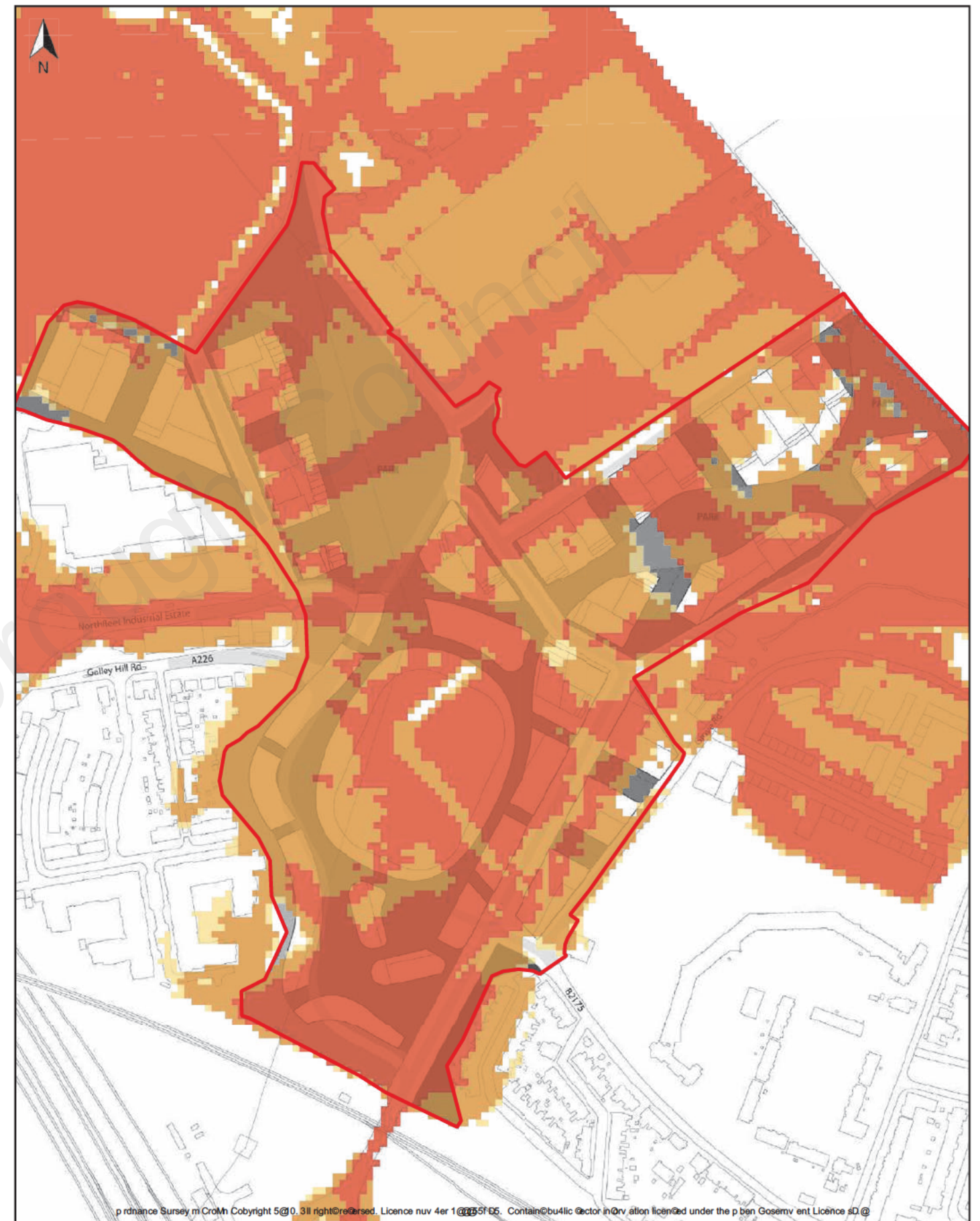
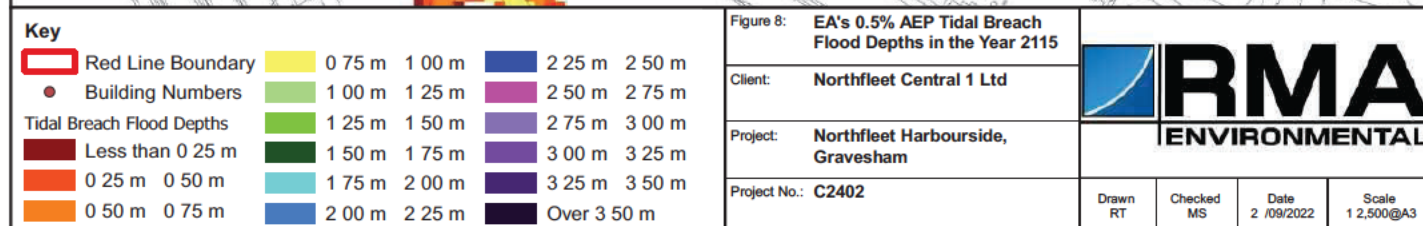
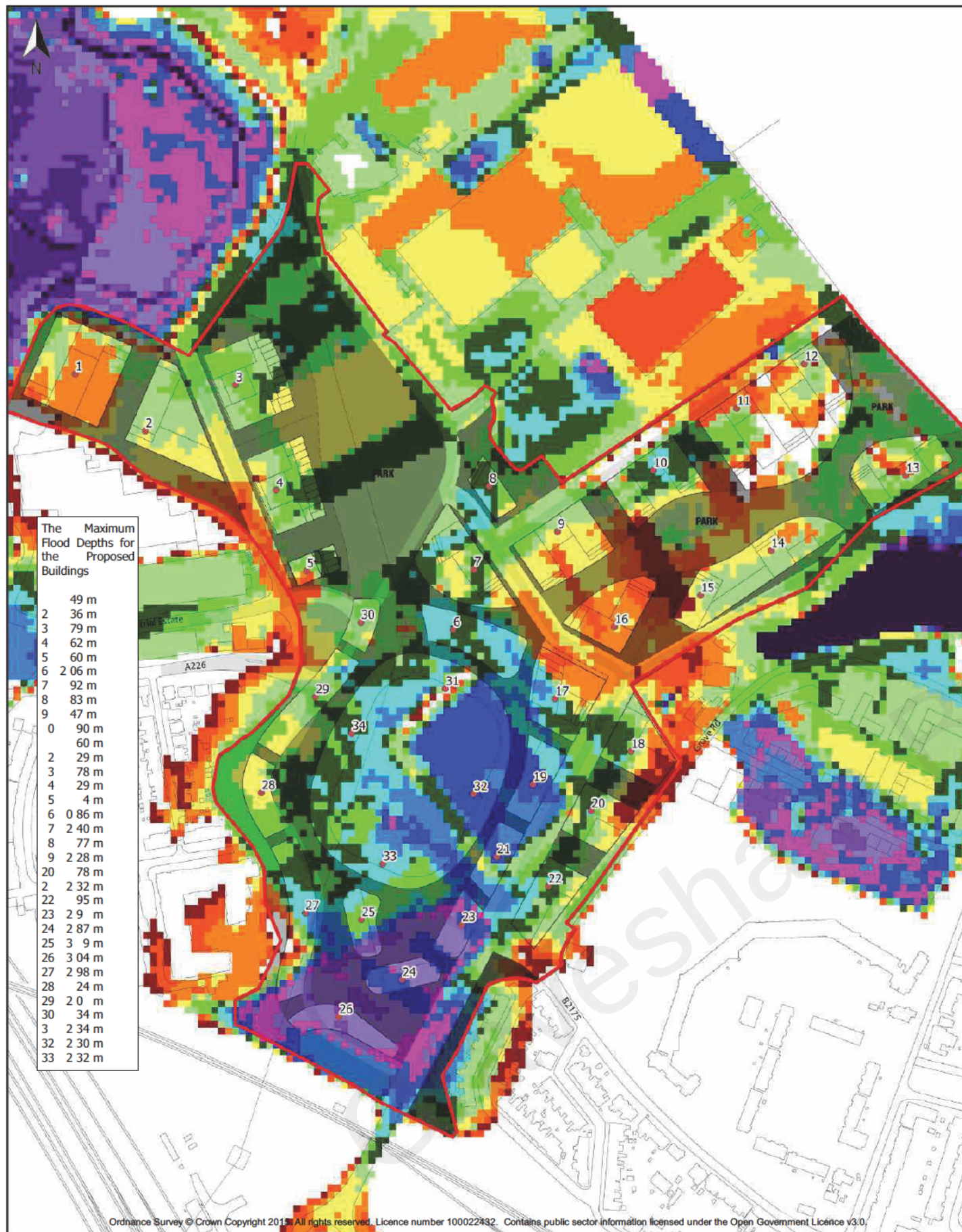


Appendix G: Surface Water Drainage Strategy

PURPOSE

The purpose of this Design Statement is to describe how the surface water drainage strategy for the proposed development at Northfleet Harbourside will manage runoff in a manner that will mitigate the risk of flooding and pollution to the environment.

