Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Aaron Rogers
Site name:	HWRCC
Site location:	Hampton Wick

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:	51.41197° N
Longitude:	0.31789° W
Reference:	2981468801
Date:	Apr 16 2024 12:25

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.137

Methodology

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

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	601	658
Hydrological region:	6	6
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):	0.21	0.23
1 in 1 year (l/s):	0.18	0.2
1 in 30 years (l/s):	0.48	0.53
1 in 100 year (l/s):	0.67	0.74
1 in 200 years (l/s):	0.78	0.87

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Aaron Rogers
Site name:	HWRCC
Site location:	Hampton Wick

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	51.41206° N
Longitude:	0.31789° W
Reference:	2474250303
Date:	Apr 16 2024 12:32

Site characteristics

Total site area (ha):	0.137
Significant public open space (ha):	0
Area positively drained (ha):	0.137
Impermeable area (ha):	0.137
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.14
Net impermable area for storage volume design (ha):	0.14
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
SPR:	0.3	0.3

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	100.1
FEH / FSR conversion factor:	1.3	1.3
SAAR (mm):	601	599
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.62	1.62
Growth curve factor 30 year:	2.3	2.3

Design criteria

Climate change allowance factor:	1.4		Growth curve factor 100 years:	3.19	3.19
Urban creep allowance factor:	1.1		Q_{BAR} for total site area (l/s):	0.21	0.21
Volume control approach	Use long term storage		Q_{BAR} for net site area (l/s):	0.21	0.21
Interception rainfall depth (mm):	5				
Minimum flow rate (l/s):	2				

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	98	98
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	98	98

Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	0.137
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	5.00
Betterment (%)	0

Calc

Return Period (years)	Q (l/s)
1	27.1
30	64.0
100	81.2

EXISITING DISCHARGE RATES - 0% BETTERMENT

Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	0.137
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	5.00
Betterment (%)	50

Calc

Return Period (years)	Q (l/s)
1	13.5
30	32.0
100	40.6

DISCHARGE RATES - 50% BETTERMENT

Pre-development discharge

Site Makeup	Brownfield
Brownfield Method	MRM
Contributing Area (ha)	0.137
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	5.00
Betterment (%)	93

Calc

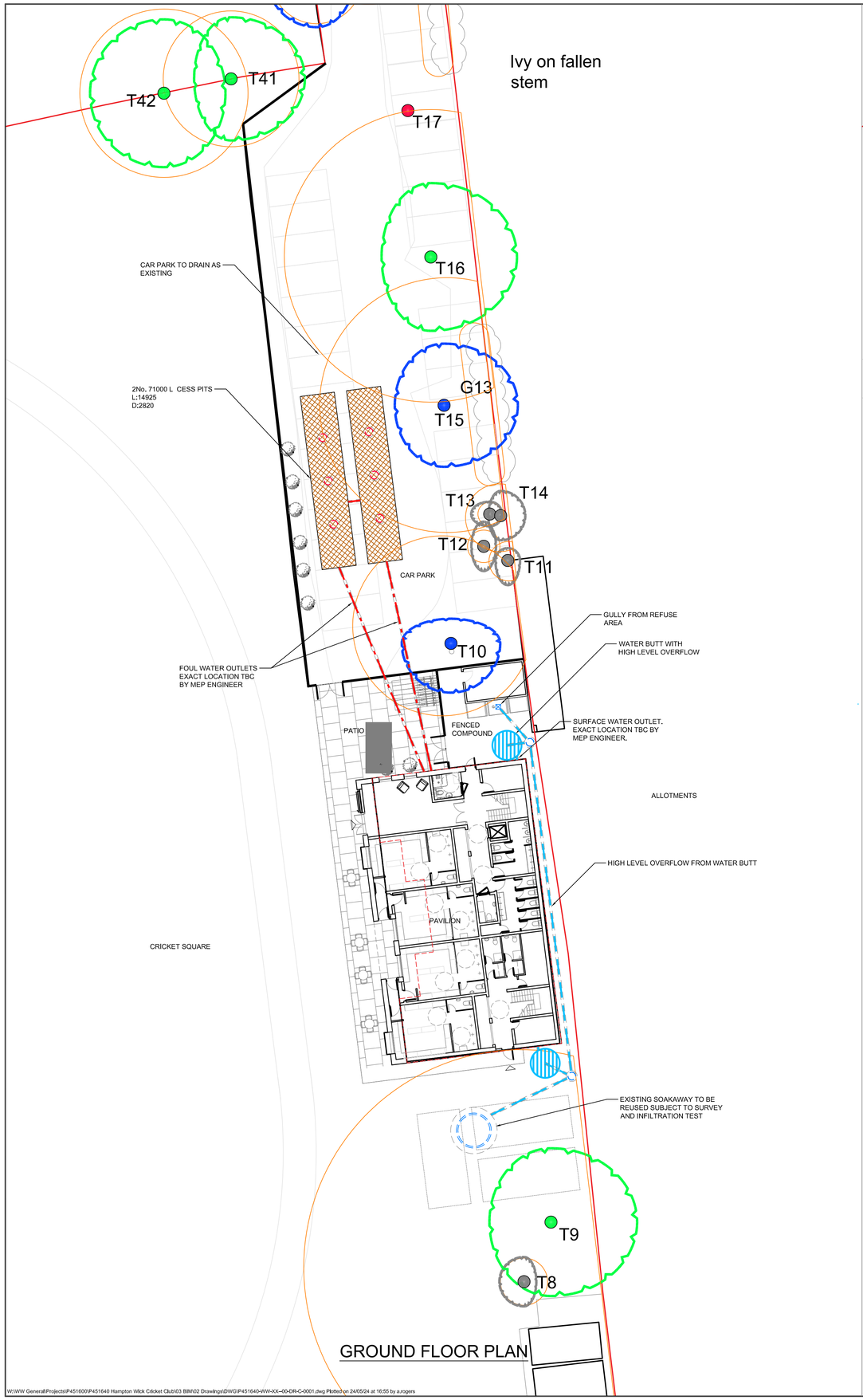
Return Period (years)	Q (l/s)
1	1.9
30	4.5
100	5.7

