain water gullies should be checked for silt build-up annually, and silt or debris removed if required.

This inspection and maintenance régime will secure the operation of the drainage scheme throughout the lifetime of the development.

5.0 CONCLUSION

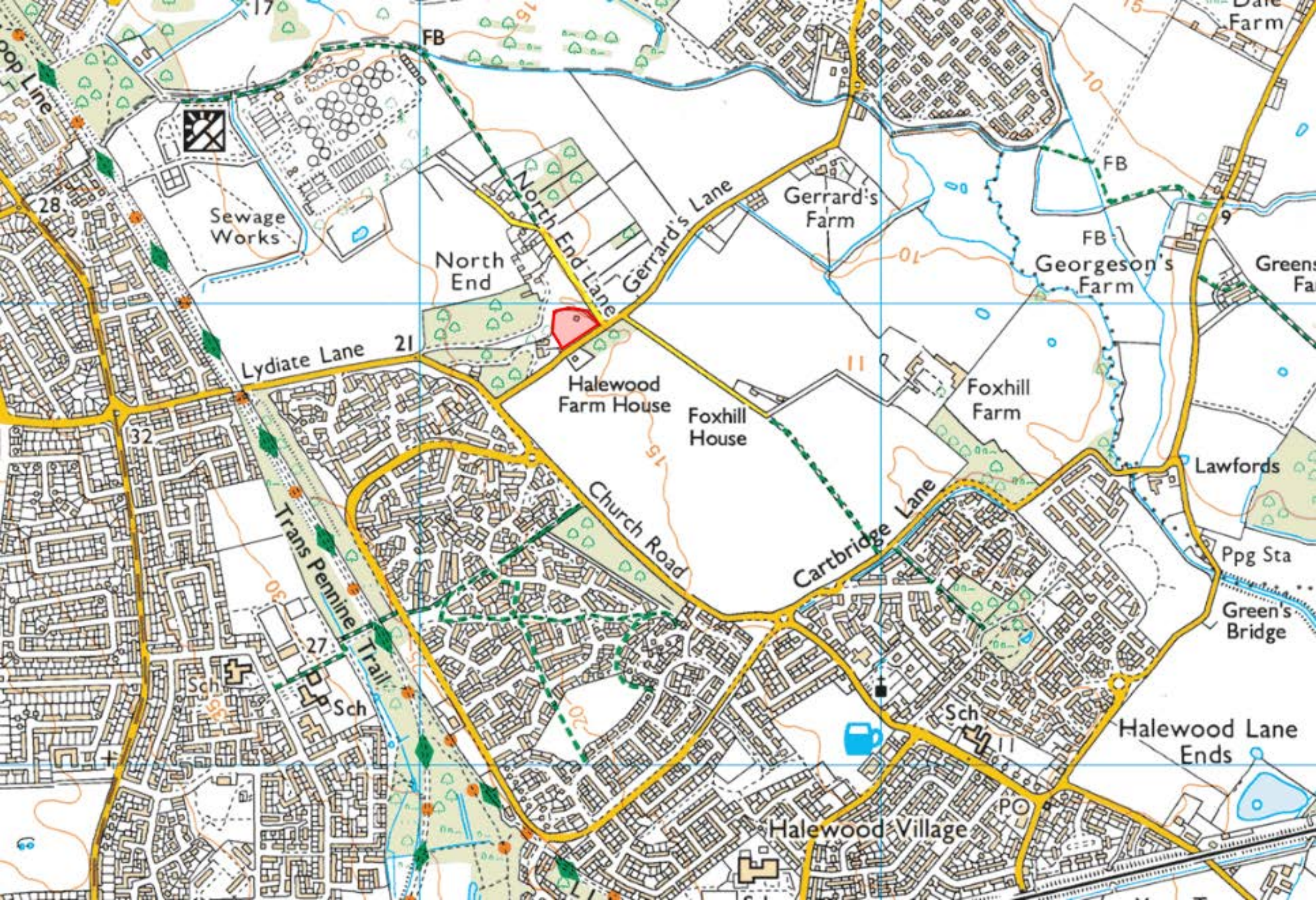
The site is considered to be at negligible risk from flooding.

