

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project Sharples - The Red House, 13 Broadhalgh Ave				Job Ref. rep-tjba-sharples-the red house-DSR-170822	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 1 / 0	
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History.

Revision	Date	Reason
0	Aug 2022	Original to support planning application.

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Introduction.

Reference:

Reference document & policy requiring a drainage strategy report.

A planning application for development is to be submitted for the erection of 2 No detached residential dwellings in what was previously the rear garden area to No.13 Broadhalgh Avenue.

As part of the planning application, a Drainage Strategy Report is required to address issues regarding sustainable drainage principles for the proposed development.

Purpose of Report:

The primary purpose of this report is to identify specific drainage proposals for parts of the proposed Site in accordance with the national drainage hierarchy for surface water disposal & exceedance characteristics, also considering the proposed end adopters and their requirements.

Regarding Site assessment, this report will appraise the existing Site and local drainage infrastructure, assess the suitability of the proposed development, giving recommendations for drainage design & management, specifically for approval of the LLFA/EA/sewerage undertakers, as applicable.

General principles:

Drainage from new developments is to be designed to follow the national drainage hierarchy for surface water discharge to the following networks in order of preference:

- *infiltration*
- *watercourse*
- *public sewer*

Flow rates (existing & proposed) are to be estimated for approval using the following methodology:

- *Development should aim to deliver greenfield runoff on greenfield sites up to a 100yr rainfall event, considering climate change.*
- *Development should aim for a minimum reduction in surface water runoff rates of 50% for brownfield sites on a 1yr rainfall event.*
- *Development should be designed so that there is no flooding to the development in a 30yr event and so that there is no property flooding in a 100yr event considering climate change.*

Plans.

Location Plan.

Refer to the appended Location Plan.

The Site is within a predominantly residential area with some immediate local amenities, such as shops, public houses, and sports facilities in the wider area.

The closest open watercourse is nominally 200m northwest of the Site.

Site Plan.

The overall pre-development Site comprises the existing Red House building to the north Side and the gardens to the south which forms the area the new dwellings will be located within. A new access driveway will be constructed to the east side of The Red House leading to the new properties.

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The predevelopment areas are:

- *Total area* 1875 *sqm*
- *Hardstanding area (impermeable)* 0 *sqm*
- *Soft landscaped area (permeable)* 1875 *sqm*.

Desk Surveys & Investigations.

Existing and proposed topography.

A topographic survey of the Site was undertaken for the previous planning application.

The Site has remained the same apart from a Site scrape ready for development.

Levels are nominally 152.50m aOD to the north at Broadhalgh Road and falling to approximately 150.00m aOD in the position of the proposed dwellings.

Geology & Site Investigations.

Geological maps of the local area suggest the Site is underlain by Devensian till (boulder clay).

Borehole Records.

There were no relevant boreholes within close proximity to the Site.

United Utilities Records.

United Utilities records indicated a 225dia combined sewer flowing east beneath Broadhalgh Road. There is also a 225dia combined sewer in Moorgate Avenue to the east which picks up the drainage from the rear of the property which share the east boundary of the Site.

Assessments.

Flood zone category.

Refer to the .gov flood maps appended. The Site is within Flood Zone 1, ie a LOW probability of flooding.

Watercourses – No risk from watercourses in the local area.

Surface water – No risk of surface water flooding to the Site.

Canals/Artificial Water Bodies – No risk.

Reservoirs – Not known to be a risk.

Climate change impacts.

Climate change allowances allow for uncertainty in the climate model, and the resultant change assumed through time. Allowances are thus related to the type of development and the potential lifetime expected of such development as per the Environment Agency table below:

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%

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Residential developments are classified within the '2080s' timeframe resulting in a 40% climate change allowance to be included on the predicted extreme rainfall models.

Existing surface water system.

The Site comprises approximately 1875 sqm of impermeable area.

The existing Red House has a connection to the UU sewer, but it is too high for connection of the new properties.

For the purposes of the assessment, the Site shall be classified as greenfield.