DISCHARGE RATES - 93% BETTERMENT

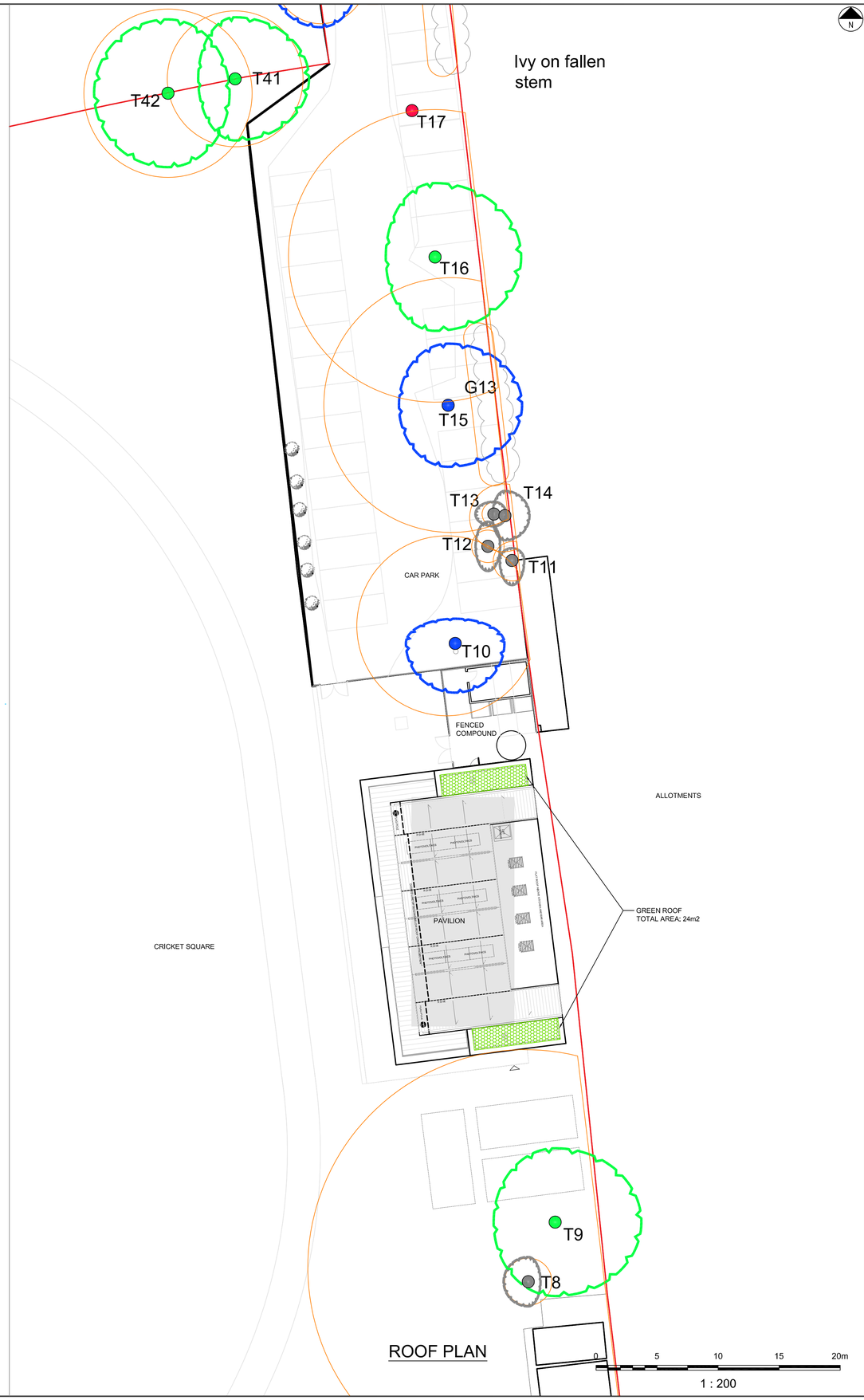
HAMPTON WICK ROYAL CRICKET GROUND
PRE-DEVELOPMENT EXISTING DISCHARGE RATES
P451640
16.04.2024