It is proposed to drain the site on a separate system of foul and surface water drainage with foul water discharging to a wastewater treatment plant with treated effluent discharging to a downstream watercourse system; and surface water disposal being considered in accordance with the preferred hierarchy of options, and attenuated to a peak rate in line with existing Greenfield run-off, taking into account the effects of climate change.

These principles are in accordance with the Technical Guidance to The National Planning Policy Framework, and Building Regulations: Approved Document H3.

Based on all the above, the proposal will not increase flood risk elsewhere.

APPENDIX A – Location Plan and Aerial Image





APPENDIX B – Topographical Survey



COORDINATED STATIONS			
STATION	EASTING	NORTHING	LEVEL (m)
GPS1	344309.514	386894.614	17.36
GPS2	344365.560	386934.843	16.08
STNA	344406.457	386960.886	15.40

ABBREVIATIONS

AV	AIR VALVE/VENT	IC	INSPECT CHAMBER
BOL	BOLLARD	IL	INVERT LEVEL
BB	BELISHA BEACON	JKW	JAPANESE KNOTT WEED
BM	BENCH MARK	LH	LAMP HOLE
BL	BED LEVEL	LP	LAMP POST
BS	BUS STOP	NP	NAME PLATE
BT	BRITISH TELECOM	MH	MANHOLE
CL	COVER LEVEL	PS	POST/SIGN POST
DI	DILAPIDATED	PB	POST BOX
Dis	DISUSED	PK	UNKNOWN SERVICE
EL	EAVES LEVEL	RE	RODDING EYE
ELE	ELEC JUNCT. BOX	RL	RIDGE LEVEL
EP	ELECTRICITY POLE	RS	ROAD SIGN
FH	FIRE HYDRANT	ST	STOP TAP
FL	FLOOR LEVEL	TH	TRIAL HOLE
FOS	FULL OF SEDIMENT	TL	TRAFFIC LIGHT
FP	FLAG POLE	TP	TELEGRAPH POLE
G	GULLY	TV	CABLE TV BOX
GM	GAS METER	UH	UNABLE TO LIFT
GV	GAS VALVE	WM	WATER METER

SYMBOLS

	SURVEY STATION		TREE
	O/H ELEC CABLE		BENCH MARK
	O/H PHONE LINE		TRIAL PIT
	CANOPY/HEDGE		BOREHOLE

NOTES

- A) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN
- B) O/S USED AND ORIENTATED TO TRUE NORTH
- C) LEVELS IN METRES RELATED TO G.P.S.
- D) DRAINAGE INFORMATION TAKEN FROM LOCAL AUTHORITY RECORDS. INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING

Rev	Description	Date
PROPOSED DEVELOPMENT AT GERRARDS LANE, HALEWOOD		
ABBEY PRESTIGE HOMES		
TOPOGRAPHICAL SURVEY		
AP001/TOO	Surveyed	A. BAYBUTT
	Drawn	I. GREEN
	Date	FEBRUARY 2021
	Scale	1:500 @ A1
Surveying Consultants Ltd LAND SURVEYORS & SITE ENGINEERS AYREFIELD COTTAGE AYREFIELD ROAD ROBY MILL UPHOLLAND LANGASHIRE WN8 0QP TEL: 01257 251554 MOBILE: 07710 308709 WEBSITE : www.rjpsurveyors.co.uk E-MAIL: mail@rjpsurveyors.co.uk		

APPENDIX C – Soil Type from Soilscales Web-Site



Search results:

Lat, Lon: 53.376473, -2.838214
East, North: 344334, 386950
[View soil information](#)

Legend

Search

Soil information

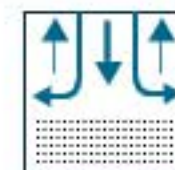
Slowly permeable seasonally wet
slightly acid but base-rich loamy and
clayey soils

