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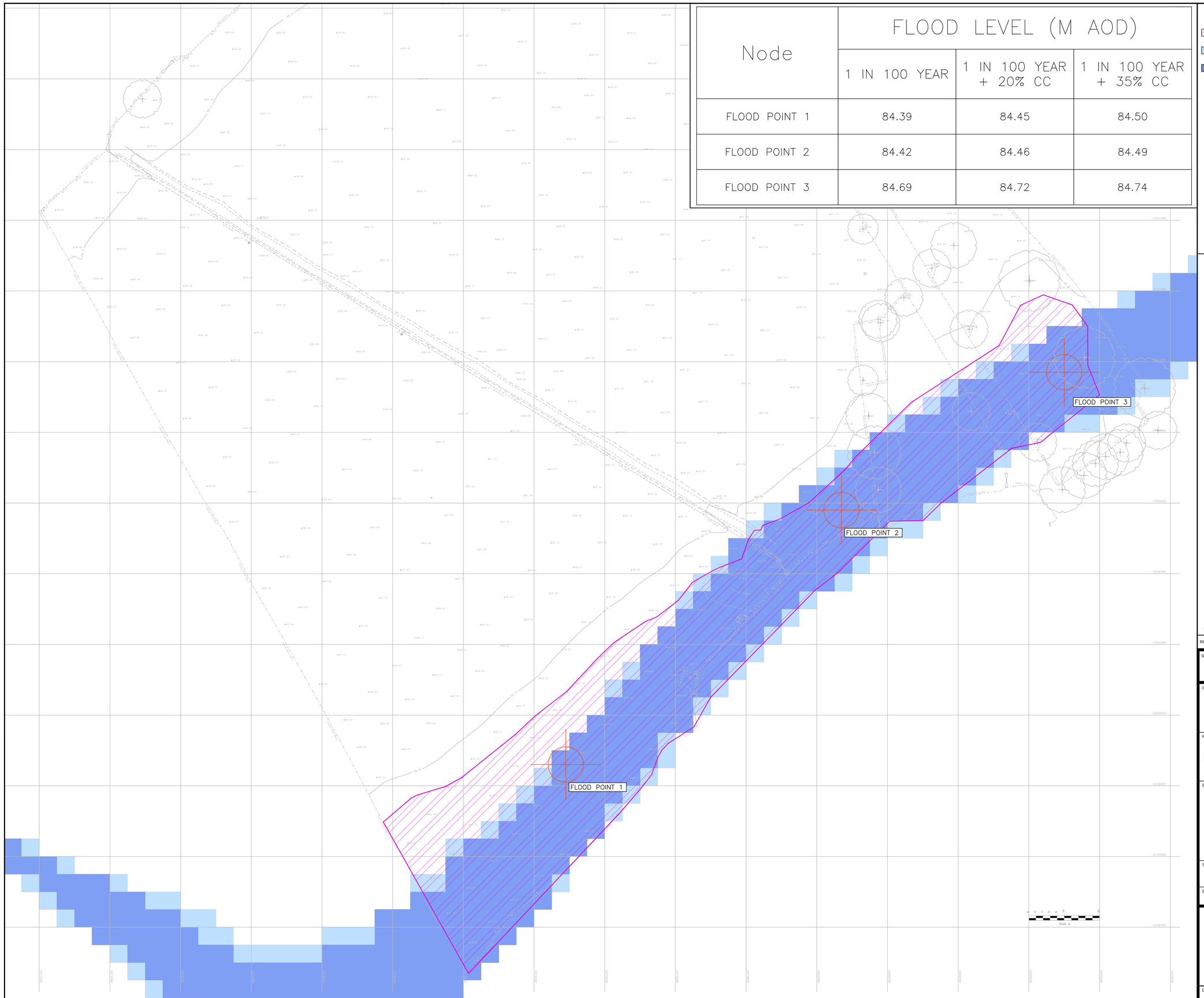
Appendix F

Fluvial Flood Map

Node	FLOOD LEVEL (M AOD)		
	1 IN 100 YEAR	1 IN 100 YEAR + 20% CC	1 IN 100 YEAR + 35% CC
FLOOD POINT 1	84.39	84.45	84.50
FLOOD POINT 2	84.42	84.46	84.49
FLOOD POINT 3	84.69	84.72	84.74



KEY

- FLOOD ZONE FOR THE 1 IN 100 YEAR EVENT + 35% CLIMATE CHANGE
- FLOOD ZONE 2 EXTENTS
- FLOOD ZONE 3 EXTENTS

REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

STATUS: INFORMATION ONLY

CLIENT: FIRETHORN BICESTER LIMITED

PROJECT: LAND AT NORTH WEST BICESTER

DRAWING TITLE: CLIMATE CHANGE FLOOD MAP

SCALES: 1:500 @ A1

DRAWN:	CHECKED:	DATE:
HE	NB	JANUARY 2021

vectos.
5th Floor, 4 Colston Avenue, Bristol, BS1 4ST
t: 0117 203 5240 e: enquiries@vectos.co.uk

DRAWING NUMBER:	REVISION:
205550_FE_01	P01

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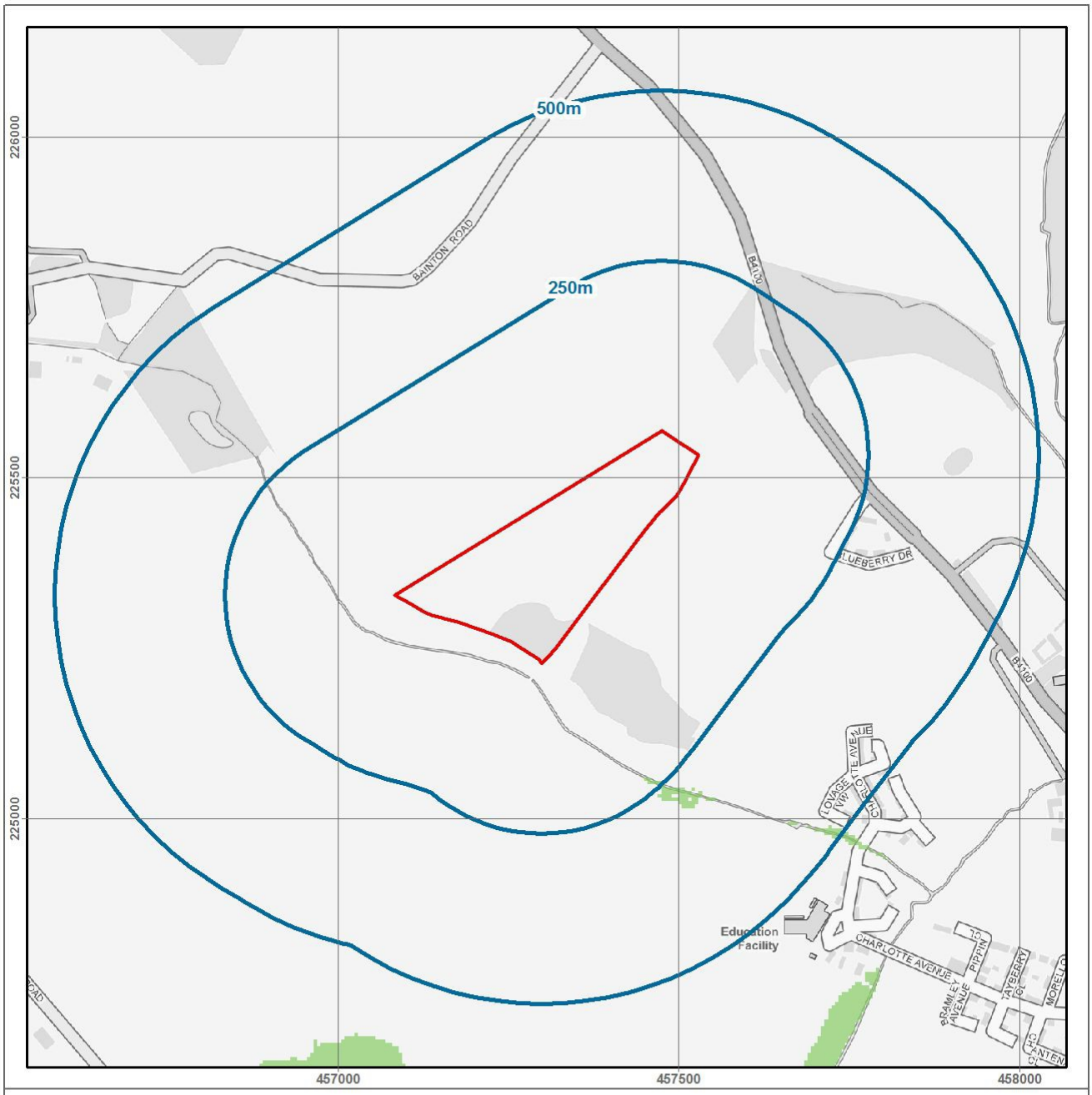
Appendix G

