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Structural
Engineering
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File: 1.0 STORM 10.11.25.pfd

Network: Storm Network

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Page 1

Lindridge Lane Phase 2

Desford, Leicestershire

Surface Water Drainage Calcs P01

Design Settings

Rainfall MethodologyFSR

Return Period (years)2

Additional Flow (%)0

FSR RegionEngland and Wales

M5-60 (mm)20.000

Ratio-R0.400

CV0.750

Time of Entry (mins)5.00

Maximum Time of Concentration (mins)30.00

Maximum Rainfall (mm/hr)50.0

Minimum Velocity (m/s)1.00

Connection TypeLevel Soffits

Minimum Backdrop Height (m)0.200

Preferred Cover Depth (m)1.200

Include Intermediate Ground✓

Enforce best practice design rulesx

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
SW1	0.144	5.00	107.980	1200	1.650
SW2	0.021	5.00	106.590	1200	1.350
IC	0.037	5.00	107.600	450	1.740
TANK			106.500	225	2.500
SW3 PUMP			106.400	1200	2.500
SW4			105.800	1200	0.600
HEADWALL			105.450	150	0.350

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW1	SW2	28.183	0.600	106.330	105.240	1.090	25.9	225	5.18	50.0
1.001	SW2	TANK	5.665	0.600	105.240	105.140	0.100	56.7	225	5.24	50.0
2.000	IC	TANK	1.000	0.600	105.860	105.850	0.010	100.0	150	5.02	50.0
1.002	TANK	SW3 PUMP	6.142	0.600	104.000	103.900	0.100	61.4	150	5.32	50.0
1.003	SW3 PUMP	SW4	25.595	0.600	103.900	105.200	-1.300	-19.7	150	30.00	26.0
1.004	SW4	HEADWALL	11.265	0.600	105.200	105.100	0.100	112.7	150	30.00	26.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	SW1	SW2	2.583	102.7	19.5	1.425	1.125	1.125	1.425	0.144	0.0
1.001	SW2	TANK	1.741	69.2	22.4	1.125	1.135	1.125	1.135	0.165	0.0
2.000	IC	TANK	1.005	17.8	5.0	1.590	0.500	0.500	1.590	0.037	0.0
1.002	TANK	SW3 PUMP	1.285	22.7	27.4	2.350	2.350	2.350	2.350	0.202	0.0
1.003	SW3 PUMP	SW4	0.007	0.1	14.2	2.350	0.450	0.450	2.350	0.202	0.0
1.004	SW4	HEADWALL	0.946	16.7	14.2	0.450	0.200	0.200	0.450	0.202	0.0

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)
1.000	28.183	25.9	225	107.980	106.330	1.425	106.590	105.240	1.125
1.001	5.665	56.7	225	106.590	105.240	1.125	106.500	105.140	1.135
2.000	1.000	100.0	150	107.600	105.860	1.590	106.500	105.850	0.500
1.002	6.142	61.4	150	106.500	104.000	2.350	106.400	103.900	2.350
1.003	25.595	-19.7	150	106.400	103.900	2.350	105.800	105.200	0.450
1.004	11.265	112.7	150	105.800	105.200	0.450	105.450	105.100	0.200

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW1	1200	Manhole	Adoptable	SW2	1200	Manhole	Adoptable
1.001	SW2	1200	Manhole	Adoptable	TANK	225	Manhole	Adoptable
2.000	IC	450	Manhole	Adoptable	TANK	225	Manhole	Adoptable
1.002	TANK	225	Manhole	Adoptable	SW3 PUMP	1200	Manhole	Adoptable
1.003	SW3 PUMP	1200	Manhole	Adoptable	SW4	1200	Manhole	Adoptable
1.004	SW4	1200	Manhole	Adoptable	HEADWALL	150	Manhole	Adoptable

Simulation Settings

Rainfall MethodologyFSR

Rainfall EventsSingular

FSR RegionEngland and Wales

M5-60 (mm)20.000

Ratio-R0.400

Summer CV0.750

Winter CV0.840

Analysis SpeedNormal

Skip Steady Statex

Drain Down Time (mins)1440

Additional Storage (m³/ha)0.0

Starting Level (m)

Check Discharge Rate(s)x

Check Discharge Volumex

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	30	0	0	0
2	0	0	0	100	40	0	0

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Node SW3 PUMP Online Pump Control

Flap Valve	x	Invert Level (m)	103.900	Design Flow (l/s)	1.8	Switch off depth (m)	0.010
Replaces Downstream Link	✓	Design Depth (m)	2.000	Switch on depth (m)	0.100		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	1.800	0.400	1.800	0.800	1.800	1.200	1.800	1.600	1.800	2.000	1.800
0.200	1.800	0.600	1.800	1.000	1.800	1.400	1.800	1.800	1.800		

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	104.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	512

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	60.0	60.0	0.400	60.0	71.0	0.800	60.0	82.0	1.200	60.0	93.0	1.600	60.0	103.9	2.000	60.0	114.9
0.200	60.0	65.5	0.600	60.0	76.5	1.000	60.0	87.5	1.400	60.0	98.4	1.800	60.0	109.4	2.010	0.0	114.9

