Eastwood

CONSULTING ENGINEERS



DRAINAGE NOTE

BIRCHWOOD LANE, SOMERCOTED

AVANT HOMES

10/05/2024

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DRAINAGE NOTE

BIRCHWOOD LANE, SOMERCOTES

FOR

AVANT HOMES



48974-ECE-XX-XX-RP-C-0001 **09 May 2024**

Eastwood Consulting Engineers is a trading name of Eastwood and Partners (Consulting Engineers) Limited
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BIRCHWOOD LANE, SOMERCOTES

DRAINAGE NOTE

AVANT HOMES

Introduction

This Drainage Note has been prepared on the instruction of Avant Homes to summarise a proposed drainage strategy.

Existing site

The site is located off Birchwood Lane, Somercotes in Alfreton, centred on coordinates 443093E, 353853N, and has an area of approximately 2.95 ha.

The site is bound by Birchwood Lane and residential properties to the north, fields to the south, east and west, with residential properties to the south-west. The whole site is currently occupied by an equestrian centre and associated fields.

The site falls from approximately 127.59 mAOD in the north-west to approximately 109.72 mAOD in the south-east at an average gradient of 1 in 13.

Proposed development

Proposals are for the development residential properties with access from Birchwood Lane to the north.

Existing drainage

Severn Trent Water sewer records (Appendix 1) show a 300 mm foul water sewer to the south of the site with an easterly orientation. There is also a 300 mm public combined sewer located in Birchwood Lane, north of the site. A drainage network is proposed for the adjacent development site located east of the site.

Ground conditions

The British Geological Survey online maps do not provide records of superficial deposits within the site but show the underlying bedrock geology as Mudstone, Siltstone and Sandstone of the Pennine Middle Coal Measures Formation.

There are no records of historical borehole logs within the vicinity of the site.

A historic borehole log (Ref: SK59SW96) located approximately 290 m north-east of the site records layers of mudstone, clay and siltstone. Groundwater was not encountered in this borehole.

Sustainable Drainage Systems (SuDS)

SuDS methods are considered in line with the hierarchy proposed in the SuDS Manual (CIRIA C753).

SuDS methods include water infiltration systems such as soakaways, basins and filter strips, together with swales, pervious pavements, detention basins, ponds and other wetland solutions. The various methods are considered in detail in The SuDS Manual (CIRIA C753).

A basin is proposed to provide attenuation and water quality treatment, as well as adding biodiversity and amenity value to the development. Additional SuDS features such as swales may also be suitable to incorporate into the site to provide initial attenuation and water quality treatment. A summary of potential SuDS features is included in Appendix 2.

Watercourse

The nearest watercourse is an unnamed watercourse located immediately south of the site boundary, which is a tributary of the River Erewash at a point 1 km south-east of the site. Discharge to this watercourse is subject to approval from the Lead Local Flood Authority.

Public sewer

There is a 300 mm public combined water sewer recorded in Birchwood Lane, north of the site. Discharge to this sewer would require pumping and approval from Severn Trent Water.

Surface water drainage proposals

The final disposal strategy for surface water run-off requires detailed consideration and approval during the design phase of the project.

- Surface water discharge will likely discharge via gravity to attenuation basins in the southern portion of the site before discharging to the unnamed watercourse located immediately south of the site boundary. This is subject to approval from the Lead Local Flood Authority.

- Surface water discharge will be restricted to the greenfield runoff rate for the developable site area, equating to 10 l/s (Appendix 2), subject to approval from the Lead Local Flood Authority.

- Attenuation storage will be provided in two basins within the southern portion of the site for rainfall events up to the 1 in 100 year plus 40 % climate change return period. The total attenuated storage volume will be approximately 1,420 m^3, subject to detailed design.

- Others SuDS features such as swales may be suitable to incorporate throughout the site.

Foul drainage proposals

Foul water will likely discharge via gravity to the southern portion of the site before discharging to the proposed drainage network for the adjacent development site. This is subject to approval from Severn Trent Water.

