

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 1 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

History.

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

Contents.

History.	1
Contents.	1
Introduction.	2
Reference:	2
Purpose of Report:	2
Plans.	2
Location Plan.	2
Site Plan.	2
Desk Surveys & Investigations.	3
Existing and proposed topography.	3
Geology & Site Investigations.	3
Borehole Records.	3
United Utilities Records.	3
Assessments.	3
Flood zone category.	3
Climate change impacts.	3
Existing surface water system.	4
Proposed Surface Water System.	5
Proposed Foul Water System.	5
Additional Recommendations.	5
Appendix.	6
Location Plan.	6
Existing Site/Topographic Plans.	6
Proposed Site Plans.	7
Existing Impermeable Area Plan.	8
Proposed Impermeable Area Plan.	9
Local BGS Borehole Records.	9
Landmark Watercourse Map.	9
BGS Superficial Geology Maps.	9
Gov River Flood Map (Flood Zones).	10
Gov Surface Water Flood Map.	10
Drainage Calculations.	11
Soil Permeability values.	11
Site Photographs.	12
Drainage Utilities Maps.	12

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 2 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

Introduction.

Reference:

Reference document & policy requiring a drainage strategy report.

A planning application for development is to be submitted for the erection of 4No. semi-detached residential dwellings. The Site is currently vegetated open space.

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, and is enclosed by Brassey Street (a predominantly unmade road) to the northwest, and Boarshaw Road (adopted highway) to the southeast.

White Brook, a tributary of the River Irk, is located nominally 60m southeast, in a small valley.

Site Plan.

The overall pre-development Site comprises a grassed surface enclosed between terraced housing neighbouring to the southwest, and a working mans club and car park neighbouring to the northeast.

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 3 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

The Site is absent of structures other than bollards and a cherry tree to the rear boundary, and two trees lining the front boundary (sycamore & mountain ash).

The predevelopment areas are:

- *Total area* 600 *sqm*
- *Hardstanding area (impermeable)* 0 *sqm*
- *Soft landscaped area (permeable)* 600 *sqm*.

Desk Surveys & Investigations.

Existing and proposed topography.

No topographic survey of the Site has been undertaken, but the Site is relatively level, with falls past Boarshaw Road toward Whit Brook.

OS plans of the local area indicate a level of 91.70m aOD centre of Boarshaw Road in front of the Site.

Geology & Site Investigations.

Geological maps of the local area indicate the Site is underlain by Devensian glaciofluvial sand & gravel.

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 southeast below Brassey Street to the rear of the Site. There is also a 300dia combined sewer flowing to the southeast below Boarshaw Road to the front 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%

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 4 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

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 600sqm total area, all of which is vegetated and considered permeable.

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) 	1034
M5-60 rainfall depth (mm) 	20 ▾
'r' ratio M5-60 / M5-2day 	0.3 ▾
FEH/FSR conversion factor 	1.1
Hydrological region 	10

EXISTING GREENFIELD FLOW ESTIMATE

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

Tedds calculation version 1.0.04

Pre post runoff 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 = 1034 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%
Routing coefficient	C _r = 1.30
Volumetric runoff coefficient	C _v = 0.75

Catchment details

Subcatchment	Name	Area (ha)	PIMP (%)	Impermeable area (ha)
1	Boarshaw Road	0.06	0.0	0.00
Total		0.06	0.0	0.00

Greenfield runoff rates

Catchment area	AREA = 50.00 hectare
Greenfield runoff rate (50 hectare site)	$\dot{Q}_{\text{rural}} = 0.00108 \text{ m}^3/\text{s} * (\text{AREA}/1\text{km}^2)^{0.89} * (\text{SAAR}/1\text{mm})^{1.17} * \text{SPR}^{2.17} = \mathbf{381.0 \text{ l/s}}$
Greenfield runoff rate	$\dot{Q} = \dot{Q}_{\text{rural}} / \text{AREA} * A = \mathbf{0.5 \text{ l/s}}$
Greenfield runoff rate per unit area	$\dot{Q}_A = \dot{Q} / A = \mathbf{7.6 \text{ l/s/hectare}}$