Texture:
Loamy and clayey

Coverage:
England: 19.9% Wales: 2.4%
England & Wales: 17.5%

Selected area:
369km²

Drainage:
Impeded drainage



Fertility:
Moderate



Habitats:
Seasonally wet pastures and
woodlands

Landcover:
Grassland and arable some
woodland

Carbon:
Low

Drains to:
Stream network

Adjust transparency

APPENDIX D – EA Flood Map for Planning Report & Long-term Risk Mapping

Flood map for planning

Your reference
CFC20061

Location (easting/northing)
344334/386950

Created
3 Jun 2021 14:47

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

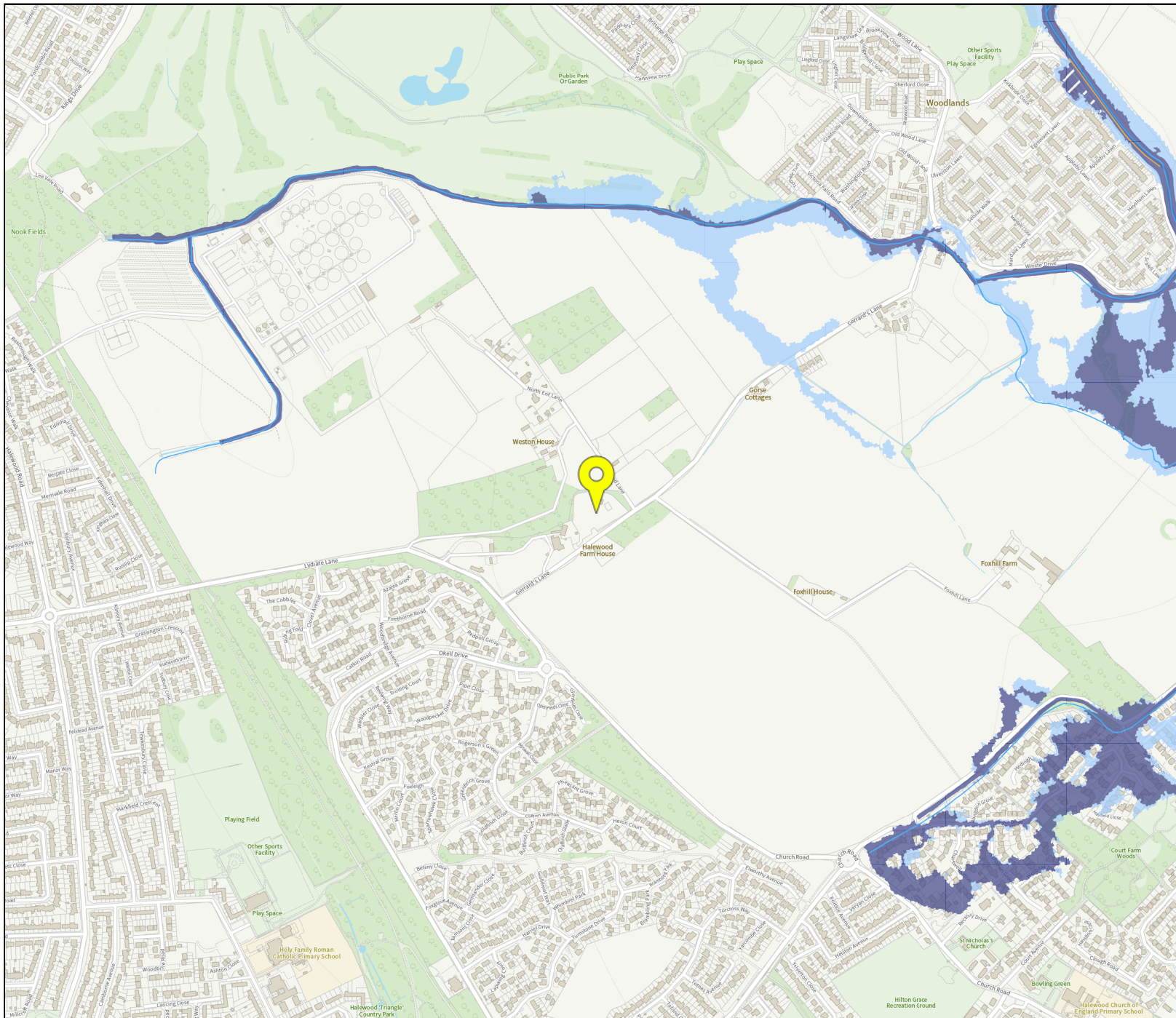
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

The Open Government Licence sets out the terms and conditions for using government data.
<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>