SCOPE

This design addresses runoff from all areas within the planning application boundary.

DESIGN CONSTRAINTS

A ground investigation has yet to be carried out, therefore a precautionary approach has been adopted and it has been assumed that infiltration will not be feasible. It is proposed to carry out percolation tests in accordance with BRE365 prior to commencement of the detailed design.

The site lies at the confluence of the tidal River Thames and the River Ebbsfleet. The Environment Agency's 2015 report Flood Map Improvements: Ebbsfleet used the highest astronomical tide (HAT) level of 3.98mAOD to establish flood risk zones. Since it is proposed to discharge runoff in the vicinity of the confluence, it is necessary to allow for the constraint high tides will have on outflows from the site. This has been done by developing a tidal hydrograph based on HAT, mean low water springs (MLWS) and the rule of twelfths – refer to calculation 2 in Appendix B

A large proportion of the site is below HAT. Therefore, a precautionary approach has been adopted and it has been assumed that a pumped discharge will be required for these areas.

Information received from Southern Water shows only a limited network of public surface water sewers within the area. It is likely that many of the sites along the frontage of the Thames and Ebbsfleet discharge directly to these watercourses without attenuation. Given the scale of works proposed, including the construction of a new vehicular tunnel it is probable that most, if not all of the public sewer network within the site will need to be replaced.

The Lead Local Flood Authority has advised that (subject to infiltration not being feasible) it will accept an unrestricted discharge to the River Ebbsfleet.

DESIGN STANDARDS

The proposed surface water drainage system is to be designed to ensure that all runoff from the 100year rainfall event plus a 40% increase in rainfall intensity is managed in accordance with DEFRA's Technical Standards for Sustainable Drainage Systems.

DESIGN - STRATEGY

It is proposed to incorporate a range of SuDS features within the drainage strategy:

- Runoff from the roofs of residential buildings will be harvested and re-used, thereby reducing discharge to sewers.
- Runoff from podium areas will be attenuated in low-profile attenuation tanks (e.g. RoofBloxx by ACO).
- Runoff from the roof of the football stadium will be captured for re-use in a low-profile tank beneath the pitch.
- All other buildings will be provided with green roofs incorporating low-profile attenuation tanks.
- Park areas will be profiled to provide attenuation for rainfall events in excess of the 30year return period rainfall event.

The proposed drainage strategy is shown on drawing DR-001 in Appendix A. It can be seen that the site has been divided into three sub-catchments as shown on drawing DR-001:

- Sub-catchment A includes much of the west of the site. It is relatively low-lying with most of its area below HAT (3.98mAD)
- Sub-catchment B includes the eastern edge of the site adjacent to the Thames. Ground levels in this area are also below HAT.
- Sub-catchment C lies between A and B. Ground levels are generally above 4.2mAD.

It will be necessary to pump the discharge from sub-catchments A & B to Robins Creek. Runoff from sub-catchment C can gravitate to Robins Creek via a swale.

Treatment Design

The pollution treatment requirements for the site have been established using the Simple Index Approach set out in Table 26.1 of the SUDS Manual.

Pollution hazard levels have been derived from Table 26.2 and are shown in the following table.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Roofs	Low	0.3	0.2	0.05
Low-traffic roads	Low	0.5	0.4	0.4
Other roads	Medium	0.7	0.6	0.7

Table 1 – Pollution Hazard Indices

The following forms of treatment will be provided:

- Parking spaces will be constructed of permeable paving
- Low-traffic roads will be constructed of permeable paving or drain to tree pits or swales;
- Other roads will drain to tree pits or swales;

The treatment parameters for the above forms of treatment are shown in the following table.

Treatment	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Permeable paving	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Tree pit	0.8	0.8	0.8

Table 2 – Proposed SuDS Mitigation Indices

Compliance with Technical Standards for Sustainable Drainage Systems

The following sections describe how the proposed surface water drainage system meets the requirements of the DEFRA document Non-Statutory Technical Standards for Sustainable Drainage Systems.

S1 *Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3 below) and volume control technical standards (S4 and S6 below) need not apply*

There are no water bodies in the vicinity of the proposed development that are capable of accommodating uncontrolled runoff without increasing flood risk.

S2 *For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.*

Not applicable – brownfield site.

S3 *For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.*

The inclusion of the following features will significantly reduce the amount of impermeable area within the site, which will in turn reduce the peak runoff rate.

- two large parks (3.08ha – 17% of site area)
- green roofs (1.32ha – 7% of site area)
- Rain water harvested roofs (1.45ha – 8% of site area).

The final rate of discharge will be determined on completion of the design of the proposed pumping stations. The rate will be a compromise between the attenuation storage required and the capacity of the pumps.

S4 *Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.*

Not applicable – brownfield site.

S5 *Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*

The inclusion of the areas described in S3 above will result in a significant decrease in the volume of runoff from the site.

S6 *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.*

Not applicable – compliant with S5.

S7 *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.*

It is proposed to design the parks such that they will not flood during the 1 in 30year event, but will act as strategic storage areas for more severe rainfall events.

The drainage system will be designed such that there will be no flooding for all events up to the 100year +40%.

MicroDrainage calculations for typical drainage features are included in Appendix B.

S8 *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.*

See S7 above.

S9 *The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*

Refer to Designing for Exceedance Section in the main body of the report.

S10 *Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.*

The drainage system will be located beyond the zone of influence of adjacent foundations. This will allow for the replacement of the drainage system without the need for special support.

S11 *The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.*

The surface water system will be designed in accordance with the SuDS Manual. The design will allow for replacement of component parts without long-term detriment to the performance of the system.

S12 *Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.*

Due to the low-lying nature of sub-catchments A & B it will be necessary to pump runoff from these areas.

