



New Keystone Centre, Eldon Way, Littlehampton - Highway Gullies



Date: June 2021

Author: K Macknay

Scale 1:1,250

Map Notes: Scale 1:1250 @ A4

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West Sussex County Council
100023447 (2017)

New Keystone Centre, Eldon Way, Littlehampton - Southern Water Sewers



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Scale 1:1,250

Map Notes: Scale 1:1250 @ A4

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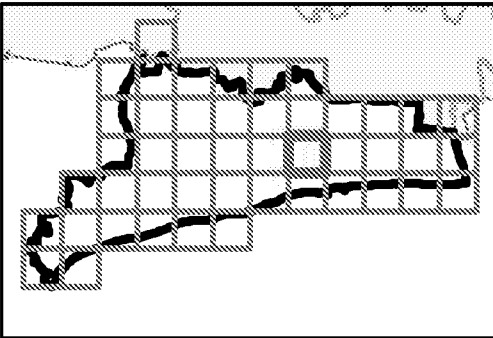
Notes

The Areas Susceptible to Groundwater Flooding (ASiGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. The data was produced to annotate Indicative Flood Risk Areas for Preliminary Flood Risk Assessment (PFRA) studies and allow the Lead Local Flood Authorities (LLFAs) to determine whether there may be a risk of flooding from groundwater.

This data shows the proportion of each 1km grid square where geological and hydrogeological condition show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring. It does not take account of the chance of flooding from groundwater rebound. This dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding.

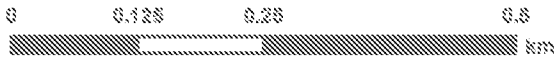
The ASiGWF data should be used only in combination with other information, for example local data or historic data. It should not be used as sole evidence for any specific flood risk management, land use planning or other decisions at any scale. However, the data can help to identify areas for assessment at a local scale where finer resolution datasets exist.

Key Plan



Legend

-  Arun District SFRA boundary
-  < 25%
-  >= 25% < 50%
-  >= 50% < 75%
-  >= 75%



REF	Date	Comments
A	June 2016	-
B		
C		

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**LEVEL 1 SFRA: APPENDIX F
AREAS SUSCEPTIBLE TO GROUNDWATER**

Sheet No. 26 of 46 Index Number. ADC_26

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Appendix E Public Sewer Records

Appendix F Hydraulic Modelling Calculations

Calculated by:	Daniel Lytton
Site name:	Keystone Youth Centre
Site location:	Bn17 7HE

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:	50.81768° N
Longitude:	0.55515° W
Reference:	1105120967
Date:	Jul 05 2021 15:50

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.35
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Methodology

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

Soil characteristics

	Default	Edited
SOIL type:	3	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	729	729
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

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

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

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

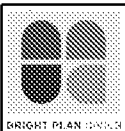
(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	1.05	1.05
1 in 1 year (l/s):	0.9	0.9
1 in 30 years (l/s):	2.43	2.43
1 in 100 years (l/s):	3.36	3.36
1 in 200 years (l/s):	3.94	3.94

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



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	250.0
Additional Flow (%)	10	Minimum Velocity (m/s)	0.75
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.500
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
✓ 9	0.050	5.00	5.920		0.650
✓ 8			5.800		0.736
✓ 7	0.012	5.00	5.900	475	0.650
✓ 6	0.012	5.00	5.850	475	0.650
✓ 5	0.012	5.00	5.750	475	0.703
✓ 4	0.012	5.00	5.700	475	0.738
✓ 3	0.012	5.00	5.650	475	0.905
✓ 2			5.300	475	0.728
✓ 1			5.100		0.900

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.004	3.428	9:2	150	5.300	4.572	0.578	5.100	4.200	0.750
1.003	18.054	104.4	150	5.650	4.745	0.755	5.300	4.572	0.578
1.002	22.734	104.8	150	5.700	4.962	0.588	5.650	4.745	0.755
2.000	21.536	42.6	150	5.900	5.250	0.500	5.650	4.745	0.755
1.001	8.866	104.3	150	5.750	5.047	0.553	5.700	4.962	0.588
1.000	16.055	104.9	150	5.850	5.200	0.500	5.750	5.047	0.553
3.000	21.605	104.9	150	5.920	5.270	0.500	5.800	5.064	0.586

Link	US Node	DS Node
1.004	2	1
1.003	3	2
1.002	4	3
2.000	7	3
1.001	5	4
1.000	6	5
3.000	9	8



Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
9	5.920	0.650					
					0	3.000	5.270 150
8	5.800	0.736			1	3.000	5.064 150
7	5.900	0.650	475				
					0	2.000	5.250 150
6	5.850	0.650	475				
					0	1.000	5.200 150
5	5.750	0.703	475		1	1.000	5.047 150
					0	1.001	5.047 150
4	5.700	0.738	475		1	1.001	4.962 150
					0	1.002	4.962 150
3	5.650	0.905	475		1	2.000	4.745 150
					2	1.002	4.745 150
					0	1.003	4.745 150
2	5.300	0.728	475		1	1.003	4.572 150
					0	1.004	4.572 150
1	5.100	0.900			1	1.004	4.200 150

Node 8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Invert Level (m)	5.315	Slope (1:X)	167.0
Side Inf Coefficient (m/hr)	0.03600	Time to half empty (mins)	97	Depth (m)	0.475
Safety Factor	2.0	Width (m)	6.810	Inf Depth (m)	0.475
Porosity	0.32	Length (m)	26.000		

Node 1 Depth/Area Storage Structure

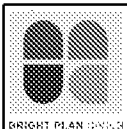
Base Inf Coefficient (m/hr)	0.03600	Safety Factor	2.0	Invert Level (m)	3.550
Side Inf Coefficient (m/hr)	0.03600	Porosity	0.95	Time to half empty (mins)	1038

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	48.0	48.0	0.800	48.0	78.6	0.801	0.0	78.6



Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	30 year 360 minute summer	31.221	8.034
1 year 15 minute winter	76.857	30.991	30 year 360 minute winter	20.295	8.034
1 year 30 minute summer	71.439	20.215	30 year 480 minute summer	24.324	6.428
1 year 30 minute winter	50.133	20.215	30 year 480 minute winter	16.160	6.428
1 year 60 minute summer	48.435	12.800	30 year 600 minute summer	19.756	5.404
1 year 60 minute winter	32.179	12.800	30 year 600 minute winter	13.498	5.404
1 year 120 minute summer	30.053	7.942	30 year 720 minute summer	17.490	4.687
1 year 120 minute winter	19.966	7.942	30 year 720 minute winter	11.754	4.687
1 year 180 minute summer	23.233	5.979	30 year 960 minute summer	14.215	3.743
1 year 180 minute winter	15.102	5.979	30 year 960 minute winter	9.416	3.743
1 year 240 minute summer	18.475	4.882	30 year 1440 minute summer	10.161	2.723
1 year 240 minute winter	12.274	4.882	30 year 1440 minute winter	6.829	2.723
1 year 360 minute summer	14.169	3.646	100 year +40% CC 15 minute summer	488.233	138.153
1 year 360 minute winter	9.210	3.646	100 year +40% CC 15 minute winter	342.620	138.153
1 year 480 minute summer	11.185	2.956	100 year +40% CC 30 minute summer	320.551	90.705
1 year 480 minute winter	7.431	2.956	100 year +40% CC 30 minute winter	224.948	90.705
1 year 600 minute summer	9.182	2.511	100 year +40% CC 60 minute summer	214.603	56.713
1 year 600 minute winter	6.274	2.511	100 year +40% CC 60 minute winter	142.577	56.713
1 year 720 minute summer	8.203	2.199	100 year +40% CC 120 minute summer	129.587	34.246
1 year 720 minute winter	5.513	2.199	100 year +40% CC 120 minute winter	86.094	34.246
1 year 960 minute summer	6.768	1.782	100 year +40% CC 180 minute summer	97.729	25.149
1 year 960 minute winter	4.483	1.782	100 year +40% CC 180 minute winter	63.526	25.149
1 year 1440 minute summer	4.949	1.326	100 year +40% CC 240 minute summer	75.977	20.078
1 year 1440 minute winter	3.326	1.326	100 year +40% CC 240 minute winter	50.477	20.078
30 year 15 minute summer	268.706	76.035	100 year +40% CC 360 minute summer	56.677	14.585
30 year 15 minute winter	188.566	76.035	100 year +40% CC 360 minute winter	36.841	14.585
30 year 30 minute summer	174.929	49.499	100 year +40% CC 480 minute summer	43.979	11.622
30 year 30 minute winter	122.757	49.499	100 year +40% CC 480 minute winter	29.219	11.622
30 year 60 minute summer	116.589	30.811	100 year +40% CC 600 minute summer	35.604	9.738
30 year 60 minute winter	77.459	30.811	100 year +40% CC 600 minute winter	24.327	9.738
30 year 120 minute summer	70.438	18.615	100 year +40% CC 720 minute summer	31.433	8.424
30 year 120 minute winter	46.797	18.615	100 year +40% CC 720 minute winter	21.125	8.424
30 year 180 minute summer	53.298	13.715	100 year +40% CC 960 minute summer	25.432	6.697
30 year 180 minute winter	34.645	13.715	100 year +40% CC 960 minute winter	16.847	6.697
30 year 240 minute summer	41.604	10.995	100 year +40% CC 1440 minute summer	18.055	4.839
30 year 240 minute winter	27.641	10.995	100 year +40% CC 1440 minute winter	12.134	4.839