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW1	10	106.397	0.067	20.3	0.0761	0.0000	OK
15 minute winter	SW2	10	105.342	0.102	23.1	0.1154	0.0000	OK
15 minute winter	IC	10	105.925	0.065	5.2	0.0104	0.0000	OK
120 minute winter	TANK	100	104.283	0.283	9.3	16.1455	0.0000	SURCHARGED
120 minute winter	SW3 PUMP	100	104.282	0.382	3.5	0.4322	0.0000	SURCHARGED
60 minute summer	SW4	189	105.234	0.034	1.8	0.0385	0.0000	OK
60 minute summer	HEADWALL	189	105.133	0.033	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW1	1.000	SW2	20.1	1.477	0.196	0.3867	
15 minute winter	SW2	1.001	TANK	22.8	1.428	0.329	0.0904	
15 minute winter	IC	2.000	TANK	5.2	0.780	0.291	0.0066	
120 minute winter	TANK	1.002	SW3 PUMP	3.5	0.606	0.154	0.1081	
120 minute winter	SW3 PUMP	Pump	SW4	1.8				
60 minute summer	SW4	1.004	HEADWALL	1.8	0.612	0.108	0.0332	19.3

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW1	10	106.407	0.077	26.2	0.0870	0.0000	OK
15 minute winter	SW2	10	105.360	0.120	29.8	0.1352	0.0000	OK
15 minute winter	IC	10	105.936	0.076	6.7	0.0120	0.0000	OK
120 minute winter	TANK	116	104.388	0.388	11.6	22.1132	0.0000	SURCHARGED
120 minute winter	SW3 PUMP	116	104.387	0.487	5.4	0.5505	0.0000	SURCHARGED
60 minute summer	SW4	235	105.234	0.034	1.8	0.0385	0.0000	OK
15 minute winter	HEADWALL	158	105.133	0.033	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW1	1.000	SW2	26.0	1.565	0.253	0.4704	
15 minute winter	SW2	1.001	TANK	29.4	1.515	0.425	0.1100	
15 minute winter	IC	2.000	TANK	6.7	0.833	0.375	0.0080	
120 minute winter	TANK	1.002	SW3 PUMP	5.4	0.759	0.239	0.1081	
120 minute winter	SW3 PUMP	Pump	SW4	1.8				
60 minute summer	SW4	1.004	HEADWALL	1.8	0.612	0.108	0.0332	24.4

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW1	10	106.440	0.109	49.8	0.1238	0.0000	OK
15 minute winter	SW2	10	105.430	0.190	56.8	0.2149	0.0000	OK
15 minute winter	IC	10	105.973	0.113	12.8	0.0180	0.0000	OK
180 minute winter	TANK	176	104.893	0.893	16.2	50.9262	0.0000	SURCHARGED
180 minute winter	SW3 PUMP	176	104.892	0.992	4.7	1.1218	0.0000	SURCHARGED
30 minute summer	SW4	355	105.234	0.034	1.8	0.0385	0.0000	OK
360 minute summer	HEADWALL	712	105.133	0.033	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW1	1.000	SW2	49.5	1.771	0.482	0.7742	
15 minute winter	SW2	1.001	TANK	56.0	1.729	0.809	0.1821	
15 minute winter	IC	2.000	TANK	12.7	0.983	0.716	0.0129	
180 minute winter	TANK	1.002	SW3 PUMP	4.7	0.671	0.209	0.1081	
180 minute winter	SW3 PUMP	Pump	SW4	1.8				
30 minute summer	SW4	1.004	HEADWALL	1.8	0.612	0.108	0.0332	37.3

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW1	11	106.665	0.335	90.5	0.3786	0.0000	SURCHARGED
360 minute winter	SW2	352	105.895	0.655	14.2	0.7403	0.0000	SURCHARGED
15 minute winter	IC	10	106.056	0.196	23.3	0.0311	0.0000	SURCHARGED
360 minute winter	TANK	352	105.895	1.894	17.4	108.0617	0.0000	SURCHARGED
360 minute winter	SW3 PUMP	352	105.894	1.994	4.5	2.2547	0.0000	SURCHARGED
120 minute winter	SW4	1088	105.234	0.034	1.8	0.0385	0.0000	OK
30 minute winter	HEADWALL	712	105.133	0.033	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW1	1.000	SW2	86.5	2.175	0.842	1.1209	
360 minute winter	SW2	1.001	TANK	14.2	1.275	0.205	0.2253	
15 minute winter	IC	2.000	TANK	23.1	1.315	1.303	0.0172	
360 minute winter	TANK	1.002	SW3 PUMP	4.5	0.840	0.199	0.1081	
360 minute winter	SW3 PUMP	Pump	SW4	1.8				
120 minute winter	SW4	1.004	HEADWALL	1.8	0.612	0.108	0.0332	116.1