Site Solutions Report

Groundwater Flooding Risk



Groundwater Flooding Risk Rating

Client Site
High Risk
Moderate Risk
Low Risk

metres
0 50 100 200

* - Not all features in legend may be present in above map

Nominal scale at A4 paper size - 1:9,250

Groundwater Flooding Risk

	Details	Distance	Reply or Direction
	What is the risk of groundwater flooding at the Site?	On Site	-

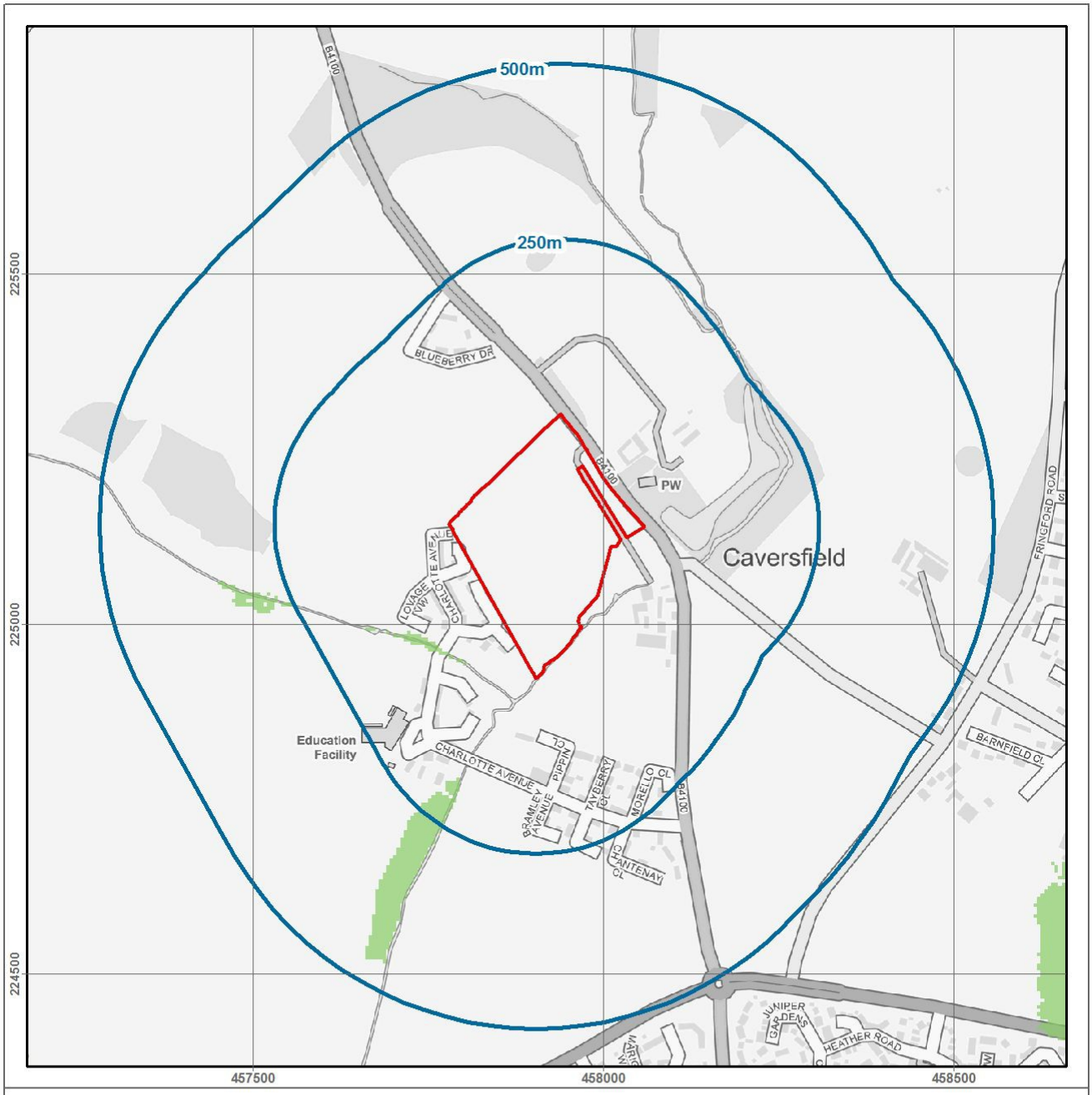
Information from GeoSmart Information Ltd indicates that there is a negligible risk of groundwater flooding in this area and any groundwater flooding incidence will be less frequent than 1 in 100 years return period.No further investigation of risk is deemed necessary unless the proposed site use is unusually sensitive. However, data may be lacking in some areas, so assessment as 'negligible risk' on the basis of the map does not rule out local flooding due to features not currently represented in the national datasets used to generate this version of the map.

GeoSmart Information Ltd Data

GeoSmart Information Ltd provides data to Argyll in relation to groundwater flooding. Through research and development, building on their expertise in addressing groundwater flooding issues for The Environment Agency and other clients in the UK, GeoSmart Information Ltd has developed algorithms and calibrated predictions of the risk of groundwater flooding occurring in England and Wales. This differs from other suppliers of data regarding groundwater flooding which only report on the susceptibility of groundwater flooding. Susceptibility merely has to be identified, whereas risk must be quantified. The resulting map is a 5x5m classification of groundwater flooding risk into four categories (Negligible, Low, Moderate and High). GeoSmart Information Ltd's classifications are based on the level of risk, combining severity and uncertainty that a site will suffer groundwater flooding within a return period of about 100 years.

The map is a general purpose indicative screening tool, and is intended to provide a useful initial view for a wide variety of applications. However, it does not provide an alternative to a site specific assessment, and a detailed risk assessment should be used for any site where the impact of groundwater flooding would have significant adverse consequences.