Results for 1 year Critical Storm Duration. Lowest mass balance: 94.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
120 minute winter	9	88	5.447	0.177	2.3	0.2718	0.0000	SURCHARGED
120 minute winter	8	88	5.446	0.382	2.2	3.1386	0.0000	OK
15 minute winter	7	10	5.275	0.025	1.7	0.0138	0.0000	OK
15 minute winter	6	10	5.231	0.031	1.7	0.0171	0.0000	OK
15 minute winter	5	10	5.093	0.046	3.4	0.0239	0.0000	OK
15 minute winter	4	11	5.017	0.055	5.0	0.0274	0.0000	OK
15 minute winter	3	11	4.825	0.080	8.2	0.0353	0.0000	OK
15 minute winter	2	11	4.612	0.040	8.2	0.0071	0.0000	OK
360 minute winter	1	296	3.717	-0.483	1.5	7.5978	0.0000	OK

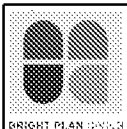
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)
120 minute winter	9	3.000	8	2.2	0.378	0.129	0.3804
120 minute winter	8	Infiltration		0.8			
15 minute winter	7	2.000	3	1.7	0.327	0.061	0.1231
15 minute winter	6	1.000	5	1.7	0.464	0.096	0.0581
15 minute winter	5	1.001	4	3.3	0.639	0.189	0.0458
15 minute winter	4	1.002	3	4.9	0.652	0.285	0.1741
15 minute winter	3	1.003	2	8.2	1.250	0.472	0.1198
15 minute winter	2	1.004	1	8.2	2.266	0.139	0.0124
360 minute winter	1	Infiltration		0.3			



Results for 30 year Critical Storm Duration. Lowest mass balance: 94.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	9	11	5.647	0.377	17.3	0.5796	0.0000	FLOOD RISK
120 minute winter	8	112	5.569	0.505	5.3	9.9736	0.0000	OK
15 minute winter	7	10	5.290	0.040	4.2	0.0216	0.0000	OK
15 minute winter	6	10	5.250	0.050	4.2	0.0272	0.0000	OK
15 minute winter	5	10	5.126	0.079	8.3	0.0410	0.0000	OK
15 minute winter	4	11	5.054	0.092	12.3	0.0463	0.0000	OK
15 minute winter	3	11	4.954	0.209	20.4	0.0925	0.0000	SURCHARGED
15 minute winter	2	12	4.636	0.064	18.8	0.0113	0.0000	OK
600 minute winter	1	585	4.014	-0.186	2.0	21.1430	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	9	3.000	8	16.2	0.921	0.936	0.3804
120 minute winter	8	Infiltration		0.9			
15 minute winter	7	2.000	3	4.1	0.383	0.152	0.2294
15 minute winter	6	1.000	5	4.1	0.572	0.238	0.1165
15 minute winter	5	1.001	4	8.1	0.787	0.469	0.0918
15 minute winter	4	1.002	3	12.1	0.788	0.696	0.3292
15 minute winter	3	1.003	2	18.8	1.403	1.083	0.2231
15 minute winter	2	1.004	1	18.9	2.808	0.320	0.0230
600 minute winter	1	Infiltration		0.3			



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 94.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	9	10	5.920	0.650	29.9	1.2326	0.0000	FLOOD RISK
180 minute winter	8	172	5.784	0.720	7.1	22.1394	0.0000	OK
15 minute winter	7	12	5.315	0.065	7.5	0.0356	0.0000	OK
15 minute winter	6	12	5.614	0.414	7.5	0.2260	0.0000	FLOOD RISK
15 minute winter	5	12	5.594	0.547	13.9	0.2836	0.0000	FLOOD RISK
15 minute winter	4	12	5.544	0.582	17.6	0.2924	0.0000	FLOOD RISK
15 minute winter	3	12	5.297	0.552	30.0	0.2442	0.0000	SURCHARGED
960 minute winter	2	930	5.017	0.445	2.5	0.0787	0.0000	FLOOD RISK
960 minute winter	1	930	5.017	0.817	2.5	36.5028	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)
15 minute summer	9	3.000	8	27.9	1.584	1.609	0.3804
180 minute winter	8	Infiltration		1.0			
15 minute winter	7	2.000	3	7.4	0.541	0.272	0.2685
15 minute winter	6	1.000	5	6.8	0.616	0.391	0.2826
15 minute winter	5	1.001	4	11.2	0.808	0.647	0.1561
15 minute winter	4	1.002	3	16.9	0.962	0.977	0.4002
15 minute winter	3	1.003	2	28.1	1.815	1.618	0.2472
960 minute winter	2	1.004	1	2.5	1.628	0.042	0.0603
960 minute winter	1	Infiltration		0.4			