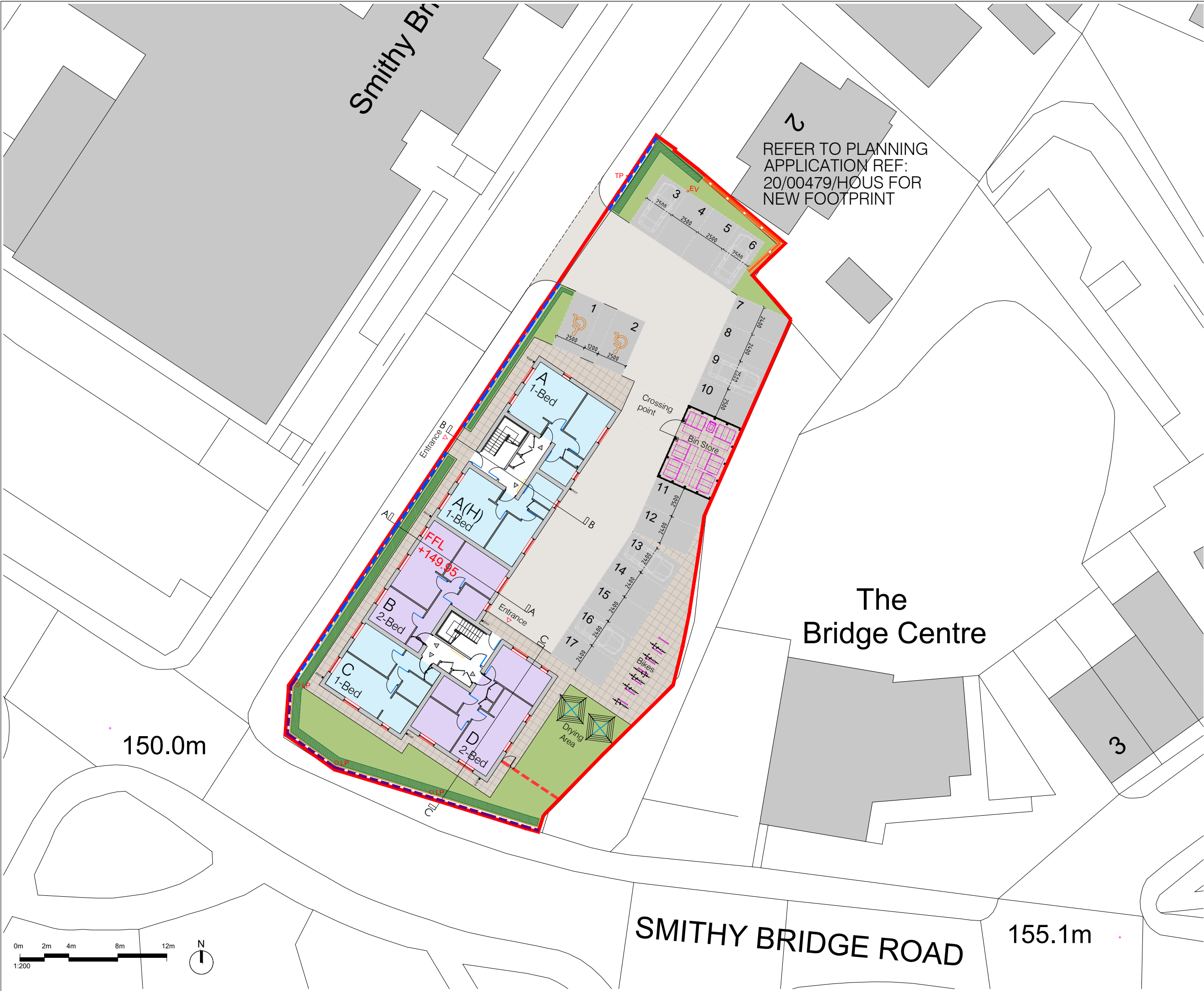


APPENDIX G

DEVELOPMENT PROPOSALS



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■DRAWING NOT TO BE SCALED. FIGURED DIMENSIONS TO BE WORKED TO IN ALL CASES.

■THE CONTRACTOR IS RESPONSIBLE FOR CHECKING DIMENSIONS, TOLERANCES & REFERENCES.

■ANY DISCREPANCY TO BE VERIFIED WITH THE ARCHITECT BEFORE PROCEEDING WITH THE WORKS.

■REPORT ERRORS & OMISSIONS TO ARCHITECT.

■WHERE AN ITEM IS COVERED BY DRAWINGS OF DIFFERENT SCALES, THE LARGER SCALE DRAWING TO BE WORKED TO. DO NOT SCALE FROM THE DRAWING. FIGURED DIMENSIONS TO BE WORKED TO IN ALL CASES.

■CHECK ALL DIMENSIONS ON SITE.

■DRAWING TO BE READ IN CONJUNCTION WITH THE HEALTH & SAFETY PLAN AND ALL RELEVANT RISK ASSESSMENTS AND THE FOLLOWING DRAWINGS:

Schedule of Accommodation

Housetype	Description	Area/m2	Total
A	1B2P Apartment	42.7	2
A(H)	1B2P Apartment	42.7	2
B	2B4P Apartment	60.1	2
C	1B2P Apartment	44.1	2
D	2B4P Apartment	59.7	2
E	1B2P Apartment	43.7	1
F	1B2P Apartment	43.4	1
G	1B2P Apartment	45.4	1
H	1B2P Apartment	45.1	1
Total			14 units

Car parking : 17No (121% Parking)

Landscape Key

	Car Park Space (Permeable block paving)		Bin Location
	Tarmac		Buff Paving (450x450 Paving)
	Grass		Existing Telephone Pole relocated
	New Hedge		Existing Lamppost relocated
	IP Rated 13A double electrical socket		Site Boundary (0.12Ha)

Boundary Treatments

	900MM HIGH RAILINGS & METAL POSTS
	LOW RETAINING WALL UPSTAND WITH 1100MM RAILINGS ABOVE (FALL PROTECTION)
	2100MM HIGH CONCRETE POST AND TIMBER PANEL FENCE & GATE
	LOW RETAINING WALL TO SE DETAILS

C	FFL amended & retaining wall indicated adj to car parking spaces 3-6.	08.01.21	AD
B	Car parking numbers updated on SoA.	11.11.21	AD
A	Building re-aligned, bin store & car parking amended. Entrance to Stair 1 amended.	19.10.21	AD
Rev Date	By	Remarks	

Client:	Armstrong Projects Ltd		
Project Name:	The Smithybridge Pub, Littleborough		
Drawing Name:	Proposed Site Plan		
Drawing Purpose:	PLANNING		
Project Number:	Drawing Number:	Revision:	
2007	04	C	
Project Origin	Vol/S	Level	Type Role Number
Status:	Scale @	Drawn:	Checked Date:
A2:	1:200@A2	AJD	BPM JULY 2021



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13 Fairfield Street,
Manchester,
M12 6EL

A P P E N D I X H

S O A K A W A Y F E A S I B I L I T Y A S S E S S M E N T



ARP (North West) 68 Quay Street, Manchester, M3 3EJ
m manchester@arpnorthwest.co.uk w www.arpconsultingengineers.co.uk

Mr C Hamlett
Armstrong Projects Ltd
The Annexe
Rear of 26 Church Street
Altrincham
WA14 4DW

BY E-MAIL

Our Ref: NW149/02/DMBnml1

8th March 2021

Dear Chris

Smithybridge Pub, Smithybridge, Rochdale
Soakaway Feasibility Assessment

In accordance with your instruction, we have undertaken a geological and geotechnical assessment of the above site with respect to consideration for the use of infiltration drainage methods, namely traditional soakaway feasibility. On occasion, it becomes evident that, regardless of infiltration rates on a site, mitigating factors such as underlying lithology, sensitive aquifers, and the location of a fault, can preclude infiltration as a viable drainage solution. This letter report is an assessment of such factors.

Background Geology and Environmental Factors

An intrusive investigation was undertaken for this site by ARP Geotechnical Ltd on the 12th February 2021 to confirm ground conditions and the underlying strata. The site is generally level and the surrounding area slopes down to the southwest.

The site is irregular in shape, with an area of approximately 0.12 hectares. The site is bounded to the west by Bridgenorth Drive and to the south by Smithy Bridge Road. To the east of the site are commercial and residential properties with hardstanding used for car parking. Residential properties are present to the north of the site.

The British Geological Survey (BGS) digital data indicate that the site is underlain by superficial glacial till diamicton deposits (usually stony cohesive material). The underlying bedrock geology comprises sandstone of the Milnrow Sandstone Formation. There are no faults shown to adversely affect the site.

The intrusive investigation, undertaken by ARP Geotechnical Ltd, encountered bitmac hardstanding across the majority of the site, underlain by made ground to a maximum recorded depth of 1.0m. Underlying the made ground were highly variable superficial glacial diamicton deposits, comprising intercalated sequences of clay, sand and gravels. The strata typically comprised slightly sandy, gravelly clays; orange clayey fine grained sands; and brown slightly sandy clayey gravels to the base of the investigation boreholes at depths of 5.45m. Solid strata were not encountered in any of the investigation holes. One dynamic probe was drilled to a depth of 10m and this indicates that bedrock is not present in the upper 10m of the surface. The cores of



the boreholes were noted to be wet at depths from 1m to 3m. In WS2, coinciding with the gravels, the water ingress was severe, with the majority of the volume of the core tube comprising water.