Estimated site discharges

FSR growth rate (1 year)	FSR _{1yr} = 0.87
Discharge (1 year)	Q _{1yr} = $\dot{Q} * \text{FSR}_{1\text{yr}} = \mathbf{0.4 \text{ l/s}}$
FSR growth rate (30 year)	FSR _{30yr} = 1.70
Discharge (30 year)	Q _{30yr} = $\dot{Q} * \text{FSR}_{30\text{yr}} = \mathbf{0.8 \text{ l/s}}$
FSR growth rate (100 year)	FSR _{100yr} = 2.08
Discharge (100 year)	Q _{100yr} = $\dot{Q} * \text{FSR}_{100\text{yr}} = \mathbf{1.0 \text{ l/s}}$

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 5 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

Pass Forward Flow Rates:

The existing greenfield flow rate is circa 1.0l/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 development should be restricted to max 5l/s for surface water discharge only should infiltration not be a suitable method of discharge from the Site.

Proposed Surface Water System.

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

- **INFILTRATION:** BGS maps suggest the subsoils comprise Devensian glaciofluvial sand & gravel, which is a permeable often with high infiltration rates suitable of sustaining infiltration techniques such as soakaways & permeable paving etc.
- Site investigations will need to be undertaken to confirm if soils are suitable for infiltration.
- **WATERCOURSE:** The closest watercourse is approximately 60m southeast of the Site, past a main highway, and other 3rd party land.
- Due to the distance and costs involved, this method of disposing of surface water is not thought to be suitable.
- **SEWER:** If infiltration is not suitable as for surface water discharge, then discharge to sewer will be required as the next reasonable point of discharge.

Proposed Foul Water System.

Foul water flows from the proposed development will need to be kept separate from surface water flows. Foul should either be connected directly to the local combined network if surface water is to be discharge via soakaway, or combined in the last manhole on Site if surface water is to be discharged to sewer.

Additional Recommendations.

Site investigations will need to be undertaken to confirm the whether the Site subsoil is a suitable material for infiltration, with permeability tests completed to ascertain infiltration coefficients for detailed drainage design.

If infiltration coefficients are suitable, then surface water should discharge via this method.

If infiltration is proved inefficient, surface water will have to be discharge to the local sewer network at not greater than 5l/s.

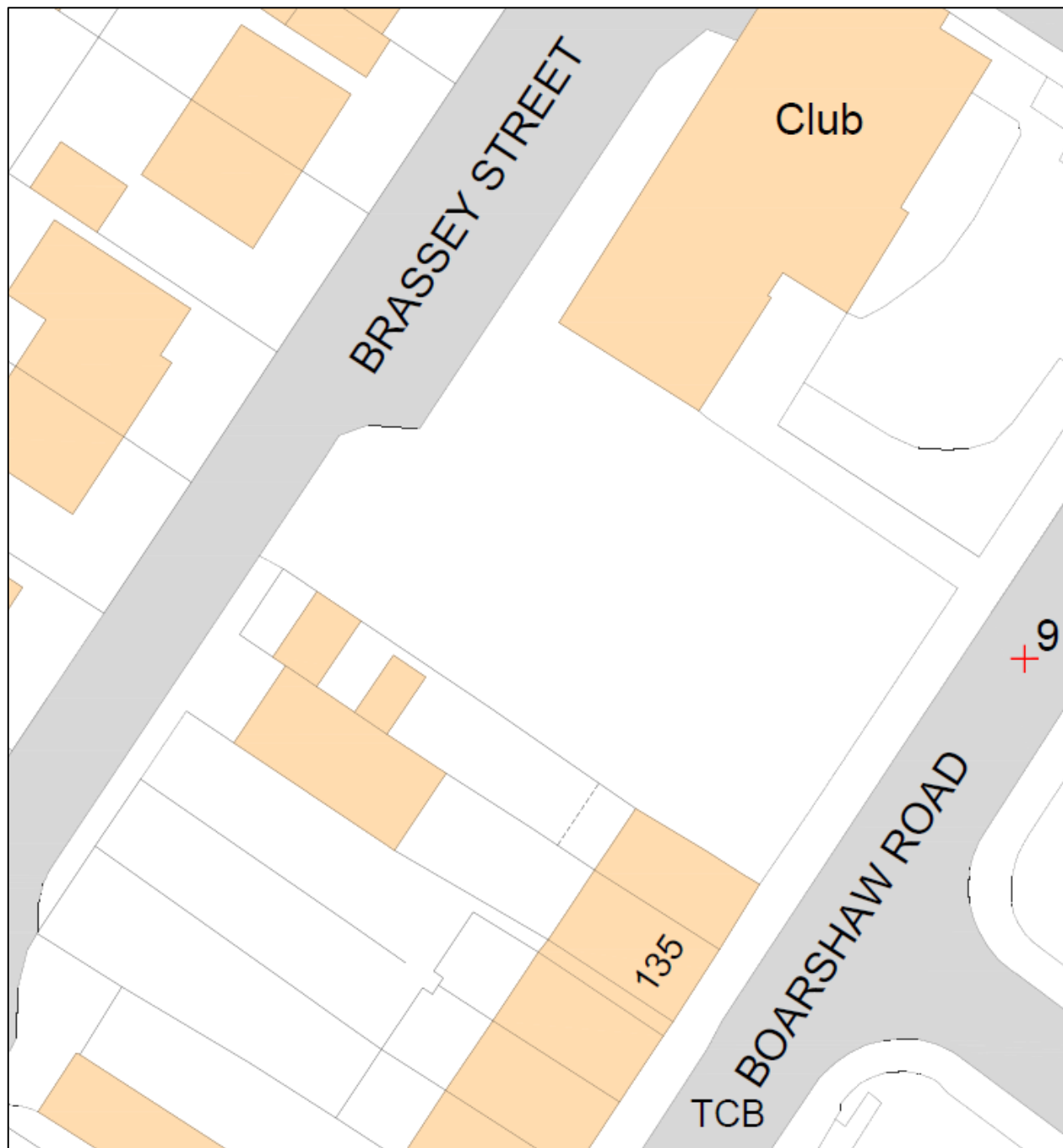
This report should be submitted as part of a planning application to RMBC, and approved in writing by the RMBC Drainage Officer. Once the proposal and flow rates have been agreed, detailed design can be undertaken to address any relevant planning conditions.