whitby wood

Appendix E –Drainage Strategy



GROUND FLOOR PLAN



ROOF PLAN

0 5 10 15 20m

1 : 200

N

HEALTH AND SAFETY INFORMATION

CONSTRUCTION
THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

MAINTENANCE/CLEANING/OPERATION.
MAINTENANCE OF SUDS FEATURES AND THE DRAINAGE SYSTEM SHOULD BE CARRIED OUT IN ACCORDANCE WITH THE CIRIA SUDS MANUAL AND MANUFACTURERS SPECIFICATIONS

DECOMMISSIONING/DEMOLITION.
REFER TO DRAWING FOR EXTENT OF EXISTING SITE DRAINAGE TO BE ABANDONED/REMOVED

NOTES

1. DO NOT SCALE FROM THIS DRAWING. ONLY FIGURED DIMENSIONS ARE TO BE USED.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. ALL FOUL AND SURFACE WATER PIPEWORK TO BE LAID AT MINIMUM GRADIENTS OF 1:40 AND 1:100 RESPECTIVELY UNLESS NOTED OTHERWISE.
6. ALL PIPEWORK TO BE 100mm DIAMETER UNLESS NOTED OTHERWISE.
7. ROCKER PIPES TO BE INSTALLED AT CONNECTION POINTS TO STRUCTURES TO ALLOW FOR MOVEMENT CAUSED BY SETTLEMENT.
8. ALL DRAINAGE IS DESIGNED TO ADOPTABLE STANDARDS WHERE POSSIBLE, AND BUILDING REGULATIONS PART H.

KEY

- RED LINE BOUNDARY
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER SEWER
- BLUE / GREEN ROOF
- CESS PIT
- G — FLOOR GULLY / ROAD GULLY
- FOUL / SURFACE WATER MANHOLE
- WATER BUTT
- CATEGORY A
- CATEGORY B
- CATEGORY C
- CATEGORY U
- G1/H1 — GROUPS OF TREES AND HEDGES

ROOT PROTECTION AREA (RPA)
TREE NUMBER AS RECORDED ON SURVEY SCHEDULE
TREE CANOPY
COLOURED SYMBOL INDICATING BS CATEGORY AS SHOWN

REV	DESCRIPTION	DRN	CHK	APP	DATE
P1	FOR INFORMATION	AR	RS	RW	24.05.24

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CLIENT
HAMPTON WICK ROYAL CRICKET CLUB