The Bedrock Aquifer Designation is shown to be "Secondary A". These Aquifers comprise "permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers". The overlying superficial glacial diamicton deposits are designated a "Secondary Undifferentiated" aquifer. These aquifers have been assigned where "it has not been possible to attribute wither category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type".

The site is not in an area at risk of river flooding. The nearest downslope surface water is the Rochdale Canal, at 67m to the west. The site is not within a Groundwater Source Protection Zone. BGS data shows that the site has the potential for groundwater flooding to occur at surface.

Infiltration Assessment

The following conditions need to be met for soakaway viability:

- Sufficient infiltration rates.
- Installation to be at least 1m above the groundwater table.
- Soakaways to be installed 5m away from the foundation of any pertinent structure.
- Ground conditions capable of supporting soakaways.

The underlying ground conditions comprise made ground to a depth of 1m, underlain by highly variable sequences of intercalated clays, sands, and gravels, to the bases of the boreholes at 5.45m. The granular sequences were described as comprising clayey fine grained sand or clayey gravels. The cohesive strata and high clay content within the granular strata are unlikely to have sufficient infiltration rates and any infiltration will be significantly impeded by the fines percentages present. The underlying sandstone bedrock geology may have sufficient infiltration rates for the use of soakaways, however the depth to bedrock was not encountered in the upper 10m and it is considered unfeasible to install a soakaway system at this depth.

BGS data indicates that the site has the potential for groundwater flooding to occur at surface, indicating a shallow groundwater table is present all year round. All six of the investigation holes identified groundwater to be present at depths of between 1m and 3m. Any soakaway system will need to be installed at least 1m above the groundwater table and also below any made ground, which is not possible given the variable and shallow groundwater conditions across the site.

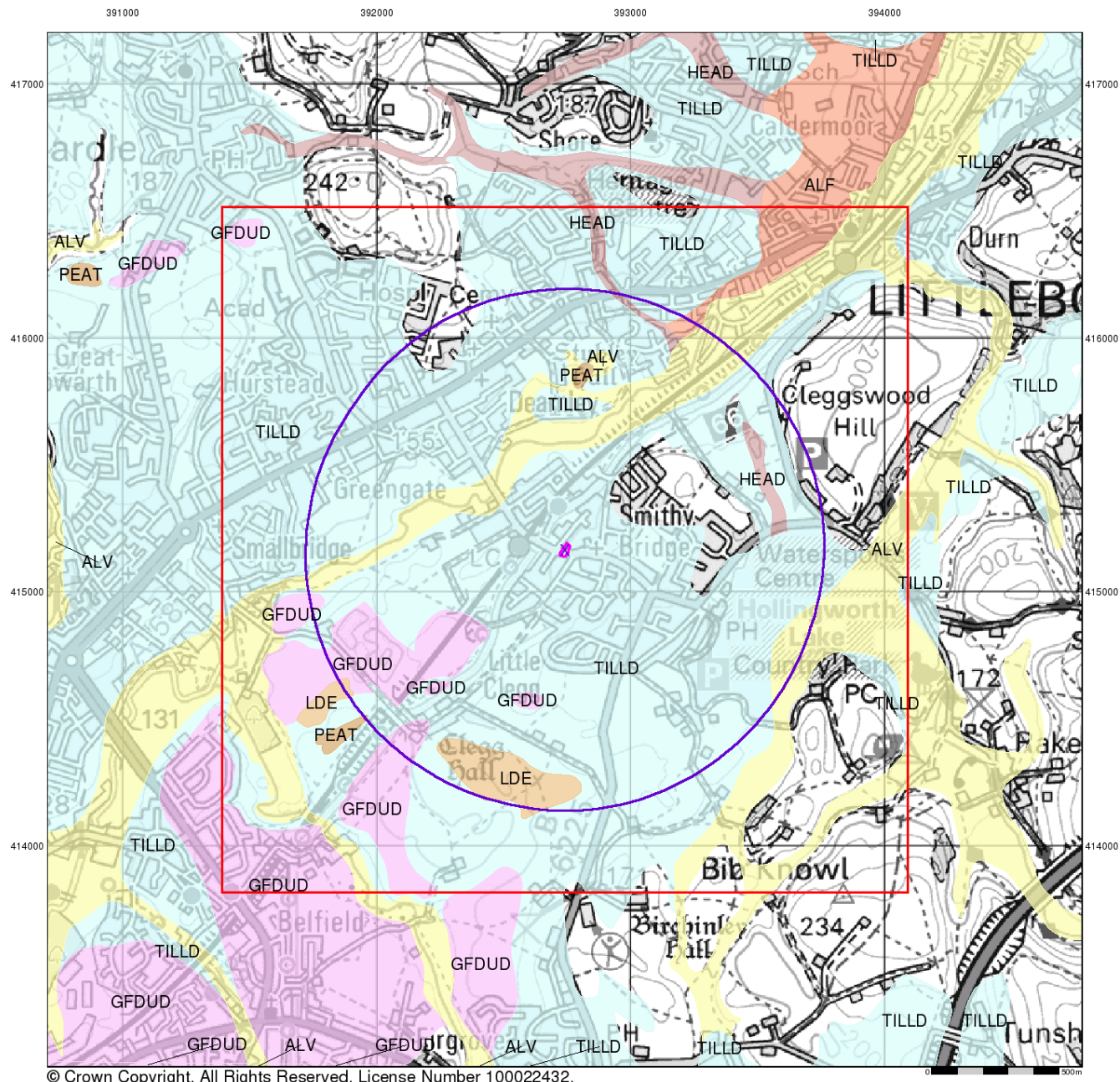
Conclusion

In the light of the underlying ground conditions, coupled with the shallow groundwater table across the site it is concluded that the use of soakaway drainage is not a viable option for the site.

We trust that the above information is satisfactory. However, if you have any queries, please do not hesitate to contact us at your convenience.

Yours sincerely
for ARP GEOTECHNICAL LTD

D Bennett



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ARP GEOTECHNICAL LTD

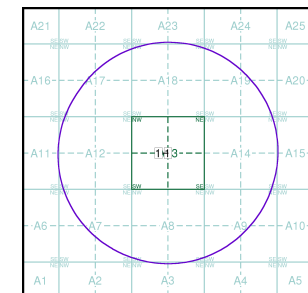
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



Order Details:

Order Number: 272462530_1_1
 Customer Reference: NW149/02
 National Grid Reference: 392740, 415160
 Slice: A
 Site Area (Ha): 0.12
 Search Buffer (m): 1000

Site Details:

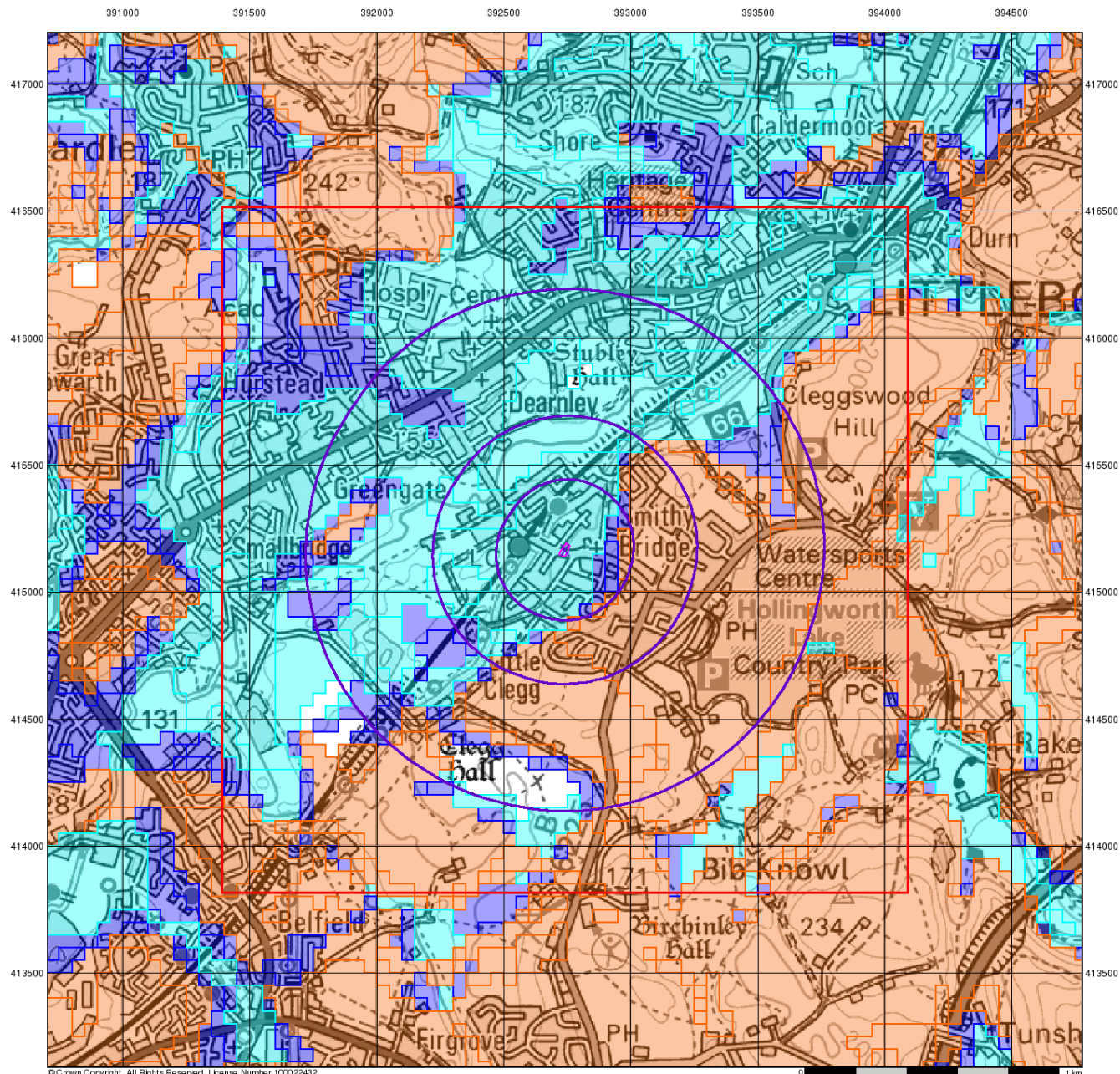
Smithy Bridge Pub, Rochdale

Landmark
 INFORMATION GROUP

Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk

v15.0 29-Jan-2021

Page 3 of 5



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ARP GEOTECHNICAL LTD

BGS Flood GFS Data

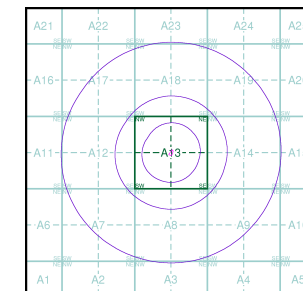
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



Order Details

Order Number: 272462530_1_1
 Customer Ref: NW149/02
 National Grid Reference: 392740, 415160
 Slice: A
 Site Area (Ha): 0.12
 Search Buffer (m): 1000

Site Details

Smithy Bridge Pub, Rochdale

Landmark
 INFORMATION GROUP

Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk

Project Name: Smithybridge Pub, Littleborough, Rochdale

Project No.
NW149/02

Co-ords: 392727.22 - 415156.17

Date
12/02/2021

Location: Smithybridge Pub, Littleborough, Rochdale

Level:

Scale
1:40

Client: Armstrong Projects Limited

Rig Crew: RP Drilling Ltd

Logged:
DMB

[illegible]

Groundwater: Cores wet from 1.5m.

Backfill: Backfilled with arisings on completion.

Remarks: Dynamic probe (DP1) follow on from base of borehole to 10m depth.



ARP Geotechnical Limited

Windowless Sample Log

Borehole No.

WS2

Sheet 1 of 1

Project Name:

Smithybridge Pub, Littleborough, Rochdale

Project No.

NW149/02

Co-ords:

392735.55 - 415147.40

Date

12/02/2021

Location:

Smithybridge Pub, Littleborough, Rochdale

Level:

Scale

1:40

Client:

Armstrong Projects Limited

Rig Crew:

RP Drilling Ltd

Logged:

DMB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10		MADE GROUND: Bitmac.		
		0.40 - 0.60	ES		0.50		MADE GROUND: Dark grey slightly clayey sandy fine to coarse angular gravel of brick, sandstone and mixed lithology.		
	▼	1.00	SPT	N=7 (3,3/1,2,2,2)	1.00		MADE GROUND: Light brown slightly clayey sandy fine to coarse angular gravel of brick, sandstone and mixed lithology.	1	
		2.00	SPT	N=9 (2,2/2,2,2,3)			Loose brown slightly sandy clayey fine to coarse subrounded GRAVEL of mixed lithology. Cores very wet.	2	
		2.70 - 3.00	D		2.80				
		3.00	SPT	N=15 (4,4/4,3,4,4)	3.00		Firm reddish brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded of mixed lithology.	3	
					3.50		Firm (medium strength) brown slightly sandy clayey fine to coarse subrounded GRAVEL of mixed lithology.		
					3.80		Brown slightly clayey gravelly SAND.		
		4.00	SPT	N=22 (5,5/5,5,6,6)	4.00		Orange slightly clayey fine grained SAND.	4	
						RECOVERY NO RECOVERY NO RECOVERY	No recovery. Core very wet, water recovery only.		
					4.50				
					4.70		Firm reddish brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium subrounded of mixed lithology.	5	
		5.00	SPT	N=9 (1,1/2,2,2,3)			Loose orange slightly clayey fine grained SAND.		
					5.45		End of Borehole at 5.450m Maximum depth achieved.		
								6	
								7	
								8	

Groundwater: Cores very wet from 1m.

Backfill: Backfilled with arisings on completion.

Remarks:

RrWS_v1.054



Windowless Sample Log

Borehole No.

WS3

Sheet 1 of 1

Project Name: Smithybridge Pub, Littleborough, Rochdale

Project No.
NW149/02

Co-ords: 392725.08 - 415148.48

Date
12/02/2021

Location: Smithybridge Pub, Littleborough, Rochdale

Level:

Scale
1:40

Client: Armstrong Projects Limited

Rig Crew: RP Drilling Ltd

Logged:
DMB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.50	ES		0.15			MADE GROUND: Bitmac.	
					0.60			MADE GROUND: Dark grey sandy fine to coarse angular gravel of mixed lithology.	
	▼	1.00	SPT	N=18 (3,4/3,5,5,5)	1.00			MADE GROUND: Dark grey sandy fine to coarse angular gravel of sandstone. Cobble of sandstone from 0.7m to 0.8m.	1
					1.60			Stiff (high strength) brown slightly sandy gravelly CLAY. Gravel is fine to medium subrounded of mixed lithology.	
		2.00	SPT	N=9 (2,2/2,2,2,3)	2.30			Loose grey slightly clayey silty fine grained SAND.	2
		2.40 - 2.80	D		2.80			Firm (medium strength) reddish brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium subrounded of mixed lithology.	
		3.00	SPT	N=22 (4,4/5,5,6,6)	3.00			Orange slightly clayey fine grained SAND.	3
					3.30			No recovery.	
					4.00			Medium dense orange slightly clayey fine grained SAND.	4
					4.40			Grey slightly clayey silty fine grained SAND.	
					4.50			Dense orange slightly clayey fine grained SAND.	
		5.00	SPT	N=36 (6,8/8,9,9,10)	5.45			End of Borehole at 5.450m Maximum depth achieved.	5
									6
									7
									8

Groundwater: Cores wet from 1m.

Backfill: Backfilled with arisings on completion.

Remarks:

 ARP Geotechnical Limited				Windowless Sample Log				Borehole No. WS4 Sheet 1 of 1		
Project Name: Smithybridge Pub, Littleborough, Rochdale				Project No. NW149/02		Co-ords: 392732.74 - 415169.88		Date 12/02/2021		
Location: Smithybridge Pub, Littleborough, Rochdale						Level:		Scale 1:40		
Client: Armstrong Projects Limited						Rig Crew: RP Drilling Ltd		Logged: DMB		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.30 - 0.60	ES		0.10			MADE GROUND: Bitmac.		
					0.50			MADE GROUND: Dark grey sandy fine to coarse angular gravel of mixed lithology.		
					0.80			MADE GROUND: Dark grey sandy fine to coarse angular gravel of sandstone.		
		1.00	SPT	N=7 (2,2/2,1,2,2)	1.00			Brown slightly clayey silty fine grained SAND.	1	
					1.60			Loose dark grey very silty SAND.		
		2.00	SPT	N=11 (2,1/2,3,3,3)	2.40			Firm (medium strength) reddish brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium subrounded of mixed lithology.	2	
					2.40			Loose dark grey clayey silty SAND.		
		3.00	SPT	N=6 (2,1/1,1,2,2)	3.45			End of Borehole at 3.450m Target depth achieved.	3	
										4
										5
								6		
								7		
								8		
Groundwater: Cores wet from 2.4m. Backfill: Backfilled with arisings on completion. Remarks:										

 ARP Geotechnical Limited				Windowless Sample Log				Borehole No. WS5 Sheet 1 of 1	
Project Name: Smithybridge Pub, Littleborough, Rochdale				Project No. NW149/02		Co-ords: 392748.38 - 415190.03		Date 12/02/2021	
Location: Smithybridge Pub, Littleborough, Rochdale						Level:		Scale 1:40	
Client: Armstrong Projects Limited						Rig Crew: RP Drilling Ltd		Logged: DMB	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
▼					0.10		MADE GROUND: Bitmac.		
		0.30 - 0.60	ES		0.60		MADE GROUND: Dark grey sandy fine to coarse angular gravel of mixed lithology.		
		1.00	SPT	N=12 (3,3/4,3,3,2)			Firm (medium strength) brown slightly sandy gravelly CLAY. Gravel is fine to coarse rounded to subrounded of mixed lithology.	1	
		2.00	SPT	N=15 (3,4/4,4,4,3)	2.00		Medium dense grey sandy very clayey fine to coarse subangular to subrounded GRAVEL of mixed lithology.	2	
		3.00	SPT	N=7 (2,2/1,3,1,2)	3.00		No recovery. Core very wet with water recovery only.	3	
		3.50 - 4.00	D		3.50		Soft to firm (medium strength) brown slightly sandy gravelly CLAY. Gravel is fine to coarse rounded to subrounded of mixed lithology.	4	
		4.00	SPT	N=9 (2,1/2,2,2,3)	4.45		End of Borehole at 4.450m Borehole collapsed at 4m.	5	
								6	
								7	
								8	
Groundwater: Cores wet from 2m. Backfill: Backfilled with arisings on completion. Remarks:									