S13 *The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.*

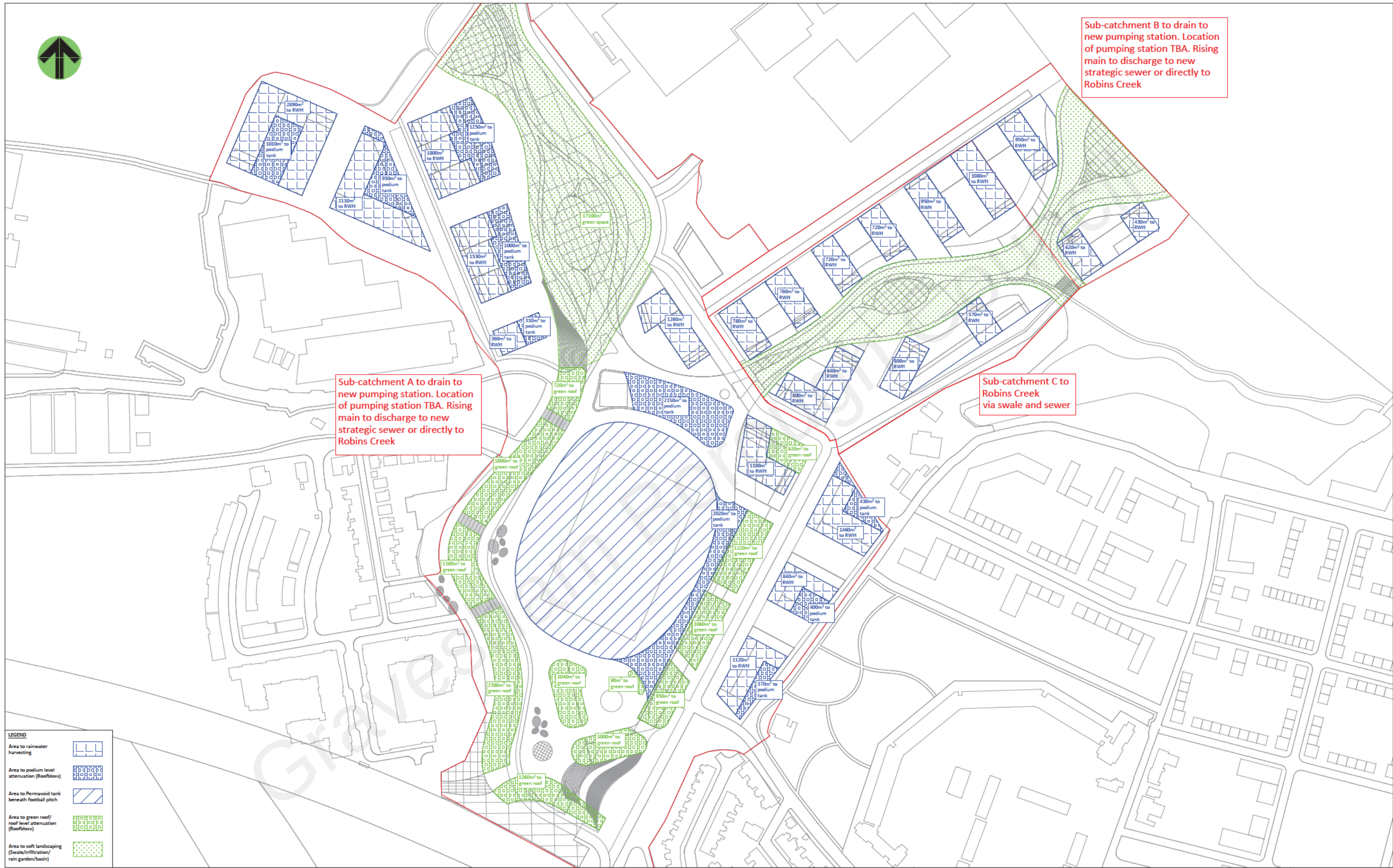
It is likely that the existing drainage systems will need to be replaced. The only communications are likely to be the outfalls to Robins Creek. This work will be carried out in accordance with the relevant permits and licenses.

S14 *Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.*

See S13 above.

APPENDIX A DRAWINGS

DR-001 Surface Water Drainage Strategy



Sub-catchment A to drain to new pumping station. Location of pumping station TBA. Rising main to discharge to new strategic sewer or directly to Robins Creek

Sub-catchment C to
Robins Creek
via swale and sewer

LEGEND	
Area to rainwater harvesting	
Area to podium level attenuation (Roofbloss)	
Area to Permaviv tank beneath football pitch	
Area to green roof/ roof level attenuation (Roofbloss)	
Area to soft landscaping (Swale/infiltration/ rain garden/basin)	

NOTES

1. This drawing to be read in conjunction with the FRA report (RMA - September 2022).

A 22.09.2022 Initial issue			PROJECT: NORTHFLEET HARBOURSIDE			DESIGN BY: 
REV DATE DESCRIPTION			TITLE: SURFACE WATER DRAINAGE STRATEGY			
CLIENT:			REV: A	PROJECT No: 0622	DRAWING No: DR-001	
			SCALE @ A1: 1:1250			

APPENDIX B CALCULATIONS

1. Sub-catchments A & B
2. Sub-catchment C

Gravesham Borough Council

Runoff from areas not shown above would drain to a strategic attenuation tank adjacent to a pumping station serving each sub-catchment. The size of the pumping stations and tanks will be determined as part of the detailed design process.

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Exminster

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Date 21/09/2022 16:52

File Green roof 1200m2.SRCX

XP Solutions

Source Control 2020.1

Page 2



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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	9.929	0.094	0.0	0.7	0.7	91.7	Flood Risk
360 min Winter	9.937	0.102	0.0	0.7	0.7	99.0	Flood Risk
480 min Winter	9.940	0.105	0.0	0.8	0.8	102.3	Flood Risk
600 min Winter	9.942	0.107	0.0	0.8	0.8	103.8	Flood Risk
720 min Winter	9.942	0.107	0.0	0.8	0.8	104.2	Flood Risk
960 min Winter	9.941	0.106	0.0	0.8	0.8	103.2	Flood Risk
1440 min Winter	9.937	0.102	0.0	0.7	0.7	99.2	Flood Risk
2160 min Winter	9.932	0.097	0.0	0.7	0.7	94.6	Flood Risk
2880 min Winter	9.928	0.093	0.0	0.7	0.7	90.0	Flood Risk
4320 min Winter	9.919	0.084	0.0	0.7	0.7	81.3	Flood Risk
5760 min Winter	9.911	0.076	0.0	0.6	0.6	74.0	Flood Risk
7200 min Winter	9.905	0.070	0.0	0.6	0.6	68.2	Flood Risk
8640 min Winter	9.900	0.065	0.0	0.6	0.6	63.3	Flood Risk
10080 min Winter	9.896	0.061	0.0	0.5	0.5	59.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	25.923	0.0	72.5	264
360 min Winter	18.962	0.0	79.4	372
480 min Winter	15.013	0.0	83.1	484
600 min Winter	12.462	0.0	85.3	598
720 min Winter	10.673	0.0	86.5	710
960 min Winter	8.322	0.0	87.3	928
1440 min Winter	5.832	0.0	85.1	1174
2160 min Winter	4.092	0.0	120.2	1624
2880 min Winter	3.189	0.0	121.7	2072
4320 min Winter	2.249	0.0	119.6	2940
5760 min Winter	1.766	0.0	142.5	3760
7200 min Winter	1.475	0.0	145.3	4552
8640 min Winter	1.280	0.0	147.3	5352
10080 min Winter	1.139	0.0	148.0	6080

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South Lodge Exminster Devon EX6 8AT		
Date 21/09/2022 16:52	Designed by Karl	
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XP Solutions	Source Control 2020.1	