Flood map for planning

Your reference
CFC20061

Location (easting/northing)
344334/386950

Scale
1:10000

Created
3 Jun 2021 14:47

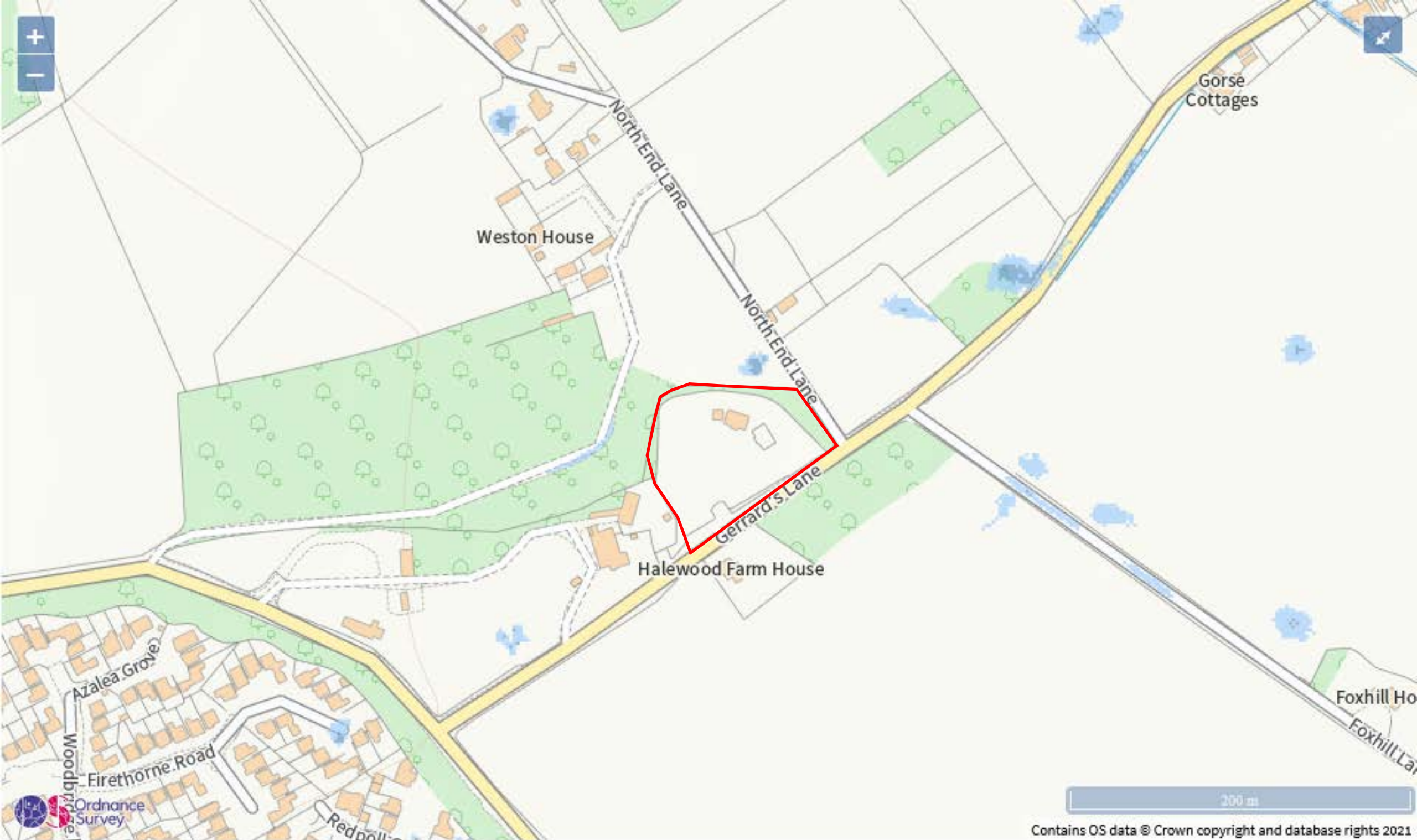
-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area

