

## Supplementary information:

### Calculation of maximum infiltration rate for Horton infiltration method

Table A1 Infiltration rates to find maximum infiltration rate for wet and dry condition for Horton infiltration method

Time (min)	Oslo				Trondheim				Sandnes			
	$f_p$ (mm/h)	$f_p$ , above $f_{min}$ (mm/h)	$V$ , above $f_{min}$ (mm)	$Cum V$ , above $f_{min}$ (mm)	$f_p$ (mm/h)	$f_p$ , above $f_{min}$ (mm/h)	$V$ , above $f_{min}$ (mm)	$Cum V$ , above $f_{min}$ (mm)	$f_p$ (mm/h)	$f_p$ , above $f_{min}$ (mm/h)	$V$ , above $f_{min}$ (mm)	$Cum V$ , above $f_{min}$ (mm)
0	209.28	104.64	1.744	1.744	63.76	31.88	0.531	0.531	28.10	14.05	0.234	0.234
1	202.53	97.89	1.632	3.376	61.70	29.82	0.497	1.028	27.19	13.14	0.219	0.453
2	196.22	91.58	1.526	4.902	59.78	27.90	0.465	1.493	26.35	12.30	0.205	0.658
3	<b>190.31</b>	85.67	1.428	<b>6.330</b>	<b>57.98</b>	26.10	0.435	<b>1.928</b>	<b>25.55</b>	11.50	0.192	<b>0.850</b>
4	<b>184.79</b>	80.15	1.336	<b>7.665</b>	<b>56.30</b>	24.42	0.407	<b>2.335</b>	<b>24.81</b>	10.76	0.179	<b>1.029</b>
5	179.62	74.98	1.250	8.915	54.72	22.84	0.381	2.716	24.12	10.07	0.168	1.197
6	174.78	70.14	1.169	10.084	53.25	21.37	0.356	3.072	23.47	9.42	0.157	1.354
7	170.26	65.62	1.094	11.178	51.87	19.99	0.333	3.405	22.86	8.81	0.147	1.501
8	166.03	61.39	1.023	12.201	50.58	18.70	0.312	3.717	22.29	8.24	0.137	1.638
9	162.07	57.43	0.957	13.158	49.38	17.50	0.292	4.009	21.76	7.71	0.129	1.767
10	158.36	53.72	0.895	14.053	48.25	16.37	0.273	4.282	21.26	7.21	0.120	1.887
11	154.90	50.26	0.838	14.891	47.19	15.31	0.255	4.537	20.80	6.75	0.112	1.999
12	151.66	47.02	0.784	15.675	46.20	14.32	0.239	4.776	20.36	6.31	0.105	2.105
13	148.63	43.99	0.733	16.408	45.28	13.40	0.223	4.999	19.96	5.91	0.098	2.203
14	145.79	41.15	0.686	17.094	44.42	12.54	0.209	5.208	19.58	5.53	0.092	2.295
15	143.13	38.49	0.642	17.735	43.61	11.73	0.195	5.403	19.22	5.17	0.086	2.381
16	140.65	36.01	0.600	18.335	42.85	10.97	0.183	5.586	18.89	4.84	0.081	2.462
17	138.33	33.69	0.561	18.897	42.14	10.26	0.171	5.757	18.57	4.52	0.075	2.537
18	136.16	31.52	0.525	19.422	41.48	9.60	0.160	5.917	18.28	4.23	0.071	2.608
19	134.12	29.48	0.491	19.914	40.86	8.98	0.150	6.067	18.01	3.96	0.066	2.674
20	<b>132.22</b>	27.58	0.460	<b>20.373</b>	40.28	8.40	0.140	6.207	17.75	3.70	0.062	2.736
21	<b>130.44</b>	25.80	0.430	<b>20.803</b>	39.74	7.86	0.131	6.338	17.51	3.46	0.058	2.793
22	128.78	24.14	0.402	21.206	39.23	7.35	0.123	6.461	17.29	3.24	0.054	2.847
23	127.22	22.58	0.376	21.582	38.76	6.88	0.115	6.575	17.08	3.03	0.051	2.898
24	125.77	21.13	0.352	21.934	38.32	6.44	0.107	6.683	16.89	2.84	0.047	2.945
25	124.40	19.76	0.329	22.264	37.90	6.02	0.100	6.783	16.70	2.65	0.044	2.989
26	123.13	18.49	0.308	22.572	37.51	5.63	0.094	6.877	16.53	2.48	0.041	3.031
27	121.94	17.30	0.288	22.860	37.15	5.27	0.088	6.965	16.37	2.32	0.039	3.069
28	120.82	16.18	0.270	23.130	36.81	4.93	0.082	7.047	16.22	2.17	0.036	3.106
29	119.78	15.14	0.252	23.382	36.49	4.61	0.077	7.124	16.08	2.03	0.034	3.139
30	118.80	14.16	0.236	23.618	36.19	4.31	0.072	7.196	15.95	1.90	0.032	3.171
31	117.89	13.25	0.221	23.839	<b>35.92</b>	4.04	0.067	<b>7.263</b>	<b>15.83</b>	1.78	0.030	<b>3.201</b>
32	117.03	12.39	0.207	24.045	<b>35.66</b>	3.78	0.063	<b>7.326</b>	<b>15.71</b>	1.66	0.028	<b>3.229</b>
33	116.23	11.59	0.193	24.239	35.41	3.53	0.059	7.385	15.61	1.56	0.026	3.255
34	115.49	10.85	0.181	24.419	35.18	3.30	0.055	7.440	15.51	1.46	0.024	3.279
35	114.79	10.15	0.169	24.589	34.97	3.09	0.052	7.491	15.41	1.36	0.023	3.301
36	114.13	9.49	0.158	24.747	34.77	2.89	0.048	7.539	15.32	1.27	0.021	3.323
37	113.52	8.88	0.148	24.895	34.59	2.71	0.045	7.585	15.24	1.19	0.020	3.343
38	112.95	8.31	0.138	25.033	34.41	2.53	0.042	7.627	15.17	1.12	0.019	3.361
39	112.41	7.77	0.130	25.163	34.25	2.37	0.039	7.666	15.09	1.04	0.017	3.379

