8 Appendices

8.1 Appendix A – Site Plan



PROPOSED SITE PLAN
1:500@A3

This drawing and its design are the copyright property of Solo Timber Frame Ltd.

SOLO
TIMBER FRAME HOMES

Solo Timber Frame
The Byre, Hodore Farm, Hartfield,
East Sussex TN7 4AR

Tel No.: 01892 771354
enquiries@solotimberframe.co.uk
www.solotimberframe.co.uk

Woodhouse Farm
New Road, Billingshurst
West Sussex, RH14 9DS

Client :Joanna Moyers

PLANNING DRAWINGS

PROPOSED SITE PLAN
Scale 1:500@A3
Drawing No : PR-01

A3

8.2 Appendix B – Borehole Log

TQ 12 NW 10

WELL BORING at Billingshurst County Sussex TQ12/7

Geol. map 1 in. map New Series 301 6 in. map 24 NW/W

Made by Duke & Ockenden Date 192

Sunk ——— feet. Bored 11 ... 302 315 GR. 1133 2617

Communicated by Duke & Ockenden

Height above Ordnance Datum 162.00 Rest level of water 25 ft.; depresses to 53 ft. when pumping at 540 g.p.h.

Yield

Quality (with copy of analysis on separate sheet)

66

GEOLOGICAL FORMATION.	NATURE OF STRATA.	THICKNESS. Feet.	Inches.	TH.	Inches.
	Wealden Clay			117	—
	Lined 6" tubes to 79 ft.				
	4½" " " 117 ft.				
	perforated 89 — 99 ft.				
	At Hill Brow, 1 mile S. of Barns Green for R.W. Ludgater, Esq.				

Billingshurst. Hill Brow. Sussex
for R.W. Ludgater Esq DEC 1928
O.D. 162.00 1 m. S of Barns Green

Bored to .. .. 117'0"
Lined 6" Tubes to 79'0"
" 4½" " " 117'0"
perforated .. 89' to 99'
Water level .. .. 25'0"
depresses to 53' when pumping at 540 g.p.h.

Stratum
Wealden Clay

WJB 4/368.

M. of H. notified 1/2/29

Disused
Visited S. Buchan 27.5.40.

Filed 2.6.47.
B.M.C.

GEOLOGICAL SURVEY AND MUSEUM,
JERMYN STREET, LONDON, S.W. 1.

(B10619). Wt. 15824—S123. 2500. 11/25. Gp. 160. O.A.

8.3 Appendix C – The BRE 365 Soakage Test

cgs civils Consulting Civil Engineers

Job: C3077 Woodhouse Farm, Billingshurst - Test 1

Infiltration Calculator

$$f = \frac{Vp75\text{-}25}{ap50 \times tp75\text{-}25}$$

Vp 75-25	=	Effective storage volume between 75% and 25% effective depth
ap50	=	Internal surface area of the trial pit up to 50% effective depth and including the base area
tp75-25	=	The time for the water level to fall from 75% to 25% effective depth
f	=	Infilitration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1
ap50	=	1.47 m/squared
tp75-25	=	41250 seconds
Vp 75-25	=	0.135 m/cubed
F	=	2.23E-06

cgs civils Consulting Civil Engineers

Job: C3077 Woodhouse Farm, Billingshurst - Test 2

Infiltration Calculator

$$f = \frac{Vp75\text{-}25}{ap50 \times tp75\text{-}25}$$

Vp 75-25	=	Effective storage volume between 75% and 25% effective depth
ap50	=	Internal surface area of the trial pit up to 50% effective depth and including the base area
tp75-25	=	The time for the water level to fall from 75% to 25% effective depth
f	=	Infilitration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1
ap50	=	1.47 m/squared
tp75-25	=	43520 seconds
Vp 75-25	=	0.135 m/cubed
F	=	2.11E-06

cgs civils Consulting Civil Engineers

Job: C3077 Woodhouse Farm, Billingshurst - Test 3

Infiltration Calculator

$$f = \frac{Vp75\text{-}25}{ap50 \times tp75\text{-}25}$$

Vp 75-25	=	Effective storage volume between 75% and 25% effective depth
ap50	=	Internal surface area of the trial pit up to 50% effective depth and including the base area
tp75-25	=	The time for the water level to fall from 75% to 25% effective depth
f	=	Infilitration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1
ap50	=	1.47 m/squared
tp75-25	=	46950 seconds
Vp 75-25	=	0.135 m/cubed
F	=	1.96E-06

Consulting Civil Engineers

Job: C3077 Woodhouse Farm, Billingshurst - **Infiltration Test Photos**







8.4 Appendix D – Proposed Drainage Strategy, Contributing Area, Exceedance Flow Routes and Hydraulic Calculations

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL
WATER AUTHORITY

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN
ORDINARY WATERCOURSE APPROVAL
LOCATION AND DEPTH OF EXISTING UTILITIES