Pitman Associates Ltd		Page 4												
South Lodge Exminster Devon EX6 8AT														
Date 21/09/2022 16:52	Designed by Karl													
File Green roof 1200m2.SRCX	Checked by													
XP Solutions	Source Control 2020.1													
<u>Model Details</u> Storage is Online Cover Level (m) 10.000 <u>Cellular Storage Structure</u> Invert Level (m) 9.835 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.90 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>1080.0</td><td>0.0</td><td>0.165</td><td>1080.0</td><td>0.0</td></tr></table> <u>Orifice Outflow Control</u> Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 9.835			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	1080.0	0.0	0.165	1080.0	0.0
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)									
0.000	1080.0	0.0	0.165	1080.0	0.0									
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 1414 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>9.868</td><td>0.033</td><td>0.0</td><td>0.4</td><td>0.4</td><td>62.6</td><td>Flood Risk</td></tr><tr><td>30 min Summer</td><td>9.879</td><td>0.044</td><td>0.0</td><td>0.6</td><td>0.6</td><td>84.3</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>9.891</td><td>0.056</td><td>0.0</td><td>0.8</td><td>0.8</td><td>106.7</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>9.905</td><td>0.070</td><td>0.0</td><td>1.2</td><td>1.2</td><td>133.2</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>9.913</td><td>0.078</td><td>0.0</td><td>1.3</td><td>1.3</td><td>148.9</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>9.918</td><td>0.083</td><td>0.0</td><td>1.4</td><td>1.4</td><td>159.3</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>9.925</td><td>0.090</td><td>0.0</td><td>1.5</td><td>1.5</td><td>171.3</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>9.928</td><td>0.093</td><td>0.0</td><td>1.5</td><td>1.5</td><td>176.6</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>9.929</td><td>0.094</td><td>0.0</td><td>1.5</td><td>1.5</td><td>178.6</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>9.929</td><td>0.094</td><td>0.0</td><td>1.5</td><td>1.5</td><td>178.7</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>9.927</td><td>0.092</td><td>0.0</td><td>1.5</td><td>1.5</td><td>176.4</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>9.925</td><td>0.090</td><td>0.0</td><td>1.5</td><td>1.5</td><td>172.1</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>9.922</td><td>0.087</td><td>0.0</td><td>1.4</td><td>1.4</td><td>166.8</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>9.920</td><td>0.085</td><td>0.0</td><td>1.4</td><td>1.4</td><td>161.7</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>9.915</td><td>0.080</td><td>0.0</td><td>1.4</td><td>1.4</td><td>152.0</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>9.910</td><td>0.075</td><td>0.0</td><td>1.3</td><td>1.3</td><td>144.0</td><td>Flood Risk</td></tr><tr><td>7200 min Summer</td><td>9.907</td><td>0.072</td><td>0.0</td><td>1.2</td><td>1.2</td><td>138.0</td><td>Flood Risk</td></tr><tr><td>8640 min Summer</td><td>9.905</td><td>0.070</td><td>0.0</td><td>1.2</td><td>1.2</td><td>132.9</td><td>Flood Risk</td></tr><tr><td>10080 min Summer</td><td>9.902</td><td>0.067</td><td>0.0</td><td>1.1</td><td>1.1</td><td>128.6</td><td>Flood Risk</td></tr><tr><td>15 min Winter</td><td>9.872</td><td>0.037</td><td>0.0</td><td>0.4</td><td>0.4</td><td>71.4</td><td>Flood Risk</td></tr><tr><td>30 min Winter</td><td>9.885</td><td>0.050</td><td>0.0</td><td>0.7</td><td>0.7</td><td>95.6</td><td>Flood Risk</td></tr><tr><td>60 min Winter</td><td>9.898</td><td>0.063</td><td>0.0</td><td>1.0</td><td>1.0</td><td>120.7</td><td>Flood Risk</td></tr><tr><td>120 min Winter</td><td>9.914</td><td>0.079</td><td>0.0</td><td>1.3</td><td>1.3</td><td>150.4</td><td>Flood Risk</td></tr><tr><td>180 min Winter</td><td>9.923</td><td>0.088</td><td>0.0</td><td>1.5</td><td>1.5</td><td>168.3</td><td>Flood Risk</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>173.460</td><td>0.0</td><td>21.5</td><td>107</td></tr><tr><td>30 min Summer</td><td>112.490</td><td>0.0</td><td>34.3</td><td>113</td></tr><tr><td>60 min Summer</td><td>69.747</td><td>0.0</td><td>68.8</td><td>128</td></tr><tr><td>120 min Summer</td><td>43.014</td><td>0.0</td><td>92.2</td><td>166</td></tr><tr><td>180 min Summer</td><td>32.102</td><td>0.0</td><td>106.7</td><td>212</td></tr><tr><td>240 min Summer</td><td>25.923</td><td>0.0</td><td>116.8</td><td>264</td></tr><tr><td>360 min Summer</td><td>18.962</td><td>0.0</td><td>129.6</td><td>374</td></tr><tr><td>480 min Summer</td><td>15.013</td><td>0.0</td><td>136.7</td><td>490</td></tr><tr><td>600 min Summer</td><td>12.462</td><td>0.0</td><td>141.1</td><td>606</td></tr><tr><td>720 min Summer</td><td>10.673</td><td>0.0</td><td>143.8</td><td>722</td></tr><tr><td>960 min Summer</td><td>8.322</td><td>0.0</td><td>146.5</td><td>856</td></tr><tr><td>1440 min Summer</td><td>5.832</td><td>0.0</td><td>145.9</td><td>1090</td></tr><tr><td>2160 min Summer</td><td>4.092</td><td>0.0</td><td>198.4</td><td>1484</td></tr><tr><td>2880 min Summer</td><td>3.189</td><td>0.0</td><td>200.7</td><td>1892</td></tr><tr><td>4320 min Summer</td><td>2.249</td><td>0.0</td><td>196.6</td><td>2696</td></tr><tr><td>5760 min Summer</td><td>1.766</td><td>0.0</td><td>237.5</td><td>3480</td></tr><tr><td>7200 min Summer</td><td>1.475</td><td>0.0</td><td>240.6</td><td>4264</td></tr><tr><td>8640 min Summer</td><td>1.280</td><td>0.0</td><td>242.1</td><td>5024</td></tr><tr><td>10080 min Summer</td><td>1.139</td><td>0.0</td><td>241.4</td><td>5784</td></tr><tr><td>15 min Winter</td><td>173.460</td><td>0.0</td><td>26.8</td><td>106</td></tr><tr><td>30 min Winter</td><td>112.490</td><td>0.0</td><td>41.0</td><td>111</td></tr><tr><td>60 min Winter</td><td>69.747</td><td>0.0</td><td>81.0</td><td>126</td></tr><tr><td>120 min Winter</td><td>43.014</td><td>0.0</td><td>107.5</td><td>166</td></tr><tr><td>180 min Winter</td><td>32.102</td><td>0.0</td><td>123.6</td><td>212</td></tr></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	9.868	0.033	0.0	0.4	0.4	62.6	Flood Risk	30 min Summer	9.879	0.044	0.0	0.6	0.6	84.3	Flood Risk	60 min Summer	9.891	0.056	0.0	0.8	0.8	106.7	Flood Risk	120 min Summer	9.905	0.070	0.0	1.2	1.2	133.2	Flood Risk	180 min Summer	9.913	0.078	0.0	1.3	1.3	148.9	Flood Risk	240 min Summer	9.918	0.083	0.0	1.4	1.4	159.3	Flood Risk	360 min Summer	9.925	0.090	0.0	1.5	1.5	171.3	Flood Risk	480 min Summer	9.928	0.093	0.0	1.5	1.5	176.6	Flood Risk	600 min Summer	9.929	0.094	0.0	1.5	1.5	178.6	Flood Risk	720 min Summer	9.929	0.094	0.0	1.5	1.5	178.7	Flood Risk	960 min Summer	9.927	0.092	0.0	1.5	1.5	176.4	Flood Risk	1440 min Summer	9.925	0.090	0.0	1.5	1.5	172.1	Flood Risk	2160 min Summer	9.922	0.087	0.0	1.4	1.4	166.8	Flood Risk	2880 min Summer	9.920	0.085	0.0	1.4	1.4	161.7	Flood Risk	4320 min Summer	9.915	0.080	0.0	1.4	1.4	152.0	Flood Risk	5760 min Summer	9.910	0.075	0.0	1.3	1.3	144.0	Flood Risk	7200 min Summer	9.907	0.072	0.0	1.2	1.2	138.0	Flood Risk	8640 min Summer	9.905	0.070	0.0	1.2	1.2	132.9	Flood Risk	10080 min Summer	9.902	0.067	0.0	1.1	1.1	128.6	Flood Risk	15 min Winter	9.872	0.037	0.0	0.4	0.4	71.4	Flood Risk	30 min Winter	9.885	0.050	0.0	0.7	0.7	95.6	Flood Risk	60 min Winter	9.898	0.063	0.0	1.0	1.0	120.7	Flood Risk	120 min Winter	9.914	0.079	0.0	1.3	1.3	150.4	Flood Risk	180 min Winter	9.923	0.088	0.0	1.5	1.5	168.3	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	173.460	0.0	21.5	107	30 min Summer	112.490	0.0	34.3	113	60 min Summer	69.747	0.0	68.8	128	120 min Summer	43.014	0.0	92.2	166	180 min Summer	32.102	0.0	106.7	212	240 min Summer	25.923	0.0	116.8	264	360 min Summer	18.962	0.0	129.6	374	480 min Summer	15.013	0.0	136.7	490	600 min Summer	12.462	0.0	141.1	606	720 min Summer	10.673	0.0	143.8	722	960 min Summer	8.322	0.0	146.5	856	1440 min Summer	5.832	0.0	145.9	1090	2160 min Summer	4.092	0.0	198.4	1484	2880 min Summer	3.189	0.0	200.7	1892	4320 min Summer	2.249	0.0	196.6	2696	5760 min Summer	1.766	0.0	237.5	3480	7200 min Summer	1.475	0.0	240.6	4264	8640 min Summer	1.280	0.0	242.1	5024	10080 min Summer	1.139	0.0	241.4	5784	15 min Winter	173.460	0.0	26.8	106	30 min Winter	112.490	0.0	41.0	111	60 min Winter	69.747	0.0	81.0	126	120 min Winter	43.014	0.0	107.5	166	180 min Winter	32.102	0.0	123.6	212
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																																																																																																
15 min Summer	9.868	0.033	0.0	0.4	0.4	62.6	Flood Risk																																																																																																																																																																																																																																																																																																																																
30 min Summer	9.879	0.044	0.0	0.6	0.6	84.3	Flood Risk																																																																																																																																																																																																																																																																																																																																
60 min Summer	9.891	0.056	0.0	0.8	0.8	106.7	Flood Risk																																																																																																																																																																																																																																																																																																																																
120 min Summer	9.905	0.070	0.0	1.2	1.2	133.2	Flood Risk																																																																																																																																																																																																																																																																																																																																
180 min Summer	9.913	0.078	0.0	1.3	1.3	148.9	Flood Risk																																																																																																																																																																																																																																																																																																																																
240 min Summer	9.918	0.083	0.0	1.4	1.4	159.3	Flood Risk																																																																																																																																																																																																																																																																																																																																
360 min Summer	9.925	0.090	0.0	1.5	1.5	171.3	Flood Risk																																																																																																																																																																																																																																																																																																																																
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600 min Summer	9.929	0.094	0.0	1.5	1.5	178.6	Flood Risk																																																																																																																																																																																																																																																																																																																																
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2160 min Summer	9.922	0.087	0.0	1.4	1.4	166.8	Flood Risk																																																																																																																																																																																																																																																																																																																																