0 100 200 300m



Extent of flooding from rivers or the sea

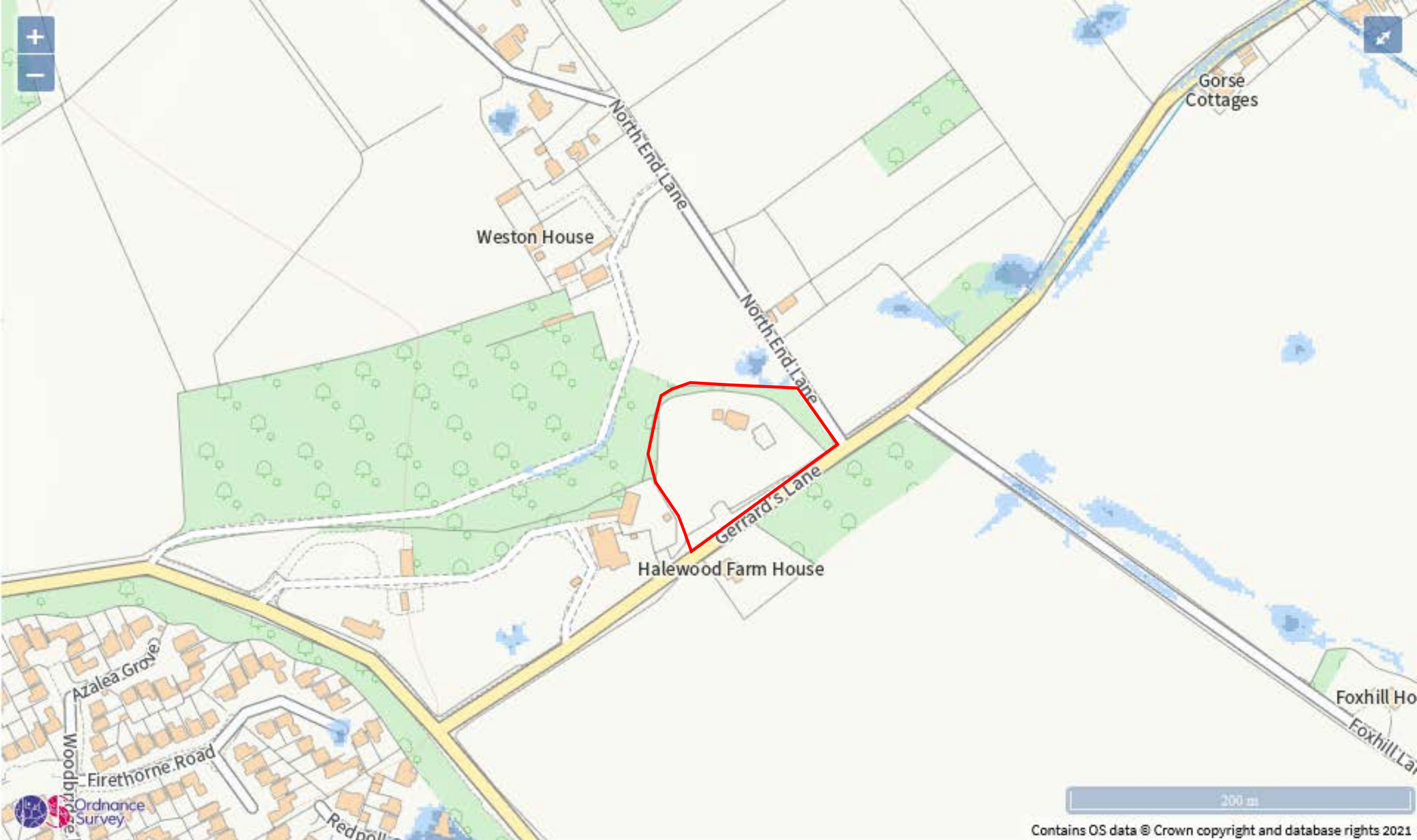
● [High](#) ● [Medium](#) ● [Low](#) ● [Very low](#)



Surface water flood risk: water depth in a high risk scenario

Flood depth (millimetres)