AT1
Cellular Attenuation Storage Tank using Polypipe Polystorm R- units wrapped in impermeable geomembrane
14.0 x 6.0 x 0.4m Thk. (1 No. Layer of units)
Provides 31.92m³ storage required in critical 1 in 100yr event +45% CCA
CL 41.900
TL 41.400
BL 41.000
Tank to be installed with min 500mm cover to units. To be vented and otherwise installed in accordance with manufacturer's recommendations

S1
Siltbiok
CL 42.000
IL 41.300
SL 41.000
450Ø CP
B125

S4
Orifice - 500Ø Flow Control Chamber with foul air trap
Restricted to 0.5l/s
Flow control constructed with an overflow to existing ditch
CL 42.000
IL 40.950
Water Level: 41.714
500Ø CP
B125

All hard paved parking areas to be constructed using permeable self-draining gravel surface to mimic current situation. Constructed with an overflow connection into the proposed attenuation tank for a higher rainfall events.
The permeable surface designed based on recorded infiltration rate of 1.96x10⁻⁶ m/s and all area being included in the proposed attenuation tank calculations.

All RWPs should discharge through Raintana RWP base units, which include an permeable cover and sump designed to allow silt and sediment to settle, thereby preventing blockage of the proposed drainage system.

PP1
Permeable surface to Client's specifications with
Porous Sub-base
Infiltration Storage
- 50mm Laying Course
- Geotextile
- 350mm 5/20mm Sub Base
- Geotextile

Provides 14.80m³ storage required in critical 1 in 100yr event +40%
CL 42.00 (Min)
FL 41.600 (Min- refer to plan for specific levels)
Designed to recorded infiltration rate of 1.96x10⁻⁶m/s

S2
CL 42.000
IL 41.400
450Ø IC
B125

S3
CL 42.000
IL 41.307
450Ø IC
B125

F1
CL 42.000
IL 41.550
450Ø IC
B125

F2
CL 42.000
IL 41.450
450Ø IC
B125

F3
CL 41.650
IL 41.100
450Ø IC
B125
Constructed within non-return valve.

F4
CL 42.400
IL 41.400
450Ø IC
B125

C1
CL 41.600
IL 40.804
450Ø IC
B125

Proposed Treatment Plant
Marsh Ultra Polylok L package sewage treatment plant (or equivalent)
CL 41.650
Inc IL 41.000
Out IL 40.925
BL 39.650 (subject to manufacturer)

Treated effluent to be discharged into the existing watercourse. Final treatment plant type and size to be confirmed at detail design. Treatment plant size based on 6 persons (6P)

Loading for Sewage Treatment System (based on *British Water Flows and Loads - 4*) :
6P x 150l/day = 900l/day
900l/day: 86400 sec = 0.01 l/s x 5 (peak factor)= 0.05 l/s

The Klargester Reed Bed Tertiary Filter for 6 persons will be installed to improve the discharge quality after the proposed treatment plant, and to facilitate the natural filtration of effluent migrating into the existing ditch

Proposed treated effluent to be connected into SW discharge via proposed combined manhole.

Discharge to the existing watercourse via concrete bag headwall.
Subject to OWC Application.

Proposed bagwork headwall. 100Ø combined IL: **40.630**
Proposed headwall apron level 40.580
Flap valve required during high-tide events.
Final headwall design subject to OWC Application

Ditch downstream to be cleared of all debris before commencement of works

FFL 42.250*

BN Kerb 25mm Upstand

SWD 100Ø 2.000
SWD 100Ø 1.80
SWD 150Ø 6m 1:120 2.002
SWD 100Ø 14.6m 1:100 1.002
SWD 100Ø 15.3m 1:92 1.001
SWD 100Ø 8.3m 1:100 1.000
CWD 100Ø 14m 1:80 1.003
FWD 100Ø 7.8m 1:25
FWD 100Ø 4.7m 1:13
FWD 100Ø 8.3m 1:80
FWD 100Ø 8.1m 1:80

Proposed Land Drainage 100Ø pipe
ACO

Existing watercourse
ditch
dense vegetation
post and rail fencing
gravel track
grass
trod gully
dense hedging
control point X=510728.2655 Y=126520.8137 Z=42.158
control point X=510745.2011 Y=126512.4708 Z=42.363