Hydrological characteristics for the site were obtained from the HR Wallingford mapping database:

SAAR (mm) 	1151
M5-60 rainfall depth (mm) 	20
'r' ratio M5-60 / M5-2day 	0.3
FEH/FSR conversion factor 	1.11
Hydrological region 	10

EXISTING GREENFIELD FLOW ESTIMATION

Attenuation design in accordance with CIRIA publication C753 - The SUDS Manual

Tedds calculation version 1.0.04

EA_Defra method

Site characteristics

Location	Other
Hydrological region	10
Soil type (Wallingford Procedure W.R.A.P map)	4
Standard percentage runoff	SPR = 0.47
Average annual rainfall	SAAR = 1151 mm
5 year return period rainfall of 60 minute duration	M5_60min = 20.0 mm
Ratio 60-minute to 2 day rainfalls of 5 year return	r = 0.30
Rainfall intensity increase due to global warming	p _{climate} = 0%
Impervious area req. attenuation storage	a = 100.0 %

Catchment details

Subcatchment	Name	Area (ha)	PIMP (%)	Impermeable area (ha)
1	13 Broadhalgh Ave Site	0.19	0.0	0.00
Total		0.19	0.0	0.00

Greenfield runoff rates

Catchment area	AREA = 50.00 hectare
Greenfield runoff rate (50 hectare site)	$\dot{Q}_{\text{rural}} = 0.00108 \text{ m}^3/\text{s} * (\text{AREA}/1\text{km}^2)^{0.89} * (\text{SAAR}/1\text{mm})^{1.17} * \text{SPR}^{2.17} = \mathbf{431.9 \text{ l/s}}$
Greenfield runoff rate	$\dot{Q} = \dot{Q}_{\text{rural}} / \text{AREA} * A = \mathbf{1.6 \text{ l/s}}$
Greenfield runoff rate per unit area	$\dot{Q}_A = \dot{Q} / A = \mathbf{8.6 \text{ l/s/hectare}}$

Estimated site discharges

FSR growth rate (1 year)	FSR _{1yr} = 0.87
Discharge (1 year)	Q _{1yr} = $\dot{Q} * \text{FSR}_{1\text{yr}} = \mathbf{1.4 \text{ l/s}}$
FSR growth rate (30 year)	FSR _{30yr} = 1.70
Discharge (30 year)	Q _{30yr} = $\dot{Q} * \text{FSR}_{30\text{yr}} = \mathbf{2.8 \text{ l/s}}$
FSR growth rate (100 year)	FSR _{100yr} = 2.08
Discharge (100 year)	Q _{100yr} = $\dot{Q} * \text{FSR}_{100\text{yr}} = \mathbf{3.4 \text{ l/s}}$

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Pass Forward Flow Rates:

The existing greenfield flow rate is c 3.4l/s. It is normal practice to limit proposed flows to a minimum of 5l/s due to the potential for blockages and so the proposed pass forward flow rate from the should be restricted to max 5l/s for surface water discharge only.

Proposed Surface Water System.

Following the guidance of hierarchy for disposal of surface water (SUDS):

- **INFILTRATION:** BGS maps suggest the subsoils comprise glacial Devensian till (boulder clay).
- Site investigations have been undertaken and have proved stiff clay at shallow depth – nominally 500mm to approx 2500mm where bedrock was noted.
- **WATERCOURSE:** There are no suitable watercourses for the discharge and connection of Site surface water. All are distant and through multiple 3rd party land which would be cost prohibitive.
- **SEWER:** Although the existing sewer at the Red House is too high to connect into, there are available combined sewers to the rear of properties on Moorgate Avenue.
- Permission has been sought to connect via one of the unmapped UU branches at the rear of No.25. The pass forward flow rate for Site surface water should not exceed 5l/s for up to and including the 100yr+40% rainfall event.

Proposed Foul Water System.

Foul water flows from the proposed development will need to be kept separate from surface water flows, and combined in the last manhole on Site and discharging to public combined sewer.

Additional Recommendations.

