

ADS Structural Ltd

Page 2

Alexandra Business Park
2nd Floor, The Court, Prescott Road
St Helens, WA10 3TP

RAINFORD AVENUE
SOUTHWAY HOUSING
4248

Date 09/01/2023 10:00
File drainage model.MDX

Designed by GlynRatcliffe
Checked by

Innovyze

Network 2020.1.3

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
Sw-3.000	5.296	0.053	100.3	0.004	4.00	0.0	0.600	o	100	Pipe/Conduit		
Sw-3.001	2.748	0.232	11.8	0.001	0.00	0.0	0.600	o	100	Pipe/Conduit		
Sw-2.002	6.217	0.062	100.3	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit		
Sw-4.000	4.180	0.042	100.3	0.000	4.00	0.0	0.600	o	100	Pipe/Conduit		
Sw-4.001	2.022	0.257	7.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit		
Sw-1.003	3.027	0.030	100.3	0.000	0.00	0.0	0.600	o	100	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)
Sw-3.000	50.00	4.11	31.847	0.004	0.0	0.0	0.0	0.77	6.0	0.5
Sw-3.001	50.00	4.14	31.794	0.005	0.0	0.0	0.0	2.26	17.7	0.7
Sw-2.002	50.00	4.51	31.562	0.010	0.0	0.0	0.0	0.77	6.0	1.4
Sw-4.000	50.00	4.09	31.799	0.000	0.0	0.0	0.0	0.77	6.0	0.0
Sw-4.001	50.00	4.10	31.757	0.000	0.0	0.0	0.0	2.77	21.8	0.0
Sw-1.003	50.00	4.58	31.500	0.020	0.0	0.0	0.0	0.77	6.0	2.7

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
Sw-1.003	MH-	32.399	31.470	30.000	0	0

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 4

Number of Online Controls 1

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

©1982-2020 Innovyze

ADS Structural Ltd		Page 3
Alexandra Business Park 2nd Floor, The Court, Prescott Road St Helens, WA10 3TP	RAINFORD AVENUE SOUTHWAY HOUSING 4248	
Date 09/01/2023 10:00 File drainage model.MDX	Designed by GlynRatcliffe Checked by	
Innovyze Network 2020.1.3		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type Summer
Return Period (years)	2	Cv (Summer) 0.750
Region England and Wales		Cv (Winter) 0.840
M5-60 (mm)	18.000	Storm Duration (mins) 30
Ratio R	0.359	

