UNDERGROUND SERVICES KEY

TELEC	British Telecom
TVCC	Communications Cable
TVOC	Virgin Media
CCTV	CCTV Cable
CFO	City Fibre
INST	Installation
ECC	Earth Cable
ECTC	Electricity Cable
EDUC	Empty Ducting
GAS	Gas Pipe
CWSC	Sewer Combined
FWSC	Sewer Foul
SWSC	Sewer Surface Water
UNKC	Unidentified GPR or electro location trace
VRC	Vapour Recovery Pipe
WSC	Water pipe
SCR	Scar trace
	End of trace
	Services survey boundary
	Area of No Access
	GPR Detected anomaly

AR - Assumed Route
BLK - Blocked
CR - Cable Riser
CP - Cover
PR - Pipe Riser
RS - Reducing Slab (Drainage)
T - Tank
VR - Vapour Recovery Point
UTL - Unable To Lift
LS - Lost Signal

GPR - Ground Penetrating Radar
TRS - Trace From Records
PE - Polyethylene Pipe
UTS - Unable To Survey
UR - Unable To Root
UT - Unable To Trace
NWP - No Visible Pipes
NP - No Probe
NS - No Signal Detected

DISCLAIMER

Electromagnetic and ground penetrating radar techniques have been used in the location of underground services shown on this survey plan. These are interpretive procedures and we recommend that trial excavations should be undertaken to to confirm identification, location and depth of services where they are critical.

Please note that not all buried pipes, cable and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

BSI PAS128:2014 QUALITY LEVELS

(A) = Verified by Inspection-trial pit, vacuum Excavation Inspection Chamber/Manhole

(B1) = Detected with GPR & EML-High confidence position and depth

(B2) = Detected with either GPR or EML-Medium confidence position and depth

(B3) = Detected with GPR or EML (no depth - poor signal)

(B4) = Assumed route - Not detected - interpretiveroute

(C) = Record data located to Street Furniture - not detected

(D) = Record data not located- not detected

(P) = Post processed

NB: QL(A) is inferred at all MHs / Co etc. unless otherwise stated.

NOTES

Where services are non-metallic or not proven on site, positions are taken from records, trench scan & surface detail.

Where stated, depth estimations are typically to the centre or top of the pipe, or to the top of the duct. Depth shown are typically to invert levels, unless otherwise stated.

Where Ground Penetrating Radar (GPR) is quoted the depth is recorded to the assumed external crown of the feature.

The diagram below describes the depth information in more detail.

Where the precise position or depths of these features are critical to the design or sitework they must be verified by the use of trial excavations.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marked plan/network available.

Services shown as 'Taken From Records' have not been proven on site.

The CAD layering may contain further information.

All data collected using GPR has been post-processed.

All utilities inspected and measured at 10's or 100's are considered to be QL(A) for a radius up to 5m from the chamber wall

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION	GRAVITY DRAIN (VISUAL OBSERVATION)	GROUND PENETRATING RADAR
APPROX. DEPTH TO CENTRE CABLE/FIBRE OPTIC	APPROX DEPTH TO INVERT	APPROX. DEPTH TO EXTERNAL CROWN

Survey Notes

Grid: Graphically fitted into client's plan
Levels: Graphically fitted into client's plan

Notes

Topographical Survey Legend

BUILDINGS AND WALLS
Building
Building Under Stand
Ruin
Passage
Wall with Height
Boundary Wall

GENERAL INFORMATION
Petrol Pump
Seasonal Light
Footbridge
Cleft Tree Observed
Stump Tree Observed
Conifer Tree Observed
Trunk Tree Observed
Tree Group
Column
Column Group
Tree Shape
Other Point
Pillar
Post
Bollard
Telephone Call Box

FENCE STYLES AND DESCRIPTIONS
Close Boarded
Corrugated Iron
Chestnut Paling
Chestnut
Barbed Wire
Brick
Iron Railings
Lattice
Miscellaneous
Palisade
Post & Chain
Post & Rail
Post & Wire
Post & Wire Mesh
Post & Wire
Post Mesh
Chain
Spike
Fence Breakpoint

OVERHEAD FEATURES
Electricity Pylon
Electricity
Telephone

WATER FEATURES
Canal
Stream
Drain
Weir
Culvert
Ditch (Land Drain)
Spring

ROADS
Kerbs
Edge of Surfacing
Pedestrian Crossing
Track
Footpath

RELIEF AND VEGETATION
Hedge
Edge of wood/Bushes
Stump
Individual Tree
Slope (Ht. Height Interval Not 1m)
Cliff Face
Marsh
Reeds

STREET FURNITURE
Address Marker
Bus Stop
Bollard
Cable Box
Cast Chute
Closed Circuit TV
Drain
Electricity Pole
Flood Light
Flag Staff
Lamp Post
Letter Box
Lamp Post (Wheel)
Meeting Place
Mile Post or Marking Post
Service Marker
Mile Stone
Post
Parking Meter
Pedestrian Guard
Reading Eye
Road Stop
Speed Camera
Intersection Sign
Ship
Traffic Light
Telephone Box
Traffic Light Push Button Post
Traffic Light Control Box
Control Box
Certain Telecom Box
Electricity Box
Gas Box

LEVEL AND HEIGHT INFORMATION
Standard Spot Height
Approximate Spot Height
Bed Level
Water Level
Soffit Level
Threshold Level
Cover Level
Invert Level
Top of Bank Level
Floor Level
Finished Floor Level
Top of Bank Level
Eave Level
Ridge Level
Roof Ed Level
Flat Roof Level
Top of Canopy Level
Underside of Canopy Level
Window Sill Level
Window Head Level
Ceiling Level
Arch Level
Cable Level
Top of Wall Level
Underside of Beam Level
Ground(Height)

INSPECTION CHAMBERS AND PIPES
Inspection Cover
Inspection Cover (Elec)
Manhole
British Telecom Cover
Inspection Cover (Control)
Cable Tel
Inspection Cover Traffic Signals
Gully
Fresh Outfall
Vent Pipe
Vent Pipe
Foul Water Pipe
Soil Pipe
Gas Pipe
Unable to lift cover
Stop Tap
Stop Valve
Lamphole
Hydrant
Bath Box
Water Tap
Water Meter
Watercock
Reading Eye

SURVEY INFORMATION SERIES
Permanent Ground Marker
O.S. Tri Station
O.S. Bench Mark

GEOTECHNICAL INFORMATION
Borehole
Trial Pit
Another Pit
Probe Hole
Window Sample

Sheet Index

Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
63 Cross Street, Sale, Manchester M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhlls.co.uk

Accreditations: RICS, The Survey Association, ICES, Land Survey Solutions, Revits