WARNING

DRAINAGE LEGEND

PROPOSED FEATURES

- SWD — Surface Water Drainage
- Storm water inspection chamber (450Ø)
- Storm water rodding eye
- Extent of permeable surface subject to Client's specifications with flat subbase of 350mm
- Storm water orifice flow control chamber (500Ø)
- Storm water catchpit chamber (450Ø)
- ACO — ACO drain
- Proposed Land Drainage
- FWD — Foul Drainage
- Foul water inspection chamber (450Ø)
- Combined water inspection chamber (450Ø)
- CS — Combined Treated Effluent and SW drain
- 25mm — BN Kerb 25mm Upstand
- 42.000 + — Proposed surface level (indicative only for drainage purposes - tbc by others at detail design stage)
- 00.000 — Finished floor level (indicative only for drainage purposes - tbc by Architect at detail design stage)
- 100Ø 4.5m 1:100 Z BED — Pipe info - diameter, length, gradient, bedding type

ABBREVIATIONS

MH	- MANHOLE
IC	- INSPECTION CHAMBER
AC	- ACCESS CHAMBER
CP	- CATCHPIT
BC	- BRAKE CHAMBER
RE	- RODDING EYE
IL	- INVERT LEVEL
SL	- SUMP LEVEL
RA	- RESTRICTED ACCESS COVER
CL	- COVER LEVEL
TL	- TOP OF CELLULAR SA
BL	- BASE OF CELLULAR SA
FL	- FORMATION LEVEL

Site Specific Notes

1. Proposed storm water drainage design based on the BGS website available information and desktop study. Infiltration method for SW discharge has been ruled out due to the site confirmed to be underlain by Weald Clay soils with poor infiltration characteristics.
2. An onsite preliminary infiltration test was conducted to BRE365 method to a total depth of 1m below ground level (BGL). The worst case infiltration rate was calculated to be 1.96 x 10^-6 m/s and was adopted for permeable paving calculations.
3. The proposed attenuation tank has been designed to cater for the Critical 1 in 100 year + 45 % climate change event + 10% area urban creep.
4. It is proposed that surface water runoff from the roof area is to be collected and discharged into the adjacent watercourse at a restricted discharge rate of 0.5l/s
5. Proposed foul water runoff to be discharged into on-site proposed treatment plant prior being discharged into the existing watercourse.The Klargester Reed Bed Tertiary Filter for 6 persons will be installed to improve the discharge quality after the proposed treatment plant, and to facilitate the natural filtration of effluent migrating into the existing ditch, This discharge will not require Environment Agency Approval.
6. All proposed hard paved areas to be constructed using permeable surface allowing for surface water runoff being partially discharged into the ground through base with recorded infiltration rate of 1.96 x 10-6m/s mimicking the existing situation and partially into the onsite attenuation tank and existing watercourse.
7. Discharge into the existing watercourse subject to OWC Application.

STANDARD DRAINAGE NOTES

1. DO NOT SCALE FROM THIS DRAWING, REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
2. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
4. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
5. BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
6. ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT, THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
7. COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
8. ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA
9. ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911:PART 1.
10. ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
11. ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION LAID DOWN DOWN IN 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
12. ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
13. THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
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16. NO PRIVATE AREAS TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
17. ALL EXISTING MANHOLE COVER'S, GULLIES, ETC, ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
18. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT
19. UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION
20. MANHOLE AND CHAMBER COVER GRADES:

- 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
- 'B125' IN ALL DRIVEWAYS
- 'C250' IN PRIVATE PARKING AREAS
- 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefixed to drawing numbers shall signify the following:-

PL = PLANNING	**Shall not be used for contract or construction purposes**
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PL2	27.08.24	UPDATED TO LLFA COMMENTS	MR	TZ	CS
PL1	26.07.24	UPDATED TO LLFA COMMENTS	MR	TZ	CS
P-	28.05.24	PRELIMINARY ISSUE	MR	TZ	CS