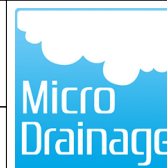
©1982-2020 Innovyze

ADS Structural Ltd		Page 4																																																																																																													
Alexandra Business Park 2nd Floor, The Court, Prescott Road St Helens, WA10 3TP	RAINFORD AVENUE SOUTHWAY HOUSING 4248																																																																																																														
Date 09/01/2023 10:00 File drainage model.MDX	Designed by GlynRatcliffe Checked by																																																																																																														
Innovyze	Network 2020.1.3																																																																																																														
<u>Online Controls for Storm</u> <u>Hydro-Brake® Optimum Manhole: MH-03, DS/PN: Sw-1.003, Volume (m³): 0.9</u> <table><tr><td>Unit Reference</td><td>MD-SHE-0071-1900-0600-1900</td></tr><tr><td>Design Head (m)</td><td>0.600</td></tr><tr><td>Design Flow (l/s)</td><td>1.9</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td></tr><tr><td>Application</td><td>Surface</td></tr><tr><td>Sump Available</td><td>Yes</td></tr><tr><td>Diameter (mm)</td><td>71</td></tr><tr><td>Invert Level (m)</td><td>31.500</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td>100</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr></table> <table><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>0.600</td><td>1.9</td></tr><tr><td>Flush-Flo™</td><td>0.178</td><td>1.9</td></tr><tr><td>Kick-Flo®</td><td>0.396</td><td>1.6</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>1.6</td></tr></table> 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 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>1.8</td><td>1.200</td><td>2.6</td><td>3.000</td><td>4.0</td><td>7.000</td><td>5.9</td></tr><tr><td>0.200</td><td>1.9</td><td>1.400</td><td>2.8</td><td>3.500</td><td>4.3</td><td>7.500</td><td>6.1</td></tr><tr><td>0.300</td><td>1.8</td><td>1.600</td><td>3.0</td><td>4.000</td><td>4.5</td><td>8.000</td><td>6.3</td></tr><tr><td>0.400</td><td>1.6</td><td>1.800</td><td>3.1</td><td>4.500</td><td>4.8</td><td>8.500</td><td>6.5</td></tr><tr><td>0.500</td><td>1.7</td><td>2.000</td><td>3.3</td><td>5.000</td><td>5.1</td><td>9.000</td><td>6.7</td></tr><tr><td>0.600</td><td>1.9</td><td>2.200</td><td>3.4</td><td>5.500</td><td>5.3</td><td>9.500</td><td>6.9</td></tr><tr><td>0.800</td><td>2.2</td><td>2.400</td><td>3.6</td><td>6.000</td><td>5.5</td><td></td><td></td></tr><tr><td>1.000</td><td>2.4</td><td>2.600</td><td>3.7</td><td>6.500</td><td>5.7</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0071-1900-0600-1900	Design Head (m)	0.600	Design Flow (l/s)	1.9	Flush-Flo™	Calculated	Objective	Minimise upstream storage	Application	Surface	Sump Available	Yes	Diameter (mm)	71	Invert Level (m)	31.500	Minimum Outlet Pipe Diameter (mm)	100	Suggested Manhole Diameter (mm)	1200	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.600	1.9	Flush-Flo™	0.178	1.9	Kick-Flo®	0.396	1.6	Mean Flow over Head Range	-	1.6	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	1.8	1.200	2.6	3.000	4.0	7.000	5.9	0.200	1.9	1.400	2.8	3.500	4.3	7.500	6.1	0.300	1.8	1.600	3.0	4.000	4.5	8.000	6.3	0.400	1.6	1.800	3.1	4.500	4.8	8.500	6.5	0.500	1.7	2.000	3.3	5.000	5.1	9.000	6.7	0.600	1.9	2.200	3.4	5.500	5.3	9.500	6.9	0.800	2.2	2.400	3.6	6.000	5.5			1.000	2.4	2.600	3.7	6.500	5.7		
Unit Reference	MD-SHE-0071-1900-0600-1900																																																																																																														
Design Head (m)	0.600																																																																																																														
Design Flow (l/s)	1.9																																																																																																														
Flush-Flo™	Calculated																																																																																																														
Objective	Minimise upstream storage																																																																																																														
Application	Surface																																																																																																														
Sump Available	Yes																																																																																																														
Diameter (mm)	71																																																																																																														
Invert Level (m)	31.500																																																																																																														
Minimum Outlet Pipe Diameter (mm)	100																																																																																																														
Suggested Manhole Diameter (mm)	1200																																																																																																														
Control Points	Head (m)	Flow (l/s)																																																																																																													
Design Point (Calculated)	0.600	1.9																																																																																																													
Flush-Flo™	0.178	1.9																																																																																																													
Kick-Flo®	0.396	1.6																																																																																																													
Mean Flow over Head Range	-	1.6																																																																																																													
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																																								
0.100	1.8	1.200	2.6	3.000	4.0	7.000	5.9																																																																																																								
0.200	1.9	1.400	2.8	3.500	4.3	7.500	6.1																																																																																																								
0.300	1.8	1.600	3.0	4.000	4.5	8.000	6.3																																																																																																								
0.400	1.6	1.800	3.1	4.500	4.8	8.500	6.5																																																																																																								
0.500	1.7	2.000	3.3	5.000	5.1	9.000	6.7																																																																																																								
0.600	1.9	2.200	3.4	5.500	5.3	9.500	6.9																																																																																																								
0.800	2.2	2.400	3.6	6.000	5.5																																																																																																										
1.000	2.4	2.600	3.7	6.500	5.7																																																																																																										
©1982-2020 Innovyze																																																																																																															