Client
GARDINER & THEO3ALD LLP
10 SOUTH CRESCENT
LONDON WC1E 7BD

Project
BEEHIVE RETAIL PARK
COLDHAMS LANE
CAMBRIDGE CB1 3ET

Drawing Title
UNDERGROUND SERVICES
SURVEY
SHEET 5/5

Drawn By	PS	02/09/22	Survey Date: JUNE 2022
Checked by	DJ	02/09/22	Scale: A0@1:200

Drawing No: 58742/UG5
Revision:

Cambridge Retail Park
Anglia House
Milton Avenue
Hotel
Depot
Cambridge Science Park
Cambridge Regional College
Cambridge Rugby Union Football Ground
Cambridge Rugby Union Football Club
Cambridge Leisure Park
Cambridge Ice Arena
Cambridge Sports Lake
Cambridge Sports Centre
Kingsley House
Kingsley Court
Kingsley Place
Kingsley Lodge
Kingsley Mews

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0002	547032	259031	F	6.903	3.468	3.435
0003	547064	259042	F	7.052	-1.648	8.7
0004	546058	259044	F	-	-	-
0005	546091	259059	F	-	-	-
0100	547050	258108	F	10.994	8.697	2.297
0101	546005	258176	F	-	-	-
0101	547068	258158	F	10.501	7.44	3.061
0102	547019	258171	F	10.359	8.107	2.252
0200	547095	258232	F	9.553	-	-
0302	546022	258371	F	11.43	9.84	1.59
0302	547099	258361	F	-	-	-
0303	546068	258360	F	11.93	9.36	2.57
0303	547095	258365	F	-	-	-
0304	546071	258360	F	12.05	9.11	2.94
0304	547092	258369	F	-	-	-
0305	546095	258385	F	12.43	8.89	3.54
0305	547089	258376	F	-	-	-
0306	546088	258353	F	12.45	10.61	1.84
0307	546073	258345	F	12.44	10.83	1.61
0308	546067	258302	F	12.04	11.02	1.02
0309	546018	258330	F	-	-	-
0310	546092	258352	F	-	-	-
0311	546068	258344	F	-	-	-
0312	546099	258327	F	-	-	-
0400	547077	258460	F	-	-	-
0401	546032	258436	F	12.2	9.23	2.97
0401	547075	258462	F	8.148	-0.174	8.322
0402	546084	258425	F	12.15	8.39	3.76
0402	547007	258465	F	-	-	-
0403	546089	258486	F	11.6	7.92	3.68
0404	546090	258478	F	11.68	7.99	3.69
0500	547027	258507	F	7.682	4.767	3.115
0501	546020	258577	F	13.81	6.18	7.63
0501	547051	258518	F	7.805	0.302	7.503
0502	546004	258581	F	13.68	10.17	3.51
0503	546014	258595	F	13.62	10	3.62
0504	546021	258593	F	13.85	6.32	7.53
0505	546057	258555	F	11.25	7.5	3.75
0506	546073	258558	F	11.19	7.55	3.64
0507	546094	258511	F	11.24	7.7	3.54
0508	546054	258568	F	11.06	7.24	3.82
0600	547007	258643	F	7.77	-0.63	8.4
0602	546065	258691	F	13.22	10.03	3.19
0603	546094	258667	F	12.83	5.92	6.91
0604	546090	258661	F	12.84	4.06	8.78
0605	546077	258669	F	12.57	8.67	3.9
0606	546071	258651	F	11.76	8.34	3.42
0607	546096	258645	F	11.6	8.04	3.56
0608	546024	258682	F	-	-	-
0701	546052	258735	F	12.88	10.54	2.34
0702	546051	258772	F	13.14	11.53	1.61
0801	546065	258836	F	12.58	9.02	3.56
0802	546093	258840	F	11.15	8.34	2.81
0803	546002	258844	F	-	-	-
0804	546008	258828	F	-	-	-
1001	546123	259048	F	9.15	7.58	1.57
1004	546157	259025	F	7.78	1.97	5.81
1005	546167	259003	F	8.22	6.15	2.07
1006	546152	259066	F	7.92	5.84	2.08
1007	546199	259060	F	6.33	5.1	1.23
1100	547179	258128	F	9.856	0.841	9.015
1101	547110	258195	F	-	-	-
1102	547111	258198	F	-	-	-
1200	547112	258202	F	-	-	-
1201	547114	258205	F	-	-	-
1202	547115	258209	F	-	-	-
1203	547116	258212	F	-	-	-
1300	547145	258351	F	8.9	0.216	8.684
1301	546138	258337	F	12.43	10.35	2.08
1301	547108	258366	F	8.869	0.077	8.792
1302	546154	258333	F	12.43	10.9	1.53
1302	547122	258308	F	9.099	6.634	2.465
1303	547168	258329	F	8.912	5.763	3.149
1316	547101	258359	F	-	-	-
1400	547105	258404	F	8.813	6.085	2.728
1401	546101	258420	F	12.2	8.6	3.6
1401	547125	258418	F	8.464	-	-
1402	546180	258420	F	13.08	11.01	2.07
1402	547158	258459	F	8.004	-	-
1403	546184	258458	F	12.3	9.97	2.33
1404	546192	258462	F	12.41	10.15	2.26
1405	546144	258413	F	12.28	8.83	3.45
1501	546179	258502	F	11.9	8.91	2.99
1502	546170	258572	F	11.25	6.62	4.63
1503	546190	258577	F	10.95	6.42	4.53
1504	546199	258541	F	10.87	6.19	4.68
1505	546186	258590	F	10.96	9.03	1.93
1506	546194	258541	F	-	-	-
1507	546181	258567	F	-	-	-
1601	546114	258621	F	10.86	8.14	2.72
1602	546198	258648	F	10.74	7.65	3.09
1603	546168	258691	F	11.65	7.39	4.26
1604	546163	258600	F	11.01	9.56	1.45
1605	546144	258676	F	11.55	7.61	3.94
1701	546151	258757	F	11.35	8.56	2.79
1702	546162	258750	F	11.93	2.09	9.84
1703	546111	258723	F	12.43	9.02	3.41
1801	547179	258856	F	7.274	-1.053	8.327
1802	546195	258858	F	12.22	1.56	10.66
1803	546136	258848	F	12.03	6.63	5.4
1804	546195	258882	F	11.3	6.72	4.58
1805	546140	258862	F	-	-	-
1901	547116	258957	F	7.553	-1.414	8.967
1901	546107	258992	F	-	-	2.1
1902	546160	258901	F	10.9	9.03	1.87
1903	546174	258903	F	10.62	10.01	0.61
1904	546179	258935	F	10.05	2.02	8.03
1905	546121	258954	F	-	-	-
2101	546291	258135	F	13.78	11.09	2.69
2102	546296	258199	F	13.19	10.66	2.53
2102	547259	258126	F	-	-	-
2200	547232	258253	F	9.054	0.543	8.511
2201	546296	258216	F	13	10.62	2.38
2201	547231	258259	F	9.118	5.475	3.643
2202	546293	258274	F	13.21	10.5	2.71
2202	547235	258256	F	9.13	5.929	3.201
2203	546291	258223	F	-	-	-
2203	547209	258205	F	-	-	-
2204	546283	258223	F	-	-	-
2205	546279	258228	F	-	-	-
2300	547206	258369	F	7.976	5.896	2.08
2301	546265	258369	F	13.33	10.7	2.63
2301	547227	258365	F	8.189	-	-
2302	546277	258342	F	12.97	10.22	2.75
2400	547240	258412	F	8.496	6.046	2.45
2401	546263	258413	F	13.57	11.58	1.99
2401	547253	258403	F	8.46	-	-
2402	546263	258457	F	13.46	11.08	2.38
2403	546258	258413	F	-	-	-
2404	546253	258404	F	13.43	10.27	3.16
2405	546217	258407	F	13.76	10.02	3.74
2406	546201	258450	F	-	-	-
2407	546200	258444	F	-	-	-
2408	546202	258436	F	-	-	-
2501	546202	258594	F	11.13	9.45	1.68
2502	546277	258557	F	9.15	4.87	4.28
2503	546223	258548	F	10.86	5.94	4.92
2504	546278	258555	F	-	-	-
2505	546271	258580	F	9.38	5.27	4.11
2601	546230	258602	F	10.58	7.6	2.98
2602	546284	258616	F	11.88	4.35	7.53
2603	546272	258651	F	11.71	3.85	7.86
2604	546263	258672	F	11.78	3.74	8.04
2605	546255	258669	F	11.48	5.56	5.92
2606	546255	258654	F	11.83	8.51	3.32
2701	546299	258747	F	12.44	7.85	4.59
2701	547240	258757	F	7.93	-0.776	8.706
2702	546292	258723	F	11.89	7.37	4.52
2703	546242	258718	F	11.86	3.18	8.68
2704	546228	258772	F	11.46	2.77	8.69