PROJECT
HAMPTON WICK ROYAL CRICKET GROUND
NEW PAVILION

PRELIMINARY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT

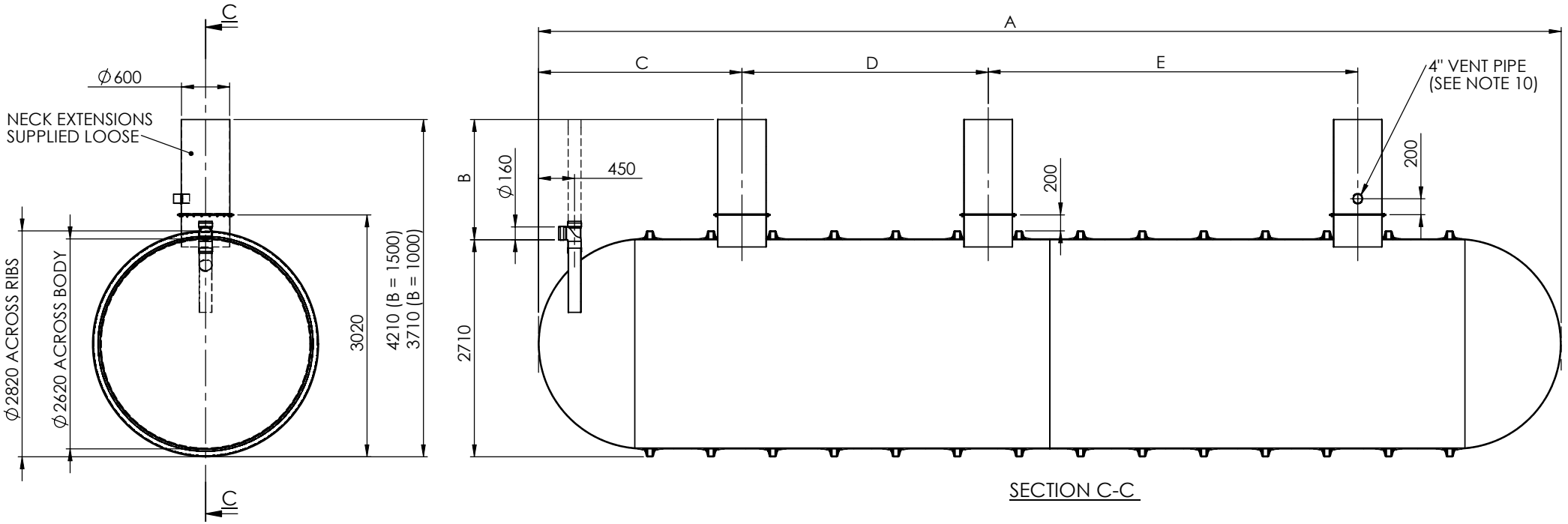
DATE	SCALES @ A1	DRAWN BY	CHECKED	APPROVED
24.05.24	1:200	AR	RS	RW

DRAWING NUMBER
P451640-WW-XX-00-DR-C-0001

REVISION
P1

W:\WW General\Projects\P451600\P451640 Hampton Wick Cricket Club\03 BIM\02 Drawings\DWG\P451640-WW-XX--00-DR-C-0001.dwg Plotted on 24/05/24 at 16:55 by a.rogers

Appendix F – Cess Pit Standard Drawing



SECTION C-C

Nominal Volume (Litres)	Nominal Volume (Gallons)	Weight (Kg)	Overall Length A	Inlet Invert B = 1.5 Metres	Inlet Invert B = 1.0 Metres	Dimension to neck C	Dimension between necks D	Dimension between necks E
54,000	11,880	2,229	11,222	1,500	1,000	2,538	3,073	3,075
59,000	12,968	2,317	11,991	1,500	1,000	2,538	3,073	3,842
63,000	13,860	2,538	12,760	1,500	1,000	2,538	3,073	4,611
71,000	15,620	2,998	14,295	1,500	1,000	2,538	4,610	4,610
79,000	17,380	3,477	15,833	1,500	1,000	2,538	5,379	5,379