Groundwater Flooding Risk



Groundwater Flooding Risk Rating

Client Site

High Risk

Moderate Risk

Low Risk

metres
0 50 100 200

* - Not all features in legend may be present in above map

Nominal scale at A4 paper size - 1:9,000

Groundwater Flooding Risk

	Details	Distance	Reply or Direction
	What is the risk of groundwater flooding at the Site?	On Site	-

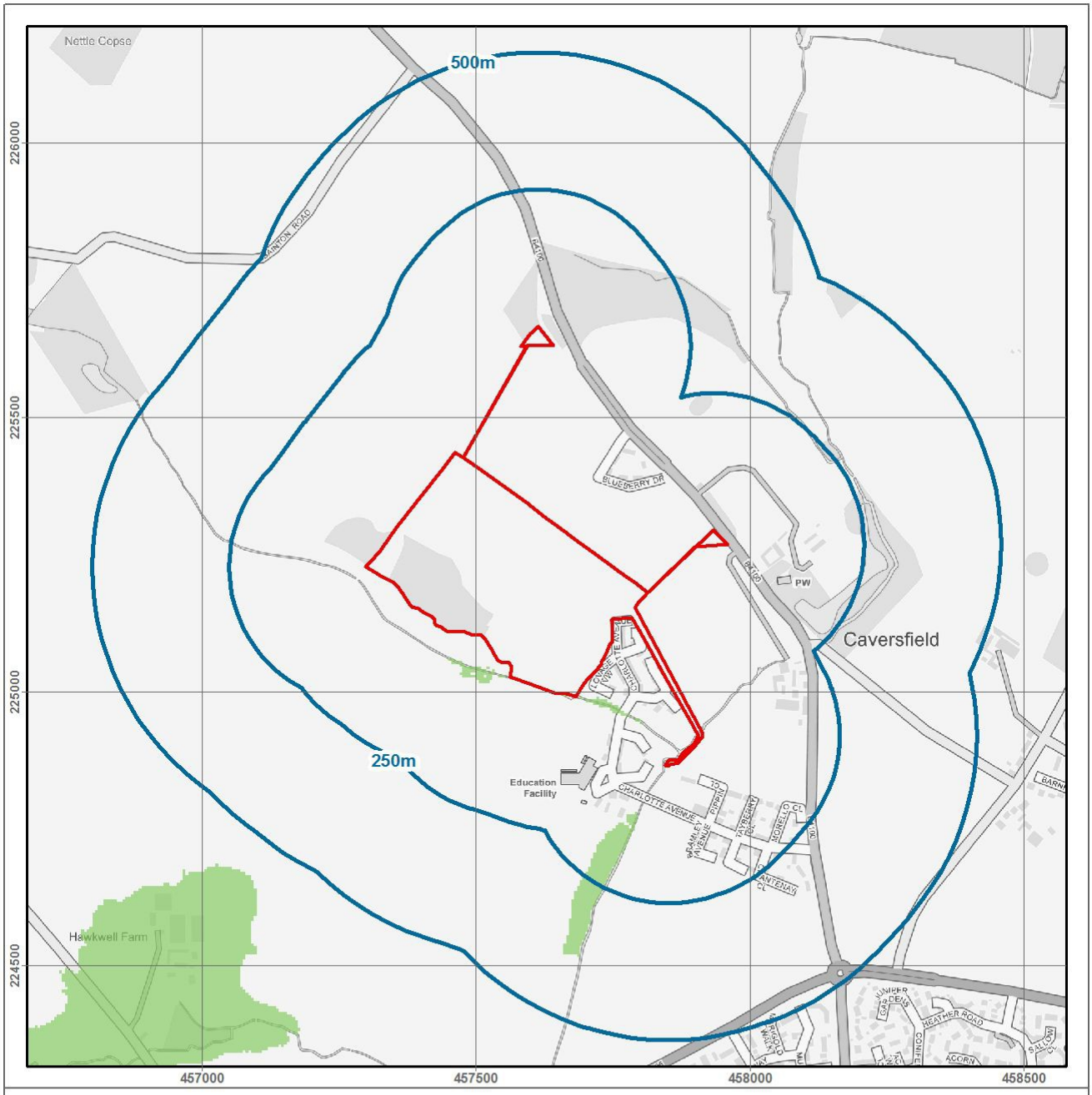
Information from GeoSmart Information Ltd indicates that there is a negligible risk of groundwater flooding in this area and any groundwater flooding incidence will be less frequent than 1 in 100 years return period.No further investigation of risk is deemed necessary unless the proposed site use is unusually sensitive. However, data may be lacking in some areas, so assessment as 'negligible risk' on the basis of the map does not rule out local flooding due to features not currently represented in the national datasets used to generate this version of the map.

GeoSmart Information Ltd Data

GeoSmart Information Ltd provides data to Argyll in relation to groundwater flooding. Through research and development, building on their expertise in addressing groundwater flooding issues for The Environment Agency and other clients in the UK, GeoSmart Information Ltd has developed algorithms and calibrated predictions of the risk of groundwater flooding occurring in England and Wales. This differs from other suppliers of data regarding groundwater flooding which only report on the susceptibility of groundwater flooding. Susceptibility merely has to be identified, whereas risk must be quantified. The resulting map is a 5x5m classification of groundwater flooding risk into four categories (Negligible, Low, Moderate and High). GeoSmart Information Ltd's classifications are based on the level of risk, combining severity and uncertainty that a site will suffer groundwater flooding within a return period of about 100 years.

The map is a general purpose indicative screening tool, and is intended to provide a useful initial view for a wide variety of applications. However, it does not provide an alternative to a site specific assessment, and a detailed risk assessment should be used for any site where the impact of groundwater flooding would have significant adverse consequences.

Groundwater Flooding Risk



Groundwater Flooding Risk Rating

Client Site

High Risk

Moderate Risk

Low Risk

metres
0 50 100 200

* - Not all features in legend may be present in above map

Nominal scale at A4 paper size - 1:11,500

Groundwater Flooding Risk

	Details	Distance	Reply or Direction
	What is the risk of groundwater flooding at the Site?	On Site	low

Information from GeoSmart Information Ltd indicates that there is a low risk of groundwater flooding in this area with a return period of 1 in 100 years.There will be a remote possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location. For sensitive land uses further consideration of site topography, drainage, and historical information on flooding in the local area should be undertaken by a suitably qualified professional. Should there be any flooding it is likely to be limited to seepages and waterlogged ground, damage to basements and subsurface infrastructure, and should pose no significant risk to life. Surface water flooding, however, may be exacerbated when groundwater levels are high.

GeoSmart Information Ltd Data

GeoSmart Information Ltd provides data to Argyll in relation to groundwater flooding. Through research and development, building on their expertise in addressing groundwater flooding issues for The Environment Agency and other clients in the UK, GeoSmart Information Ltd has developed algorithms and calibrated predictions of the risk of groundwater flooding occurring in England and Wales. This differs from other suppliers of data regarding groundwater flooding which only report on the susceptibility of groundwater flooding. Susceptibility merely has to be identified, whereas risk must be quantified. The resulting map is a 5x5m classification of groundwater flooding risk into four categories (Negligible, Low, Moderate and High). GeoSmart Information Ltd's classifications are based on the level of risk, combining severity and uncertainty that a site will suffer groundwater flooding within a return period of about 100 years.

The map is a general purpose indicative screening tool, and is intended to provide a useful initial view for a wide variety of applications. However, it does not provide an alternative to a site specific assessment, and a detailed risk assessment should be used for any site where the impact of groundwater flooding would have significant adverse consequences.