2880 min Summer	9.920	0.085	0.0	1.4	1.4	161.7	Flood Risk																																																																																																																																																																																																																																																																																																																																
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5760 min Summer	9.910	0.075	0.0	1.3	1.3	144.0	Flood Risk																																																																																																																																																																																																																																																																																																																																
7200 min Summer	9.907	0.072	0.0	1.2	1.2	138.0	Flood Risk																																																																																																																																																																																																																																																																																																																																
8640 min Summer	9.905	0.070	0.0	1.2	1.2	132.9	Flood Risk																																																																																																																																																																																																																																																																																																																																
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15 min Winter	9.872	0.037	0.0	0.4	0.4	71.4	Flood Risk																																																																																																																																																																																																																																																																																																																																
30 min Winter	9.885	0.050	0.0	0.7	0.7	95.6	Flood Risk																																																																																																																																																																																																																																																																																																																																
60 min Winter	9.898	0.063	0.0	1.0	1.0	120.7	Flood Risk																																																																																																																																																																																																																																																																																																																																
120 min Winter	9.914	0.079	0.0	1.3	1.3	150.4	Flood Risk																																																																																																																																																																																																																																																																																																																																
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Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																																																																			
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60 min Summer	69.747	0.0	68.8	128																																																																																																																																																																																																																																																																																																																																			
120 min Summer	43.014	0.0	92.2	166																																																																																																																																																																																																																																																																																																																																			
180 min Summer	32.102	0.0	106.7	212																																																																																																																																																																																																																																																																																																																																			
240 min Summer	25.923	0.0	116.8	264																																																																																																																																																																																																																																																																																																																																			
360 min Summer	18.962	0.0	129.6	374																																																																																																																																																																																																																																																																																																																																			
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600 min Summer	12.462	0.0	141.1	606																																																																																																																																																																																																																																																																																																																																			
720 min Summer	10.673	0.0	143.8	722																																																																																																																																																																																																																																																																																																																																			
960 min Summer	8.322	0.0	146.5	856																																																																																																																																																																																																																																																																																																																																			
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<u>Summary of Results for 100 year Return Period (+40%)</u> <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>240 min Winter</td><td>9.929</td><td>0.094</td><td>0.0</td><td>1.5</td><td>1.5</td><td>180.2</td><td>Flood Risk</td></tr><tr><td>360 min Winter</td><td>9.937</td><td>0.102</td><td>0.0</td><td>1.6</td><td>1.6</td><td>194.1</td><td>Flood Risk</td></tr><tr><td>480 min Winter</td><td>9.940</td><td>0.105</td><td>0.0</td><td>1.6</td><td>1.6</td><td>200.4</td><td>Flood Risk</td></tr><tr><td>600 min Winter</td><td>9.941</td><td>0.106</td><td>0.0</td><td>1.7</td><td>1.7</td><td>203.0</td><td>Flood Risk</td></tr><tr><td>720 min Winter</td><td>9.942</td><td>0.107</td><td>0.0</td><td>1.7</td><td>1.7</td><td>203.5</td><td>Flood Risk</td></tr><tr><td>960 min Winter</td><td>9.940</td><td>0.105</td><td>0.0</td><td>1.6</td><td>1.6</td><td>201.2</td><td>Flood Risk</td></tr><tr><td>1440 min Winter</td><td>9.937</td><td>0.102</td><td>0.0</td><td>1.6</td><td>1.6</td><td>194.3</td><td>Flood Risk</td></tr><tr><td>2160 min Winter</td><td>9.932</td><td>0.097</td><td>0.0</td><td>1.6</td><td>1.6</td><td>185.7</td><td>Flood Risk</td></tr><tr><td>2880 min Winter</td><td>9.928</td><td>0.093</td><td>0.0</td><td>1.5</td><td>1.5</td><td>177.2</td><td>Flood Risk</td></tr><tr><td>4320 min Winter</td><td>9.920</td><td>0.085</td><td>0.0</td><td>1.4</td><td>1.4</td><td>161.4</td><td>Flood Risk</td></tr><tr><td>5760 min Winter</td><td>9.913</td><td>0.078</td><td>0.0</td><td>1.3</td><td>1.3</td><td>148.8</td><td>Flood Risk</td></tr><tr><td>7200 min Winter</td><td>9.908</td><td>0.073</td><td>0.0</td><td>1.2</td><td>1.2</td><td>139.7</td><td>Flood Risk</td></tr><tr><td>8640 min Winter</td><td>9.904</td><td>0.069</td><td>0.0</td><td>1.1</td><td>1.1</td><td>132.5</td><td>Flood Risk</td></tr><tr><td>10080 min Winter</td><td>9.901</td><td>0.066</td><td>0.0</td><td>1.1</td><td>1.1</td><td>126.5</td><td>Flood Risk</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>240 min Winter</td><td>25.923</td><td>0.0</td><td>134.6</td><td>262</td></tr><tr><td>360 min Winter</td><td>18.962</td><td>0.0</td><td>148.8</td><td>370</td></tr><tr><td>480 min Winter</td><td>15.013</td><td>0.0</td><td>156.7</td><td>482</td></tr><tr><td>600 min Winter</td><td>12.462</td><td>0.0</td><td>161.5</td><td>596</td></tr><tr><td>720 min Winter</td><td>10.673</td><td>0.0</td><td>164.6</td><td>706</td></tr><tr><td>960 min Winter</td><td>8.322</td><td>0.0</td><td>167.6</td><td>918</td></tr><tr><td>1440 min Winter</td><td>5.832</td><td>0.0</td><td>166.7</td><td>1142</td></tr><tr><td>2160 min Winter</td><td>4.092</td><td>0.0</td><td>227.6</td><td>1596</td></tr><tr><td>2880 min Winter</td><td>3.189</td><td>0.0</td><td>230.7</td><td>2044</td></tr><tr><td>4320 min Winter</td><td>2.249</td><td>0.0</td><td>226.9</td><td>2896</td></tr><tr><td>5760 min Winter</td><td>1.766</td><td>0.0</td><td>273.4</td><td>3696</td></tr><tr><td>7200 min Winter</td><td>1.475</td><td>0.0</td><td>277.9</td><td>4480</td></tr><tr><td>8640 min Winter</td><td>1.280</td><td>0.0</td><td>280.6</td><td>5280</td></tr><tr><td>10080 min Winter</td><td>1.139</td><td>0.0</td><td>280.8</td><td>6056</td></tr></table>				Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status	240 min Winter	9.929	0.094	0.0	1.5	1.5	180.2	Flood Risk	360 min Winter	9.937	0.102	0.0	1.6	1.6	194.1	Flood Risk	480 min Winter	9.940	0.105	0.0	1.6	1.6	200.4	Flood Risk	600 min Winter	9.941	0.106	0.0	1.7	1.7	203.0	Flood Risk	720 min Winter	9.942	0.107	0.0	1.7	1.7	203.5	Flood Risk	960 min Winter	9.940	0.105	0.0	1.6	1.6	201.2	Flood Risk	1440 min Winter	9.937	0.102	0.0	1.6	1.6	194.3	Flood Risk	2160 min Winter	9.932	0.097	0.0	1.6	1.6	185.7	Flood Risk	2880 min Winter	9.928	0.093	0.0	1.5	1.5	177.2	Flood Risk	4320 min Winter	9.920	0.085	0.0	1.4	1.4	161.4	Flood Risk	5760 min Winter	9.913	0.078	0.0	1.3	1.3	148.8	Flood Risk	7200 min Winter	9.908	0.073	0.0	1.2	1.2	139.7	Flood Risk	8640 min Winter	9.904	0.069	0.0	1.1	1.1	132.5	Flood Risk	10080 min Winter	9.901	0.066	0.0	1.1	1.1	126.5	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	240 min Winter	25.923	0.0	134.6	262	360 min Winter	18.962	0.0	148.8	370	480 min Winter	15.013	0.0	156.7	482	600 min Winter	12.462	0.0	161.5	596	720 min Winter	10.673	0.0	164.6	706	960 min Winter	8.322	0.0	167.6	918	1440 min Winter	5.832	0.0	166.7	1142	2160 min Winter	4.092	0.0	227.6	1596	2880 min Winter	3.189	0.0	230.7	2044	4320 min Winter	2.249	0.0	226.9	2896	5760 min Winter	1.766	0.0	273.4	3696	7200 min Winter	1.475	0.0	277.9	4480	8640 min Winter	1.280	0.0	280.6	5280	10080 min Winter	1.139	0.0	280.8	6056
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status																																																																																																																																																																																															
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<u>Model Details</u> Storage is Online Cover Level (m) 10.000 <u>Cellular Storage Structure</u> Invert Level (m) 9.835 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.90 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td></tr><tr><td>0.000</td><td>2120.0</td><td>0.0</td><td>0.165</td><td>2120.0</td><td>0.0</td></tr></table> <u>Orifice Outflow Control</u> Diameter (m) 0.053 Discharge Coefficient 0.600 Invert Level (m) 9.835			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	2120.0	0.0	0.165	2120.0	0.0
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)									
0.000	2120.0	0.0	0.165	2120.0	0.0									