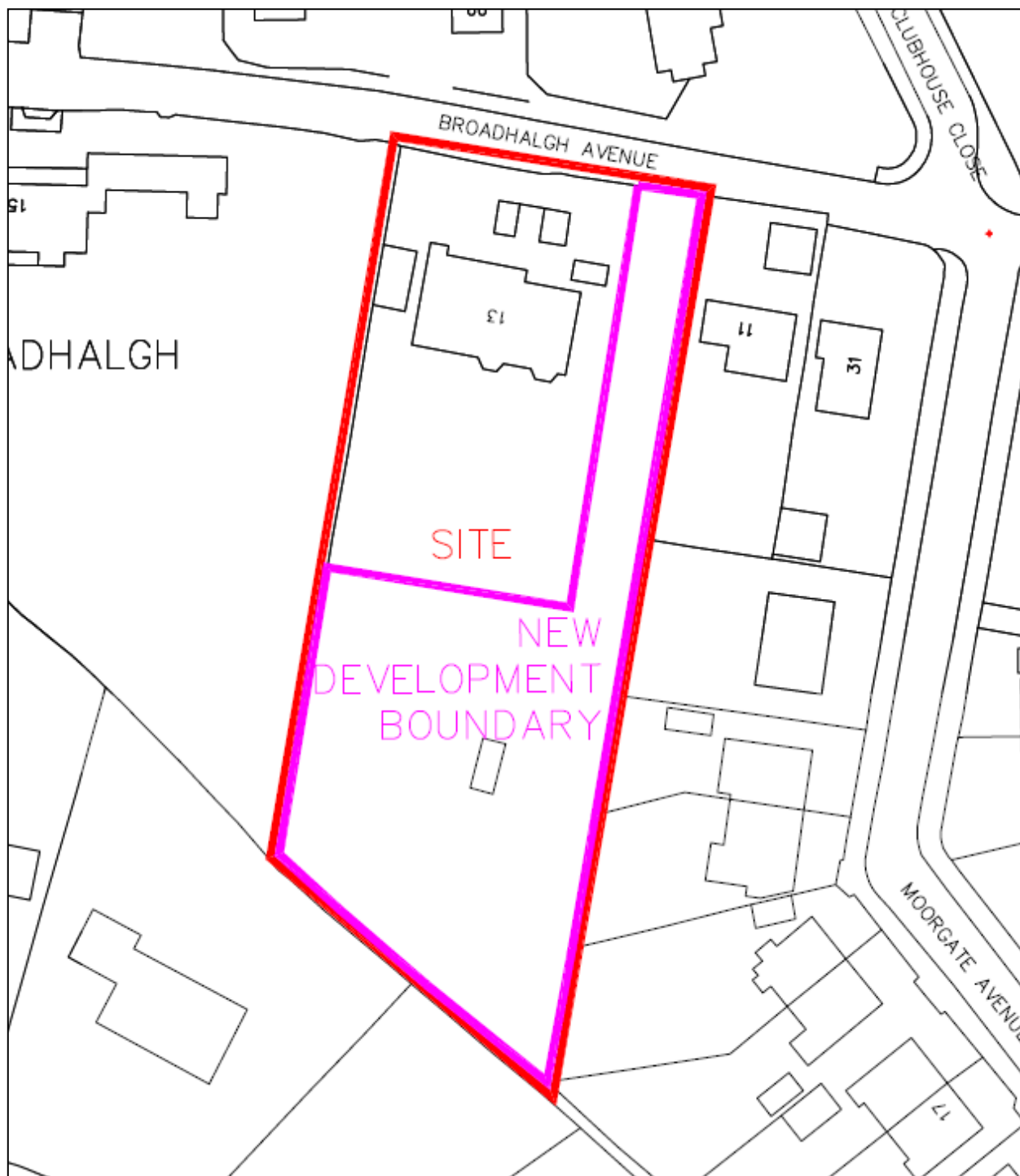
This report should be submitted as part of a planning application to RMBC, and approved in writing by the RMBC Drainage Officer. Once the proposal and flow rates have been agreed, detailed design can be undertaken to address any relevant planning conditions.