Appendices

Appendix 1 – Severn Trent Water	Sewer plan
Appendix 2 - Eastwood Consulting Engineers	UKSuDS greenfield runoff calculations
	SuDS checklist
	Attenuation calculations

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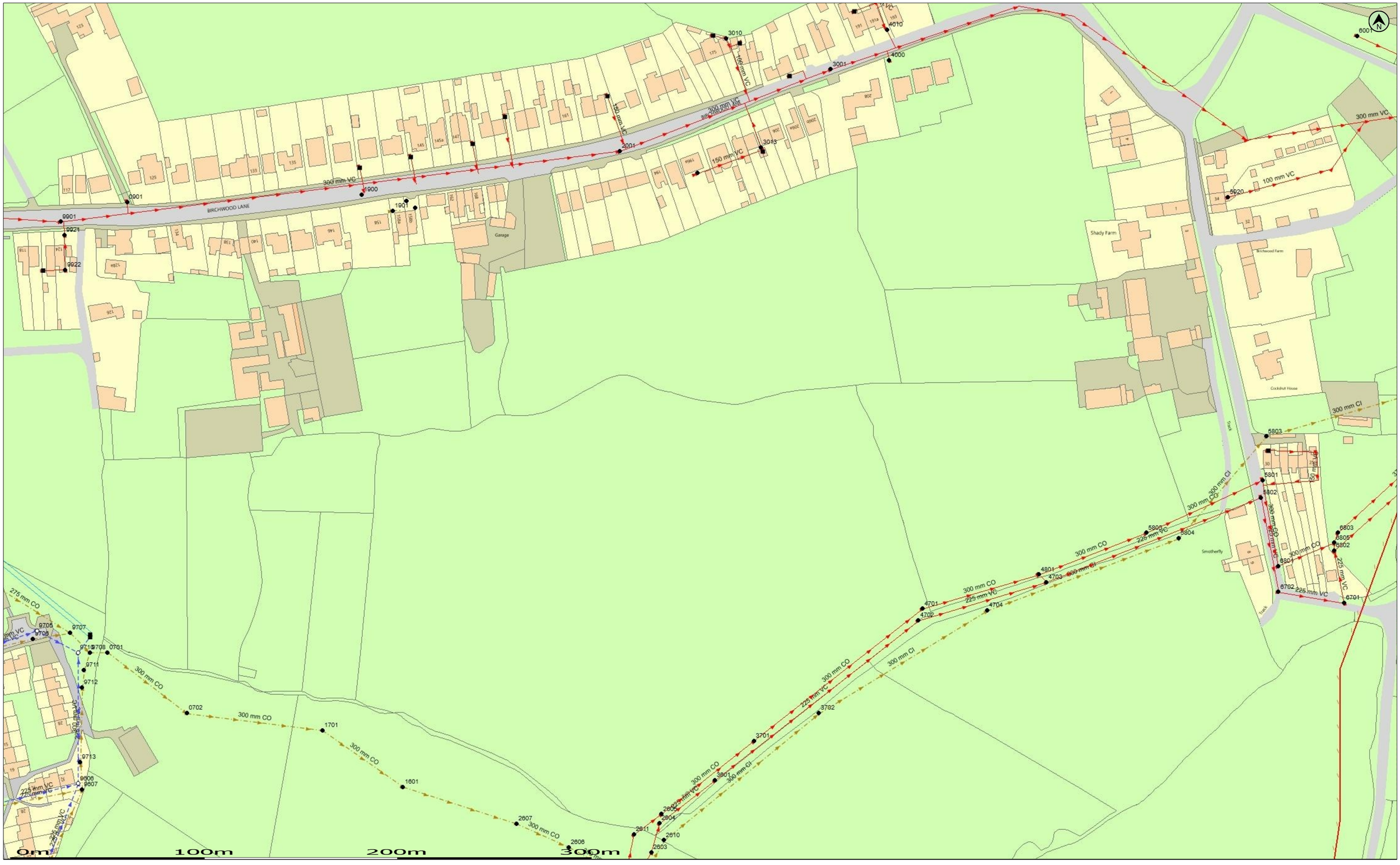
Appendix 1