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
2705	546231	258728	F	11.8	8.74	3.06
2801	546209	258831	F	11.62	2.01	9.61
2802	546276	258872	F	12.45	8.03	4.42
2803	546216	258822	F	11.44	8.45	2.99
2804	546207	258854	F	12.32	1.89	10.43
2805	546239	258826	F	-	-	-
2806	546239	258837	F	-	-	-
2807	546256	258834	F	-	-	-
2808	546232	258827	F	-	-	-
2901	546222	258976	F	7.75	5.24	2.51
2902	546264	258957	F	9.32	7.08	2.24
2903	546288	258924	F	9.27	7.34	1.93
3001	546355	259048	F	8.5	6.63	1.87
3004	546305	259024	F	6.72	5.64	1.08
3004	546306	259019	F	-	-	-
3100	547308	259181	F	9.258	1.795	7.463
3101	546398	259188	F	13.52	10.16	3.36
3101	547379	259113	F	9.171	2.001	7.17
3102	546384	259141	F	13.71	10.76	2.95
3102	547314	259182	F	9.255	6.7	2.555
3103	547371	259127	F	9.232	7.205	2.027
3201	546374	259294	F	11.16	9.14	2.02
3202	546315	259235	F	-	-	-
3203	546316	259235	F	-	-	-
3204	546317	259242	F	-	-	-
3205	546311	259245	F	-	-	-
3301	546358	259362	F	13.27	8.04	5.23
3302	546397	259305	F	-	-	-
3303	546397	259313	F	-	-	-
3312	546326	259339	F	-	-	-
3314	546320	259339	F	-	-	-
3315	546321	259336	F	-	-	-
3316	546325	259337	F	-	-	-
3401	546331	259462	F	13.49	10.97	2.52
3402	546338	259462	F	13.48	7.33	6.15
3403	546395	259436	F	13.73	12.28	1.45
3404	546337	259454	F	-	-	-
3405	546388	259493	F	-	-	-
3406	546376	259490	F	-	-	-
3407	546311	259494	F	-	-	-
3501	546301	259502	F	12.78	10.95	1.83
3501	547371	259549	F	7.914	-0.333	8.247
3502	546312	259504	F	13.01	11.04	1.97
3503	546325	259516	F	12.45	7.11	5.34
3504	546355	259529	F	13.05	11.03	2.02
3505	546320	259520	F	12.96	6.28	6.68
3506	546311	259560	F	12.28	4.92	7.36
3507	546314	259507	F	-	-	-
3508	546372	259530	F	-	-	-
3509	546369	259532	F	-	-	-
3510	546336	259509	F	-	-	-
3511	546339	259511	F	-	-	-
3512	546397	259539	F	-	-	-
3513	546358	259575	F	-	-	-
3514	546360	259553	F	-	-	-
3517	546351	259530	F	-	-	-
3518	546356	259534	F	-	-	-
3519	546349	259541	F	-	-	-
3523	546392	259574	F	-	-	-
3524	546394	259570	F	-	-	-
3525	546398	259567	F	-	-	-
3526	546396	259559	F	-	-	-
3601	547303	259658	F	7.726	-0.579	8.305
3601	546378	259677	F	12.02	10.26	1.76
3602	546390	259619	F	13.29	9.39	3.9
3603	546358	259604	F	13.34	9.17	4.17
3604	546334	259667	F	12.61	8.73	3.88
3605	546373	259681	F	-	-	-
3606	546353	259688	F	12.42	8.78	3.64
3607	546394	259652	F	-	-	-
3609	546349	259699	F	-	-	-
3611	546346	259699	F	-	-	-
3701	546358	259774	F	13.53	9.12	4.41
3702	546312	259752	F	12.64	8.53	4.11
3703	546324	259711	F	-	-	-
3704	546344	259717	F	-	-	-
3705	546348	259721	F	-	-	-
3709	546340	259712	F	-	-	-
3710	546344	259703	F	-	-	-
3712	546340	259712	F	-	-	-
3713	546352	259709	F	-	-	-
3714	546361	259715	F	-	-	-
3715	546345	259703	F	-	-	-
3716	546339	259720	F	-	-	-
3717	546331	259727	F	-	-	-
3718	546341	259743	F	-	-	-
3719	546336	259741	F	-	-	-
3720	546331	259737	F	-	-	-
3801	546338	259895	F	13.21	8.3	4.91
3802	546311	259886	F	12.85	8.16	4.69
3901	546388	259912	F	13.41	8.98	4.43
3902	546371	259989	F	-	-	-
3903	546368	259973	F	-	-	-
4001	546413	259002	F	10.39	7.94	2.45
4007	546444	259019	F	12.231	10.121	2.11
4012	546432	259002	F	-	-	-
4013	546435	259003	F	-	-	-
4014	546438	259005	F	-	-	-
4019	546442	259009	F	-	-	-
4020	546439	259016	F	-	-	-
4101	546479	259104	F	13.38	12.09	1.29
4102	546471	259106	F	14.01	12.3	1.71
4103	546481	259142	F	-	12.31	-
4201	546446	259262	F	13.75	11.78	1.97
4202	546455	259277	F	13.45	11.17	2.28
4203	546455	259299	F	13.76	11.14	2.62
4204	546491	259253	F	13.73	11.56	2.17
4205	546461	259216	F	13.65	11.63	2.02
4206	546462	259217	F	14.01	12.15	1.86
4210	546439	259287	F	-	-	-
4211	546438	259287	F	-	-	-
4212	546438	259276	F	-	-	-
4213	546438	259261	F	-	-	-
4214	546491	259281	F	-	-	-
4301	546411	259347	F	13.78	11.81	1.97
4302	546485	259330	F	13.96	11.52	2.44
4303	546499	259338	F	13.92	11.28	2.64
4304	546452	259318	F	-	-	-
4305	546436	259312	F	-	-	-
4401	546449	259471	F	14.02	10.45	3.57
4402	546473	259400	F	13.52	11.08	2.44
4403	546404	259499	F	-	-	-
4424	546476	259411	F	-	-	-
4501	546421	259546	F	13.71	9.9	3.81
4502	546451	259580	F	-	-	-
4503	546469	259576	F	-	-	-
4504	546424	259545	F	-	-	-
4505	546431	259551	F	-	-	-
4506	546408	259543	F	-	-	-
4507	546451	259551	F	-	-	-
4600	546431	259654	F	-	-	-
4601	546461	259630	F	-	-	-
4602	546421	259621	F	-	-	-
4603	546499	259698	F	-	-	-
4604	546416	259691	F	-	-	-
4605	546418	259649	F	-	-	-
4606	546400	259628	F	-	-	-
4700	546461	259758	F	-	-	-
4701	546488	259717	F	-	-	-
4702	546472	259753	F	-	-	-
4703	546410	259731	F	-	-	-
4704	546409	259721	F	-	-	-
4705	546440	259699	F	-	-	-
4706	546438	259814	F	12.97	10.01	2.96
4805	546479	259809	F	-	-	-
4901	546441	259929	F	12.97	9.64	3.33
4902	546499	259941	F	12.79	10.52	2.27
4903	546499	259938	F	12.87	7.94	4.93
4904	546499	259940	F	12.9	1.85	11.05
5001	546508	259013	F	11.92	4.86	7.06