An S106 connection application to United Utilities will need to be submitted & approved.

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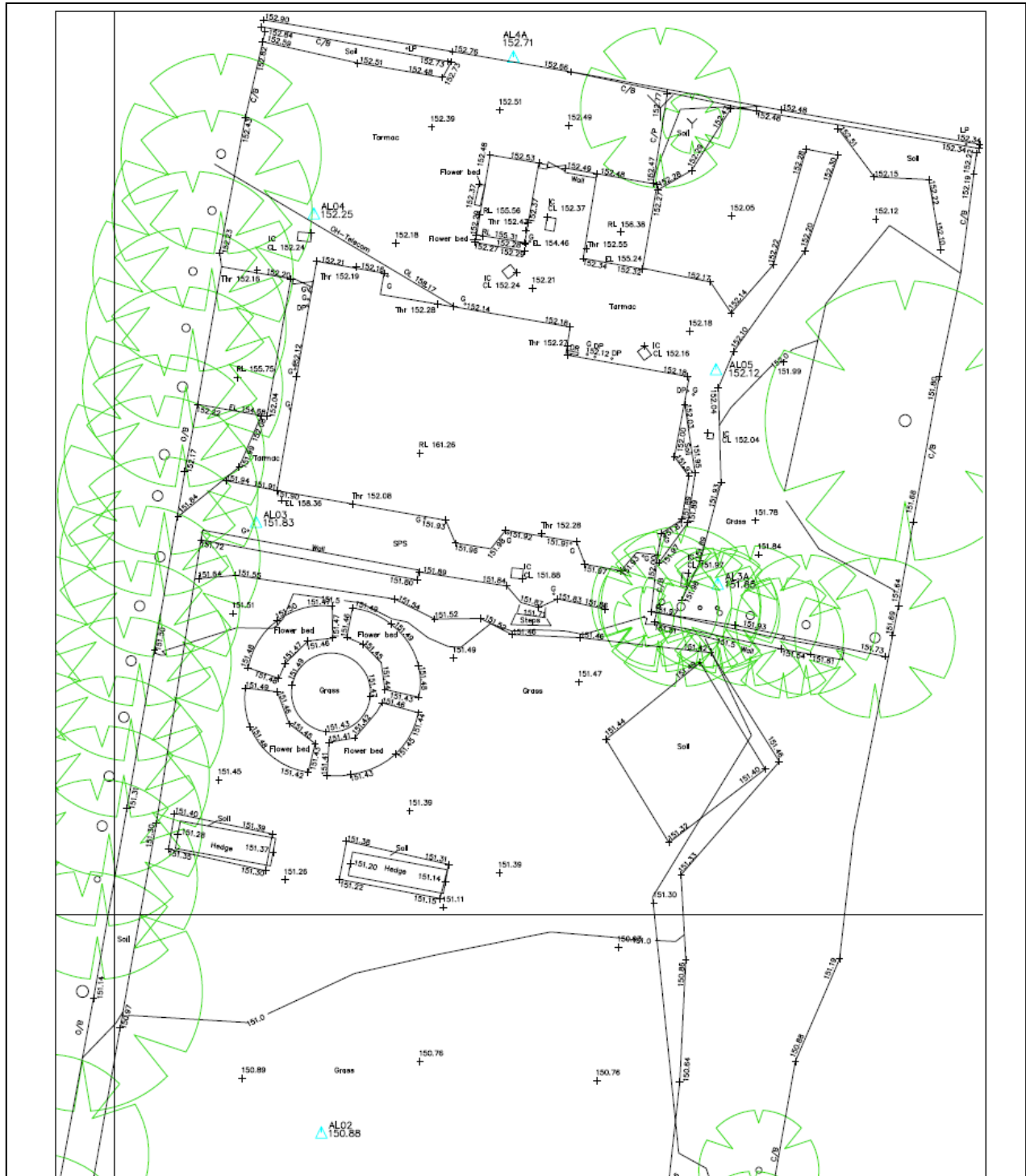
Appendix.