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

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 6 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

Appendix.

Location Plan.

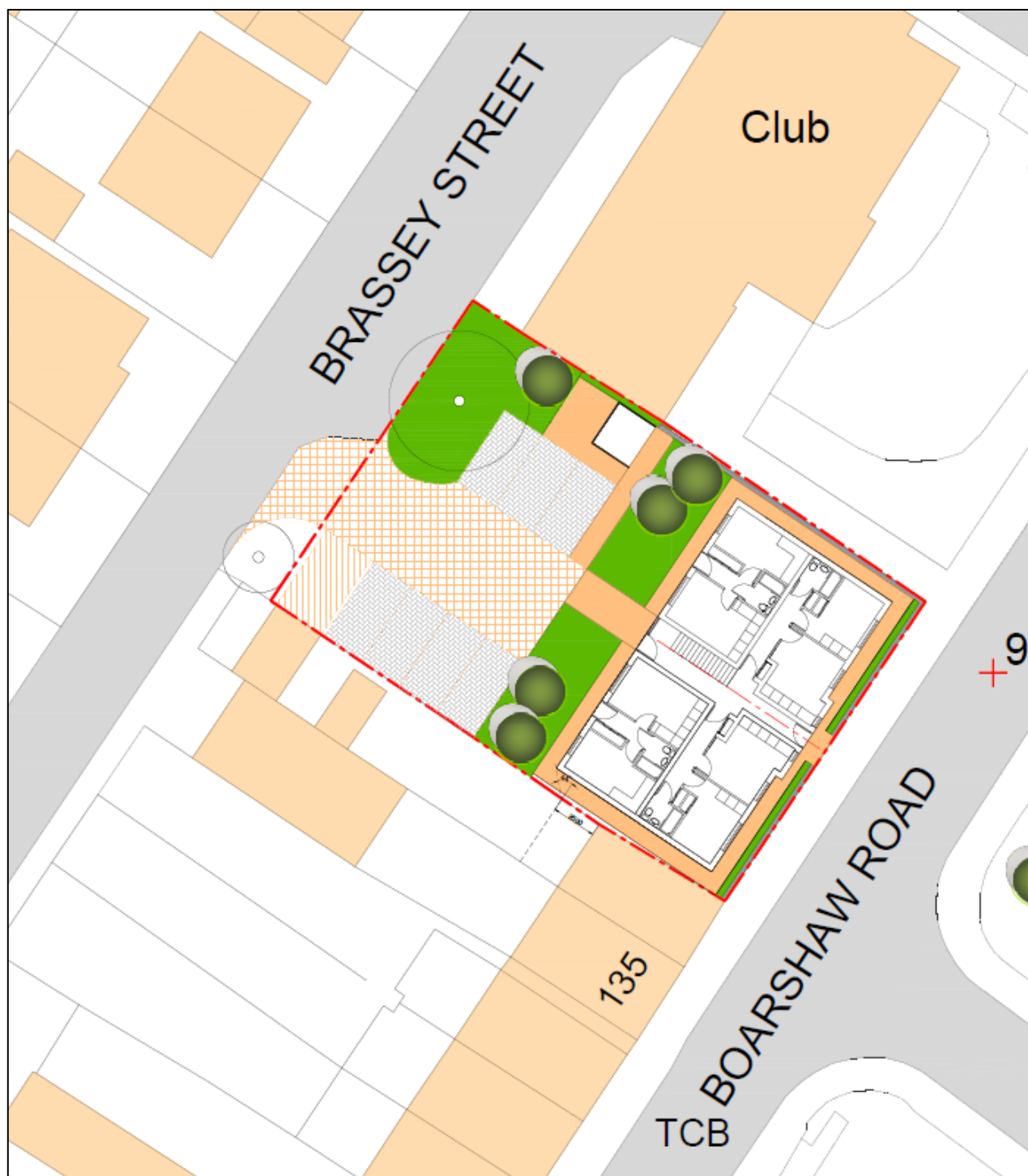


Existing Site/Topographic Plans.

N/A

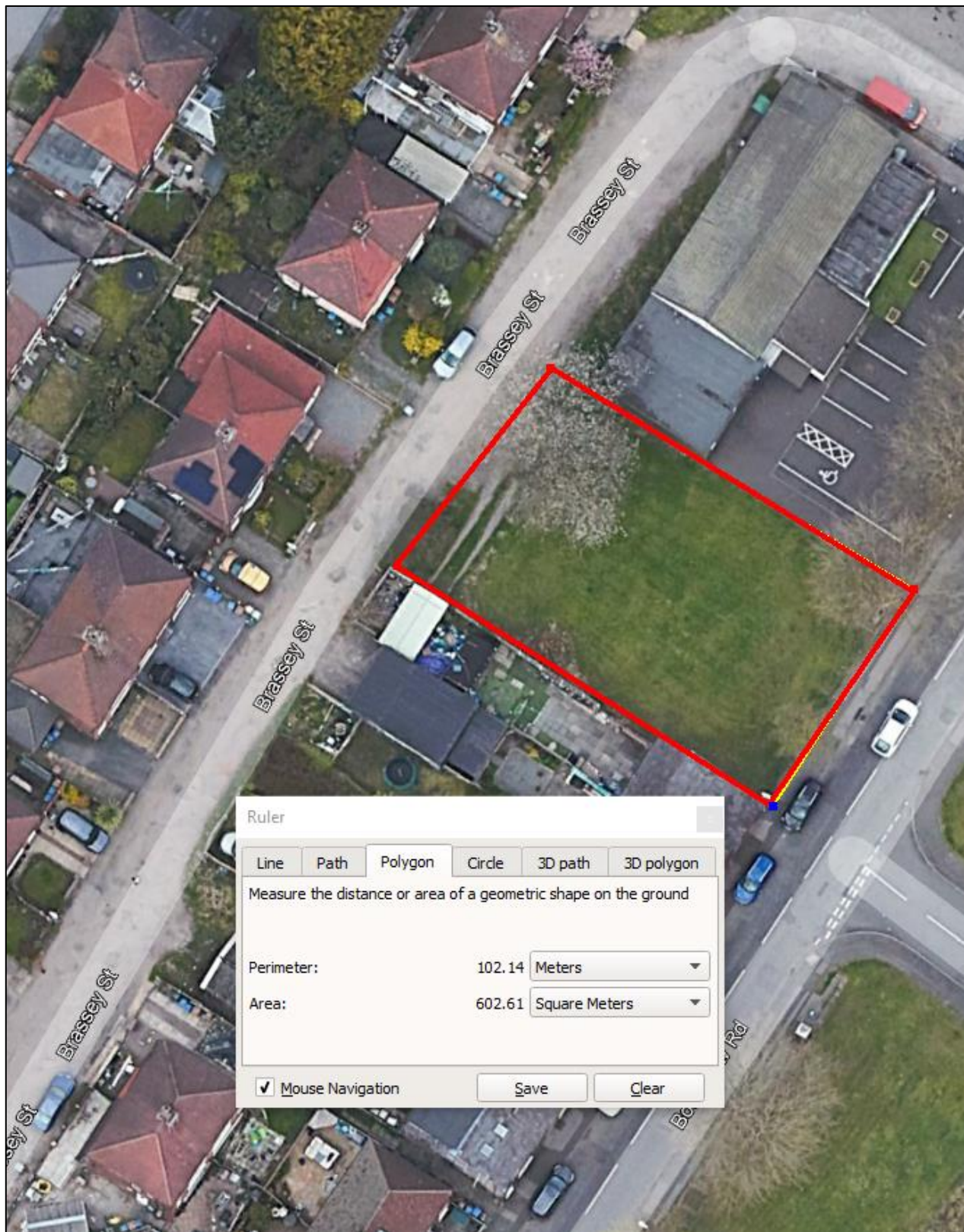
 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 7 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