cgs civils
Consulting Civil Engineers

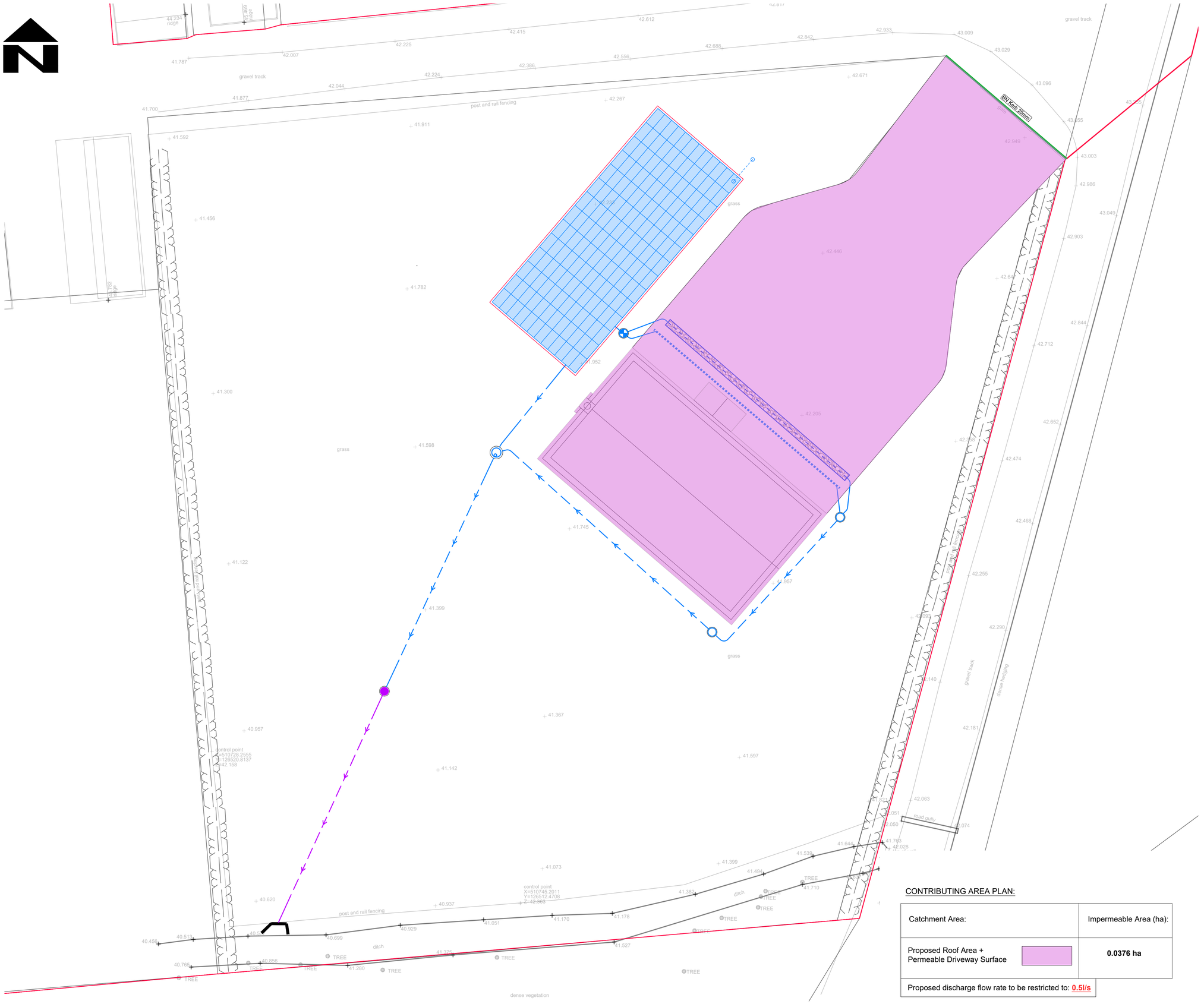
CLIENT: JOANNA MOYERS
ARCHITECT: SOLO TIMBER FRAME HOMES
JOB TITLE: WOODHOUSE FARM, BILLINGHURST, RH14 9DS
DRAWING TITLE: PROPOSED DRAINAGE STRATEGY

DRAWN	ENGINEER	CHECKED	APPROVED
MR	TZ	LH	CS

DATE: MAY 2024
SCALE @ A1: 1:100

JOB No.	STATUS	DRAWING No.	REV.
C3077	PL	101	PL2

FOR PLANNING ONLY



CONTRIBUTING AREA PLAN:

Catchment Area:	Impermeable Area (ha):
Proposed Roof Area + Permeable Driveway Surface	**0.0376 ha**
Proposed discharge flow rate to be restricted to: 0.5l/s	

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cgs civils
Consulting Civil Engineers