Location Plan.



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Existing Site/Topographic Plans





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Proposed Site Plans



Existing Impermeable Area Plan

N/A, none available.

Proposed Impermeable Area Plan

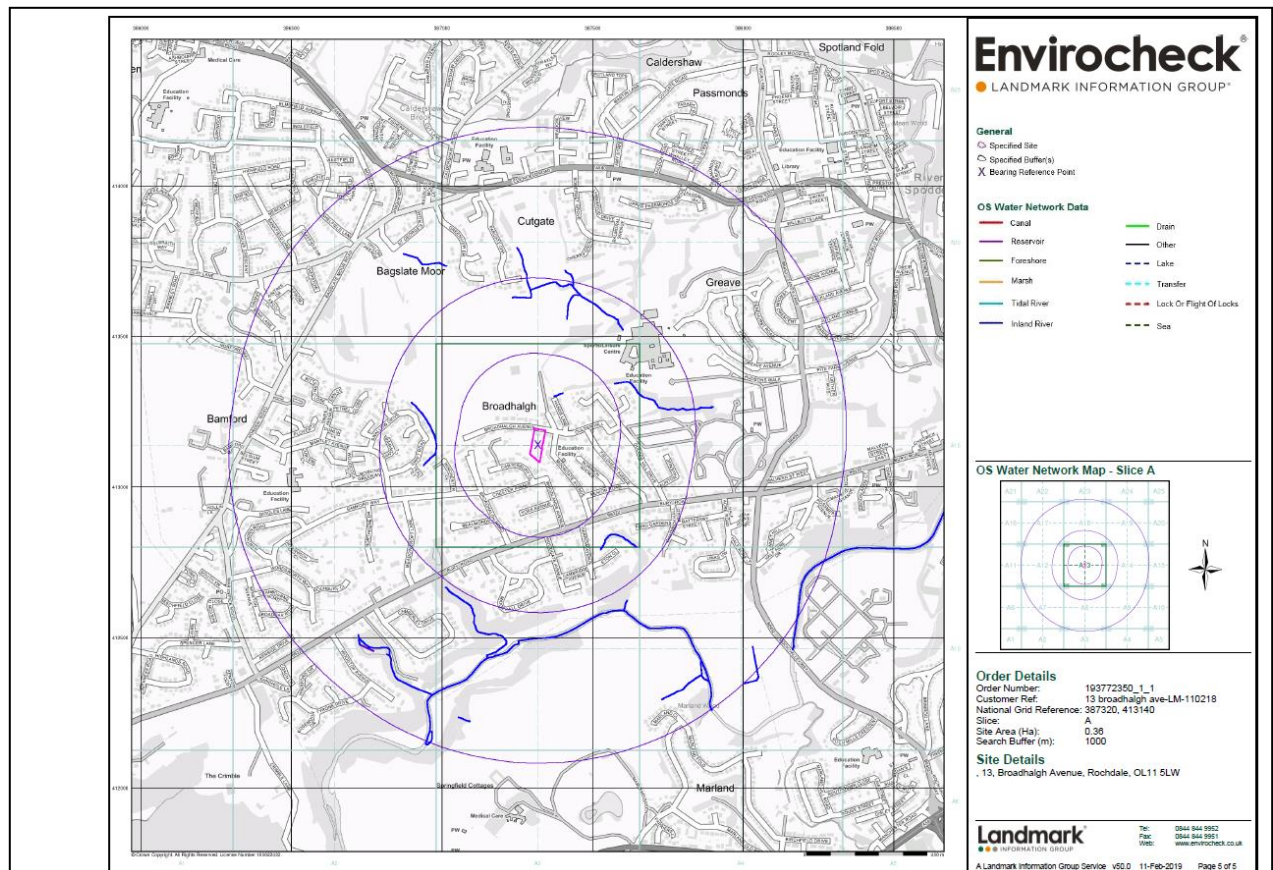
N/A, none available.