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
5003	546542	259033	F	12.033	10.766	1.267
5004	546561	259056	F	12.088	10.355	1.733
5100	546512	258139	F	-	-	-
5101	546514	258140	F	-	-	-
5102	546519	258140	F	-	-	-
5103	546539	258140	F	-	-	-
5104	546545	258145	F	-	-	-
5105	546548	258157	F	-	-	-
5201	546586	258242	F	13.83	12.48	1.35
5202	546536	258287	F	-	-	-
5203	546555	258287	F	-	-	-
5204	546555	258289	F	-	-	-
5205	546555	258293	F	-	-	-
5207	546570	258286	F	-	-	-
5208	546570	258290	F	-	-	-
5213	546610	258279	F	-	-	-
5301	546534	258344	F	13.92	12.3	1.62
5500	546522	258597	F	-	-	-
5502	546588	258855	F	11.43	9.33	2.1
5603	546587	258854	F	-	-	-
5604	546557	258878	F	11.36	8.95	2.41
5605	546526	258907	F	-	-	-
5606	546513	258947	F	-	-	-
5607	546505	258965	F	-	-	-
5701	546582	258716	F	11.03	8.72	2.31
5702	546572	258714	F	11.12	8.63	2.49
5703	546543	258768	F	11.09	8.35	2.74
5725	546538	258702	F	-	-	-
5801	546574	258821	F	10.96	1.82	9.14
5802	546562	258832	F	10.9	8.89	2.01
5803	546532	258880	F	12.18	1.92	10.26
5804	546510	258856	F	12.32	10.61	1.71
5805	546576	258817	F	-	-	-
5902	546544	258955	F	12.52	8.32	4.2
5905	546536	258979	F	12.14	5.42	6.72
5906	546548	258955	F	12.49	1.74	10.75
6001	546617	259012	F	11.98	6.2	5.78
6002	546689	259069	F	11.98	6.23	5.75
6003	546646	259033	F	11.99	8.9	3.09
6701	546677	258781	F	10.31	7.13	3.18
6702	546652	258790	F	10.02	6.14	3.88
6707	546690	258791	F	-	-	-
6801	546615	258898	F	10.74	9.37	1.37
6802	546606	258905	F	9.91	4.71	5.2
7106	546779	258110	F	-	-	-
7201	546796	258237	F	11.12	9.4	1.72
7209	546795	258292	F	-	-	-
7210	546792	258284	F	-	-	-
7211	546790	258280	F	-	-	-
7400	546799	258462	F	-	-	-
7701	546768	258721	F	10.12	8.13	1.99
7702	546772	258726	F	-	-	-
7801	546790	258845	F	-	-	-
8101	546813	258147	F	11.53	10.16	1.37
8102	546849	258139	F	11.52	9.45	2.07
8103	546839	258122	F	11.88	10.16	1.72
8218	546815	258216	F	-	-	-
8301	546835	258332	F	9.79	8.05	1.7
8302	546848	258351	F	9.41	7.78	1.63
8303	546846	258358	F	-	-	-
8304	546837	258361	F	-	-	-
8312	546882	258378	F	-	-	-
8401	546870	258418	F	8.51	7.86	0.65
8402	546875	258421	F	8.45	6.73	1.72
8403	546873	258422	F	-	-	-
8404	546889	258464	F	-	-	-
8405	546874	258425	F	-	-	-
8406	546866	258428	F	-	-	-
8407	546803	258462	F	-	-	-
8408	546833	258440	F	-	-	-
8409	546804	258475	F	-	-	-
8601	546882	258998	F	9.02	0.61	8.41
8701	546865	258702	F	8.79	4.32	4.47
8702	546885	258794	F	8.56	5.24	3.32
8801	546888	258831	F	9.11	6.09	3.02
8802	546877	258823	F	8.73	5.71	3.02
9001	546942	259018	F	5.32	1.06	4.26
9002	546925	259019	F	5.24	1.44	3.8
9102	546920	258151	F	11.18	8.87	2.31
9103	546965	258160	F	11.32	9.34	1.98
9104	546915	258175	F	10.77	8.83	1.94
9201	546904	258229	F	10.3	8.17	2.13
9203	546943	258208	F	13.52	11.3	2.22
9204	546948	258205	F	-	-	-
9301	546928	258362	F	11.63	8.6	3.03
9301	546938	258315	F	9.57	7.71	1.86
9302	546949	258387	F	13	9.02	3.98
9302	546972	258399	F	-	-	-
9303	546960	258352	F	11.93	8.83	3.1
9401	546977	258428	F	13.38	9.3	4.08
9402	546941	258439	F	13.21	9.22	3.99
9405	546929	258479	F	14.06	6.59	7.47
9409	546940	258497	F	12.94	10.74	2.2
9410	546942	258458	F	-	-	-
9411	546923	258478	F	-	-	-
9412	546935	258475	F	-	-	-
9413	546941	258463	F	-	-	-
9427	546966	258446	F	-	-	-
9501	546941	258591	F	7.45	5.64	1.81
9502	546958	258541	F	13.91	11.94	1.97
9502	546903	258501	F	7.75	6.1	1.65
9504	546967	258536	F	-	-	-
9601	546965	258878	F	7.57	0.84	6.73
9602	546972	258812	F	7.34	5.28	2.06
9603	546996	258830	F	7.13	4.96	2.17
9701	546987	258740	F	13.45	11.13	2.32
9801	546941	258817	F	-	-	-
9801	546998	258896	F	9.54	7.24	2.3
9802	546949	258819	F	13.37	10.5	2.87
9803	546967	258821	F	13.33	10.28	3.05
9805	546988	258807	F	13.17	10.26	2.91
9806	546968	258869	F	-	-	-
9807	546992	258887	F	-	-	-
9808	546991	258824	F	-	-	-
9810	546986	258896	F	-	-	-
9900	546964	259908	F	-	-	-
9900	546997	258945	F	6.888	4.003	2.885
9901	546975	258912	F	-	-	-
9902	546980	258914	F	-	-	-
0151	547052	258105	S	10.943	-	-
0152	547019	258169	S	-	-	-
0153	547070	258153	S	10.282	7.894	2.388
0251	547099	258232	S	9.556	7.491	2.065
0351	546006	258339	S	11.75	8.74	3.01
0351	547095	258400	S	8.677	6.602	2.075
0451	546098	258422	S	12.16	8.52	3.64
0451	547060	258482	S	-	-	-
0452	546083	258428	S	12.13	9.36	2.77
0452	547009	258485	S	-	-	-
0453	546071	258426	S	12.07	9.52	2.55
0454	546090	258478	S	11.72	9.26	2.46
0456	546039	258476	S	11.35	9.86	1.49
0551	546016	258594	S	13.7	6.14	7.56
0551	547027	258570	S	7.558	6.158	1.4
0552	546086	258510	S	11.17	8.9	2.27
0553	547043	258520	S	7.706	6.286	1.42
0553	546074	258558	S	11.22	8.86	2.36
0554	546033	258503	S	11.18	9.4	1.78
0555	546029	258524	S	11.1	8.48	2.62
0556	546025	258543	S	11.14	9.3	1.84
0557	546057	258554	S	11.11	7.98	3.13
0558	546055	258565	S	11.26	8.75	2.51
0652	546042	258588	S	13.38	7.66	5.72
0652	547005	258627	S	7.437	5.742	1.695
0653	546020	258683	S	13.46	12.32	1.14
0654	546028	258695	S	13.41	12.05	1.36
0655	546032	258890	S	13.58	11.95	1.63
0656	546034	258888	S	13.58	11.91	1.67
0657	546037	258890	S	13.57	11.84	1.73
0658	546039	258887	S	13.57	11.78	1.79