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 1408 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>9.875</td><td>0.040</td><td>0.0</td><td>0.3</td><td>0.3</td><td>32.4</td><td>Flood Risk</td></tr><tr><td>30 min Summer</td><td>9.887</td><td>0.052</td><td>0.0</td><td>0.4</td><td>0.4</td><td>41.8</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>9.899</td><td>0.064</td><td>0.0</td><td>0.5</td><td>0.5</td><td>51.4</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>9.912</td><td>0.077</td><td>0.0</td><td>0.5</td><td>0.5</td><td>62.5</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>9.920</td><td>0.085</td><td>0.0</td><td>0.6</td><td>0.6</td><td>69.1</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>9.926</td><td>0.091</td><td>0.0</td><td>0.6</td><td>0.6</td><td>73.4</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>9.932</td><td>0.097</td><td>0.0</td><td>0.6</td><td>0.6</td><td>78.4</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>9.934</td><td>0.099</td><td>0.0</td><td>0.6</td><td>0.6</td><td>80.5</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>9.935</td><td>0.100</td><td>0.0</td><td>0.6</td><td>0.6</td><td>81.4</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>9.936</td><td>0.101</td><td>0.0</td><td>0.6</td><td>0.6</td><td>81.4</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>9.934</td><td>0.099</td><td>0.0</td><td>0.6</td><td>0.6</td><td>80.3</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>9.931</td><td>0.096</td><td>0.0</td><td>0.6</td><td>0.6</td><td>78.1</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>9.928</td><td>0.093</td><td>0.0</td><td>0.6</td><td>0.6</td><td>75.3</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>9.925</td><td>0.090</td><td>0.0</td><td>0.6</td><td>0.6</td><td>72.8</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>9.919</td><td>0.084</td><td>0.0</td><td>0.6</td><td>0.6</td><td>67.8</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>9.913</td><td>0.078</td><td>0.0</td><td>0.5</td><td>0.5</td><td>63.5</td><td>Flood Risk</td></tr><tr><td>7200 min Summer</td><td>9.909</td><td>0.074</td><td>0.0</td><td>0.5</td><td>0.5</td><td>60.0</td><td>Flood Risk</td></tr><tr><td>8640 min Summer</td><td>9.905</td><td>0.070</td><td>0.0</td><td>0.5</td><td>0.5</td><td>57.0</td><td>Flood Risk</td></tr><tr><td>10080 min Summer</td><td>9.902</td><td>0.067</td><td>0.0</td><td>0.5</td><td>0.5</td><td>54.4</td><td>Flood Risk</td></tr><tr><td>15 min Winter</td><td>9.880</td><td>0.045</td><td>0.0</td><td>0.4</td><td>0.4</td><td>36.2</td><td>Flood Risk</td></tr><tr><td>30 min Winter</td><td>9.893</td><td>0.058</td><td>0.0</td><td>0.4</td><td>0.4</td><td>46.8</td><td>Flood Risk</td></tr><tr><td>60 min Winter</td><td>9.906</td><td>0.071</td><td>0.0</td><td>0.5</td><td>0.5</td><td>57.6</td><td>Flood Risk</td></tr><tr><td>120 min Winter</td><td>9.922</td><td>0.087</td><td>0.0</td><td>0.6</td><td>0.6</td><td>70.1</td><td>Flood Risk</td></tr><tr><td>180 min Winter</td><td>9.931</td><td>0.096</td><td>0.0</td><td>0.6</td><td>0.6</td><td>77.5</td><td>Flood Risk</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>173.460</td><td>0.0</td><td>15.8</td><td>19</td></tr><tr><td>30 min Summer</td><td>112.490</td><td>0.0</td><td>22.1</td><td>34</td></tr><tr><td>60 min Summer</td><td>69.747</td><td>0.0</td><td>38.9</td><td>64</td></tr><tr><td>120 min Summer</td><td>43.014</td><td>0.0</td><td>48.8</td><td>124</td></tr><tr><td>180 min Summer</td><td>32.102</td><td>0.0</td><td>54.9</td><td>182</td></tr><tr><td>240 min Summer</td><td>25.923</td><td>0.0</td><td>59.0</td><td>242</td></tr><tr><td>360 min Summer</td><td>18.962</td><td>0.0</td><td>64.4</td><td>362</td></tr><tr><td>480 min Summer</td><td>15.013</td><td>0.0</td><td>67.4</td><td>482</td></tr><tr><td>600 min Summer</td><td>12.462</td><td>0.0</td><td>69.2</td><td>602</td></tr><tr><td>720 min Summer</td><td>10.673</td><td>0.0</td><td>70.4</td><td>720</td></tr><tr><td>960 min Summer</td><td>8.322</td><td>0.0</td><td>71.3</td><td>894</td></tr><tr><td>1440 min Summer</td><td>5.832</td><td>0.0</td><td>70.2</td><td>1112</td></tr><tr><td>2160 min Summer</td><td>4.092</td><td>0.0</td><td>98.1</td><td>1492</td></tr><tr><td>2880 min Summer</td><td>3.189</td><td>0.0</td><td>100.5</td><td>1904</td></tr><tr><td>4320 min Summer</td><td>2.249</td><td>0.0</td><td>101.1</td><td>2724</td></tr><tr><td>5760 min Summer</td><td>1.766</td><td>0.0</td><td>121.1</td><td>3520</td></tr><tr><td>7200 min Summer</td><td>1.475</td><td>0.0</td><td>125.7</td><td>4320</td></tr><tr><td>8640 min Summer</td><td>1.280</td><td>0.0</td><td>129.6</td><td>5096</td></tr><tr><td>10080 min Summer</td><td>1.139</td><td>0.0</td><td>132.2</td><td>5848</td></tr><tr><td>15 min Winter</td><td>173.460</td><td>0.0</td><td>18.4</td><td>19</td></tr><tr><td>30 min Winter</td><td>112.490</td><td>0.0</td><td>25.3</td><td>34</td></tr><tr><td>60 min Winter</td><td>69.747</td><td>0.0</td><td>44.1</td><td>64</td></tr><tr><td>120 min Winter</td><td>43.014</td><td>0.0</td><td>55.1</td><td>122</td></tr><tr><td>180 min Winter</td><td>32.102</td><td>0.0</td><td>61.7</td><td>180</td></tr></table>				Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	9.875	0.040	0.0	0.3	0.3	32.4	Flood Risk	30 min Summer	9.887	0.052	0.0	0.4	0.4	41.8	Flood Risk	60 min Summer	9.899	0.064	0.0	0.5	0.5	51.4	Flood Risk	120 min Summer	9.912	0.077	0.0	0.5	0.5	62.5	Flood Risk	180 min Summer	9.920	0.085	0.0	0.6	0.6	69.1	Flood Risk	240 min Summer	9.926	0.091	0.0	0.6	0.6	73.4	Flood Risk	360 min Summer	9.932	0.097	0.0	0.6	0.6	78.4	Flood Risk	480 min Summer	9.934	0.099	0.0	0.6	0.6	80.5	Flood Risk	600 min Summer	9.935	0.100	0.0	0.6	0.6	81.4	Flood Risk	720 min Summer	9.936	0.101	0.0	0.6	0.6	81.4	Flood Risk	960 min Summer	9.934	0.099	0.0	0.6	0.6	80.3	Flood Risk	1440 min Summer	9.931	0.096	0.0	0.6	0.6	78.1	Flood Risk	2160 min Summer	9.928	0.093	0.0	0.6	0.6	75.3	Flood Risk	2880 min Summer	9.925	0.090	0.0	0.6	0.6	72.8	Flood Risk	4320 min Summer	9.919	0.084	0.0	0.6	0.6	67.8	Flood Risk	5760 min Summer	9.913	0.078	0.0	0.5	0.5	63.5	Flood Risk	7200 min Summer	9.909	0.074	0.0	0.5	0.5	60.0	Flood Risk	8640 min Summer	9.905	0.070	0.0	0.5	0.5	57.0	Flood Risk	10080 min Summer	9.902	0.067	0.0	0.5	0.5	54.4	Flood Risk	15 min Winter	9.880	0.045	0.0	0.4	0.4	36.2	Flood Risk	30 min Winter	9.893	0.058	0.0	0.4	0.4	46.8	Flood Risk	60 min Winter	9.906	0.071	0.0	0.5	0.5	57.6	Flood Risk	120 min Winter	9.922	0.087	0.0	0.6	0.6	70.1	Flood Risk	180 min Winter	9.931	0.096	0.0	0.6	0.6	77.5	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	173.460	0.0	15.8	19	30 min Summer	112.490	0.0	22.1	34	60 min Summer	69.747	0.0	38.9	64	120 min Summer	43.014	0.0	48.8	124	180 min Summer	32.102	0.0	54.9	182	240 min Summer	25.923	0.0	59.0	242	360 min Summer	18.962	0.0	64.4	362	480 min Summer	15.013	0.0	67.4	482	600 min Summer	12.462	0.0	69.2	602	720 min Summer	10.673	0.0	70.4	720	960 min Summer	8.322	0.0	71.3	894	1440 min Summer	5.832	0.0	70.2	1112	2160 min Summer	4.092	0.0	98.1	1492	2880 min Summer	3.189	0.0	100.5	1904	4320 min Summer	2.249	0.0	101.1	2724	5760 min Summer	1.766	0.0	121.1	3520	7200 min Summer	1.475	0.0	125.7	4320	8640 min Summer	1.280	0.0	129.6	5096	10080 min Summer	1.139	0.0	132.2	5848	15 min Winter	173.460	0.0	18.4	19	30 min Winter	112.490	0.0	25.3	34	60 min Winter	69.747	0.0	44.1	64	120 min Winter	43.014	0.0	55.1	122	180 min Winter	32.102	0.0	61.7	180
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																																																																																																	
15 min Summer	9.875	0.040	0.0	0.3	0.3	32.4	Flood Risk																																																																																																																																																																																																																																																																																																																																	
30 min Summer	9.887	0.052	0.0	0.4	0.4	41.8	Flood Risk																																																																																																																																																																																																																																																																																																																																	
60 min Summer	9.899	0.064	0.0	0.5	0.5	51.4	Flood Risk																																																																																																																																																																																																																																																																																																																																	
120 min Summer	9.912	0.077	0.0	0.5	0.5	62.5	Flood Risk																																																																																																																																																																																																																																																																																																																																	
180 min Summer	9.920	0.085	0.0	0.6	0.6	69.1	Flood Risk																																																																																																																																																																																																																																																																																																																																	
240 min Summer	9.926	0.091	0.0	0.6	0.6	73.4	Flood Risk																																																																																																																																																																																																																																																																																																																																	
360 min Summer	9.932	0.097	0.0	0.6	0.6	78.4	Flood Risk																																																																																																																																																																																																																																																																																																																																	
480 min Summer	9.934	0.099	0.0	0.6	0.6	80.5	Flood Risk																																																																																																																																																																																																																																																																																																																																	
600 min Summer	9.935	0.100	0.0	0.6	0.6	81.4	Flood Risk																																																																																																																																																																																																																																																																																																																																	
720 min Summer	9.936	0.101	0.0	0.6	0.6	81.4	Flood Risk																																																																																																																																																																																																																																																																																																																																	
960 min Summer	9.934	0.099	0.0	0.6	0.6	80.3	Flood Risk																																																																																																																																																																																																																																																																																																																																	
1440 min Summer	9.931	0.096	0.0	0.6	0.6	78.1	Flood Risk																																																																																																																																																																																																																																																																																																																																	
2160 min Summer	9.928	0.093	0.0	0.6	0.6	75.3	Flood Risk																																																																																																																																																																																																																																																																																																																																	