CLIENT: JOANNA MOYERS

ARCHITECT: SOLO TIMBER FRAME HOMES

JOB TITLE: WOODHOUSE FARM, BILLINGHURST, RH14 9DS

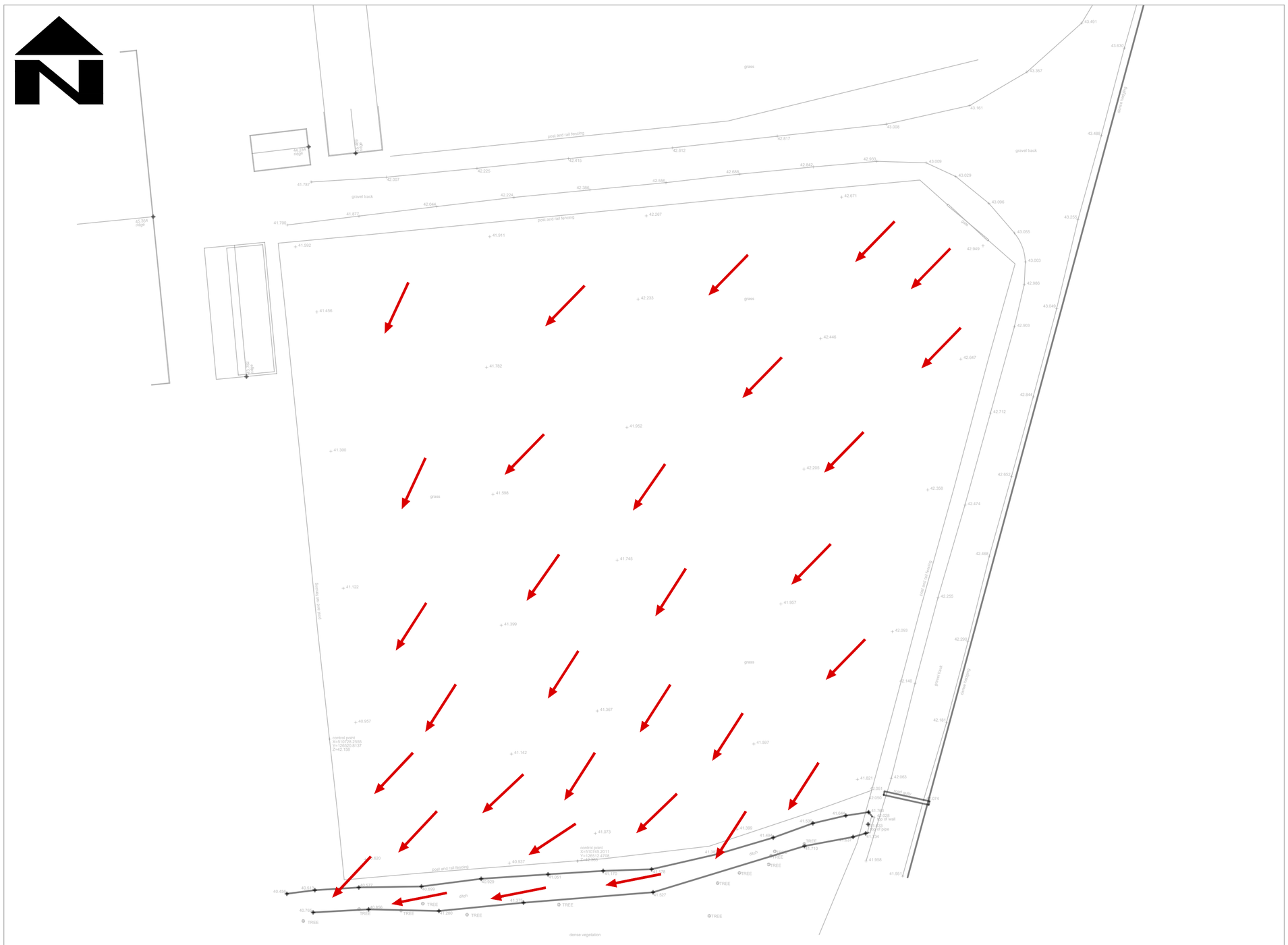
DRAWING TITLE: CONTRIBUTING AREA PLAN

DRAWN	ENGINEER	CHECKED	APPROVED
MR	TZ	LH	CS

DATE	SCALE @ A1
MAY 2024	1:100

JOB No.	STATUS	DRAWING No.	REV.
C3077	PL	201	PL2

FOR PLANNING ONLY



CURRENT EXCEEDANCE FLOW ROUTES (scale 1:200)

RED ARROWS SHOW ROUTE OF EXCEEDANCE FLOWS FROM CURRENT SITE SITUATION.



PROPOSED EXCEEDANCE FLOW ROUTES (scale 1:200)

BLUE ARROWS SHOW ROUTE OF EXCEEDANCE FLOWS FROM PROJECTED POINTS OF EMERGENCE TOWARDS DIRECTION OF FALL.

ALL STRUCTURES DESIGNED TO ACCOMMODATE BELOW GROUND THE CRITICAL 1 IN 100 YEAR STORM EVENT PLUS 45%. EXCEEDANCE WOULD ONLY OCCUR IN STORMS OF GREATER INTENSITY THAN THIS.