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0659	546054	258661	S	12.9	11.25	1.65
0660	546074	258685	S	12.91	10.78	2.13
0661	546081	258674	S	12.95	5.88	7.07
0662	546072	258663	S	13.07	5.98	7.09
0663	546066	258601	S	11.19	10.28	0.91
0664	546041	258685	S	13.57	8.96	4.61
0751	546017	258739	S	13.31	7.79	5.52
0752	546021	258719	S	13.76	12.29	1.47
0753	546094	258701	S	12.57	10.68	1.89
0851	546061	258831	S	12.65	9.77	2.88
0852	546004	258843	S	-	-	-
0853	546011	258826	S	-	-	-
0854	546002	258850	S	-	-	-
0950	546095	259012	S	-	-	-
1051	546156	259023	S	-	-	-
1052	546161	259026	S	-	-	-
1053	546154	259036	S	-	-	-
1054	546154	259042	S	-	-	-
1151	547191	259180	S	-	-	-
1351	547144	258343	S	8.91	6.75	2.16
1352	547161	258325	S	8.782	6.842	1.94
1353	547125	258309	S	-	-	-
1451	546136	258414	S	12.19	9.5	2.69
1451	547134	258427	S	-	-	-
1452	546182	258410	S	13.39	10.22	3.17
1452	547155	258463	S	8.004	6.854	1.15
1453	546144	258413	S	12.81	10.1	2.71
1551	546186	258506	S	11.72	9.66	2.06
1552	546171	258569	S	11.21	8.76	2.45
1553	546190	258572	S	10.75	8.5	2.25
1554	546161	258599	S	11.35	10.33	1.02
1651	546136	258628	S	11.58	10.47	1.11
1652	546101	258633	S	12.03	10.59	1.44
1653	546147	258681	S	11.71	10.52	1.19
1751	546134	258751	S	12.17	5.41	6.76
1752	546122	258732	S	11.9	10.54	1.36
1753	546125	258729	S	12.18	7.35	4.83
1851	546136	258840	S	12.17	7.09	5.08
1852	546151	258870	S	12.14	7.92	4.22
1853	546166	258844	S	-	-	-
1854	546152	258842	S	-	7.1

E. Existing Drainage Calculations

Greenfield Runoff Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Gurveer Jutte
Site name:	Beehive Centre
Site location:	Cambridge

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:	52.20574° N
Longitude:	0.14488° E
Reference:	2649967453
Date:	Jun 12 2024 15:01

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1

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):	540	540
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

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.

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Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	1.35	1.35
1 in 1 year (l/s):	1.17	1.17
1 in 30 years (l/s):	3.3	3.3
1 in 100 year (l/s):	4.79	4.79
1 in 200 years (l/s):	5.66	5.66

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.