Proposed Site Plans.



 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 8 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

Existing Impermeable Area Plan.



 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project RMBC - Brassey Street, Middleton. M24 6AR				Job Ref. rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section DRAINAGE STRATEGY REPORT				Sheet no./rev. 9 / 0	
	Calc. by DS	Date 01/09/2022	Chk'd by	Date	App'd by	Date

Proposed Impermeable Area Plan.

N/A, none available.

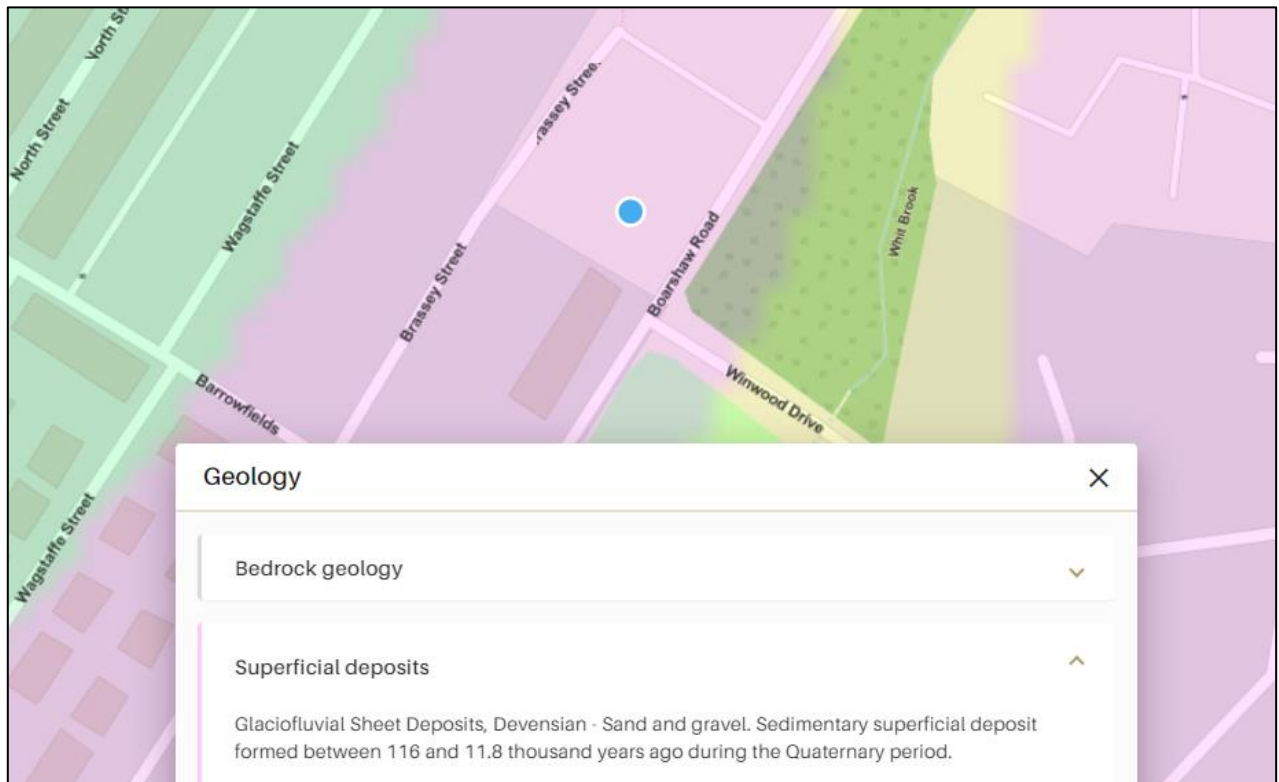
Local BGS Borehole Records.