40	111.91	7.27	0.121	25.284	34.10	2.22	0.037	7.703	15.03	0.98	0.016	3.395
41	111.44	6.80	0.113	25.397	33.95	2.07	0.035	7.738	14.96	0.91	0.015	3.410
42	111.00	6.36	0.106	25.503	33.82	1.94	0.032	7.770	14.90	0.85	0.014	3.424
43	110.59	5.95	0.099	25.603	33.69	1.81	0.030	7.800	14.85	0.80	0.013	3.438
44	110.21	5.57	0.093	25.695	33.58	1.70	0.028	7.828	14.80	0.75	0.012	3.450
45	109.85	5.21	0.087	25.782	33.47	1.59	0.026	7.855	14.75	0.70	0.012	3.462
46	109.51	4.87	0.081	25.863	33.36	1.48	0.025	7.880	14.70	0.65	0.011	3.473
47	109.20	4.56	0.076	25.939	33.27	1.39	0.023	7.903	14.66	0.61	0.010	3.483
48	108.91	4.27	0.071	26.010	33.18	1.30	0.022	7.924	14.62	0.57	0.010	3.492
49	108.63	3.99	0.067	26.077	33.10	1.22	0.020	7.945	14.59	0.54	0.009	3.501
50	108.37	3.73	0.062	26.139	33.02	1.14	0.019	7.964	14.55	0.50	0.008	3.510
51	108.13	3.49	0.058	26.197	32.94	1.06	0.018	7.981	14.52	0.47	0.008	3.518
52	107.91	3.27	0.054	26.252	32.88	1.00	0.017	7.998	14.49	0.44	0.007	3.525
53	107.70	3.06	0.051	26.303	32.81	0.93	0.016	8.014	14.46	0.41	0.007	3.532
54	107.50	2.86	0.048	26.350	32.75	0.87	0.015	8.028	14.43	0.38	0.006	3.538
55	107.31	2.67	0.045	26.395	32.69	0.81	0.014	8.042	14.41	0.36	0.006	3.544
56	107.14	2.50	0.042	26.437	32.64	0.76	0.013	8.054	14.39	0.34	0.006	3.550
57	106.98	2.34	0.039	26.476	32.59	0.71	0.012	8.066	14.36	0.31	0.005	3.555
58	106.83	2.19	0.036	26.512	32.55	0.67	0.011	8.077	14.34	0.29	0.005	3.560
59	106.69	2.05	0.034	26.546	32.50	0.62	0.010	8.088	14.33	0.28	0.005	3.564
60	106.56	1.92	0.032	26.578	32.46	0.58	0.010	8.097	14.31	0.26	0.004	3.569
61	106.43	1.79	0.030	26.608	32.43	0.55	0.009	8.107	14.29	0.24	0.004	3.573
62	106.32	1.68	0.028	26.636	32.39	0.51	0.009	8.115	14.28	0.23	0.004	3.576
63	106.21	1.57	0.026	26.662	32.36	0.48	0.008	8.123	14.26	0.21	0.004	3.580
64	106.11	1.47	0.024	26.687	32.33	0.45	0.007	8.130	14.25	0.20	0.003	3.583
65	106.01	1.37	0.023	26.710	32.30	0.42	0.007	8.137	14.23	0.18	0.003	3.586
66	105.92	1.28	0.021	26.731	32.27	0.39	0.007	8.144	14.22	0.17	0.003	3.589
67	105.84	1.20	0.020	26.751	32.25	0.37	0.006	8.150	14.21	0.16	0.003	3.592
68	105.76	1.12	0.019	26.770	32.22	0.34	0.006	8.156	14.20	0.15	0.003	3.594
69	105.69	1.05	0.018	26.787	32.20	0.32	0.005	8.161	14.19	0.14	0.002	3.597
70	105.62	0.98	0.016	26.804	32.18	0.30	0.005	8.166	14.18	0.13	0.002	3.599
71	105.56	0.92	0.015	26.819	32.16	0.28	0.005	8.171	14.17	0.12	0.002	3.601
72	105.50	0.86	0.014	26.833	32.14	0.26	0.004	8.175	14.17	0.12	0.002	3.603
73	105.45	0.81	0.013	26.847	32.13	0.25	0.004	8.179	14.16	0.11	0.002	3.605
74	105.39	0.75	0.013	26.859	32.11	0.23	0.004	8.183	14.15	0.10	0.002	3.606
75	105.35	0.71	0.012	26.871	32.09	0.21	0.004	8.187	14.14	0.09	0.002	3.608
76	105.30	0.66	0.011	26.882	32.08	0.20	0.003	8.190	14.14	0.09	0.001	3.609
77	105.26	0.62	0.010	26.893	32.07	0.19	0.003	8.193	14.13	0.08	0.001	3.611
78	105.22	0.58	0.010	26.902	32.06	0.18	0.003	8.196	14.13	0.08	0.001	3.612
79	105.18	0.54	0.009	26.911	32.04	0.16	0.003	8.199	14.12	0.07	0.001	3.613
80	105.15	0.51	0.008	26.920	32.03	0.15	0.003	8.201	14.12	0.07	0.001	3.614
81	105.11	0.47	0.008	26.927	32.02	0.14	0.002	8.204	14.11	0.06	0.001	3.616
82	105.08	0.44	0.007	26.935	32.01	0.13	0.002	8.206	14.11	0.06	0.001	3.617
83	105.05	0.41	0.007	26.942	32.01	0.13	0.002	8.208	14.11	0.06	0.001	3.617
84	105.03	0.39	0.006	26.948	32.00	0.12	0.002	8.210	14.10	0.05	0.001	3.618
85	105.00	0.36	0.006	26.954	31.99	0.11	0.002	8.212	14.10	0.05	0.001	3.619
86	104.98	0.34	0.006	26.960	31.98	0.10	0.002	8.214	14.10	0.05	0.001	3.620
87	104.96	0.32	0.005	26.965	31.98	0.10	0.002	8.215	14.09	0.04	0.001	3.621
88	104.94	0.30	0.005	26.970	31.97	0.09	0.002	8.217	14.09	0.04	0.001	3.621
89	104.92	0.28	0.005	26.975	31.96	0.08	0.001	8.218	14.09	0.04	0.001	3.622
90	104.90	0.26	0.004	26.979	31.96	0.08	0.001	8.220	14.08	0.03	0.001	3.622
91	104.88	0.24	0.004	26.983	31.95	0.07	0.001	8.221	14.08	0.03	0.001	3.623
92	104.87	0.23	0.004	26.987	31.95	0.07	0.001	8.222	14.08	0.03	0.001	3.624
93	104.85	0.21	0.004	26.990	31.94	0.06	0.001	8.223	14.08	0.03	0.000	3.624
94	104.84	0.20	0.003	26.994	31.94	0.06	0.001	8.224	14.08	0.03	0.000	3.624