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Date: 29/11/23

Scale: 1:1250

Map Centre: 443311,353875

Data updated: 14/11/23

Our Ref: 1334264 - 2

Wastewater Plan A2

Do not scale off this map. The plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. Reproduction by permission of Ordnance Survey on behalf of HMSO. ©Crown Copyright and database rights 2023 All rights reserved. Ordnance Survey licence number 100031673. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

- Public Foul Gravity/Lateral Drain
- Public Combined Gravity/Lateral Drain
- Public Surface Water Gravity/Lateral Drain
- Pressure Foul
- Pressure Combined
- Pressure Surface Water
- Highway Drain
- Overflow Pipe
- Disposal Pipe
- Culverted Water Course
- Pumping Station
- Fitting
- Manhole Foul
- Manhole Surface
- Abandoned Pipe
- Chamber

Section 104 sewers are shown in green

Private sewers are shown in magenta

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SEVERN TRENT

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May2014

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
	C			
0901	C	128.94	128.06	0.88
2001	C	117.11	115.33	1.78
2603	C	102.97	101.87	1.1
2604	C	102.9	101.81	1.09
2605	C	102.91	101.77	1.14
2611	C	103.47	102.3	1.17
3001	C	-	0	0
3010	C	-	0	0
3013	C	-	0	0
3601	C	102.58	100.22	2.36
3701	C	102.98	101.2	1.78
4010	C	-	0	0
4701	C	102.87	100.47	2.4
4702	C	102.14	100.16	1.98
4703	C	100.91	99.91	1
4801	C	101.21	100.04	1.17
5801	C	98.15	96.15	2
5802	C	98.01	96.43	1.58
5805	C	99.16	98.08	1.08
5920	C	-	0	0
6001	C	94.87	93.09	1.78
6701	C	94.33	91.92	2.41
6702	C	94.67	93.02	1.65
6801	C	95.51	94.03	1.48
6802	C	93.41	91.78	1.63
6803	C	93.46	91.48	1.98
6805	C	93.57	91.67	1.9
9901	C	-	0	0
9921	C	-	0	0
9922	C	-	0	0
	F			
	F			
0701	F	117.79	116.08	1.71
0702	F	115.27	113.9	1.37
1601	F	-	0	0
1701	F	110.79	108.54	2.25
1900	F	-	0	0
1901	F	-	0	0
2606	F	104.76	103.06	1.7
2607	F	107.42	105.29	2.13
2610	F	101.85	99.7	2.15
3702	F	102.33	99.51	2.82
4000	F	-	0	0
4704	F	101.02	98.7	2.32
5803	F	99.42	96.62	2.8
5804	F	98.26	96.75	1.51
9607	F	123.03	120.89	2.14
9706	F	123.37	120.55	2.82
9707	F	122.9	117.13	5.77
9708	F	118.67	116.33	2.34
9711	F	121.51	118.98	2.53
9712	F	-	0	0
9713	F	122.94	120.57	2.37
9606	S	123.11	121.54	1.57
9705	S	123.17	120.86	2.31
9710	S	121.99	118.01	3.98

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

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Appendix 2

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Jess Steels
Site name:	Birchwood Lane
Site location:	Somercotes

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.08047° N
Longitude:	1.35814° W
Reference:	646186024
Date:	May 02 2024 15:08

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	2.36

Methodology

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

Soil characteristics

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

Hydrological characteristics

	Default	Edited
SAAR (mm):	736	736
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	12.08	12.08
1 in 1 year (l/s):	10.03	10.03
1 in 30 years (l/s):	24.16	24.16
1 in 100 year (l/s):	31.05	31.05
1 in 200 years (l/s):	36.73	36.73