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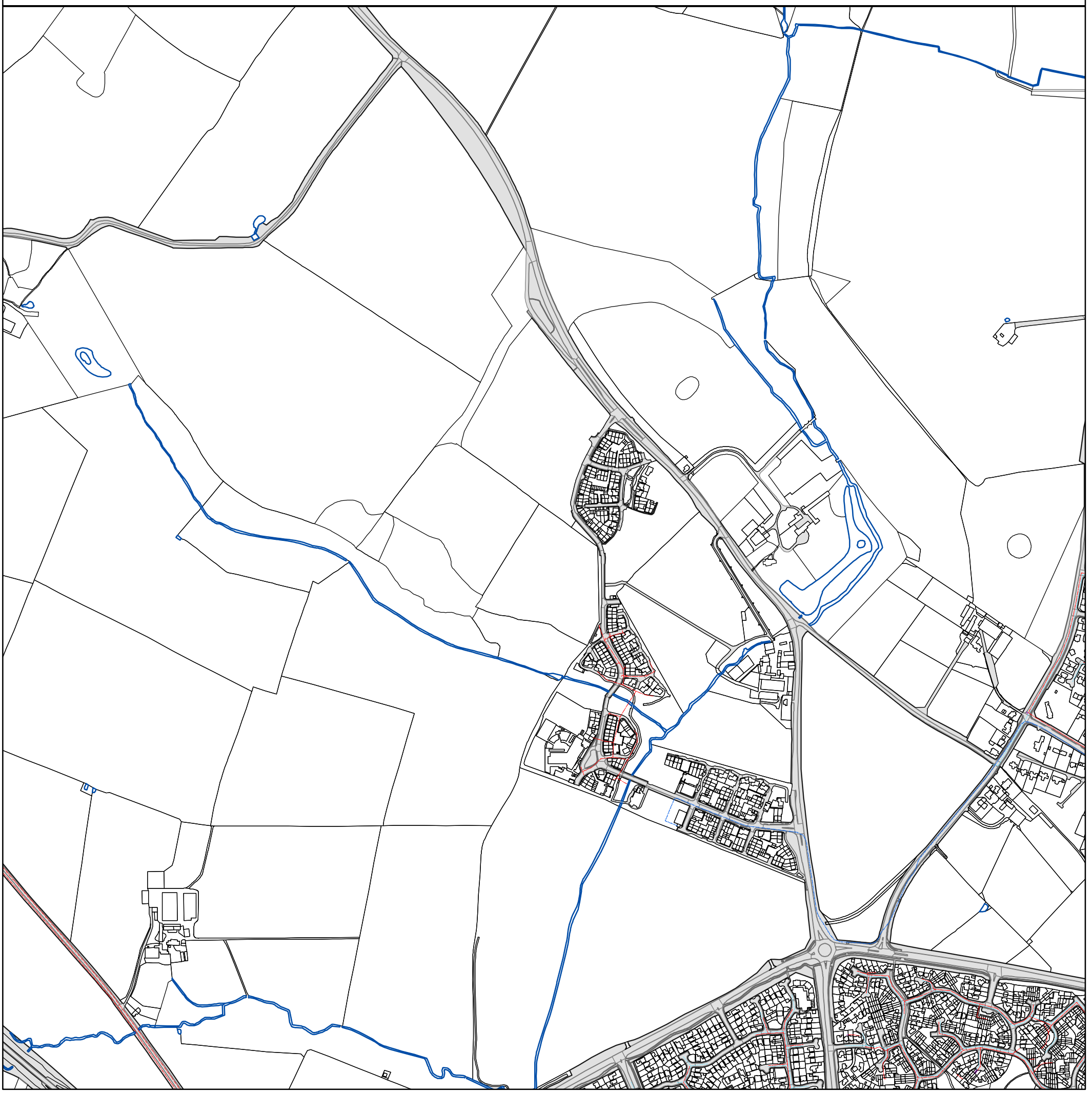
Appendix H

Thames Water Asset Maps

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2020_4260587



0 45 90 180 270 360
Meters

Scale:	1:7158
Width:	2000m
Printed By:	G1KANAGA
Print Date:	23/09/2020
Map Centre:	457647,225228
Grid Reference:	SP5725SE

Comments:

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Trunk Surface Water
- Trunk Foul
- Storm Relief
- Trunk Combined
- Vent Pipe
- Bio-solids (Sludge)
- Proposed Thames Surface Water Sewer
- Proposed Thames Water Foul Sewer
- Gallery
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Sludge Rising Main
- Proposed Thames Water Rising Main
- Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Dam Chase
- Fitting
- Meter
- Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Control Valve
- Drop Pipe
- Ancillary
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Outfall
- Undefined End
- Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

- Public/Private Pumping Station
- Change of characteristic indicator (C.O.C.I.)
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Operational Site
- Chamber
- Tunnel
- Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- Gulley
- Culverted Watercourse
- Proposed
- Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

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Appendix I

Surface Water Drainage Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Nick Bosanko
Site name:	NW Bicester
Site location:	Bicester

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:	51.92217° N
Longitude:	1.16466° W
Reference:	1674798360
Date:	Feb 02 2021 14:37

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:	1	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	635	635
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):	0.15	1.63
1 in 1 year (l/s):	0.13	1.38
1 in 30 years (l/s):	0.34	3.74
1 in 100 year (l/s):	0.48	5.19
1 in 200 years (l/s):	0.56	6.08

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	8.995	0.495	6.3	583.4	O K
30 min Summer	9.128	0.628	6.3	758.8	O K
60 min Summer	9.258	0.758	6.3	936.9	O K
120 min Summer	9.380	0.880	6.3	1112.6	O K
180 min Summer	9.448	0.948	6.3	1213.3	O K
240 min Summer	9.491	0.991	6.3	1277.9	O K
360 min Summer	9.538	1.038	6.3	1350.1	O K
480 min Summer	9.562	1.062	6.3	1387.1	O K
600 min Summer	9.574	1.074	6.3	1404.4	O K
720 min Summer	9.577	1.077	6.3	1409.9	O K
960 min Summer	9.570	1.070	6.3	1398.4	O K
1440 min Summer	9.535	1.035	6.3	1344.0	O K
2160 min Summer	9.472	0.972	6.3	1248.2	O K
2880 min Summer	9.422	0.922	6.3	1174.4	O K
4320 min Summer	9.349	0.849	6.3	1067.3	O K
5760 min Summer	9.290	0.790	6.3	982.7	O K
7200 min Summer	9.234	0.734	6.3	903.2	O K
8640 min Summer	9.183	0.683	6.3	832.6	O K
10080 min Summer	9.139	0.639	6.3	773.0	O K
15 min Winter	9.049	0.549	6.3	654.2	O K
30 min Winter	9.196	0.696	6.3	851.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	152.077	0.0	500.6	27
30 min Summer	99.113	0.0	528.1	41
60 min Summer	61.510	0.0	906.9	72
120 min Summer	36.942	0.0	994.8	130
180 min Summer	27.163	0.0	985.2	190
240 min Summer	21.700	0.0	974.6	250
360 min Summer	15.627	0.0	959.7	368
480 min Summer	12.308	0.0	949.2	488
600 min Summer	10.189	0.0	940.5	606
720 min Summer	8.711	0.0	932.6	726
960 min Summer	6.770	0.0	917.6	964
1440 min Summer	4.735	0.0	889.8	1442
2160 min Summer	3.315	0.0	1793.7	1856
2880 min Summer	2.584	0.0	1799.3	2224
4320 min Summer	1.843	0.0	1645.4	3024
5760 min Summer	1.464	0.0	2174.5	3864
7200 min Summer	1.234	0.0	2289.7	4680
8640 min Summer	1.079	0.0	2400.6	5440
10080 min Summer	0.967	0.0	2505.9	6160
15 min Winter	152.077	0.0	524.8	27
30 min Winter	99.113	0.0	520.5	41