95	104.83	0.19	0.003	26.997	31.94	0.06	0.001	8.225	14.07	0.02	0.000	3.625
96	104.81	0.17	0.003	27.000	31.93	0.05	0.001	8.226	14.07	0.02	0.000	3.625
97	104.80	0.16	0.003	27.002	31.93	0.05	0.001	8.227	14.07	0.02	0.000	3.626
98	104.79	0.15	0.003	27.005	31.93	0.05	0.001	8.227	14.07	0.02	0.000	3.626
99	104.78	0.14	0.002	27.007	31.92	0.04	0.001	8.228	14.07	0.02	0.000	3.626
100	104.77	0.13	0.002	27.009	31.92	0.04	0.001	8.229	14.07	0.02	0.000	3.627
101	104.76	0.12	0.002	27.012	31.92	0.04	0.001	8.229	14.07	0.02	0.000	3.627
102	104.76	0.12	0.002	27.014	31.92	0.04	0.001	8.230	14.07	0.02	0.000	3.627
103	104.75	0.11	0.002	27.015	31.91	0.03	0.001	8.231	14.06	0.01	0.000	3.627
104	104.74	0.10	0.002	27.017	31.91	0.03	0.001	8.231	14.06	0.01	0.000	3.628
105	104.74	0.10	0.002	27.019	31.91	0.03	0.000	8.232	14.06	0.01	0.000	3.628
106	104.73	0.09	0.001	27.020	31.91	0.03	0.000	8.232	14.06	0.01	0.000	3.628
107	104.72	0.08	0.001	27.021	31.91	0.03	0.000	8.232	14.06	0.01	0.000	3.628
108	104.72	0.08	0.001	27.023	31.90	0.02	0.000	8.233	14.06	0.01	0.000	3.628
109	104.71	0.07	0.001	27.024	31.90	0.02	0.000	8.233	14.06	0.01	0.000	3.629
110	104.71	0.07	0.001	27.025	31.90	0.02	0.000	8.234	14.06	0.01	0.000	3.629
111	104.70	0.06	0.001	27.026	31.90	0.02	0.000	8.234	14.06	0.01	0.000	3.629
112	104.70	0.06	0.001	27.027	31.90	0.02	0.000	8.234	14.06	0.01	0.000	3.629
113	104.70	0.06	0.001	27.028	31.90	0.02	0.000	8.234	14.06	0.01	0.000	3.629
114	104.69	0.05	0.001	27.029	31.90	0.02	0.000	8.235	14.06	0.01	0.000	3.629
115	104.69	0.05	0.001	27.030	31.89	0.01	0.000	8.235	14.06	0.01	0.000	3.629
116	104.69	0.05	0.001	27.031	31.89	0.01	0.000	8.235	14.06	0.01	0.000	3.629
117	104.68	0.04	0.001	27.031	31.89	0.01	0.000	8.235	14.06	0.01	0.000	3.629
118	104.68	0.04	0.001	27.032	31.89	0.01	0.000	8.236	14.06	0.01	0.000	3.630
119	104.68	0.04	0.001	27.033	31.89	0.01	0.000	8.236	14.06	0.01	0.000	3.630
120	104.68	0.04	0.001	27.033	31.89	0.01	0.000	8.236	14.05	0.00	0.000	3.630