ADS Structural Ltd		Page 5																																																																																								
Alexandra Business Park 2nd Floor, The Court, Prescott Road St Helens, WA10 3TP	RAINFORD AVENUE SOUTHWAY HOUSING 4248																																																																																									
Date 09/01/2023 10:00 File drainage model.MDX	Designed by GlynRatcliffe Checked by																																																																																									
Innovyze	Network 2020.1.3																																																																																									
<u>Storage Structures for Storm</u> <u>Porous Car Park Manhole: MH-PARKING-2, DS/PN: Sw-1.002</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>2.4</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>6.0</td></tr><tr><td>Max Percolation (l/s)</td><td>4.0</td><td>Slope (1:X)</td><td>50.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>31.722</td><td>Cap Volume Depth (m)</td><td>0.150</td></tr></table> <u>Porous Car Park Manhole: MH-CP-1, DS/PN: Sw-2.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>2.4</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>6.0</td></tr><tr><td>Max Percolation (l/s)</td><td>4.0</td><td>Slope (1:X)</td><td>50.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>31.743</td><td>Cap Volume Depth (m)</td><td>0.150</td></tr></table> <u>Trench Soakaway Manhole: MH-PLANTER-1, DS/PN: Sw-3.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Trench Width (m)</td><td>1.2</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00000</td><td>Trench Length (m)</td><td>6.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Cap Volume Depth (m)</td><td>0.000</td></tr><tr><td>Invert Level (m)</td><td>31.794</td><td>Cap Infiltration Depth (m)</td><td>0.300</td></tr></table> <u>Trench Soakaway Manhole: MH-PLANNTER-2, DS/PN: Sw-4.001</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Trench Width (m)</td><td>1.2</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00000</td><td>Trench Length (m)</td><td>2.3</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Slope (1:X)</td><td>500.0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Cap Volume Depth (m)</td><td>0.000</td></tr><tr><td>Invert Level (m)</td><td>31.757</td><td>Cap Infiltration Depth (m)</td><td>0.300</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.4	Membrane Percolation (mm/hr)	1000	Length (m)	6.0	Max Percolation (l/s)	4.0	Slope (1:X)	50.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	31.722	Cap Volume Depth (m)	0.150	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.4	Membrane Percolation (mm/hr)	1000	Length (m)	6.0	Max Percolation (l/s)	4.0	Slope (1:X)	50.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	31.743	Cap Volume Depth (m)	0.150	Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	1.2	Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	6.0	Safety Factor	2.0	Slope (1:X)	500.0	Porosity	0.30	Cap Volume Depth (m)	0.000	Invert Level (m)	31.794	Cap Infiltration Depth (m)	0.300	Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	1.2	Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	2.3	Safety Factor	2.0	Slope (1:X)	500.0	Porosity	0.30	Cap Volume Depth (m)	0.000	Invert Level (m)	31.757	Cap Infiltration Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.4																																																																																							
Membrane Percolation (mm/hr)	1000	Length (m)	6.0																																																																																							
Max Percolation (l/s)	4.0	Slope (1:X)	50.0																																																																																							
Safety Factor	2.0	Depression Storage (mm)	5																																																																																							
Porosity	0.30	Evaporation (mm/day)	3																																																																																							
Invert Level (m)	31.722	Cap Volume Depth (m)	0.150																																																																																							
Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.4																																																																																							
Membrane Percolation (mm/hr)	1000	Length (m)	6.0																																																																																							
Max Percolation (l/s)	4.0	Slope (1:X)	50.0																																																																																							
Safety Factor	2.0	Depression Storage (mm)	5																																																																																							
Porosity	0.30	Evaporation (mm/day)	3																																																																																							
Invert Level (m)	31.743	Cap Volume Depth (m)	0.150																																																																																							
Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	1.2																																																																																							
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	6.0																																																																																							
Safety Factor	2.0	Slope (1:X)	500.0																																																																																							
Porosity	0.30	Cap Volume Depth (m)	0.000																																																																																							
Invert Level (m)	31.794	Cap Infiltration Depth (m)	0.300																																																																																							
Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	1.2																																																																																							
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	2.3																																																																																							
Safety Factor	2.0	Slope (1:X)	500.0																																																																																							
Porosity	0.30	Cap Volume Depth (m)	0.000																																																																																							
Invert Level (m)	31.757	Cap Infiltration Depth (m)	0.300																																																																																							
©1982-2020 Innovyze																																																																																										

RAINFORD AVENUE
SOUTHWAY HOUSING
4248

Designed by GlynRatcliffe
Checked by



Network 2020.1.3

PN	US/MH Name	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain
			Level (m)	Depth (m)	Volume (m³)			Time (mins)
Sw-1.003	MH-03		31.826	0.226	0.000	0.39		

PN	US/MH Name	Pipe	Status	Level Exceeded
		Flow (l/s)		
Sw-1.000	MH-RWP-3	1.3	OK*	
Sw-1.001	MH-01	2.4	OK	
Sw-1.002	MH-PARKING-2	2.4	SURCHARGED*	
Sw-2.000	MH-RWP-1	1.3	OK*	
Sw-2.001	MH-CP-1	1.2	OK*	
Sw-3.000	MH-RWP-2	1.2	OK*	
Sw-3.001	MH-PLANTER-1	1.5	OK	
Sw-2.002	MH-8	1.6	SURCHARGED	
Sw-4.000	MH-10	0.1	OK	
Sw-4.001	MH-PLANNTER-2	0.3	OK*	
Sw-1.003	MH-03	1.9	SURCHARGED	

©1982-2020 Innovyze