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	9.338	0.838	6.3	1051.5	O K
120 min Winter	9.472	0.972	6.3	1249.4	O K
180 min Winter	9.547	1.047	6.3	1363.9	O K
240 min Winter	9.595	1.095	6.3	1438.1	O K
360 min Winter	9.649	1.149	6.3	1522.6	O K
480 min Winter	9.677	1.177	6.3	1567.7	O K
600 min Winter	9.691	1.191	6.3	1590.7	O K
720 min Winter	9.697	1.197	6.3	1600.4	O K
960 min Winter	9.693	1.193	6.3	1594.4	O K
1440 min Winter	9.664	1.164	6.3	1547.2	O K
2160 min Winter	9.602	1.102	6.3	1448.3	O K
2880 min Winter	9.541	1.041	6.3	1353.3	O K
4320 min Winter	9.451	0.951	6.3	1216.8	O K
5760 min Winter	9.370	0.870	6.3	1098.3	O K
7200 min Winter	9.294	0.794	6.3	988.8	O K
8640 min Winter	9.209	0.709	6.3	869.5	O K
10080 min Winter	9.133	0.633	6.3	765.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	61.510	0.0	981.1	70
120 min Winter	36.942	0.0	988.1	128
180 min Winter	27.163	0.0	974.7	188
240 min Winter	21.700	0.0	967.1	246
360 min Winter	15.627	0.0	959.5	362
480 min Winter	12.308	0.0	955.7	480
600 min Winter	10.189	0.0	953.2	596
720 min Winter	8.711	0.0	951.3	714
960 min Winter	6.770	0.0	947.7	944
1440 min Winter	4.735	0.0	933.7	1396
2160 min Winter	3.315	0.0	1898.9	2036
2880 min Winter	2.584	0.0	1839.5	2316
4320 min Winter	1.843	0.0	1694.8	3244
5760 min Winter	1.464	0.0	2435.2	4160
7200 min Winter	1.234	0.0	2563.6	5112
8640 min Winter	1.079	0.0	2687.7	5888
10080 min Winter	0.967	0.0	2807.3	6656

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 457626 225232 SP 57626 25232
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 2.070

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.690	4	8	0.690	8	12	0.690

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 8.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1075.0	1.500	1771.8

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0115-6300-1200-6300
Design Head (m)	1.200
Design Flow (l/s)	6.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	115
Invert Level (m)	8.500
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	6.3
Flush-Flo™	0.355	6.3
Kick-Flo®	0.754	5.1
Mean Flow over Head Range	-	5.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.0	1.200	6.3	3.000	9.7	7.000	14.5
0.200	6.0	1.400	6.8	3.500	10.4	7.500	15.0
0.300	6.3	1.600	7.2	4.000	11.1	8.000	15.5
0.400	6.3	1.800	7.6	4.500	11.7	8.500	15.9
0.500	6.2	2.000	8.0	5.000	12.3	9.000	16.4
0.600	6.0	2.200	8.4	5.500	12.9	9.500	16.8
0.800	5.2	2.400	8.7	6.000	13.5		
1.000	5.8	2.600	9.1	6.500	14.0		

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	8.977	0.477	13.3	1243.7	O K
30 min Summer	9.110	0.610	13.3	1617.5	O K
60 min Summer	9.241	0.741	13.3	1997.1	O K
120 min Summer	9.368	0.868	13.3	2374.5	O K
180 min Summer	9.439	0.939	13.3	2591.5	O K
240 min Summer	9.484	0.984	13.3	2731.3	O K
360 min Summer	9.535	1.035	13.3	2889.1	O K
480 min Summer	9.561	1.061	13.3	2971.6	O K
600 min Summer	9.574	1.074	13.3	3012.2	O K
720 min Summer	9.579	1.079	13.3	3027.4	O K
960 min Summer	9.573	1.073	13.3	3009.6	O K
1440 min Summer	9.540	1.040	13.3	2905.9	O K
2160 min Summer	9.479	0.979	13.3	2716.1	O K
2880 min Summer	9.431	0.931	13.3	2568.4	O K
4320 min Summer	9.359	0.859	13.3	2347.8	O K
5760 min Summer	9.297	0.797	13.3	2163.7	O K
7200 min Summer	9.239	0.739	13.3	1992.2	O K
8640 min Summer	9.191	0.691	13.3	1849.9	O K
10080 min Summer	9.149	0.649	13.3	1729.4	O K
15 min Winter	9.031	0.531	13.3	1394.3	O K
30 min Winter	9.178	0.678	13.3	1814.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	152.077	0.0	1018.7	27
30 min Summer	99.113	0.0	1121.1	41
60 min Summer	61.510	0.0	1884.4	72
120 min Summer	36.942	0.0	2116.1	130
180 min Summer	27.163	0.0	2112.2	190
240 min Summer	21.700	0.0	2088.9	250
360 min Summer	15.627	0.0	2053.6	368
480 min Summer	12.308	0.0	2027.0	488
600 min Summer	10.189	0.0	2004.3	606
720 min Summer	8.711	0.0	1983.1	726
960 min Summer	6.770	0.0	1942.1	964
1440 min Summer	4.735	0.0	1862.6	1442
2160 min Summer	3.315	0.0	3758.1	1860
2880 min Summer	2.584	0.0	3771.6	2224
4320 min Summer	1.843	0.0	3452.6	3024
5760 min Summer	1.464	0.0	4617.4	3864
7200 min Summer	1.234	0.0	4860.1	4616
8640 min Summer	1.079	0.0	5092.1	5376
10080 min Summer	0.967	0.0	5306.6	6160
15 min Winter	152.077	0.0	1091.0	27
30 min Winter	99.113	0.0	1115.9	41

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	9.323	0.823	13.3	2241.6	O K
120 min Winter	9.463	0.963	13.3	2665.6	O K
180 min Winter	9.542	1.042	13.3	2911.3	O K
240 min Winter	9.592	1.092	13.3	3071.1	O K
360 min Winter	9.650	1.150	13.3	3254.5	O K
480 min Winter	9.680	1.180	13.3	3353.6	O K
600 min Winter	9.696	1.196	13.4	3405.6	O K
720 min Winter	9.704	1.204	13.4	3429.1	Flood Risk
960 min Winter	9.701	1.201	13.4	3422.0	Flood Risk
1440 min Winter	9.674	1.174	13.3	3332.0	O K
2160 min Winter	9.612	1.112	13.3	3134.8	O K
2880 min Winter	9.552	1.052	13.3	2943.0	O K
4320 min Winter	9.462	0.962	13.3	2663.4	O K
5760 min Winter	9.381	0.881	13.3	2413.6	O K
7200 min Winter	9.301	0.801	13.3	2173.6	O K
8640 min Winter	9.216	0.716	13.3	1923.1	O K
10080 min Winter	9.144	0.644	13.3	1715.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	61.510	0.0	2053.5	70
120 min Winter	36.942	0.0	2121.1	128
180 min Winter	27.163	0.0	2092.3	188
240 min Winter	21.700	0.0	2074.1	246
360 min Winter	15.627	0.0	2053.2	362
480 min Winter	12.308	0.0	2039.2	480
600 min Winter	10.189	0.0	2027.0	596
720 min Winter	8.711	0.0	2015.6	714
960 min Winter	6.770	0.0	1992.6	944
1440 min Winter	4.735	0.0	1949.7	1396
2160 min Winter	3.315	0.0	4009.1	2036
2880 min Winter	2.584	0.0	3875.5	2316
4320 min Winter	1.843	0.0	3558.5	3244
5760 min Winter	1.464	0.0	5170.3	4160
7200 min Winter	1.234	0.0	5440.5	5112
8640 min Winter	1.079	0.0	5700.3	5880
10080 min Winter	0.967	0.0	5945.4	6656