Where  $f_p$  is infiltration rate with the use of equation [3] with respective site-specific data,  $f_p$  above  $f_{min}$  is the infiltration rate minus minimum infiltration rate,  $V$  above  $f_{min}$  is the volume infiltrating minus the minimum infiltrated volume, and cum  $V$  above  $f_{min}$  is the cumulative infiltrated volume above minimum infiltrated volume.

Highlighted values correspond to the values that are used for maximum infiltration rate based on the values in Table A2

**Table A2 Parameters needed to calculate maximum infiltration rate at the specific initial soil moisture content, and the maximum infiltration rate used for wet and dry conditions**

	Unit	Oslo	Trondheim	Sandnes
Minimum infiltration rate, $f_{min}$	mm/h	104.64	31.88	14.05
Maximum infiltration rate, $f_{max}$	mm/h	209.28	63.76	28.10
Decay coefficient, $k_d$	min	0.067	0.067	0.067
Water content, wet*	-	0.76	0.88	0.88
Water content, dry*	-	0.24	0.24	0.27
Infiltrated volume after 2h	mm	27.033	8.236	3.630
Amount away, wet**	mm	20.672	7.267	3.203
Amount away, dry**	mm	6.401	1.984	0.984
<b>Maximum infiltration rate, wet</b>	<b>mm/h</b>	<b>130.99</b>	<b>35.90</b>	<b>15.82</b>
<b>Maximum infiltration rate, dry</b>	<b>mm/h</b>	<b>190.02</b>	<b>57.75</b>	<b>25.00</b>

\* Water content percentage of porosity (Initial soil moisture/porosity)

\*\* Volume that are infiltrated based on the initial soil moisture content (Water content\*Total volume after 2h above minimum infiltrated water volume)

Maximum infiltration rate was found by following steps:

1. Calculating infiltration rate with site-specific parameters for the corresponding locations within 2 h with the use of equation [3],
2. Calculating the cumulative volume of water infiltrated minus the minimum volume of infiltrated water,
3. Finding the percentage of water that are assumed infiltrated at the specific initial soil moisture content (Initial soil moisture/porosity),
4. Taking this percentage of the total cumulative water above minimum infiltrated water after 2 h to find the total water that are infiltrated with the specific initial soil moisture content,
5. Using Table A1 to find this amount of water at a specific time with corresponding infiltration rate which is set to maximum infiltration rate.