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17. ALL EXISTING MANHOLE COVER'S, GULLIES, ETC, ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
18. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT
19. UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION
20. MANHOLE AND CHAMBER COVER GRADES:

- 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
- 'B125' IN ALL DRIVEWAYS
- 'C250' IN PRIVATE PARKING AREAS
- 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefixed to drawing numbers shall signify the following:-

PL = PLANNING	**Shall not be used for contract or construction purposes**
P = PRELIMINARY	**Shall not be used for contract or construction purposes**
T = TENDER	**Shall not be used for construction purposes**
C = CONSTRUCTION	These are the only drawings that shall be used for construction purposes
R = RECORD	Record of actual completed work

REV	DATE	DESCRIPTION	BY	CHK	APP
PL2	27.08.24	UPDATED TO LLFA COMMENTS	MR	TZ	CS
PL1	26.07.24	UPDATED TO LLFA COMMENTS	MR	TZ	CS
P-	28.05.24	PRELIMINARY ISSUE	MR	TZ	CS

cgs civils
Consulting Civil Engineers

CLIENT
JOANNA MOYERS

ARCHITECT
SOLO TIMBER FRAME HOMES

JOB TITLE
WOODHOUSE FARM
BILLINGHURST, RH14 9DS

DRAWING TITLE
EXISTING AND PROPOSED EXCEEDANCE FLOW ROUTES

DRAWN	ENGINEER	CHECKED	APPROVED
MR	TZ	CS	CS

DATE	SCALE @ A1
MAY 2024	1:200

JOB No.	STATUS	DRAWING No.	REV.
C3077	PL	301	PL2

PRELIMINARY

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Tom Zajac
Site name:	
Site location:	

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:	51.02768° N
Longitude:	0.42187° W
Reference:	868457869
Date:	May 23 2024 09:55

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.2042

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):	774	774
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

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):	1.11	1.11
1 in 1 year (l/s):	0.94	0.94
1 in 30 years (l/s):	2.55	2.55
1 in 100 year (l/s):	3.54	3.54
1 in 200 years (l/s):	4.15	4.15

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.

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	4.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Carpark	0.026	4.00	42.000		510754.034	126544.509	0.400
Attenuation Tank			42.000	1200	510747.376	126542.530	1.000
S4	0.003	4.00	42.000	500	510743.887	126537.235	1.050
DITCH			41.150	450	510730.994	126510.837	0.521
S1	0.003	4.00	42.000	450	510750.871	126543.787	0.700
S2	0.003	4.00	42.000	450	510762.775	126533.681	0.600
S3	0.003	4.00	42.000	450	510755.743	126527.370	0.693
C1			41.600	450	510737.880	126524.191	0.796

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)
2.000	Carpark	S1	2.500	0.600	41.600	41.300	0.300	8.3	100	4.02	50.0
2.002	Attenuation Tank	S4	6.000	0.600	41.000	40.950	0.050	120.0	150	4.13	50.0
1.000	S2	S3	9.449	0.600	41.400	41.307	0.093	101.6	100	4.21	50.0
1.001	S3	S4	15.423	0.600	41.307	41.000	0.307	50.2	100	4.44	50.0
2.001	S1	Attenuation Tank	1.000	0.600	41.300	41.000	0.300	3.3	100	4.02	50.0
1.002	S4	C1	14.600	0.600	40.950	40.804	0.146	100.0	100	4.76	0.0
1.003	C1	DITCH	14.000	0.600	40.804	40.629	0.175	80.0	100	5.03	0.0

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)
2.000	2.694	21.2	4.7	0.300	0.600	0.026	0.0	32	2.155
2.002	0.916	16.2	5.2	0.850	0.900	0.029	0.0	59	0.820
1.000	0.763	6.0	0.5	0.500	0.593	0.003	0.0	21	0.475
1.001	1.090	8.6	1.1	0.593	0.900	0.006	0.0	24	0.740
2.001	4.267	33.5	5.2	0.600	0.900	0.029	0.0	27	3.124
1.002	0.769	6.0	0.0	0.950	0.696	0.038	0.0	0	0.000
1.003	0.861	6.8	0.0	0.696	0.421	0.038	0.0	0	0.000

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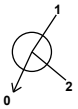
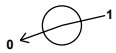
Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	2.500	8.3	100	Circular	42.000	41.600	0.300	42.000	41.300	0.600
2.002	6.000	120.0	150	Circular	42.000	41.000	0.850	42.000	40.950	0.900
1.000	9.449	101.6	100	Circular	42.000	41.400	0.500	42.000	41.307	0.593
1.001	15.423	50.2	100	Circular	42.000	41.307	0.593	42.000	41.000	0.900
2.001	1.000	3.3	100	Circular	42.000	41.300	0.600	42.000	41.000	0.900
1.002	14.600	100.0	100	Circular	42.000	40.950	0.950	41.600	40.804	0.696
1.003	14.000	80.0	100	Circular	41.600	40.804	0.696	41.150	40.629	0.421