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 457626 225232 SP 57626 25232
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 4.410

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	1.470	4	8	1.470	8	12	1.470

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 8.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2460.0	1.500	3469.7

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0163-1340-1200-1340
Design Head (m)	1.200
Design Flow (l/s)	13.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	163
Invert Level (m)	8.500
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	13.4
Flush-Flo™	0.363	13.3
Kick-Flo®	0.795	11.0
Mean Flow over Head Range	-	11.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.8	1.200	13.4	3.000	20.7	7.000	31.1
0.200	12.6	1.400	14.4	3.500	22.3	7.500	32.1
0.300	13.2	1.600	15.3	4.000	23.7	8.000	33.1
0.400	13.3	1.800	16.2	4.500	25.1	8.500	34.1
0.500	13.1	2.000	17.0	5.000	26.4	9.000	35.1
0.600	12.8	2.200	17.8	5.500	27.7	9.500	36.0
0.800	11.0	2.400	18.6	6.000	28.8		
1.000	12.3	2.600	19.3	6.500	30.0		

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	9.279	0.279	2.7	251.8	O K
30 min Summer	9.357	0.357	2.7	327.2	O K
60 min Summer	9.434	0.434	2.7	403.6	O K
120 min Summer	9.507	0.507	2.7	479.6	O K
180 min Summer	9.549	0.549	2.7	523.1	O K
240 min Summer	9.575	0.575	2.7	551.2	O K
360 min Summer	9.605	0.605	2.7	582.8	O K
480 min Summer	9.620	0.620	2.7	599.3	O K
600 min Summer	9.627	0.627	2.7	607.3	O K
720 min Summer	9.630	0.630	2.7	610.2	O K
960 min Summer	9.626	0.626	2.7	606.1	O K
1440 min Summer	9.606	0.606	2.7	584.5	O K
2160 min Summer	9.570	0.570	2.7	545.5	O K
2880 min Summer	9.541	0.541	2.7	515.3	O K
4320 min Summer	9.498	0.498	2.7	470.3	O K
5760 min Summer	9.462	0.462	2.7	433.0	O K
7200 min Summer	9.428	0.428	2.7	398.3	O K
8640 min Summer	9.400	0.400	2.7	369.4	O K
10080 min Summer	9.375	0.375	2.7	345.0	O K
15 min Winter	9.311	0.311	2.7	282.2	O K
30 min Winter	9.397	0.397	2.7	366.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	152.077	0.0	207.9	19
30 min Summer	99.113	0.0	227.5	34
60 min Summer	61.510	0.0	383.0	64
120 min Summer	36.942	0.0	429.0	124
180 min Summer	27.163	0.0	428.2	184
240 min Summer	21.700	0.0	423.6	244
360 min Summer	15.627	0.0	416.6	362
480 min Summer	12.308	0.0	411.4	482
600 min Summer	10.189	0.0	406.9	602
720 min Summer	8.711	0.0	402.8	722
960 min Summer	6.770	0.0	394.7	962
1440 min Summer	4.735	0.0	379.1	1440
2160 min Summer	3.315	0.0	762.1	1856
2880 min Summer	2.584	0.0	765.6	2220
4320 min Summer	1.843	0.0	702.4	3024
5760 min Summer	1.464	0.0	932.8	3856
7200 min Summer	1.234	0.0	981.9	4608
8640 min Summer	1.079	0.0	1029.0	5368
10080 min Summer	0.967	0.0	1072.8	6152
15 min Winter	152.077	0.0	221.8	19
30 min Winter	99.113	0.0	226.3	34

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	9.482	0.482	2.7	452.8	O K
120 min Winter	9.563	0.563	2.7	538.3	O K
180 min Winter	9.609	0.609	2.7	587.7	O K
240 min Winter	9.638	0.638	2.7	619.8	O K
360 min Winter	9.672	0.672	2.7	656.5	O K
480 min Winter	9.690	0.690	2.7	676.3	O K
600 min Winter	9.699	0.699	2.7	686.6	O K
720 min Winter	9.703	0.703	2.7	691.2	Flood Risk
960 min Winter	9.701	0.701	2.7	689.4	Flood Risk
1440 min Winter	9.685	0.685	2.7	670.7	O K
2160 min Winter	9.648	0.648	2.7	630.3	O K
2880 min Winter	9.612	0.612	2.7	591.1	O K
4320 min Winter	9.559	0.559	2.7	533.9	O K
5760 min Winter	9.511	0.511	2.7	483.2	O K
7200 min Winter	9.464	0.464	2.7	434.6	O K
8640 min Winter	9.414	0.414	2.7	383.8	O K
10080 min Winter	9.372	0.372	2.7	341.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	61.510	0.0	416.9	64
120 min Winter	36.942	0.0	429.9	122
180 min Winter	27.163	0.0	424.2	182
240 min Winter	21.700	0.0	420.6	240
360 min Winter	15.627	0.0	416.4	358
480 min Winter	12.308	0.0	413.7	476
600 min Winter	10.189	0.0	411.3	594
720 min Winter	8.711	0.0	409.1	708
960 min Winter	6.770	0.0	404.7	942
1440 min Winter	4.735	0.0	396.4	1388
2160 min Winter	3.315	0.0	813.4	2032
2880 min Winter	2.584	0.0	787.1	2308
4320 min Winter	1.843	0.0	723.4	3240
5760 min Winter	1.464	0.0	1044.5	4152
7200 min Winter	1.234	0.0	1099.3	5112
8640 min Winter	1.079	0.0	1152.0	5872
10080 min Winter	0.967	0.0	1201.9	6656

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 457626 225232 SP 57626 25232
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.890

Time (mins) From:	To:	Area (ha)
0	4	0.890

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 9.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	850.0	1.000	1250.2

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0083-2700-0700-2700
Design Head (m)	0.700
Design Flow (l/s)	2.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	83
Invert Level (m)	9.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.700	2.7
Flush-Flo™	0.208	2.7
Kick-Flo®	0.459	2.2
Mean Flow over Head Range	-	2.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	3.5	3.000	5.3	7.000	7.9
0.200	2.7	1.400	3.7	3.500	5.7	7.500	8.2
0.300	2.6	1.600	3.9	4.000	6.1	8.000	8.4
0.400	2.5	1.800	4.2	4.500	6.4	8.500	8.7
0.500	2.3	2.000	4.4	5.000	6.7	9.000	8.9
0.600	2.5	2.200	4.6	5.500	7.0	9.500	9.2
0.800	2.9	2.400	4.8	6.000	7.3		
1.000	3.2	2.600	4.9	6.500	7.6		