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Local BGS Borehole Records

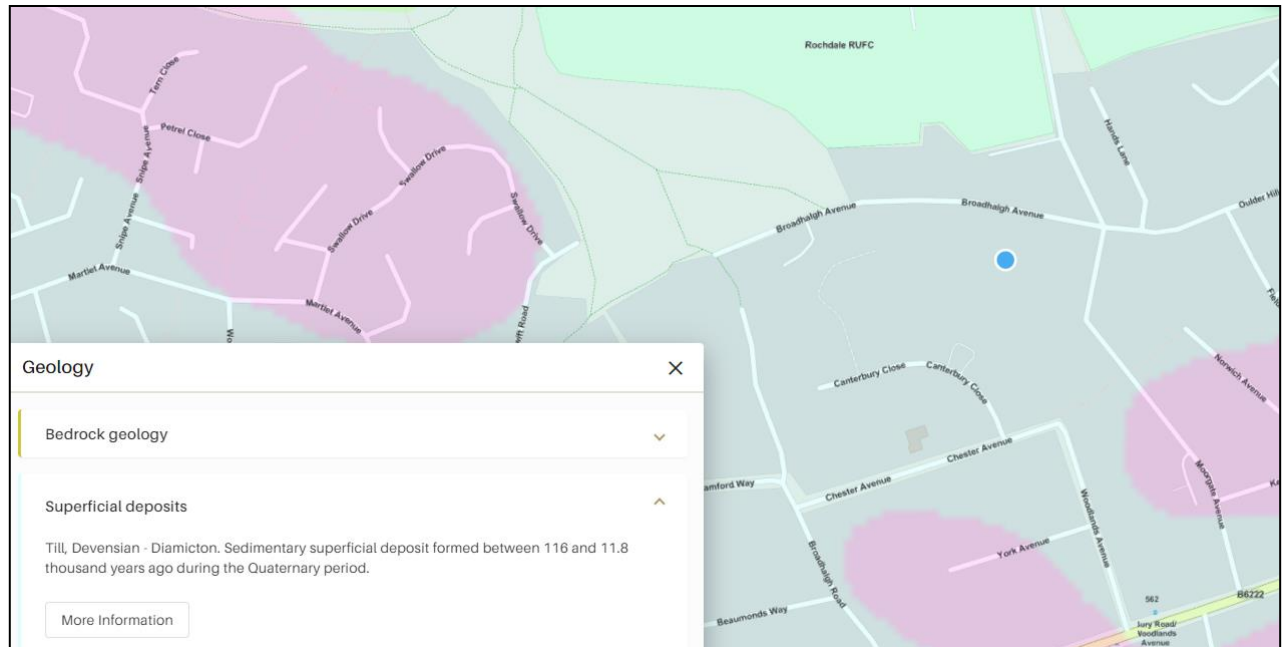
N/A, none available.