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

SUDS Type	SUDS Technique	Description	Suitable	Comments
Source Control	Green roof	Vegetated roof that reduces runoff volume and rate	No	Expected planning requirement for traditional pitched roofs to match neighbouring housing.
	Rain garden/ bio retention area	Small depressions in the ground that can act as infiltration points.	Possible	Potential areas of rain gardens to be developed.
	Rainwater harvesting/rainwater butts	Rainwater is stored and re-used	Possible	Individual water butts can be used for garden watering.
	Permeable paving	Paving which allows inflow of rainwater into underlying construction/soil	Possible	Type C permeable paving may be suitable for private drives depending on site conditions.
Infiltration	Soakaway	Pit or trench which stores and disposes of water to the ground	No	Expected presence of impermeable ground (mudstone).
	Filter Drain	Trench which conveys and/or disposes of water to the ground.	No	
	Infiltration Basin	Shallow basin which stores and disposes of water to the ground	No	Lack of suitable open space.
Conveyance	Swale	Shallow vegetated depression which conducts and retains water	No	Difficulties of adoption and lack of space.
Detention	Subsurface storage	Traditional underground pipes, tank storage, or modular systems	Yes	Area available on the site for an attenuation tank.
	Detention Basin	Normally dry but may have small permanent water pools at the inlet and outlet. They can function as POS	No	Area available on the site for a detention basin.

Detention	Pond	Permanent body of water	No	Lack of suitable public open space.
	Wetland	Permanent body of shallow water or marsh	No	

EASTWOOD & PARTNERS (Consulting Engineers) Ltd.

Project:	**48974**	Sheet	1.00
location	**Birchwood Lane**	Job No.	48974
town	**Somercotes**	Date	02.05.24
Subject:		Designed	JSS
	Surface Water Drainage	Checked	CH
	Storage Estimates	Revision	A

Site Details :

Information From Wallingford Maps :

Location : Birchwood Lane, Somercotes
Grid Ref : 443096E, 353899N

M5-60	**20.0**	mm			
r	**0.40**				
SAAR	**736**	mm			
UCWI	78	(Fig. 9.7)			
Soil Type	**4**				
SOIL	0.45	(Section 7.4)			

Total Site Area	**2.950**	ha		
Deduct areas to soakaways	0.000	ha		
Effective Drainage Area	**2.950**	ha		
Total Impermeable	**1.770**	ha	60%	assumed impermeable area
Allow for Urban Creep	**0.000**	ha		
Total Impermeable	**1.770**	ha		

PIMP	60.0%		
PR	46.4	Equation 7.3	
Cv	0.77	Equation 7.21	
Default Cv	**1.00**	Designer to insert to override calculated Cv	

Design Return Period	**100**	**Years**	Max. Branch Length	**350**	metres
			Approx. Time of Flow	**5.8**	mins

Percentage Increase For Climate Change: **40%**

Details of Restricted Discharge :

Maximum Permitted Rate of Flow from the System	[redacted]	Litres/sec.ha
	10.0	Litres/sec
Assumed Average Flow as a Proportion (Estimate)	85	%
Average Rate of Flow	**8.5**	Litres/sec

Calculation of Critical Duration and Storage Volume Required :

Trial Durations (mins)	**550**	**600**	**650**	**700**	**750**	**800**	**850**
Average Point Intensity (mm/hr)	7.5	7.0	6.5	6.2	5.8	5.5	5.3
Volume of Run-off for the period = Area x Cv x i x D (m3)	1209.3	1231.2	1251.6	1270.8	1288.8	1305.8	1321.9
With climate change	1693.0	1723.7	1752.3	1779.1	1804.3	1828.1	1850.7
Volume of Out-flow for the period = Ave. flow x (D+Tf)(m3)	283.5	309.0	334.5	360.0	385.5	411.0	436.5
Storage Volume for this Duration (m3)	**1410**	**1415**	**1418**	**1419**	**1419**	**1417**	**1414**

Storage Volume Reqired for

100 Year Return Period = 1419 m^3

Is this the worst case (ie. Critical Duration)? 1 (1 = Yes, 0 = No)



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