NOTES:-

1. CESSPOOLS AND SILAGE TANKS MUST NOT DISCHARGE IN TO THE ENVIRONMENT AND MUST BE EMPTIED WHEN FULL.
2. THE TANK IS FITTED WITH A 160MM INLET SOCKET. PIPE ADAPTORS CAN BE PROVIDED FOR ANALTERNATIVE SIZE OF 110mm. THESE ARE FITTED EXTERNALLY TO THE TANK.
3. THIS DRAWING IS PROVIDED TO SUPPLY DIMENSIONAL INFORMATION ONLY.
4. THE UNIT MUST BE INSTALLED WITH A CONCRETE SURROUND. PLEASE SEE THE DETAILED INSTALLATION PROCEDURE SUPPLIED WITH EACH UNIT.
5. THE UNIT IS SUPPLIED WITH LOOSE, BOLT ON TANK SHAFTS TO SUIT EITHER 1 OR 1.5 METRE INVERT (SPECIFY WITH ORDER). THEY MUST BE FITTED ON SITE AS PART OF THE INSTALLATION AND CAN BE TRIMMED TO SUIT THE EXACT SIZE OF INVERT.
6. THE UNIT IS PROVIDED WITH 1, 2 OR 3 SHAFTS, DEPENDING ON IT'S VOLUME. TO AID DE-SLUDGING IT IS RECOMMENDED THAT 2 SHAFTS ARE SELECTED FOR TANKS WITH CAPACITES OF 34m3 AND ABOVE. 3 SHAFTS SHOULD BE FITTED TO UNITS OF ABOVE 54m3 (SPECIFY WITH ORDER). ADDITIONAL SHAFTS CAN BE FITTED. UNITS SHOULD NOT BE INSTALLED DEEPER THAN NECESSARY, NOR DEEPER THAN THE INVERT SPECIFIED FOR THE UNIT SUPPLIED.
7. PEDESTRIAN DUTY COVER AND FRAMES TO FIT DIAMETER 600mm NECKS, ARE AVAILABLE FOR PURCHASE.
8. THE WEIGHTS GIVEN ARE FOR HANDLING PURPOSES ONLY AND EXCLUDE THE BOLT ON SHAFTS.
9. THE INLET PIPE SHOULD BE EXTENDED TO GROUND LEVEL. DIAMETER 450mm ACCESS COVERS ARE FOR PURCHASE TO ALLOW FOR RODDING ACCESS.
10. SINGLE NECK TANKS SERVING SINGLE PROPERTIES SHOULD BE VENTED, USING THE SOIL STACK. LARGER TANKS SERVING MULTIPLE PROPERTIES SHOULD HAVE A VENT FITTED TO THE NECK TO ENABLE LOCALISED HIGH LEVEL VENTING.
11. WE RECOMMEND THE PURCHASE AND USE OF A HIGH LEVEL ALARM WITH THESE TANKS.

Material : Various	Tolerance (unless stated) :
Finish :	Thickness : n/a
	Surface Area :

Drawing : DS0963P - Ø2.6 CP - SL

TRIPLE NECK CESSPOOL / SILAGE TANK

All dimensions in mm

Scale: Not to scale

Kingspan Environmental

Appendix G – Flow+ Report

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	30	Connection Type	Level Soffits
Additional Flow (%)	35	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	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)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.005	5.00		10.000	1200	-16.165	99.759	0.700
2				10.000	1200	-12.663	104.024	0.828
3				10.000	1200	12.252	104.547	1.247
4	0.000	5.00	0.0	10.000		14.578	99.432	1.342
5	0.031	5.00		10.000	1200	-11.794	101.657	0.700

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	1	2	5.519	0.600	9.300	9.222	0.078	70.8	100	5.10	50.0
1.001	2	3	24.920	0.600	9.172	8.753	0.419	59.5	150	5.42	50.0
1.002	3	4	5.619	0.600	8.753	8.658	0.095	59.1	150	5.49	50.0
2.000	5	2	2.521	0.600	9.300	9.222	0.078	32.3	100	5.03	50.0

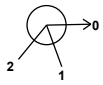
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.916	7.2	0.9	0.600	0.678	0.005	0.0	25	0.634
1.001	1.306	23.1	6.5	0.678	1.097	0.036	0.0	54	1.122
1.002	1.310	23.1	6.5	1.097	1.192	0.036	0.0	54	1.126
2.000	1.361	10.7	5.6	0.600	0.678	0.031	0.0	51	1.375

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)
1.000	5.519	70.8	100	Circular	10.000	9.300	0.600	10.000	9.222	0.678
1.001	24.920	59.5	150	Circular	10.000	9.172	0.678	10.000	8.753	1.097
1.002	5.619	59.1	150	Circular	10.000	8.753	1.097	10.000	8.658	1.192
2.000	2.521	32.3	100	Circular	10.000	9.300	0.600	10.000	9.222	0.678