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Existing Site Brownfield Runoff Calculations

Appendices

Railway Pensions Nominees Limited

Project Number: WIE17469-110

Document Reference: WIE17469-110-R-1-1-4-FRADS_Project Otter

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.450	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	24.277	0.243	99.9	0.000	5.00	0.0	0.600	o	450	Pipe/Conduit	🔒
1.001	27.259	0.273	99.8	0.648	0.00	0.0	0.600	o	450	Pipe/Conduit	🔒
2.000	54.171	0.542	100.0	1.343	5.00	0.0	0.600	o	450	Pipe/Conduit	🔒
2.001	18.448	0.184	100.3	1.660	0.00	0.0	0.600	o	600	Pipe/Conduit	🔒
2.002	40.132	0.040	1003.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	🔒
1.002	106.473	0.194	550.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
1.003	22.724	0.023	988.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
1.004	58.147	0.145	400.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
1.005	73.126	0.146	500.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.20	9.280	0.000	0.0	0.0	0.0	2.03	323.5	0.0
1.001	50.00	5.42	9.360	0.648	0.0	0.0	0.0	2.03	323.6	87.7
2.000	50.00	5.44	9.770	1.343	0.0	0.0	0.0	2.03	323.4	181.8
2.001	50.00	5.57	9.200	3.002	0.0	0.0	0.0	2.43	687.7	406.6
2.002	50.00	6.45	9.016	3.002	0.0	0.0	0.0	0.76	215.0«	406.6
1.002	50.00	9.12	9.000	3.650	0.0	0.0	0.0	0.66	46.9«	494.3
1.003	50.00	9.89	8.800	3.650	0.0	0.0	0.0	0.49	34.8«	494.3
1.004	50.00	11.14	8.760	3.650	0.0	0.0	0.0	0.78	55.1«	494.3
1.005	50.00	12.89	8.600	3.650	0.0	0.0	0.0	0.70	49.2«	494.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.006	30.561	0.153	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	11.312	0.019	600.0	0.259	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	19.651	0.197	100.0	0.764	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	22.332	0.015	1500.0	0.071	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.010	5.909	0.788	7.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	63.549	0.635	100.0	0.542	5.00	0.0	0.600	o	500	Pipe/Conduit	
3.001	36.106	0.241	150.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
3.002	42.384	0.326	130.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
3.003	35.389	0.393	90.0	0.443	0.00	0.0	0.600	o	500	Pipe/Conduit	
3.004	13.889	0.198	70.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
1.011	5.834	0.083	70.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
1.012	10.083	0.144	70.0	0.000	0.00	0.0	0.600	o	500	Pipe/Conduit	
4.000	55.490	0.222	250.0	0.453	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	56.637	0.227	249.5	0.057	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	70.789	0.566	125.0	0.181	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	44.255	0.177	250.0	0.149	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	23.628	0.158	150.0	0.259	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.003	58.842	0.392	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.006	50.00	13.35	8.450	3.650	0.0	0.0	0.0	1.11	78.3«	494.3
1.007	50.00	13.58	8.270	3.909	0.0	0.0	0.0	0.82	130.8«	529.3
1.008	50.00	13.79	8.250	4.673	0.0	0.0	0.0	1.57	111.1«	632.8
1.009	50.00	14.72	8.020	4.744	0.0	0.0	0.0	0.40	28.1«	642.3
1.010	50.00	14.74	8.000	4.744	0.0	0.0	0.0	5.78	408.2«	642.3
3.000	50.00	5.49	9.070	0.542	0.0	0.0	0.0	2.17	426.6	73.4
3.001	50.00	5.83	8.390	0.542	0.0	0.0	0.0	1.77	347.8	73.4
3.002	50.00	6.20	8.140	0.542	0.0	0.0	0.0	1.90	373.8	73.4
3.003	50.00	6.46	7.800	0.985	0.0	0.0	0.0	2.29	449.8	133.4
3.004	50.00	6.54	7.390	0.985	0.0	0.0	0.0	2.60	510.3	133.4
1.011	50.00	14.78	7.190	5.729	0.0	0.0	0.0	2.60	510.3«	775.7
1.012	50.00	14.84	7.100	5.729	0.0	0.0	0.0	2.60	510.3«	775.7
4.000	50.00	5.93	11.030	0.453	0.0	0.0	0.0	0.99	70.0	61.3
4.001	50.00	6.89	10.770	0.510	0.0	0.0	0.0	0.99	70.0	69.1
5.000	50.00	6.01	9.650	0.181	0.0	0.0	0.0	1.17	46.4	24.5
5.001	50.00	6.91	9.080	0.331	0.0	0.0	0.0	0.82	32.7«	44.8
5.002	50.00	7.28	8.870	0.590	0.0	0.0	0.0	1.07	42.4«	79.9
5.003	50.00	8.20	8.700	0.590	0.0	0.0	0.0	1.07	42.4«	79.9

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 546583 258531 TL 46583 58531
Data Type	Point
Summer Storms	Yes
Winter Storms	No
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

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2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 546583 258531 TL 46583 58531
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 101
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	30 minute 2 year Winter I+0%	12.010	10.673	0.943	0.000	0.00
1.001	2	15 minute 2 year Winter I+0%	12.460	10.456	0.646	0.000	0.29
2.000	3	15 minute 2 year Winter I+0%	11.210	10.480	0.260	0.000	0.69
2.001	4	15 minute 2 year Winter I+0%	11.300	10.473	0.673	0.000	0.88
2.002	5	15 minute 2 year Winter I+0%	11.600	10.463	0.847	0.000	2.15
1.002	3	15 minute 2 year Winter I+0%	12.200	10.448	1.148	0.000	2.05
1.003	4	15 minute 2 year Winter I+0%	12.180	9.863	0.763	0.000	4.29
1.004	5	15 minute 2 year Winter I+0%	11.900	9.709	0.649	0.000	1.64
1.005	6	120 minute 2 year Winter I+0%	10.460	9.565	0.665	0.000	1.81
1.006	7	120 minute 2 year Winter I+0%	9.590	9.144	0.394	0.000	1.20
1.007	8	120 minute 2 year Winter I+0%	9.360	8.982	0.262	0.000	1.28
1.008	9	60 minute 2 year Winter I+0%	9.670	9.009	0.459	0.000	1.28
1.009	10	60 minute 2 year Winter I+0%	9.020	8.682	0.362	0.000	6.24
1.010	11	60 minute 2 year Winter I+0%	9.120	8.163	-0.137	0.000	0.57
3.000	15	15 minute 2 year Winter I+0%	10.940	9.234	-0.336	0.000	0.23
3.001	16	15 minute 2 year Winter I+0%	10.110	8.576	-0.314	0.000	0.30

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2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		0.8	SURCHARGED
1.001	2		78.4	SURCHARGED
2.000	3		203.5	SURCHARGED
2.001	4		380.1	SURCHARGED
2.002	5		354.3	SURCHARGED
1.002	3		93.5	SURCHARGED
1.003	4		89.6	SURCHARGED
1.004	5		85.7	SURCHARGED
1.005	6		85.4	SURCHARGED
1.006	7		85.5	SURCHARGED
1.007	8		90.5	SURCHARGED
1.008	9		123.8	SURCHARGED
1.009	10		127.4	SURCHARGED
1.010	11		127.5	OK
3.000	15		89.0	OK
3.001	16		89.2	OK