APPENDIX J

SURFACE WATER DRAINAGE CALCULATIONS

	Smithybridge Pub, Littleborough Surface Water Drainage Estimated Existing Surface Water Discharge Rates		JOB No:
			NW149/02
		DATE:	27/04/2021
		BY:	MW

Theoretical Runoff Rate

Calculation based on Wallingford Procedure to calculate FSR Rainfall, and Rational Method to calculate runoff

Data

M5-60min 19.5 mm $Q=2.78CiA$
 r 0.30 C 0.9

Calculation - 1 in 1 Year

Catchment Area	Impermeable Area	Duration (D) min	Z1	M5-Dmin	Z2	M1-Dmin	i	Impermeable Runoff Q
	ha			mm		mm	mm/hr	l/s
1	0.116	15	0.60	11.70	0.62	7.25	29.0	8.5
Total								8.5 l/s

D	Z1	M5	Z2 for 1 in 1yr
5	0.40	5	0.620
10	0.55	10	0.610
15	0.60	15	0.620

Calculation - 1 in 2 Year

Catchment Area	Impermeable Area	Duration (D) min	Z1	M5-Dmin	Z2	M1-Dmin	i	Impermeable Runoff Q
	ha			mm		mm	mm/hr	l/s
1	0.116	15	0.60	11.70	0.80	9.36	37.4	10.9
Total								10.9 l/s

D	Z1	M5	Z2 for 1 in 2yr
5	0.40	5	0.790
10	0.55	10	0.790
15	0.60	15	0.800

Calculation - 1 in 30 Year

Catchment Area	Impermeable Area	Duration (D) min	Z1	M5-Dmin	Z2	M1-Dmin	i	Impermeable Runoff Q
	ha			mm		mm	mm/hr	l/s
1	0.116	15	0.60	11.70	1.50	17.55	70.2	20.4
Total								20.4 l/s

D	Z1	M5	Z2 for 1 in 30yr
5	0.40	5	1.450
10	0.55	10	1.490
15	0.60	15	1.500

Calculation - 1 in 100 Year

Catchment Area	Impermeable Area	Duration (D) min	Z1	M5-Dmin	Z2	M100-Dmin	i	Impermeable Runoff
	ha			mm		mm	mm/hr	l/s
1	0.116	15	0.60	11.70	1.99	23.28	93.1	27.1
Total								27.1 l/s

<i>D</i>	<i>Z1</i>	<i>M5</i>	<i>Z2 for 1 in 100yr</i>
5	0.40	5	1.790
10	0.55	10	1.910
15	0.60	15	1.990

Pipe Capacity

Based on the Colebrook-White formula, and assuming a conservative gradient of 1:150, the maximum capacity of the existing 150mm pipe at the downstream end of the combined drainage system is estimated to be 12.6l/s.

Estimated Discharge Rate

Based on the above, the runoff from the existing site to the public sewer is estimated to be as follows:

Event	Runoff (l/s)
1 in 1 year	8.5
1 in 2 year	10.9
1 in 30 year	12.6
1 in 100 year	12.6

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	RE1	S1	5.183	0.600	149.200	149.148	0.052	99.7	150	4.09	65.2
1.001	S1	S2	14.031	0.600	149.148	149.008	0.140	100.2	150	4.32	63.9
1.002	S2	S3	10.839	0.600	149.008	148.900	0.108	100.4	150	4.50	63.0
1.003	S3	S5	6.782	0.600	148.900	148.832	0.068	99.7	150	4.61	62.4
2.000	S4	S5	3.140	0.600	148.985	148.832	0.153	20.5	150	4.02	65.5
1.004	S5	S6	22.709	0.600	148.532	148.441	0.091	249.5	450	4.91	61.0
3.000	RE8	S8	15.643	0.600	149.200	148.937	0.263	59.5	100	4.26	64.2
3.001	S8	S6	11.574	0.600	148.937	148.592	0.345	33.5	100	4.40	63.5
4.000	S10	RE11	6.956	0.600	149.145	148.700	0.445	15.6	150	4.05	65.4
5.000	S9	RE11	1.000	0.600	149.090	148.990	0.100	10.0	150	4.01	65.7
4.001	RE11	S11	12.944	0.600	148.700	148.571	0.129	100.3	150	4.26	64.2
5.002	S11	S6	2.870	0.600	148.571	148.542	0.029	99.0	150	4.31	64.0
6.000	S7	S6	3.641	0.600	149.275	149.238	0.037	98.4	150	4.06	65.3
1.005	S6	C1	10.612	0.600	148.441	148.332	0.109	97.4	150	5.08	60.2
1.006	C1	OUT	5.680	0.600	148.332	148.290	0.042	135.2	225	5.16	108.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.006	17.8	0.7	0.450	0.602	0.004	0.0	20	0.484
1.001	1.003	17.7	1.9	0.602	0.692	0.011	0.0	33	0.655
1.002	1.003	17.7	1.9	0.692	0.750	0.011	0.0	33	0.655
1.003	1.006	17.8	1.9	0.750	0.713	0.011	0.0	33	0.650
2.000	2.233	39.5	4.4	0.500	0.713	0.025	0.0	34	1.478
1.004	1.282	203.9	8.4	0.713	1.039	0.051	0.0	62	0.644
3.000	1.000	7.9	1.6	0.500	0.813	0.009	0.0	30	0.777
3.001	1.336	10.5	1.5	0.813	1.238	0.009	0.0	26	0.960
4.000	2.560	45.2	1.9	0.500	0.900	0.011	0.0	21	1.287
5.000	3.204	56.6	2.3	0.500	0.610	0.013	0.0	21	1.584
4.001	1.003	17.7	4.2	0.900	1.249	0.024	0.0	50	0.822
5.002	1.010	17.8	4.2	1.249	1.238	0.024	0.0	50	0.827
6.000	1.013	17.9	1.2	0.500	0.542	0.007	0.0	27	0.580
1.005	1.018	18.0	14.8	1.339	1.378	0.091	0.0	104	1.135
1.006	1.122	44.6	26.7	1.303	1.175	0.091	0.0	125	1.170

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE1	149.800	0.600	150				
				0	1.000	149.200	150
S1	149.900	0.752	450		1	1.000	149.148
				0	1.001	149.148	150
S2	149.850	0.842	450		1	1.001	149.008
				0	1.002	149.008	150

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S3	149.800	0.900	450	1	1.002	148.900	150
				0	1.003	148.900	150
S4	149.635	0.650	600	0	2.000	148.985	150
S5	149.695	1.163	1200	1	2.000	148.832	150
				2	1.003	148.832	150
				0	1.004	148.532	450
RE8	149.800	0.600	150	0	3.000	149.200	100
S8	149.850	0.913	450	1	3.000	148.937	100
				0	3.001	148.937	100
S10	149.795	0.650	600	0	4.000	149.145	150
S9	149.740	0.650	600	0	5.000	149.090	150
RE11	149.750	1.050	150	1	5.000	148.990	150
				2	4.000	148.700	150
				0	4.001	148.700	150
S11	149.970	1.399	450	1	4.001	148.571	150
				0	5.002	148.571	150
S7	149.925	0.650	600	0	6.000	149.275	150
S6	149.930	1.489	1500	1	6.000	149.238	150
				2	5.002	148.542	150
				3	3.001	148.592	100
				4	1.004	148.441	450
				0	1.005	148.441	150
C1	149.860	1.528	600	1	1.005	148.332	150
				0	1.006	148.332	225
OUT	149.690	1.400	750	1	1.006	148.290	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	✓
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	40	0	0
100	45	0	0

Node S6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.005	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0107-5500-1200-5500
Invert Level (m)	148.441	Min Outlet Diameter (m)	0.150
Design Depth (m)	1.200	Min Node Diameter (mm)	1200
Design Flow (l/s)	5.5		

Node S4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	148.985	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	82	Depth (m)	0.350
Safety Factor	1.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	14.800		

Node S7 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	149.275	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	11	Depth (m)	0.350
Safety Factor	1.0	Width (m)	3.700	Inf Depth (m)	
Porosity	0.30	Length (m)	9.600		

Node S9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	149.090	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	60	Depth (m)	0.350
Safety Factor	1.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	6.200		

Node S10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	149.145	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	45	Depth (m)	0.350
Safety Factor	1.0	Width (m)	4.300	Inf Depth (m)	
Porosity	0.30	Length (m)	9.600		