N/A, none available.

Landmark Watercourse Map.

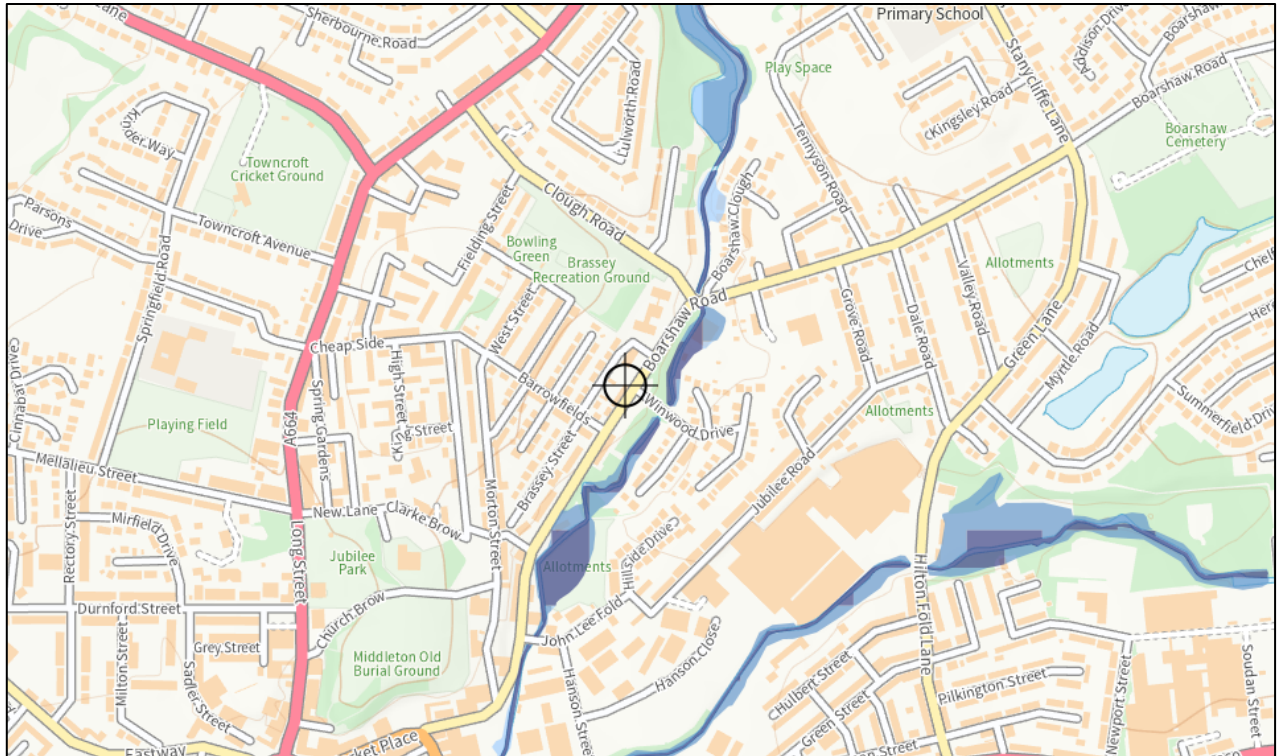
N/A, none available.

BGS Superficial Geology Maps.