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2 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
3.002	17	15 minute 2 year Winter I+0%	9.950	8.316	-0.324	0.000	0.27	
3.003	18	15 minute 2 year Winter I+0%	9.670	8.014	-0.286	0.000	0.38	
3.004	19	15 minute 2 year Winter I+0%	9.580	7.742	-0.148	0.000	0.45	
1.011	12	15 minute 2 year Winter I+0%	9.290	7.706	0.016	0.000	1.12	
1.012	13	15 minute 2 year Winter I+0%	9.530	7.479	-0.121	0.000	0.92	
4.000	22	15 minute 2 year Winter I+0%	12.010	11.344	0.014	0.000	1.02	
4.001	23	15 minute 2 year Winter I+0%	12.090	11.082	0.012	0.000	1.04	
5.000	24	15 minute 2 year Winter I+0%	10.990	9.786	-0.089	0.000	0.64	
5.001	25	15 minute 2 year Summer I+0%	10.030	9.582	0.277	0.000	1.02	
5.002	26	15 minute 2 year Winter I+0%	9.950	9.525	0.430	0.000	1.40	
5.003	28	15 minute 2 year Winter I+0%	10.170	9.215	0.290	0.000	1.32	

PN	US/MH Name	Pipe Flow (l/s)	Status
3.002	17	87.9	OK
3.003	18	146.5	OK
3.004	19	138.5	OK
1.011	12	245.4	SURCHARGED
1.012	13	242.8	OK
4.000	22	67.8	SURCHARGED
4.001	23	68.8	SURCHARGED
5.000	24	28.9	OK
5.001	25	31.9	SURCHARGED
5.002	26	54.4	SURCHARGED
5.003	28	53.8	SURCHARGED

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 546583 258531 TL 46583 58531
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 101
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	30 minute 30 year Summer I+0%	12.010	12.012	2.282	1.905	0.13
1.001	2	30 minute 30 year Summer I+0%	12.460	11.918	2.108	0.000	0.79
2.000	3	15 minute 30 year Summer I+0%	11.210	11.340	1.120	130.029	0.86
2.001	4	15 minute 30 year Winter I+0%	11.300	11.421	1.621	120.982	1.46
2.002	5	15 minute 30 year Winter I+0%	11.600	11.612	1.996	11.762	3.59
1.002	3	15 minute 30 year Winter I+0%	12.200	11.909	2.609	0.616	2.34
1.003	4	15 minute 30 year Winter I+0%	12.180	10.822	1.722	0.000	4.84
1.004	5	120 minute 30 year Winter I+0%	11.900	10.543	1.483	0.000	1.90
1.005	6	120 minute 30 year Winter I+0%	10.460	10.124	1.224	0.000	2.11
1.006	7	60 minute 30 year Winter I+0%	9.590	9.610	0.860	19.611	1.82
1.007	8	30 minute 30 year Winter I+0%	9.360	9.437	0.717	76.587	2.16
1.008	9	30 minute 30 year Winter I+0%	9.670	9.442	0.892	0.000	1.61
1.009	10	15 minute 30 year Winter I+0%	9.020	9.024	0.704	3.744	7.94
1.010	11	15 minute 30 year Winter I+0%	9.120	8.528	0.228	0.000	0.77
3.000	15	15 minute 30 year Winter I+0%	10.940	9.335	-0.235	0.000	0.53
3.001	16	15 minute 30 year Winter I+0%	10.110	8.785	-0.105	0.000	0.67

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		34.8	FLOOD
1.001	2		217.0	SURCHARGED
2.000	3		254.6	FLOOD
2.001	4		629.7	FLOOD
2.002	5		591.2	FLOOD
1.002	3		106.7	FLOOD
1.003	4		101.1	SURCHARGED
1.004	5		99.5	SURCHARGED
1.005	6		99.4	SURCHARGED
1.006	7		129.4	FLOOD
1.007	8		152.5	FLOOD
1.008	9		155.6	FLOOD RISK
1.009	10		162.1	FLOOD
1.010	11		170.8	SURCHARGED
3.000	15		208.5	OK
3.001	16		200.4	OK

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
3.002	17	15 minute 30 year Winter I+0%	9.950	8.702	0.062	0.000	0.57
3.003	18	15 minute 30 year Winter I+0%	9.670	8.603	0.303	0.000	0.75
3.004	19	15 minute 30 year Winter I+0%	9.580	8.379	0.489	0.000	0.93
1.011	12	15 minute 30 year Winter I+0%	9.290	8.203	0.513	0.000	1.96
1.012	13	15 minute 30 year Winter I+0%	9.530	7.816	0.216	0.000	1.64
4.000	22	15 minute 30 year Winter I+0%	12.010	12.021	0.691	10.834	1.59
4.001	23	15 minute 30 year Winter I+0%	12.090	11.587	0.517	0.000	1.72
5.000	24	15 minute 30 year Winter I+0%	10.990	10.990	1.115	0.211	1.25
5.001	25	15 minute 30 year Winter I+0%	10.030	10.059	0.754	29.314	1.75
5.002	26	15 minute 30 year Winter I+0%	9.950	9.962	0.867	12.221	1.71
5.003	28	15 minute 30 year Winter I+0%	10.170	9.527	0.602	0.000	1.59

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
3.002	17		188.2	SURCHARGED
3.003	18		289.4	SURCHARGED
3.004	19		288.7	SURCHARGED
1.011	12		432.3	SURCHARGED
1.012	13		431.9	SURCHARGED
4.000	22		105.6	FLOOD
4.001	23		114.1	SURCHARGED
5.000	24		56.5	FLOOD
5.001	25		54.5	FLOOD
5.002	26		66.6	FLOOD
5.003	28		65.2	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 0 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 546583 258531 TL 46583 58531
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 101
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	15 minute 100 year Summer I+0%	12.010	12.014	2.284	5.699	0.27
1.001	2	30 minute 100 year Summer I+0%	12.460	11.893	2.083	0.000	1.03
2.000	3	15 minute 100 year Winter I+0%	11.210	11.472	1.252	262.384	0.84
2.001	4	15 minute 100 year Winter I+0%	11.300	11.531	1.731	231.588	1.60
2.002	5	15 minute 100 year Summer I+0%	11.600	11.602	1.986	16.129	3.88
1.002	3	15 minute 100 year Winter I+0%	12.200	12.216	2.916	1.934	2.43
1.003	4	15 minute 100 year Winter I+0%	12.180	10.934	1.834	0.000	5.00
1.004	5	180 minute 100 year Winter I+0%	11.900	10.635	1.575	0.000	1.95
1.005	6	180 minute 100 year Winter I+0%	10.460	10.187	1.287	0.000	2.16
1.006	7	120 minute 100 year Winter I+0%	9.590	9.644	0.894	54.227	1.84
1.007	8	15 minute 100 year Winter I+0%	9.360	9.465	0.745	105.223	2.22
1.008	9	60 minute 100 year Winter I+0%	9.670	9.491	0.941	0.000	1.65
1.009	10	30 minute 100 year Winter I+0%	9.020	9.034	0.714	14.333	8.60
1.010	11	15 minute 100 year Summer I+0%	9.120	8.631	0.331	0.000	0.82
3.000	15	15 minute 100 year Winter I+0%	10.940	9.538	-0.032	0.000	0.69
3.001	16	15 minute 100 year Summer I+0%	10.110	9.179	0.289	0.000	0.78