Results for 2 year Critical Storm Duration. Lowest mass balance: 97.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE1	10	149.220	0.020	0.7	0.0004	0.0000	OK
15 minute winter	S1	10	149.182	0.034	1.9	0.0054	0.0000	OK
15 minute summer	S2	10	149.042	0.034	1.9	0.0054	0.0000	OK
15 minute summer	S3	11	148.934	0.034	1.9	0.0054	0.0000	OK
15 minute winter	S4	10	149.022	0.037	4.4	0.1134	0.0000	OK
30 minute winter	S5	23	148.775	0.243	6.8	0.2743	0.0000	OK
15 minute winter	RE8	10	149.232	0.032	1.6	0.0006	0.0000	OK
15 minute summer	S8	10	148.963	0.026	1.6	0.0042	0.0000	OK
15 minute winter	S10	10	149.166	0.021	1.9	0.0363	0.0000	OK
15 minute winter	S9	10	149.114	0.024	2.3	0.0508	0.0000	OK
30 minute winter	RE11	23	148.776	0.076	3.3	0.0014	0.0000	OK
30 minute winter	S11	24	148.775	0.204	3.2	0.0325	0.0000	SURCHARGED
15 minute winter	S7	10	149.302	0.027	1.2	0.0515	0.0000	OK
30 minute winter	S6	24	148.775	0.334	8.9	0.5901	0.0000	SURCHARGED
30 minute winter	C1	24	148.389	0.057	5.4	0.0160	0.0000	OK
30 minute winter	OUT	24	148.343	0.053	5.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE1	1.000	S1	0.7	0.325	0.039	0.0114	
15 minute summer	S1	1.001	S2	1.9	0.641	0.107	0.0415	
15 minute summer	S2	1.002	S3	1.9	0.637	0.106	0.0318	
15 minute summer	S3	1.003	S5	1.9	0.639	0.105	0.0198	
15 minute winter	S4	2.000	S5	4.4	1.375	0.111	0.0100	
15 minute summer	S5	1.004	S6	6.3	0.386	0.031	2.0950	
15 minute winter	RE8	3.000	S8	1.6	0.843	0.204	0.0298	
15 minute summer	S8	3.001	S6	1.6	0.905	0.151	0.0543	
15 minute winter	S10	4.000	RE11	1.9	0.648	0.042	0.0302	
15 minute winter	S9	5.000	RE11	2.3	1.396	0.040	0.0016	
15 minute summer	RE11	4.001	S11	4.2	0.717	0.237	0.1441	
15 minute summer	S11	5.002	S6	3.8	0.628	0.213	0.0505	
15 minute winter	S7	6.000	S6	1.2	0.552	0.065	0.0077	
30 minute winter	S6	1.005	C1	5.4	0.865	0.302	0.0667	
30 minute winter	C1	1.006	OUT	5.4	0.731	0.122	0.0423	9.4

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 97.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	RE1	49	149.306	0.106	1.0	0.0019	0.0000	OK
60 minute winter	S1	49	149.306	0.158	2.7	0.0251	0.0000	SURCHARGED
60 minute winter	S2	49	149.305	0.297	3.5	0.0473	0.0000	SURCHARGED
60 minute winter	S3	50	149.305	0.405	3.3	0.0644	0.0000	SURCHARGED
60 minute winter	S4	49	149.305	0.320	10.9	5.3391	0.0000	SURCHARGED
60 minute winter	S5	50	149.305	0.773	10.8	0.8738	0.0000	SURCHARGED
60 minute winter	RE8	49	149.307	0.107	2.2	0.0019	0.0000	SURCHARGED
60 minute winter	S8	48	149.305	0.368	4.1	0.0586	0.0000	SURCHARGED
60 minute winter	S10	49	149.306	0.161	3.5	1.4472	0.0000	SURCHARGED
60 minute winter	S9	50	149.306	0.216	5.6	1.7127	0.0000	SURCHARGED
60 minute winter	RE11	50	149.306	0.606	5.9	0.0109	0.0000	SURCHARGED
60 minute winter	S11	50	149.305	0.734	5.2	0.1167	0.0000	SURCHARGED
15 minute winter	S7	10	149.322	0.047	3.3	0.1374	0.0000	OK
60 minute winter	S6	50	149.305	0.864	10.6	1.5260	0.0000	SURCHARGED
30 minute winter	C1	76	148.389	0.057	5.5	0.0161	0.0000	OK
30 minute winter	OUT	76	148.343	0.053	5.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE1	1.000	S1	1.9	0.424	0.107	0.0323	
15 minute winter	S1	1.001	S2	5.2	0.828	0.294	0.1922	
15 minute summer	S2	1.002	S3	5.2	0.804	0.293	0.1908	
30 minute summer	S3	1.003	S5	-7.3	0.752	-0.409	0.1194	
15 minute summer	S4	2.000	S5	11.7	1.687	0.296	0.0553	
15 minute summer	S5	1.004	S6	16.2	0.439	0.080	3.5981	
15 minute summer	RE8	3.000	S8	4.3	1.080	0.546	0.0902	
15 minute winter	S8	3.001	S6	3.9	0.908	0.373	0.0906	
15 minute winter	S10	4.000	RE11	5.1	0.772	0.113	0.0977	
15 minute summer	S9	5.000	RE11	8.9	1.724	0.157	0.0153	
15 minute winter	RE11	4.001	S11	8.3	0.726	0.470	0.2279	
60 minute summer	S11	5.002	S6	6.3	0.510	0.352	0.0505	
15 minute winter	S7	6.000	S6	3.2	0.725	0.178	0.0160	
240 minute winter	S6	1.005	C1	5.5	0.868	0.305	0.0672	
30 minute winter	C1	1.006	OUT	5.5	0.733	0.123	0.0426	25.2

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	RE1	58	149.564	0.364	1.4	0.0066	0.0000	FLOOD RISK
60 minute winter	S1	58	149.564	0.416	3.7	0.0662	0.0000	SURCHARGED
60 minute winter	S2	58	149.564	0.556	3.5	0.0884	0.0000	FLOOD RISK
60 minute winter	S3	54	149.564	0.664	4.8	0.1055	0.0000	FLOOD RISK
60 minute winter	S4	54	149.564	0.579	14.1	6.0640	0.0000	FLOOD RISK
60 minute winter	S5	54	149.564	1.032	12.7	1.1666	0.0000	FLOOD RISK
60 minute winter	RE8	53	149.566	0.366	3.1	0.0066	0.0000	FLOOD RISK
60 minute winter	S8	54	149.565	0.628	3.5	0.0998	0.0000	FLOOD RISK
60 minute winter	S10	54	149.565	0.420	6.0	3.8698	0.0000	FLOOD RISK
60 minute winter	S9	54	149.565	0.475	6.1	2.9900	0.0000	FLOOD RISK
60 minute winter	RE11	54	149.565	0.865	7.3	0.0156	0.0000	FLOOD RISK
60 minute winter	S11	54	149.564	0.993	6.1	0.1579	0.0000	SURCHARGED
60 minute winter	S7	58	149.564	0.289	5.6	2.6503	0.0000	SURCHARGED
60 minute winter	S6	54	149.564	1.122	13.4	1.9834	0.0000	SURCHARGED
15 minute summer	C1	63	148.389	0.057	5.5	0.0161	0.0000	OK
120 minute summer	OUT	178	148.343	0.053	5.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE1	1.000	S1	2.5	0.450	0.141	0.0885	
15 minute summer	S1	1.001	S2	7.0	0.885	0.395	0.2449	
15 minute winter	S2	1.002	S3	6.7	0.818	0.380	0.1908	
15 minute summer	S3	1.003	S5	6.4	0.743	0.361	0.1194	
15 minute winter	S4	2.000	S5	-14.3	1.718	-0.362	0.0553	
30 minute winter	S5	1.004	S6	14.1	0.443	0.069	3.5981	
15 minute winter	RE8	3.000	S8	5.6	1.111	0.719	0.1224	
15 minute winter	S8	3.001	S6	4.2	0.893	0.399	0.0906	
15 minute summer	S10	4.000	RE11	6.8	0.787	0.150	0.1220	
15 minute winter	S9	5.000	RE11	7.9	1.726	0.139	0.0176	
30 minute summer	RE11	4.001	S11	9.0	0.620	0.507	0.2279	
15 minute summer	S11	5.002	S6	8.0	0.666	0.449	0.0505	
15 minute winter	S7	6.000	S6	4.2	0.780	0.236	0.0336	
720 minute summer	S6	1.005	C1	5.5	0.867	0.305	0.0672	
120 minute summer	C1	1.006	OUT	5.5	0.733	0.123	0.0426	50.6

APPENDIX K

DRAFT MAINTENANCE AND MANAGEMENT PLAN



ARP ASSOCIATES
CHARTERED CONSULTING ENGINEERS

Our ref: NW149/02tn1a

25th April 2023

ARMSTRONG PROJECTS LTD

DRAINAGE MAINTENANCE AND MANAGEMENT PLAN
FOR
DEVELOPMENT AT FORMER SMITHYBRIDGE PUB, ROCHDALE

Introduction

It is essential that drainage systems, including any Sustainable Drainage Systems (SuDS) and proprietary components, are subject to periodic inspection and maintenance over their lifetime, so that they continue to function to the intended design standard.