Landmark Watercourse Map

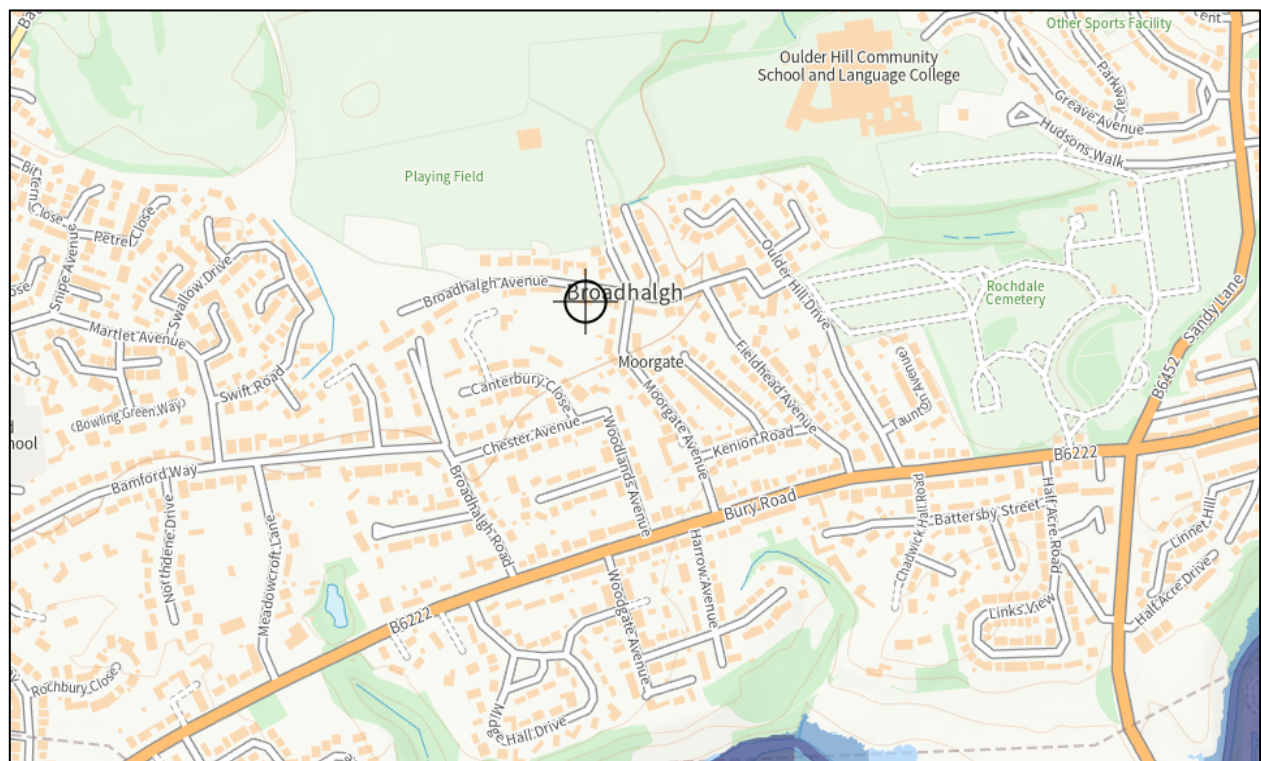


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BGS Superficial Geology Maps