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	9.046	0.546	1.7	181.2	O K
30 min Summer	9.178	0.678	1.7	235.4	O K
60 min Summer	9.301	0.801	1.7	290.3	O K
120 min Summer	9.415	0.915	1.7	344.4	O K
180 min Summer	9.477	0.977	1.7	375.5	O K
240 min Summer	9.516	1.016	1.8	395.5	O K
360 min Summer	9.559	1.059	1.8	417.9	O K
480 min Summer	9.580	1.080	1.8	429.4	O K
600 min Summer	9.590	1.090	1.8	434.9	O K
720 min Summer	9.594	1.094	1.8	436.7	O K
960 min Summer	9.587	1.087	1.8	433.3	O K
1440 min Summer	9.556	1.056	1.8	416.7	O K
2160 min Summer	9.500	1.000	1.7	387.0	O K
2880 min Summer	9.455	0.955	1.7	364.4	O K
4320 min Summer	9.393	0.893	1.7	333.8	O K
5760 min Summer	9.348	0.848	1.7	312.0	O K
7200 min Summer	9.312	0.812	1.7	295.0	O K
8640 min Summer	9.281	0.781	1.7	280.8	O K
10080 min Summer	9.254	0.754	1.7	268.5	O K
15 min Winter	9.101	0.601	1.7	203.1	O K
30 min Winter	9.243	0.743	1.7	263.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	152.077	0.0	136.6	19
30 min Summer	99.113	0.0	127.2	34
60 min Summer	61.510	0.0	263.3	64
120 min Summer	36.942	0.0	263.6	124
180 min Summer	27.163	0.0	264.4	184
240 min Summer	21.700	0.0	266.0	244
360 min Summer	15.627	0.0	270.2	362
480 min Summer	12.308	0.0	274.2	482
600 min Summer	10.189	0.0	276.4	602
720 min Summer	8.711	0.0	277.4	722
960 min Summer	6.770	0.0	277.3	962
1440 min Summer	4.735	0.0	273.2	1440
2160 min Summer	3.315	0.0	526.8	1860
2880 min Summer	2.584	0.0	511.0	2220
4320 min Summer	1.843	0.0	473.5	3024
5760 min Summer	1.464	0.0	673.8	3856
7200 min Summer	1.234	0.0	709.5	4680
8640 min Summer	1.079	0.0	743.9	5528
10080 min Summer	0.967	0.0	776.6	6352
15 min Winter	152.077	0.0	132.5	19
30 min Winter	99.113	0.0	125.2	34

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	9.376	0.876	1.7	325.6	O K
120 min Winter	9.499	0.999	1.7	386.8	O K
180 min Winter	9.567	1.067	1.8	422.3	O K
240 min Winter	9.610	1.110	1.8	445.3	O K
360 min Winter	9.657	1.157	1.9	471.7	O K
480 min Winter	9.682	1.182	1.9	485.9	O K
600 min Winter	9.695	1.195	1.9	493.3	O K
720 min Winter	9.701	1.201	1.9	496.6	Flood Risk
960 min Winter	9.699	1.199	1.9	495.3	O K
1440 min Winter	9.675	1.175	1.9	481.8	O K
2160 min Winter	9.623	1.123	1.8	452.4	O K
2880 min Winter	9.570	1.070	1.8	423.8	O K
4320 min Winter	9.496	0.996	1.7	385.0	O K
5760 min Winter	9.434	0.934	1.7	353.9	O K
7200 min Winter	9.381	0.881	1.7	327.7	O K
8640 min Winter	9.333	0.833	1.7	304.8	O K
10080 min Winter	9.288	0.788	1.7	284.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	61.510	0.0	264.2	64
120 min Winter	36.942	0.0	265.8	122
180 min Winter	27.163	0.0	270.3	182
240 min Winter	21.700	0.0	276.1	240
360 min Winter	15.627	0.0	283.7	358
480 min Winter	12.308	0.0	287.6	476
600 min Winter	10.189	0.0	289.5	594
720 min Winter	8.711	0.0	290.2	708
960 min Winter	6.770	0.0	289.4	942
1440 min Winter	4.735	0.0	284.3	1396
2160 min Winter	3.315	0.0	538.0	2032
2880 min Winter	2.584	0.0	524.8	2336
4320 min Winter	1.843	0.0	501.1	3240
5760 min Winter	1.464	0.0	754.6	4152
7200 min Winter	1.234	0.0	794.5	5048
8640 min Winter	1.079	0.0	832.5	5968
10080 min Winter	0.967	0.0	863.3	6856

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 457626 225232 SP 57626 25232
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.640

Time (mins) From:	To:	Area (ha)
0	4	0.640

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 8.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	272.0	1.500	665.5

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0063-1900-1200-1900
Design Head (m)	1.200
Design Flow (l/s)	1.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	63
Invert Level (m)	8.500
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	1.9
Flush-Flo™	0.274	1.7
Kick-Flo®	0.558	1.3
Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.4	1.200	1.9	3.000	2.9	7.000	4.3
0.200	1.6	1.400	2.0	3.500	3.1	7.500	4.4
0.300	1.7	1.600	2.2	4.000	3.3	8.000	4.6
0.400	1.6	1.800	2.3	4.500	3.5	8.500	4.7
0.500	1.5	2.000	2.4	5.000	3.7	9.000	4.8
0.600	1.4	2.200	2.5	5.500	3.8	9.500	5.0
0.800	1.6	2.400	2.6	6.000	4.0		
1.000	1.7	2.600	2.7	6.500	4.1		

	Dev Area (ha)	Impermable Factor	Urban Creep Factor	Current Impermable Area (ha)	Future Impermable Area (ha)	Min Rate (l/s)
Catchment 1	3.13	0.6	1.1	1.88	2.07	6.3
Catchment 2	6.68	0.6	1.1	4.01	4.41	13.4
Catchment 3	1.35	0.6	1.1	0.81	0.89	2.7
Catchment 4	0.97	0.6	1.1	0.58	0.64	1.9

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Appendix J

Preliminary Surface Water Drainage Strategy

KEY

- PROPOSED SURFACE WATER ATTENUATION BASIN
- PROPOSED SWALE
- PROPOSED CATCHMENT AREA
- PROPOSED SURFACE WATER SYSTEM

NOTES

1. DRAWING TO BE READ IN CONJUNCTION WITH THE VECTOS FLOOD RISK ASSESSMENT.
2. ALL HEIGHTS GIVEN AS METRES ABOVE ORDNANCE DATUM (AOD)

CATCHMENT	DEVELOPMENT AREA (HA)	ASSUMED IMPERMEABLE AREA (HA)	FUTURE IMPERMEABLE AREA (HA)	GREENFIELD DISCHARGE RATE (L/S)	ATTENUATION PERIMETER (M^2)	ATTENUATION VOLUME (M^3)	ADDITIONAL BASIN FREEBOARD (M)
1	3.13	1.88	2.07	6.3	1772	1600	0.3
2	6.68	4.01	4.41	13.4	3470	3429	0.3
3	1.35	0.81	0.89	2.7	1250	691	0.3
4	0.97	0.58	0.64	1.9	666	497	0.3

REV.	DETAILS	DRAWN	CHECKED	DATE
P04	INDICATIVE LEVELS ADDED. BASIN OUTFALL LOCATIONS MOVED. CATCHMENT 3 BASIN ADJUSTED.	HE	NB	25.03.2021
P03	MASTERPLAN UPDATED. CATCHMENT AREAS, DRAINAGE LAYOUT & TABLE UPDATED TO SUIT.	HE	NB	19.03.2021
P02	FRAMEWORK PLAN UPDATED.	HE	NB	08.03.2021