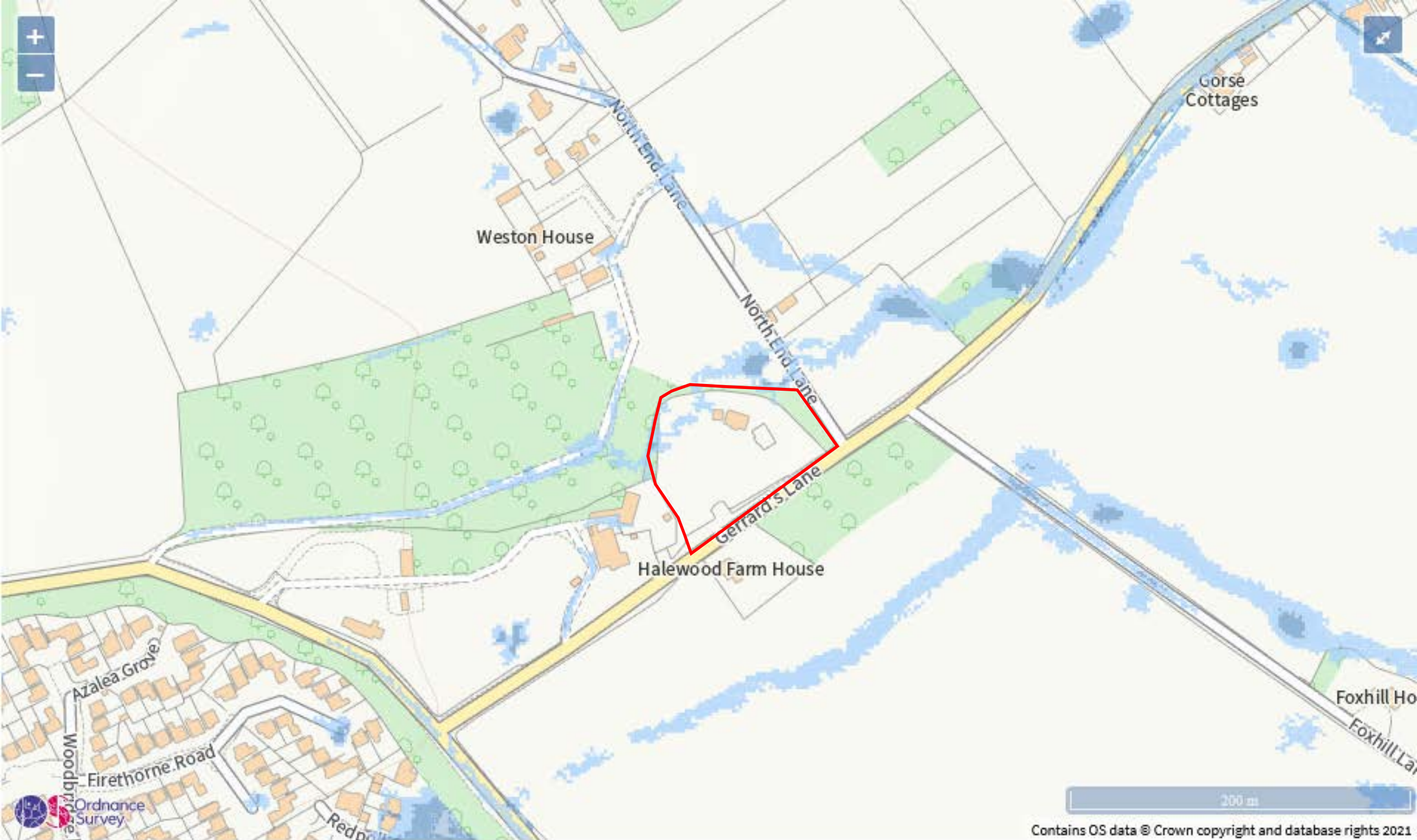
Over 900mm 300 to 900mm Below 300mm



Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm



Extent of flooding from reservoirs

● Maximum extent of flooding

APPENDIX E – Proposed Site Plan

Key
Subject to approval

Grassed area

Buff tarmac to driveway and paths

Block paviors to new roads

New shrub planting

New trees

Note
*for existing trees to be retained/removed
please refer to tree survey*



1 Proposed Site Plan
1:250

APPENDIX F – Greenfield Runoff Estimation

Calculated by:	Tim Carr
Site name:	Gerrards Lane
Site location:	Halewood

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.

Site Details

Latitude:	53.37654° N
Longitude:	2.83795° W
Reference:	1202253195
Date:	Jun 03 2021 14:54

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.673
-----------------------	-------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	803	803
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	3.82	3.82
1 in 1 year (l/s):	3.32	3.32
1 in 30 years (l/s):	6.49	6.49
1 in 100 year (l/s):	7.94	7.94
1 in 200 years (l/s):	9.04	9.04

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at 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 www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of 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, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.