2880 min Summer	9.925	0.090	0.0	0.6	0.6	72.8	Flood Risk																																																																																																																																																																																																																																																																																																																																	
4320 min Summer	9.919	0.084	0.0	0.6	0.6	67.8	Flood Risk																																																																																																																																																																																																																																																																																																																																	
5760 min Summer	9.913	0.078	0.0	0.5	0.5	63.5	Flood Risk																																																																																																																																																																																																																																																																																																																																	
7200 min Summer	9.909	0.074	0.0	0.5	0.5	60.0	Flood Risk																																																																																																																																																																																																																																																																																																																																	
8640 min Summer	9.905	0.070	0.0	0.5	0.5	57.0	Flood Risk																																																																																																																																																																																																																																																																																																																																	
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15 min Winter	9.880	0.045	0.0	0.4	0.4	36.2	Flood Risk																																																																																																																																																																																																																																																																																																																																	
30 min Winter	9.893	0.058	0.0	0.4	0.4	46.8	Flood Risk																																																																																																																																																																																																																																																																																																																																	
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120 min Winter	9.922	0.087	0.0	0.6	0.6	70.1	Flood Risk																																																																																																																																																																																																																																																																																																																																	
180 min Winter	9.931	0.096	0.0	0.6	0.6	77.5	Flood Risk																																																																																																																																																																																																																																																																																																																																	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																																																																				
15 min Summer	173.460	0.0	15.8	19																																																																																																																																																																																																																																																																																																																																				
30 min Summer	112.490	0.0	22.1	34																																																																																																																																																																																																																																																																																																																																				
60 min Summer	69.747	0.0	38.9	64																																																																																																																																																																																																																																																																																																																																				
120 min Summer	43.014	0.0	48.8	124																																																																																																																																																																																																																																																																																																																																				
180 min Summer	32.102	0.0	54.9	182																																																																																																																																																																																																																																																																																																																																				
240 min Summer	25.923	0.0	59.0	242																																																																																																																																																																																																																																																																																																																																				
360 min Summer	18.962	0.0	64.4	362																																																																																																																																																																																																																																																																																																																																				
480 min Summer	15.013	0.0	67.4	482																																																																																																																																																																																																																																																																																																																																				
600 min Summer	12.462	0.0	69.2	602																																																																																																																																																																																																																																																																																																																																				
720 min Summer	10.673	0.0	70.4	720																																																																																																																																																																																																																																																																																																																																				
960 min Summer	8.322	0.0	71.3	894																																																																																																																																																																																																																																																																																																																																				
1440 min Summer	5.832	0.0	70.2	1112																																																																																																																																																																																																																																																																																																																																				
2160 min Summer	4.092	0.0	98.1	1492																																																																																																																																																																																																																																																																																																																																				
2880 min Summer	3.189	0.0	100.5	1904																																																																																																																																																																																																																																																																																																																																				
4320 min Summer	2.249	0.0	101.1	2724																																																																																																																																																																																																																																																																																																																																				
5760 min Summer	1.766	0.0	121.1	3520																																																																																																																																																																																																																																																																																																																																				
7200 min Summer	1.475	0.0	125.7	4320																																																																																																																																																																																																																																																																																																																																				
8640 min Summer	1.280	0.0	129.6	5096																																																																																																																																																																																																																																																																																																																																				
10080 min Summer	1.139	0.0	132.2	5848																																																																																																																																																																																																																																																																																																																																				
15 min Winter	173.460	0.0	18.4	19																																																																																																																																																																																																																																																																																																																																				
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60 min Winter	69.747	0.0	44.1	64																																																																																																																																																																																																																																																																																																																																				
120 min Winter	43.014	0.0	55.1	122																																																																																																																																																																																																																																																																																																																																				
180 min Winter	32.102	0.0	61.7	180																																																																																																																																																																																																																																																																																																																																				
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Pitman Associates Ltd