This document sets out the responsibilities for management and maintenance of the proposed drainage systems at the above site, and outlines a recommended maintenance regime to be implemented by the responsible party.

This draft has been prepared for agreement with the Lead Local Flood Authority and Local Planning Authority. The document should be finalised upon completion of construction, including all listed drainage drawing references which should be revised to 'as-built' status.

The maintenance plan should be reviewed periodically to confirm it is meeting the objective of ensuring effective drainage is maintained. The maintenance plan should be revised if necessary to keep systems working effectively.

This report has been initially prepared for the use and reliance of the Client only. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Associates. For the avoidance of any doubt, where ARP Associates enters into a letter of reliance for the benefit of a third party, that third party will be permitted to rely on the report. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without ARP Associates consent.

Drainage Drawings

The following drawings illustrate the drainage systems for this development, and should be referred to when planning maintenance requirements:

- NW149/02/03 Private Drainage Layout
- NW149/02/05 Drainage Details
- NW149/02/06 Typical External Construction Details
- NW149/02/07 Exceedance Flow Routing Plan
- NW149/02/09 Drainage Catchments

Any persons undertaking maintenance should ensure they refer to the most recent revision of the drainage drawings for the site, including 'as-built' drawings when available.

Maintenance and Management Responsibility

It is envisaged that responsibility for the surface water and foul drainage outfall pipes (connecting to the public sewers) beyond the site boundary will lie with United Utilities (via Section 106 sewer connection agreements).

Responsibility for the ongoing inspection and maintenance of the remainder of the drainage systems on this development is expected to remain the responsibility of the site/building owner or to be transferred to a management company.

All operation, inspection and maintenance should be undertaken by suitably qualified professionals, using appropriate safe systems of work.

Attention is drawn to the requirements of the Construction Design and Management Regulations 2015, and in particular, the duties and obligations of the Client.

Suggested Maintenance and Management Regime

As a minimum, it is recommended that inspection and maintenance follow the regime set out below. However, the timescales indicated below are guides, and should be based on inspections and determined by requirement.

Asset/Item	Inspection and Maintenance Requirement
Overall Maintenance inspections	Inspection at regular intervals with appropriate remedial works instigated should the inspection show a need. After heavy storms or sustained periods of inclement weather, on-site inspection should take place.
Gullies	Gullies should be cleaned at regular intervals, recommended not more than six months apart. Jet-washing and suction-borne methods are recommended, with the contents disposed of at a licenced waste facility.

Asset/Item	Inspection and Maintenance Requirement
Carrier Drains	Drains/sewers should be cleaned at regular intervals, recommended not more than six months apart. Jet-washing and suction-borne methods are recommended, with the contents disposed of at a licenced waste facility.
Manholes/Inspection Chambers	Visual inspection of manholes and inspection chambers, to check for any siltation or obstruction to flow, should be undertaken at regular intervals, recommended not more than six months apart.
Catch Pits	Catch pits should be cleaned at regular intervals, recommended not more than six months apart. Jet-washing and suction-borne methods are recommended, with the contents disposed of at a licenced waste facility. Catch pits should be inspected in advance of storm conditions if feasible, and should be re-inspected after heavy storms or sustained periods of inclement weather.
Guttering/Rainwater Downpipes	These should be cleaned at regular intervals, in recommended not more than six months apart. In inclement months, this frequency is likely to increase.
Ironworks	Cover frames, gully lids etc. should be inspected at regular intervals, in particular to check line and level, and to ensure integrity, security of hinges and to check line/level is within safe and workable tolerance. Recommended not more than six months apart.
Car Park Roads and Kerb Channels	Manual or Motorised sweeping should be undertaken at appropriate intervals. Requirement should be periodically monitored and be flexible. Road level and low spots should be monitored to check for safe tolerance.
Vortex Flow Control	The flow control should be regularly inspected and maintained, as necessary, in accordance with Manufacturers requirements (recommended not more than twelve months apart). The sump of the unit should be emptied periodically (recommended not more than six months apart) using a suction unit and the contents disposed of at a licenced waste facility. The unit should be inspected in advance of storm conditions if feasible, and should be re-inspected after heavy storms or sustained periods of inclement weather.
Porous Paving	Annual brushing and stabilize permeable paving and contributing areas, removal of weeds and inspection of flows at outlets after rainfall events. Monitoring of silt accumulation in upstream silt traps and increase/co-ordinate surface's cleaning regime/silt trap emptying when needed.

Notwithstanding any recommendations set out in this document, all proprietary components should be operated/inspected/maintained in accordance with the manufacturer's requirements/specifications.

Further advice on inspection and maintenance of SuDS components is set out in CIRIA publication C753 The SuDS Manual (2015).

APPENDIX L

NORTH WEST SUDS PROFORMA

NORTH WEST SuDS PRO-FORMA TEMPLATE

Endorsed and recommended for use by:



Document Change Log		
Version	Date Agreed	Changes made
Version 1	April 2020	Initial version issued
Version 2	July 2020	- Page 1 – ‘Guidance to support you’ section – word ‘approved’ changed to ‘appropriate’ - Section 5 – Box 4 ‘Evidence Required’ - word ‘approved’ changed to ‘appropriate’ - Section 5 – Box 9 ‘Summarise how storage will be provided for 1 in 100 year (plus climate change) event on site’ - word ‘approved’ changed to ‘appropriate’
Version 3	August 2020	- Front sheet and Document Change Log added - Page 1 – Para 1 Footnote – words ‘of 0.5 hectares’ removed

Website: [The Flood Hub](#)

This website is an online resource which has been funded by the North West Regional Flood and Coastal Committee as a one stop shop for flood advice and information across the North West.

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NORTH WEST SuDS PRO-FORMA

This pro-forma is a requirement for any planning application for major development¹.

It supports applicants in summarising and confirming how surface water from a development will be managed sustainably under current and future conditions.

Your sustainable drainage system should be designed in accordance with [CIRIA The SuDS Manual C753](#) and any necessary adoption standards.

HOW TO COMPLETE

Blue Box	Instruction/ Question
Orange Box	Evidence Required
White Box	To be completed by Developer / Consultant

1. Complete ALL white boxes
2. Submit this pro-forma to the Local Planning Authority, along with:
 - Sustainable Drainage Strategy
 - Site Specific Flood Risk Assessment (if required)
 - Minimum supporting evidence, as indicated in orange boxes of this pro-forma.

GUIDANCE TO SUPPORT YOU

The pro-forma should be completed in conjunction with ‘Completing your SuDS Pro Forma Guide.’

The pro-forma can be completed using freely available tools such as [Tools for Sustainable Drainage Systems](#) or appropriate industry standard surface water management design software.

¹ as defined in Section 2 of [Statutory Instrument 2015 No. 595](#) or on sites in Critical Drainage Areas.

SECTION 1. APPLICATION & DEVELOPMENT DETAILS

Planning Application Reference (if available)	21/01083/FUL	
State type of planning application i.e. Pre-application, Outline, Full, Hybrid, Reserved Matters* *Information only required if drainage is to be considered as part of reserved matters application	Full	
Developer(s) Name:	Armstrong Projects Ltd	
Consultant(s) Name:	ARP (North West)	
Development Address (including postcode)	Former Smithybridge Pub, 43 Smithy Bridge Road, Littleborough OL15 0DY	
Development Grid Reference (Eastings/Northings)	392740, 415160	
Total Development Site Area (Ha)	0.12ha	
Drained Area (Ha)* of Development	0.12ha	
Please indicate the flood zone that your development is in. Tick all that apply. <i>Based on the Environment Agency Flood Map for Planning and the relevant Local Authority Strategic Flood Risk Assessment (to identify Flood Zones 3a/3b).</i>	Flood Zone 1 ☒ Flood Zone 2 ☐ Flood Zone 3a ☐ Flood Zone 3b ☐	
What is the surface water risk of the site? Tick all that apply. <i>Based on the Environment Agency Surface Water Flood Map.</i>	High ☐ Medium ☐ Low ☒	
Have you submitted a Site Specific Flood Risk Assessment (FRA)? <i>See separate guidance notes for clarification on when a FRA is required</i>	Yes ☐ No ☒	
Have you submitted a Sustainable Drainage Strategy?	Yes ☒ No ☐	
Does your drainage proposal provide multi-functional benefits via SuDS?	Yes ☒ No ☐	
Expected Lifetime of Development (years) <i>Refer to Planning Practice Guidance "Flood Risk and Coastal Change" Paragraph 026</i>	100	
Development Type:		State Proposed Number of Units
Greenfield Site Site is wholly undeveloped, and a new drainage system will be installed	☐	
Previously Developed/ Brownfield Site - Site is already developed, and the <u>entirety</u> of the existing surface water drainage system will be used to serve the new development (evidence must be provided to prove existing surface water drainage system is reusable); OR - Where records of the previously developed system are not available so that the hydraulic characteristics of the system cannot be determined or where the drainage system is not in reasonable working order i.e. broken, blocked or no longer operational for other reasons, then one of the approaches outlined in Section 24.5 of The SuDS Manual (C753) should be adopted.	☒	14 apartments in a single block
Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 1.	Foul and Surface Water Drainage Strategy report; ARP; NW149/02/2a; Dec 2021. Drainage Layout drawing; ARP; NW149/02/03-C; Dec 2021	