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	Carpark		Junction		S1	450	Manhole	Adoptable
2.002	Attenuation Tank	1200	Manhole	Adoptable	S4	500	Manhole	Adoptable
1.000	S2	450	Manhole	Adoptable	S3	450	Manhole	Adoptable
1.001	S3	450	Manhole	Adoptable	S4	500	Manhole	Adoptable
2.001	S1	450	Manhole	Adoptable	Attenuation Tank	1200	Manhole	Adoptable
1.002	S4	500	Manhole	Adoptable	C1	450	Manhole	Adoptable
1.003	C1	450	Manhole	Adoptable	DITCH	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Carpark	510754.034	126544.509	42.000	0.400					
						0	2.000	41.600	100
Attenuation Tank	510747.376	126542.530	42.000	1.000	1200	1	2.001	41.000	100
									
						0	2.002	41.000	150
S4	510743.887	126537.235	42.000	1.050	500	1	2.002	40.950	150
						2	1.001	41.000	100
									
						0	1.002	40.950	100
DITCH	510730.994	126510.837	41.150	0.521	450	1	1.003	40.629	100
									
S1	510750.871	126543.787	42.000	0.700	450	1	2.000	41.300	100
									
						0	2.001	41.300	100
S2	510762.775	126533.681	42.000	0.600	450				
						0	1.000	41.400	100
S3	510755.743	126527.370	42.000	0.693	450	1	1.000	41.307	100
									
						0	1.001	41.307	100

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
C1	510737.880	126524.191	41.600	0.796	450		1	1.002	40.804	100
							0	1.003	40.804	100

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
10	0	0	0
30	0	0	0
30	45	0	0
100	0	0	0
100	45	10	0

Node S4 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.700	Discharge Coefficient	0.650
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	40.950	Diameter (m)	0.016		

Node Attenuation Tank Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	41.000	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	6.000	Number Required	1
Porosity	0.95	Pit Length (m)	14.000		

Node Carpark Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00706	Invert Level (m)	41.600	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	96	Depth (m)	0.350
Safety Factor	3.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	14.100		

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Results for 10 year Critical Storm Duration. Lowest mass balance: 95.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Carpark	11	41.646	0.046	11.2	1.3489	0.0000	OK
600 minute winter	Attenuation Tank	555	41.175	0.175	1.2	14.1646	0.0000	SURCHARGED
600 minute winter	S4	555	41.175	0.225	0.3	0.0441	0.0000	SURCHARGED
15 minute summer	DITCH	1	41.074	0.445	0.0	0.0000	0.0000	OK
15 minute summer	S1	10	41.353	0.053	9.4	0.0085	0.0000	OK
15 minute summer	S2	10	41.432	0.032	1.3	0.0051	0.0000	OK
15 minute summer	S3	10	41.345	0.038	2.6	0.0060	0.0000	OK
60 minute winter	C1	46	41.075	0.271	0.2	0.0431	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Carpark	2.000	S1	8.3	2.300	0.390	0.0093	
15 minute summer	Carpark	Infiltration		0.1				
600 minute winter	Attenuation Tank	2.002	S4	-0.3	0.110	-0.017	0.1056	
600 minute winter	S4	Orifice	C1	0.2				
15 minute summer	S1	2.001	Attenuation Tank	9.4	3.195	0.282	0.0033	
15 minute summer	S2	1.000	S3	1.3	0.535	0.217	0.0230	
15 minute summer	S3	1.001	S4	2.6	0.602	0.302	0.0684	
60 minute winter	C1	1.003	DITCH	0.1	0.018	0.021	0.1095	1.6

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Results for 30 year Critical Storm Duration. Lowest mass balance: 95.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Carpark	11	41.655	0.055	14.6	1.7261	0.0000	OK
720 minute winter	Attenuation Tank	555	41.223	0.223	1.2	18.0472	0.0000	SURCHARGED
720 minute winter	S4	555	41.223	0.273	0.3	0.0535	0.0000	SURCHARGED
15 minute summer	DITCH	1	41.074	0.445	0.1	0.0000	0.0000	OK
15 minute summer	S1	10	41.362	0.062	12.3	0.0099	0.0000	OK
15 minute summer	S2	10	41.437	0.037	1.7	0.0059	0.0000	OK
15 minute summer	S3	10	41.351	0.044	3.4	0.0070	0.0000	OK
60 minute summer	C1	42	41.076	0.272	0.2	0.0432	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Carpark	2.000	S1	10.9	2.435	0.515	0.0116	
15 minute summer	Carpark	Infiltration		0.1				
720 minute winter	Attenuation Tank	2.002	S4	-0.3	0.110	-0.017	0.1056	
720 minute winter	S4	Orifice	C1	0.2				
15 minute summer	S1	2.001	Attenuation Tank	12.4	3.237	0.370	0.0043	
15 minute summer	S2	1.000	S3	1.7	0.573	0.284	0.0281	
15 minute summer	S3	1.001	S4	3.4	0.638	0.396	0.0799	
60 minute summer	C1	1.003	DITCH	0.2	0.024	0.028	0.1095	2.4