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	4		Junction	
2.000	5	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	-16.165	99.759	10.000	0.700	1200				
						0	1.000	9.300	100
2	-12.663	104.024	10.000	0.828	1200		2.000	9.222	100
							1.000	9.222	100
						0	1.001	9.172	150
3	12.252	104.547	10.000	1.247	1200	1	1.001	8.753	150
									
						0	1.002	8.753	150
4	14.578	99.432	10.000	1.342		 1	1.002	8.658	150
5	-11.794	101.657	10.000	0.700	1200				
						0	2.000	9.300	100

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	1 year (l/s)	0.0
Summer CV	0.750	Drain Down Time (mins)	240	30 year (l/s)	5.9
Winter CV	0.840	Additional Storage (m³/ha)	20.0	100 year (l/s)	7.4
Analysis Speed	Normal	Check Discharge Rate(s)	✓	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 %)
2	0	0	0
30	35	0	0
100	0	0	0

Pre-development Discharge Rate

Site Makeup	Brownfield	Time of Concentration (mins)	5.00
Brownfield Method	MRM	Betterment (%)	0
Contributing Area (ha)	0.137	Q 1 year (l/s)	
PIMP (%)	100	Q 30 year (l/s)	5.9
CV	1.000	Q 100 year (l/s)	7.4

Node 4 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Invert Level (m)	8.658	Depth (m)	2.000
Side Inf Coefficient (m/hr)	0.00360	Time to half empty (mins)	11276	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.500	Number Required	1
Porosity	0.95	Pit Length (m)	4.500		

Results for 2 year Critical Storm Duration. Lowest mass balance: 97.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	9.321	0.021	0.7	0.0268	0.0000	OK
15 minute winter	2	11	9.217	0.045	4.5	0.0510	0.0000	OK
960 minute winter	3	930	9.078	0.325	0.6	0.3671	0.0000	SURCHARGED
960 minute winter	4	930	9.078	0.420	1.0	8.0725	0.0000	OK
15 minute winter	5	10	9.347	0.047	3.9	0.0951	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	1	1.000	2	0.7	0.558	0.091	0.0064
15 minute winter	2	1.001	3	4.5	0.982	0.193	0.1131
15 minute summer	3	1.002	4	4.3	1.340	0.186	0.0339
960 minute winter	4	Infiltration		0.0			
15 minute winter	5	2.000	2	3.8	1.142	0.359	0.0085

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 97.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1	1440	9.772	0.472	0.1	0.6022	0.0000	FLOOD RISK
1440 minute winter	2	1440	9.772	0.600	0.8	0.6785	0.0000	FLOOD RISK
1440 minute winter	3	1440	9.772	1.019	0.8	1.1524	0.0000	FLOOD RISK
1440 minute winter	4	1440	9.772	1.114	0.7	21.4294	0.0000	OK
1440 minute winter	5	1440	9.772	0.472	0.7	0.9457	0.0000	FLOOD RISK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	1	1.000	2	2.6	0.781	0.354	0.0189
15 minute winter	2	1.001	3	17.4	1.289	0.755	0.3698
15 minute winter	3	1.002	4	15.8	1.554	0.681	0.0989
1440 minute winter	4	Infiltration		0.0			
15 minute winter	5	2.000	2	14.7	1.881	1.376	0.0195

Results for 100 year Critical Storm Duration. Lowest mass balance: 97.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	960	9.724	0.424	0.2	0.5408	0.0000	FLOOD RISK
960 minute winter	2	960	9.724	0.552	1.2	0.6241	0.0000	FLOOD RISK
960 minute winter	3	960	9.724	0.971	1.1	1.0980	0.0000	FLOOD RISK
960 minute winter	4	960	9.724	1.066	1.0	20.5044	0.0000	OK
960 minute winter	5	960	9.724	0.424	1.0	0.8493	0.0000	FLOOD RISK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	1	1.000	2	2.5	0.771	0.341	0.0178
15 minute winter	2	1.001	3	16.5	1.279	0.716	0.3555
15 minute winter	3	1.002	4	15.1	1.546	0.652	0.0989
960 minute winter	4	Infiltration		0.0			
15 minute winter	5	2.000	2	14.0	1.786	1.307	0.0197

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