STATUS: INFORMATION ONLY

CLIENT: FIRETHORN BICESTER LIMITED

PROJECT: LAND AT NORTH WEST BICESTER

DRAWING TITLE: PRELIMINARY SURFACE WATER DRAINAGE LAYOUT

SCALES: 1:2000 @ A1

DRAWN:	CHECKED:	DATE:
HE	NB	JANUARY 2021

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DRAWING NUMBER: 205550_PDL_01 REVISION: P04

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Appendix K

SuDS Proforma

SuDS Flows and Volumes - LLFA Technical Assessment Pro-forma

This form identifies the information required by Oxfordshire County Council LLFA to enable technical assessment of flows and volumes determined as part of drainage I SuDS *calculations.*

*Note : * means delete as appropriate; Numbers in brackets refer to accompanying notes.*

SITE DETAILS

1.1 Planning application reference

1.2 Site name North West Bicester

1.3 Total application site area (1 222372 m2 22.2. ha

1.4 Is the site located in a CDA or LFRZ N

1.5 Is the site located in a SPZ N

VOLUME AND FLOW DESIGN INPUTS

2.1 Site area which is positively drained by SuDS (2 121300 m^2

2.2 Impermeable area drained pre development (3 0 m^2

2.3 Impermeable area drained post development (3 .. .72800.. .m^2

2.4 Additional impermeable area (2.3 minus 2.2) . .....72800.. .. m^2

2.5 Predevelopment use (4 Greenfield

2.6 Method of discharge (5 waterbody (limited infiltration for smaller events)

2.7 Infiltration rate (where applicable) .....m/hr

2.8 Influencing factors on infiltration

2.9 Depth to highest known ground water table...0.1 m bgl in isolated part of site

2.10 Coefficient of runoff (Cv) (6 Default values have been used from MicroDrainage

2.11 Justification for Cv used Similar to table 11.4 of SuDS manual and methods used on nearby applications. Swales used to convey so the Cv values allow for infiltration losses .

2.12 FEH rainfall data used (Note that FSR is no longer the preferred rainfall calculation method) Y

2.13 Will storage be subject to surcharge by elevated water levels in watercourse/ sewer N

2.14 Invert level at outlet (invert level of final flow control) ....variable (see drawing)...mAOD

2.15 Design level used for surcharge water level at point of discharge(14].....NA .. .. mAOD

SuDS Flows and Volumes - LLFA Technical Assessment Pro-forma

CALCULATION OUTPUTS

Sections 3 and 4 refer to site where storage is provided by attenuation and I or partial infiltration. Where all flows are infiltrated to ground omit Sections 3 -5 and complete Section 6.

3.0 Defining rate of runoff from the site

3.2 Max. discharge for 1 in 1 year rainfall .....2.....l/s/ha, ...l/s for the site

3.2 Max. discharge for Qmed rainfall .....2.....l/s/ha, ...l/s for the site

3.3 Max. discharge for 1 in 30 year rainfall .....2.....I/s/ha, ...I/s for the site

3.4 Max. discharge for 1 in 100 year rainfall .....2.....I/s/ha, ...I/s for the site

3.5 Max. discharge for 1 in 100 year plus 40%CC .....2.....I/s/ha, ...I/s for the site

4.0 Attenuation storage to manage peak runoff rates from the site

4.1 Storage - 1 in 1 year .....m^3 .....m^3/m^2 (of developed impermeable area)

4.2 Storage -1in 30 year (7 .....m^3 .....m3/m2

4.3 Storage -1in 100 year (8) .....m^3 .....m3/m2

4.4 Storage - 1 in 100 year plus 40%CC (9) 6214 m3 .....m3/m2

5.0 Controlling volume of runoff from the site

5.1 Pre development runoff volume(10) ...112..... m^3 for the site

5.2 Post development runoff volume (unmitigated) (10) ..... m^3 for the site Refer to FRA

5.3 Volume to be controlled/does not leave site (5.2-5.1)..... m^3 for the site Refer to FRA

5.4 Volume control provided by

Interception losses(11)	.....m3
Rain harvesting(12)	.....m3
Infiltration (even at very low rates)	.....m3
Separate area designated as long term storage(13)	.....m3

5.5 Total volume control (sum of inputs for 5.4) .6214..m3 (15) Refer to FRA

6.0 Site storage volumes (full infiltration only)

6.1 Storage - 1in 30 year (7 .....m^3 .....m^3/m^2 (of developed impermeable area)

6.2 Storage - 1 in 100 year plus CC (9 .....m3 .....m3/m2

SuDS Flows and Volumes - LLFA Technical Assessment Pro-forma

Notes

1. All area with the proposed application site boundary to be included.
2. The site area which is positively drained includes all green areas which drain to the SuDS system and area of surface SuDS features. It excludes large open green spaces which do not drain to the SuDS system.
3. Impermeable area should be measured pre and post development. Impermeable surfaces includes, roofs, pavements, driveways and paths where runoff is conveyed to the drainage system.
4. Predevelopment use may impact on the allowable discharge rate. The LLFA will seek for reduction in flow rates to GF status in all instances. The design statement and drawings explain/ demonstrate how flows will be managed from the site.
5. Runoff may be discharge via one or a number of means.
6. Sewers for Adoption 6th Edition recommends a Cv of 100% when designing drainage for impermeable area (assumes no loss of runoff from impermeable surfaces) and 0% for permeable areas. Where lower Cv's are used the application should justify the selection of Cv.
7. Storage for the 1 in 30 year must be fully contained within the SuDS components. Note that standing water within SuDS components such as ponds, basins and swales is not classified as flooding. Storage should be calculated for the critical duration rainfall event.
8. Runoff generated from rainfall events up to the 1 in 100 year will not be allowed to leave the site in an uncontrolled way. Temporary flooding of specified areas to shallow depths (150-300mm) may be permitted in agreement with the LLFA.
9. Climate change is specified as 40% increase to rainfall intensity, unless otherwise agreed with the LLFA / EA.
10. To be determined using the 100 year return period 6 hour duration rainfall event.
11. Where Source Control is provided Interception losses will occur. An allowance of 5mm rainfall depth can be subtracted from the net inflow to the storage calculation where interception losses are demonstrated. The Applicant should demonstrate use of subcatchments and source control techniques.
12. Please refer to Rain harvesting BS for guidance on available storage.
13. Flow diverted to Long term storage areas should be infiltrated to the ground, or where this is not possible, discharged to the receiving water at slow flow rates (maximum 2 l/s/ha). LT storage would not be allowed to empty directly back into attenuation storage and would be expected to drain away over 5-10 days. Typically LT storage may be provided on multi-functional open space or sacrificial car parking areas.
14. Careful consideration should be used for calculations where flow control / storage is likely to be influenced by surcharged sewer or peak levels within a watercourse. Storm sewers are designed for pipe full capacity for 1 in 1 to 1 in 5 year return period. Beyond this, the pipe network will usually be in conditions of surcharge. Where information cannot be gathered from Thames Water, engineering judgement should be used to evaluate potential impact (using sensitivity analysis for example).
15. In controlling the volume of runoff the total volume from mitigation measures should be greater than or equal to the additional volume generated.

Design and Credit to: McCloy Consulting Ltd

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