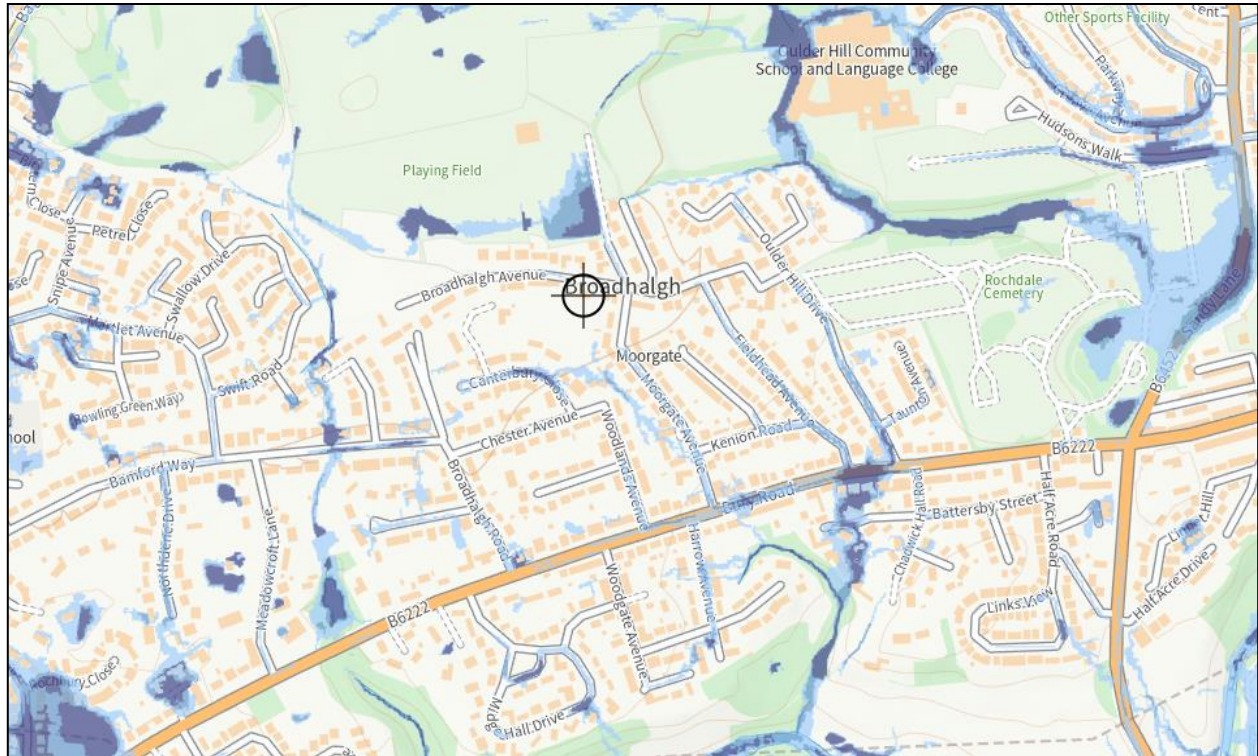


Gov River Flood Map (Flood Zones).



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Gov Surface Water Flood Map.



Drainage Calculations

N/A.

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Soil Permeability values.

Typical values of soil permeability

Some typical values of permeability coefficient are given below for different soil types. It refers to normally consolidated condition unless otherwise mentioned. These values should be used only as guideline for geotechnical problems; however, specific condition of each engineering problem often needs to be considered for an appropriate choice of geotechnical parameters.

Description	USCS	min (m/s)	max (m/s)	Specific value (m/s)	Reference
Well graded gravel, sandy gravel, with little or no fines	GW	5.00E-04	5.00E-02		[1].
Poorly graded gravel, sandy gravel, with little or no fines	GP	5.00E-04	5.00E-02		[1].
Silty gravels, silty sandy gravels	GM	5.00E-08	5.00E-06		[1].
Alluvial sand and gravel	(GM)	4.00E-04	4.00E-03		[2&3 in 4]
Clayey gravels, clayey sandy gravels	GC	5.00E-09	5.00E-06		[1].
Well graded sands, gravelly sands, with little or no fines	SW	1.00E-08	1.00E-06		[1].
Very fine sand, very well sorted	(SW)			8.40E-05	[5].
Medium sand, very well sorted	(SW)			2.23E-03	[5].
Coarse sand, very well sorted	(SW)			3.69E-01	[5].
Poorly graded sands, gravelly sands, with little or no fines	SP	2.55E-05	5.35E-04		[1]. [2&3 in 4]
Clean sands (good aquifers)	(SP-SW)	1.00E-05	1.00E-02		[5].
Uniform sand and gravel	(SP-GP)	4.00E-03	4.00E-01		[2&3 in 4]
Well graded sand and gravel without fines	(GW-SW)	4.00E-05	4.00E-03		[2&3 in 4]
Silty sands	SM	1.00E-08	5.00E-06		[1].
Clayey sands	SC	5.50E-09	5.50E-06		[1]. [5]
Inorganic silts, silty or clayey fine sands, with slight plasticity	ML	5.00E-09	1.00E-06		[1].
Inorganic clays, silty clays, sandy clays of low plasticity	CL	5.00E-10	5.00E-08		[1].
Organic silts and organic silty clays of low plasticity	OL	5.00E-09	1.00E-07		[1].
Inorganic silts of high plasticity	MH	1.00E-10	5.00E-08		[1].
Inorganic clays of high plasticity	CH	1.00E-10	1.00E-07		[1].
Compacted silt	(ML-MH)	7.00E-10	7.00E-08		[2&3 in 4]
Compacted clay	(CL-CH)	-	1.00E-09		[2&3 in 4]
Organic clays of high plasticity	OH	5.00E-10	1.00E-07		[1].
Peat and other highly organic soils	Pt	-	-		

Site Photographs.

Not used.

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Drainage Utilities Maps.