SECTION 2: IMPERMEABLE AREA AND EXISTING DRAINAGE

	Existing (E)	Proposed (P)	Change (P – E)
State Impermeable Area (Ha)	0.116ha	0.091ha	-0.025ha
Evidence Required: Plans showing development layout of site with existing and proposed impermeable areas.			☒

Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?	Yes ☐ No ☒ Don't Know ☐
Evidence Required: Plan(s) showing existing layout to include all: • Watercourses, open and culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes, gullies etc. • Infiltration features - soakaways, filter drains etc.	☒ See existing drainage survey plan in Appendix C of Drainage Strategy Report (ARP; NW149/02r2a; Dec 2021)

Drainage Design <i>Outline planning applications should be able to demonstrate that a suitable drainage system is achievable.</i> <i>All other type of planning application should provide full details or reference to previous planning application where drainage details have been submitted or approved.</i>	
Select which design approach you are taking to manage water quantity (refer to Section 3.3 SuDS Manual)	
Approach 1 – Volume control / Long Term Storage (Technical Standards S2/3, S4/5) <i>The attenuated runoff volume for the 1 in 100 year 6 hour event (plus climate change allowance) is limited to the greenfield runoff volume for the 1 in 100 year 6 hour event, with any additional runoff volume utilising long term storage and either infiltrated or released at 2 l/s/ha</i> <i>The discharge rate for the critical duration 1 in 1 year event is restricted to the 1 in 1 year greenfield runoff rate</i> <i>The discharge rate for the critical duration 1 in 100 year event (plus climate change allowance) is restricted to the 1 in 100 year greenfield runoff rate</i>	☐ N/A - see below
Approach 2 – Qbar (Technical Standards S6) <i>Justification has been provided that the provision of volume control/long term storage is not appropriate and an attenuation only approach is proposed. All events up to the critical duration 1 in 100 year event (plus climate change allowance) are limited to Qbar (1 in 2 year greenfield rate) or 2 l/s/ha, whichever is greater.</i>	☐ N/A - see below
Evidence Required: Plans showing: - Existing flow routes and flood risks - Modified flow routes - Contributing and impermeable areas - Current (if any) and proposed ‘source control’ and ‘management train’ locations of sustainable drainage components (C753 Chapter 7) - Details of drainage ownership - Details of exceedance routes (Technical Standards S9) - Topographic survey - Locations and number of existing and proposed discharge points Rate of surface water discharge to be reduced by development of the site, with runoff continuing to discharge to combined public sewer but at a restricted rate - see 6.13 to 6.15 of Drainage Strategy report. <i>Note consideration should be given to manage surface water from both impermeable and permeable surfaces (including gardens and verges) likely to enter the drainage system.</i>	☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 2.	Foul and Surface Water Drainage Strategy report; ARP: NW149/02r2a; Dec 2021; Drainage Layout drawing; ARP: NW149/02/03-C; Dec 2021
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SECTION 3: PEAK RUNOFF RATES – TECHNICAL STANDARDS S2, S3 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) <i>Previously developed sites - In line with S3 should be equivalent to Greenfield runoff rates – discuss with LLFA if this is not achievable pre-application</i>
Qbar (Approach 2)	10.9 l/s (FSR and Rational Method)		
1 in 1 Year Event (Approach 1)	8.5 l/s (FSR and Rational Method)		5.4l/s
1 in 30 Year Event	12.6 l/s (limited by pipe capacity)		5.5l/s
1 in 100 Year Event* (Approach 1)	12.6 l/s (limited by pipe capacity)		5.5l/s
* Total discharge at the 1 in 100 year rate should be restricted to the greenfield runoff volume for the 1 in 100 Year 6 hour event with additional volumes (long-term storage volume) released at a rate no greater than 2 l/s/ha where infiltration is not possible. The climate change allowance should only be applied to the proposed rate and not the existing or greenfield rate.			
Evidence Required: Methodology used to calculate peak runoff rate clearly stated and justified. Impermeable areas plan, supported by topographical survey confirming positive drainage. Hydraulic calculations and details of software used.			☒ ☒ ☒

State the hydraulic method used in your calculations (Refer to Table 24.1 of The SuDS Manual)	Existing runoff: (i) FSR rainfall and Rational Method (theoretical runoff); (ii) Colebrook-White (pipe capacity) Proposed runoff: Calculated using Causeway Flow model with limiting discharge of 5.5l/s
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Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 3.	Foul and Surface Water Drainage Strategy report; ARP; NW149/02r2a; Dec 2021. Drainage Layout drawing; ARP; NW149/02/03-C; Dec 2021
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SECTION 4: DISCHARGE VOLUME – TECHNICAL STANDARDS S4, S5 AND S6 (UNLESS S1 APPLIES)

Rainfall Event	Existing Volume (m ³)	Greenfield Volume (m ³)	Proposed Volume (m ³)
1 in 100 Year 6 Hour Event (Approach 1)	Proposed impermeable area is less than existing impermeable area, therefore discharge volume is significantly reduced by development		
Does the below statement apply to your development proposal? Long term storage is not achievable on this site and, in accordance with S6 of the Non Statutory Technical Standards for SuDS, the surface water discharge rates for events up to and including the 1 in 100 year critical event are limited to Qbar (Approach 2)			Yes ☐ No ☒
Evidence Required: Approach to managing the quantity of surface water leaving the site clearly stated and justified Methodology used to calculate discharge volume clearly stated and justified. Hydraulic calculations and details of software used.			☒ ☒ As above ☐ N/A

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 4.	Foul and Surface Water Drainage Strategy report; ARP; NW149/02r2a; Dec 2021. Drainage Layout drawing; ARP; NW149/02/03-C; Dec 2021
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SECTION 5: STORAGE – TECHNICAL STANDARDS S7 AND S8

State climate change allowance used (%)	+45%
State housing density (houses per ha)	N/A (apartments)
State urban creep allowance used (%)	0% (unlikely to occur)
Evidence Required: State / used in appropriate industry standard surface water management design software.	☒

State storage volume required (m³) (excluding non-void spaces) <i>Must include an allowance for climate change and urban creep</i>	18.6
Have you incorporated interception into your design? <i>(Refer to Chapter 24 of The SuDS Manual C753)</i> <i>Where possible, infiltration or other techniques are to be used to try and achieve zero discharge to receiving waters for rainfall depths up to 5mm.</i>	Yes ☒ No ☐ Permeable paving in shared car park provides element of interception
Evidence Required: Drainage plans showing location of attenuation and all flow control devices and supporting calculations.	☒

Summarise how storage will be provided for 1 in 30 year event on site. <i>Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas and no flooding occurs offsite in a 1 in 100 year (plus climate change allowance) event.</i>	Storage provided within granular sub-base beneath the proposed permeable parking spaces
Summarise how storage will be provided for 1 in 100 year (plus climate change) event on site. <i>Where storage above the 1 in 30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by calculations used in appropriate industry standard surface water management design software. It is important to run a range of duration events to ensure the worst case condition is found for each drainage element on the site</i>	Storage provided within granular sub-base beneath the proposed permeable parking spaces
Evidence Required: Plans showing size and location of storage and supporting calculations. Where there is controlled flooding, extents and depths must be indicated.	☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 5.	Foul and Surface Water Drainage Strategy report; ARP; NW149/02/2a; Dec 2021. Drainage Layout drawing; ARP; NW149/02/03-C; Dec 2021
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SECTION 6: WATER QUALITY PROTECTION

Contaminated surface water run-off can have negative impacts on the quality of receiving water bodies. The potential level of contamination will influence final the design of an appropriate treatment train as part of your sustainable drainage system.

Is the proposal site known to be or potentially contaminated? Storage systems will be 'tanked' to avoid groundwater interactions. Discharge will be to combined public sewer as per existing site	Yes ☒ No ☐
• If the site is contaminated, it should be demonstrated that the sustainable drainage system will not increase the risk of pollution to controlled waters though the mobilisation of contaminants and/or creation of new pollution pathways.	

Confirm the Pollution Hazard Level of the proposed development - Tick ALL that apply Refer to Pollution Hazard Indices for different Land Use Classifications in Table 26.2 of The SuDS Manual C753 for further guidance.		
Pollution Hazard Level <i>Tick ALL that apply</i>	Surface water run-off from the proposed development will drain from:	
VERY LOW	☒	Residential roofs
LOW	☒	- Other roofs (typically commercial/industrial roofs) - Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, home-zones and general access roads) - Non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day
MEDIUM	☐	- Commercial yard and delivery areas - Non-residential car parking with frequent change (e.g. hospitals, retail) - All roads except low traffic roads and trunk roads/motorways²
HIGH	☐	- Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites) - Sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured - Industrial sites - Trunk roads and motorways¹

If the development's Pollution Hazard Level is 'Very Low' or 'Low', has the sustainable drainage design been risk assessed and appropriate mitigation measures included?	Yes ☒ No ☐
• If the proposed development has a very low or low polluting potential, you should design your sustainable drainage system to include an appropriate treatment train in accordance with The SuDS Manual (C753).	