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		72.0	FLOOD
1.001	2		282.2	SURCHARGED
2.000	3		248.3	FLOOD
2.001	4		689.1	FLOOD
2.002	5		638.7	FLOOD
1.002	3		110.7	FLOOD
1.003	4		104.5	SURCHARGED
1.004	5		102.1	SURCHARGED
1.005	6		102.0	FLOOD RISK
1.006	7		131.0	FLOOD
1.007	8		157.0	FLOOD
1.008	9		159.7	FLOOD RISK
1.009	10		175.7	FLOOD
1.010	11		181.7	SURCHARGED
3.000	15		270.8	OK
3.001	16		234.0	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
3.002	17	15 minute 100 year Summer I+0%	9.950	9.071	0.431	0.000	0.71
3.003	18	15 minute 100 year Winter I+0%	9.670	9.060	0.760	0.000	0.94
3.004	19	15 minute 100 year Winter I+0%	9.580	8.688	0.798	0.000	1.17
1.011	12	15 minute 100 year Winter I+0%	9.290	8.410	0.720	0.000	2.22
1.012	13	15 minute 100 year Winter I+0%	9.530	7.920	0.320	0.000	1.85
4.000	22	15 minute 100 year Winter I+0%	12.010	12.041	0.711	30.806	1.63
4.001	23	15 minute 100 year Winter I+0%	12.090	11.661	0.591	0.000	1.79
5.000	24	15 minute 100 year Summer I+0%	10.990	10.994	1.119	4.023	1.28
5.001	25	30 minute 100 year Winter I+0%	10.030	10.083	0.778	53.130	1.75
5.002	26	15 minute 100 year Winter I+0%	9.950	9.974	0.879	24.041	1.71
5.003	28	15 minute 100 year Winter I+0%	10.170	9.535	0.610	0.000	1.60

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
3.002	17		233.7	SURCHARGED
3.003	18		364.1	SURCHARGED
3.004	19		364.0	SURCHARGED
1.011	12		488.5	SURCHARGED
1.012	13		487.7	SURCHARGED
4.000	22		107.9	FLOOD
4.001	23		119.1	SURCHARGED
5.000	24		57.8	FLOOD
5.001	25		54.7	FLOOD
5.002	26		66.7	FLOOD
5.003	28		65.4	SURCHARGED

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101 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 0 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 546583 258531 TL 46583 58531
Data Type Point
Cv (Summer) 0.750
Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100, 101
Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	15 minute 101 year Winter I+40%	12.010	12.030	2.300	21.089	0.47
1.001	2	30 minute 101 year Winter I+40%	12.460	12.098	2.288	0.000	1.16
2.000	3	15 minute 101 year Winter I+40%	11.210	11.622	1.402	411.612	0.84
2.001	4	15 minute 101 year Winter I+40%	11.300	11.674	1.874	374.262	1.69
2.002	5	15 minute 101 year Winter I+40%	11.600	11.662	2.046	65.469	4.02
1.002	3	15 minute 101 year Winter I+40%	12.200	12.234	2.934	5.686	2.47
1.003	4	15 minute 101 year Winter I+40%	12.180	11.007	1.907	0.000	5.09
1.004	5	240 minute 101 year Winter I+40%	11.900	10.782	1.722	0.000	1.99
1.005	6	240 minute 101 year Winter I+40%	10.460	10.297	1.397	0.000	2.21
1.006	7	120 minute 101 year Winter I+40%	9.590	9.719	0.969	129.091	1.88
1.007	8	60 minute 101 year Winter I+40%	9.360	9.595	0.875	234.571	2.26
1.008	9	15 minute 101 year Winter I+40%	9.670	9.672	1.122	2.348	1.80
1.009	10	30 minute 101 year Winter I+40%	9.020	9.070	0.750	49.837	8.81
1.010	11	15 minute 101 year Winter I+40%	9.120	8.841	0.541	0.000	0.83
3.000	15	15 minute 101 year Winter I+40%	10.940	10.681	1.111	0.000	0.89
3.001	16	15 minute 101 year Summer I+40%	10.110	10.113	1.223	3.386	0.95

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101 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1		127.9	FLOOD
1.001	2		318.8	SURCHARGED
2.000	3		248.9	FLOOD
2.001	4		724.9	FLOOD
2.002	5		661.0	FLOOD
1.002	3		112.6	FLOOD
1.003	4		106.3	SURCHARGED
1.004	5		104.4	SURCHARGED
1.005	6		104.4	FLOOD RISK
1.006	7		134.0	FLOOD
1.007	8		159.6	FLOOD
1.008	9		173.5	FLOOD
1.009	10		179.9	FLOOD
1.010	11		184.1	FLOOD RISK
3.000	15		346.6	FLOOD RISK
3.001	16		285.3	FLOOD

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101 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
3.002	17	15 minute 101 year Summer I+40%	9.950	9.906	1.266	0.000	0.90
3.003	18	15 minute 101 year Winter I+40%	9.670	9.679	1.379	9.104	1.18
3.004	19	15 minute 101 year Winter I+40%	9.580	9.130	1.240	0.000	1.48
1.011	12	15 minute 101 year Winter I+40%	9.290	8.696	1.006	0.000	2.51
1.012	13	15 minute 101 year Winter I+40%	9.530	8.064	0.464	0.000	2.09
4.000	22	15 minute 101 year Winter I+40%	12.010	12.078	0.748	68.382	1.66
4.001	23	15 minute 101 year Winter I+40%	12.090	11.719	0.649	0.000	1.90
5.000	24	15 minute 101 year Summer I+40%	10.990	11.004	1.129	14.174	1.28
5.001	25	30 minute 101 year Winter I+40%	10.030	10.120	0.815	89.866	1.76
5.002	26	15 minute 101 year Summer I+40%	9.950	9.988	0.893	37.730	1.72
5.003	28	30 minute 101 year Winter I+40%	10.170	9.544	0.619	0.000	1.61

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
3.002	17		297.9	FLOOD RISK
3.003	18		459.6	FLOOD
3.004	19		459.3	SURCHARGED
1.011	12		553.3	SURCHARGED
1.012	13		553.3	SURCHARGED
4.000	22		109.8	FLOOD
4.001	23		126.3	SURCHARGED
5.000	24		57.8	FLOOD
5.001	25		55.0	FLOOD
5.002	26		66.8	FLOOD
5.003	28		66.0	SURCHARGED

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F. Proposed Drainage Arrangements