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Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 95.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Carpark	11	41.673	0.073	21.1	2.4682	0.0000	OK
360 minute winter	Attenuation Tank	352	41.340	0.340	3.4	27.4840	0.0000	SURCHARGED
360 minute winter	S4	352	41.340	0.390	0.9	0.0764	0.0000	SURCHARGED
15 minute summer	DITCH	1	41.074	0.445	0.3	0.0000	0.0000	OK
15 minute summer	S1	10	41.380	0.080	17.9	0.0128	0.0000	OK
15 minute summer	S2	10	41.445	0.045	2.4	0.0072	0.0000	OK
15 minute summer	S3	10	41.361	0.054	4.8	0.0085	0.0000	OK
60 minute winter	C1	39	41.076	0.272	0.2	0.0433	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Carpark	2.000	S1	15.9	2.576	0.751	0.0158	
15 minute summer	Carpark	Infiltration		0.1				
360 minute winter	Attenuation Tank	2.002	S4	-0.7	0.165	-0.042	0.1056	
360 minute winter	S4	Orifice	C1	0.3				
15 minute summer	S1	2.001	Attenuation Tank	18.0	3.603	0.536	0.0064	
15 minute summer	S2	1.000	S3	2.4	0.621	0.401	0.0365	
15 minute summer	S3	1.001	S4	4.8	0.736	0.560	0.0932	
60 minute winter	C1	1.003	DITCH	0.2	0.030	0.035	0.1095	3.4

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Results for 100 year Critical Storm Duration. Lowest mass balance: 95.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Carpark	11	41.665	0.065	18.4	2.1576	0.0000	OK
480 minute winter	Attenuation Tank	456	41.280	0.280	2.3	22.6679	0.0000	SURCHARGED
480 minute winter	S4	456	41.280	0.330	0.6	0.0647	0.0000	SURCHARGED
15 minute summer	DITCH	1	41.074	0.445	0.2	0.0000	0.0000	OK
15 minute summer	S1	10	41.372	0.072	15.7	0.0114	0.0000	OK
15 minute summer	S2	10	41.442	0.042	2.1	0.0067	0.0000	OK
15 minute summer	S3	10	41.356	0.049	4.2	0.0079	0.0000	OK
30 minute winter	C1	33	41.076	0.272	0.2	0.0433	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Carpark	2.000	S1	13.9	2.532	0.657	0.0141	
15 minute summer	Carpark	Infiltration		0.1				
480 minute winter	Attenuation Tank	2.002	S4	-0.5	0.126	-0.029	0.1056	
480 minute winter	S4	Orifice	C1	0.3				
15 minute summer	S1	2.001	Attenuation Tank	15.8	3.494	0.471	0.0056	
15 minute summer	S2	1.000	S3	2.1	0.602	0.351	0.0330	
15 minute summer	S3	1.001	S4	4.2	0.695	0.490	0.0888	
30 minute winter	C1	1.003	DITCH	0.2	0.029	0.033	0.1095	2.3

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Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 95.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Carpark	456	41.714	0.114	2.8	4.2160	0.0000	FLOOD RISK
480 minute winter	Attenuation Tank	456	41.713	0.713	3.7	32.7663	0.0000	FLOOD RISK
480 minute winter	S4	456	41.714	0.764	1.2	0.1497	0.0000	FLOOD RISK
15 minute summer	DITCH	1	41.074	0.445	0.3	0.0000	0.0000	OK
480 minute winter	S1	456	41.715	0.415	3.0	0.0660	0.0000	FLOOD RISK
480 minute winter	S2	456	41.713	0.313	0.5	0.0498	0.0000	FLOOD RISK
480 minute winter	S3	456	41.713	0.406	0.7	0.0646	0.0000	FLOOD RISK
30 minute winter	C1	29	41.077	0.273	0.3	0.0434	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	Carpark	2.000	S1	2.7	1.967	0.130	0.0196	
480 minute winter	Carpark	Infiltration		0.1				
480 minute winter	Attenuation Tank	2.002	S4	1.0	0.059	0.065	0.1056	
480 minute winter	S4	Orifice	C1	0.5				
480 minute winter	S1	2.001	Attenuation Tank	3.2	1.971	0.096	0.0078	
480 minute winter	S2	1.000	S3	0.3	0.353	0.050	0.0739	
480 minute winter	S3	1.001	S4	0.6	0.450	0.071	0.1207	
30 minute winter	C1	1.003	DITCH	0.3	0.041	0.047	0.1095	3.4

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