If the development's Pollution Hazard Level is 'Medium' or 'High', is the application supported by a detailed water quality risk assessment?	Yes ☐ No ☐
• If the proposed development has a high polluting potential, a detailed risk assessment <i>will</i> be required to identify an appropriate SuDS treatment train and ensure compliance with Paragraph 170 of the National Planning Policy Framework. • If the proposed development has a medium polluting potential, a detailed risk assessment <i>may</i> be required depending on the nature, scale and location of the development.	

Has pre-application advice on water quality been obtained from the Environment Agency?	Yes ☐ No ☒
If YES, provide details:	

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 6.	Foul and Surface Water Drainage Strategy report; ARP: NW149/02r2a; Dec 2021. Drainage Layout drawing; ARP: NW149/02/03-C; Dec 2021
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² Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

SECTION 7: DETAILS OF YOUR SUSTAINABLE DRAINAGE SYSTEM

a) Function of your Sustainable Drainage System

Do your proposals store rainwater for later use (as a resource)?	Yes ☐ No ☒
Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	
Do your proposals promote source control to manage rainfall close to where it falls? (e.g. promoting natural losses through soakage, infiltration and evapotranspiration)	Yes ☐ No ☒
Evidence Required: Please provide a brief sentence in the adjacent white box to describe how this function has been achieved.	Infiltration is not feasible on this site
Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7a.	Foul and Surface Water Drainage Strategy report; ARP: NW149/02/2a; Dec 2021. Drainage Layout drawing; ARP: NW149/02/03-C; Dec 2021

b) Hierarchy of Drainage Options – Planning Practice Guidance

The proposed method of discharge are set out within order of priority. Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

Proposed method of surface water discharge		Is this proposed?	
Hierarchy Level 1: Into the ground (via infiltration)		Yes ☐ No ☒	
If YES - Evidence Required		If NO – Evidence Required Tick ALL that apply	
☐	A. Completed Infiltration Checklist from The SuDS Manual (C753) Appendix B <i>An editable version of this form is available on SusDrain website.</i>	☐	A. Site investigation to demonstrate that the ground is not free draining. Test results to be provided in accordance with: - The methodology within BRE 365 (2016), OR - Falling head permeability tests BS EN ISO 22282-2: 2012
☐	B. British Geological Survey (BGS) Infiltration SuDS Map	☐	B. NOTE: where an applicant is unable to access a site to undertake testing, e.g. where unable to access a site for an outline application, they can submit a SuDS GeoReport or similar.
☐	C. Infiltration testing to BRE 365 (2016) or falling head permeability tests to BS EN ISO 2228-2: 2012 (optional for outline)	☐	C. Evidence to confirm that infiltration to ground would result in a risk of deterioration to ground water quality.
☐	'Plan B' sustainable drainage plan and statement of approach with an alternative discharge method, in case infiltration proposals are proven not feasible upon further site specific ground investigation e.g. to consider seasonal variations to groundwater.	☒	D. Geotechnical advice from a competent person* which determines that infiltration of water to ground would pose an unacceptable risk of geohazards to the site and/or local area. *Note: Competent person may include a Chartered Engineer, Chartered Geologists, Registered Ground Engineering Professionals (RoGEP). See 6.7 of Drainage Strategy Report, and Soakaway Feasibility Assessment in Appendix H of Drainage Strategy Report

Proposed method of surface water discharge		Is this proposed?	
Hierarchy Level 2: To a surface water body <i>(select type)</i> NOTE: Consent from LLFA or Permit from Environment Agency may be required – refer to guidance		Yes ☐ No ☒ N/A ☐	
		☐ Main river ☐ Ordinary watercourse	☐ Canal ☐ Other water body
If YES - Evidence Required		If NO – Evidence Required Tick <u>ALL</u> that apply	
☐ Surface water body / watercourse survey and report	☒ Plan showing nearby watercourses and waterbodies AND ☒ Statement providing justification in your Sustainable Drainage Strategy Note: Where third party land is cited as a barrier, you should provide visibility of discussions held to date with the riparian landowner of the waterbody.		

See Flood Map for Planning in Appendix D of Drainage Strategy Report
See 6.8 to 6.10 of Drainage Strategy report

Proposed method of surface water discharge		Is this proposed?	
Hierarchy Level 3: To a surface water sewer or highway drain <i>(select type)</i>		Yes ☐ No ☒ N/A ☐	
		☐ Surface water sewer	☐ Highway drain
If YES - Evidence Required		If NO – Evidence Required Tick <u>ALL</u> that apply	
☐ Written correspondence from Water and Sewerage Company/ Highway Authority regarding proposed connection.	☒ Plan showing nearby sewers and highway drains AND ☒ Statement providing justification in your Sustainable Drainage Strategy		

See public sewer records in Appendix E of Drainage Strategy report
See 6.11 to 6.12 of Drainage Strategy report

Proposed method of surface water discharge		Is this proposed?	
Hierarchy Level 4: To combined sewer		Yes ☒ No ☐ N/A ☐	
If YES - Evidence Required		If NO – Evidence Required	
☒ Written correspondence from Water and Sewerage Company	N/A		

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7b.	Foul and Surface Water Drainage Strategy report; ARP: NW149/02r2a; Dec 2021. Drainage Layout drawing: ARP: NW149/02/03-C; Dec 2021 <i>type text here</i>
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c) Proposed SuDS Component Types

	Tick ALL that apply				
Within property boundary	☐ Rainwater harvesting	☐ Green/ blue roofs	☐ Pervious pavements [Type: A ☐ B ☐ C ☐	☐ Soakaway	☐ Bio retention systems

	Tick ALL that apply				
Within development site boundary (not property)	☐ Infiltration system [Type: ☐ Surface level ☐ Below ground]		☐ Filter strips	☐ Filter drains	☐ Swales
	☐ Bio retention system	☐ Detention basins	☐ Ponds and wetlands	☒ Attenuation tanks/ Oversized pipes	☒ Other (state below)
	If 'Other' please state: Permeable paving in shared car park - Type C				

Off site (not within the boundary of the proposed development)	Please state: N/A (only proposed off-site drainage infrastructure is final discharge pipe to public sewer)
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I confirm that the above selected components have been designed in accordance with The SuDS Manual (C753).	I confirm ☒
I confirm that the management of flows resulting from rainfall in excess of a 1 in 100 year plus climate change rainfall event, and their exceedance route(s), has been fully considered in order to minimise the risks to people, property (new and existing) and infrastructure.	I confirm ☒

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 7c.	Type text here Foul and Surface Water Drainage Strategy report; ARP; NW149/02/2a; Dec 2021. Drainage Layout drawing; ARP; NW149/02/03-C; Dec 2021
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The applicant is responsible to ensure that ALL components selected in Section 7 can be maintained for the design life of the development. This information is required so the Local Planning Authority can ensure the maintenance and management of the sustainable drainage system. The Local Planning Authority will discuss how this will be secured (e.g. via planning condition or planning obligation).

[illegible]

		Information Provided?
Maintenance Schedule		Yes ☒ No ☐
Evidence Required: A copy of the maintenance schedule including: Proactive and preventative maintenance Detailing regular, occasional and remedial maintenance activities including recommendations for inspection and monitoring. This should include recommended frequencies, advice on plant/ machinery required and an explanation of the objectives for the maintenance proposed and potential implications of not meeting them. Reactive and corrective maintenance (e.g. product repair and replacement). Including advice on excavations, or similar works, in locations that could affect the SuDS components/ adjacent structures.		 See section 8 and Appendix K of Drainage Strategy report

		Information Provided?
Maintenance and Management Arrangements		Yes ☒ No ☐
Evidence Required: Evidence of formal agreement with the party responsible for undertaking maintenance. Please select any of the adopting bodies that you will be offering your sustainable drainage components for adoption. Tick all that apply. ☐ Water and Sewerage Company <i>Section 104 agreement (Water Industry Act 1991)</i> ☐ Highway Authority <i>Section 278/38 agreement (Highways Act 1980)</i> ☐ Local Authority Public Open Space <i>[Refer to Local Authority Policy]</i> Please select the arrangement(s) for all non-adopted sustainable drainage components. Tick all that apply. ☐ Management Company ☒ Property Owner <i>(for SuDS components within property boundary only)</i> ☐ Other (please state) See section 8 of Drainage Strategy report		☐ N/A See section 8 and Appendix K of Drainage Strategy report

Please list any relevant document and or drawing numbers (including revision reference) to support your answers to Section 8.	Foul and Surface Water Drainage Strategy report; ARP; NW149/02/2a; Dec 2021 Drainage Layout drawing; ARP; NW149/02/03-C; Dec 2021
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DECLARATION AND SUBMISSION

This pro-forma has been completed using evidence from information which has been submitted with the planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details			
Completed by	Matthew Wilson	Email Address	matthewwilson@arpnorthwest.co.uk
		Telephone Number(s)	07307 849 396
Signed off by	Paul Carter	Accreditation(s) and/or Qualification(s) of Signatory	BEng (Hons) CEng MICE
Date (dd/mm/yyyy)	26/04/2023	Company	ARP (North West)

(Rev 2 - minor updates to reflect changes to detail of drainage design)

Client Details			
Name	Chris Hamlett	Company	Armstrong Projects Ltd