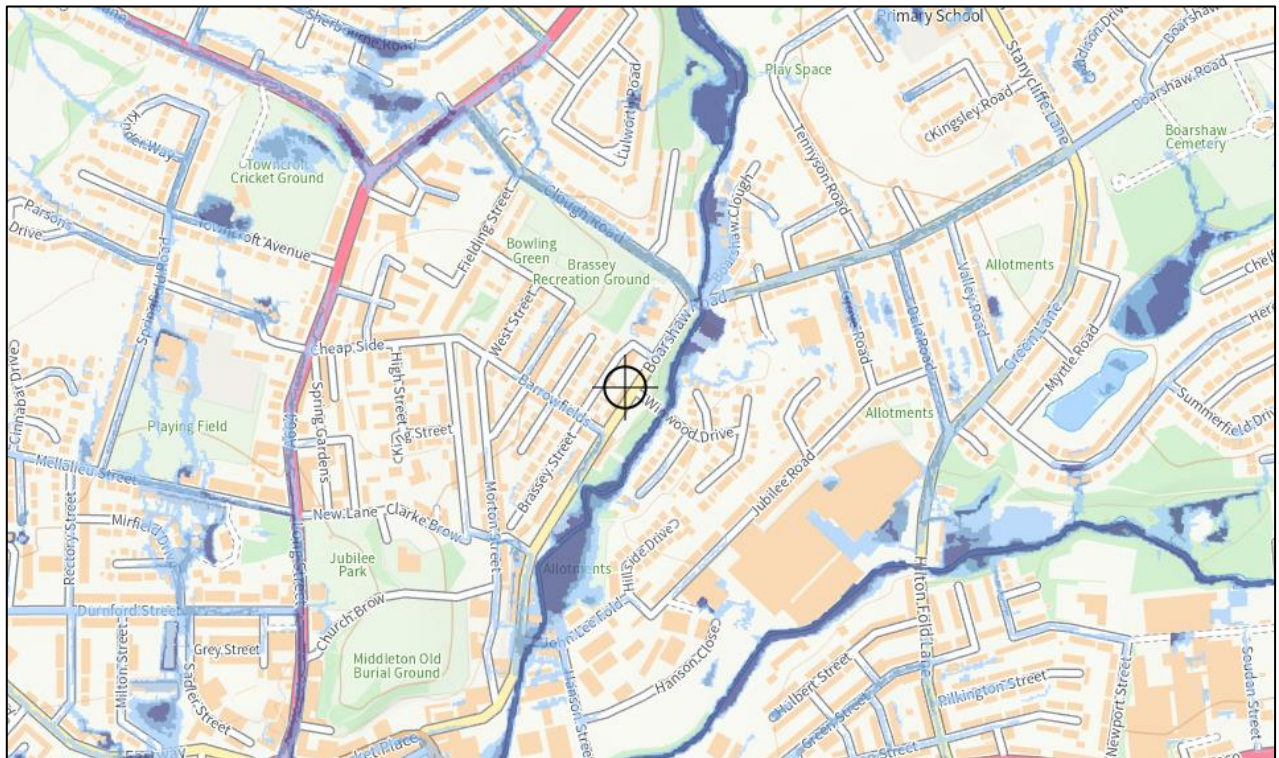


 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project				Job Ref.	
	RMBC - Brassey Street, Middleton. M24 6AR				rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section				Sheet no./rev.	
Calc. by	Date	Chk'd by	Date	App'd by	Date	
DS	01/09/2022				10 / 0	

Gov River Flood Map (Flood Zones).



Gov Surface Water Flood Map



 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH	Project				Job Ref.	
	RMBC - Brassey Street, Middleton. M24 6AR				rep-tjba-RMBC-brassey street-DSR-010922.docx	
	Section				Sheet no./rev.	
	DRAINAGE STRATEGY REPORT				11 / 0	
	Calc. by	Date	Chk'd by	Date	App'd by	Date
	DS	01/09/2022				

Drainage Calculations.

N/A.

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	-	-		

 T J Booth Associates. Consulting Engineers 20A Eastgate St, Rochdale OL16 1DH		Project		Job Ref.	
		RMBC - Brassey Street, Middleton. M24 6AR		rep-tjba-RMBC-brassey street-DSR-010922.docx	
Section		DRAINAGE STRATEGY REPORT		Sheet no./rev.	
				12 / 0	
Calc. by	Date	Chk'd by	Date	App'd by	Date
DS	01/09/2022				

Site Photographs.



Drainage Utilities Maps.