South Lodge

Exminster

Devon EX6 8AT

Date 21/09/2022 16:55

File Proposed Podium 1000m2.SRCX

Designed by Karl

Checked by

XP Solutions

Source Control 2020.1

Page 2



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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	9.937	0.102	0.0	0.6	0.6	82.4	Flood Risk
360 min Winter	9.944	0.109	0.0	0.7	0.7	88.1	Flood Risk
480 min Winter	9.947	0.112	0.0	0.7	0.7	90.7	Flood Risk
600 min Winter	9.948	0.113	0.0	0.7	0.7	91.8	Flood Risk
720 min Winter	9.949	0.114	0.0	0.7	0.7	92.0	Flood Risk
960 min Winter	9.947	0.112	0.0	0.7	0.7	91.1	Flood Risk
1440 min Winter	9.943	0.108	0.0	0.6	0.6	87.6	Flood Risk
2160 min Winter	9.938	0.103	0.0	0.6	0.6	83.6	Flood Risk
2880 min Winter	9.933	0.098	0.0	0.6	0.6	79.6	Flood Risk
4320 min Winter	9.924	0.089	0.0	0.6	0.6	72.1	Flood Risk
5760 min Winter	9.916	0.081	0.0	0.5	0.5	65.6	Flood Risk
7200 min Winter	9.910	0.075	0.0	0.5	0.5	60.4	Flood Risk
8640 min Winter	9.904	0.069	0.0	0.5	0.5	56.1	Flood Risk
10080 min Winter	9.900	0.065	0.0	0.5	0.5	52.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	25.923	0.0	66.3	240
360 min Winter	18.962	0.0	72.1	356
480 min Winter	15.013	0.0	75.2	472
600 min Winter	12.462	0.0	77.1	584
720 min Winter	10.673	0.0	78.1	698
960 min Winter	8.322	0.0	78.8	914
1440 min Winter	5.832	0.0	76.9	1154
2160 min Winter	4.092	0.0	110.3	1604
2880 min Winter	3.189	0.0	112.8	2048
4320 min Winter	2.249	0.0	113.3	2936
5760 min Winter	1.766	0.0	136.2	3752
7200 min Winter	1.475	0.0	141.4	4544
8640 min Winter	1.280	0.0	145.9	5360
10080 min Winter	1.139	0.0	149.0	6144

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South Lodge Exminster Devon EX6 8AT																																
Date 21/09/2022 16:55	Designed by Karl																															
File Proposed Podium 1000m2.SRCX	Checked by																															
XP Solutions	Source Control 2020.1																															
<u>Rainfall Details</u> <table><tr><td>Rainfall Model</td><td>FEH</td></tr><tr><td>Return Period (years)</td><td>100</td></tr><tr><td>FEH Rainfall Version</td><td>2013</td></tr><tr><td>Site Location</td><td>GB 561475 174841 TQ 61475 74841</td></tr><tr><td>Data Type</td><td>Point</td></tr><tr><td>Summer Storms</td><td>Yes</td></tr><tr><td>Winter Storms</td><td>Yes</td></tr><tr><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>Shortest Storm (mins)</td><td>15</td></tr><tr><td>Longest Storm (mins)</td><td>10080</td></tr><tr><td>Climate Change %</td><td>+40</td></tr></table> <u>Time Area Diagram</u> Total Area (ha) 0.100 <table><tr><td>Time (mins)</td><td>Area</td></tr><tr><td>From: To:</td><td>(ha)</td></tr><tr><td>0 4</td><td>0.100</td></tr></table>			Rainfall Model	FEH	Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 561475 174841 TQ 61475 74841	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 (mins)	Area	From: To:	(ha)	0 4	0.100
Rainfall Model	FEH																															
Return Period (years)	100																															
FEH Rainfall Version	2013																															
Site Location	GB 561475 174841 TQ 61475 74841																															
Data Type	Point																															
Summer Storms	Yes																															
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Climate Change %	+40																															
Time (mins)	Area																															
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South Lodge Exminster Devon EX6 8AT														
Date 21/09/2022 16:55	Designed by Karl													
File Proposed Podium 1000m2.SRCX	Checked by													
XP Solutions	Source Control 2020.1													
<u>Model Details</u> Storage is Online Cover Level (m) 10.000 <u>Cellular Storage Structure</u> Invert Level (m) 9.835 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.90 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>900.0</td><td>0.0</td><td>0.165</td><td>900.0</td><td>0.0</td></tr></table> <u>Orifice Outflow Control</u> Diameter (m) 0.032 Discharge Coefficient 0.600 Invert Level (m) 9.835			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	900.0	0.0	0.165	900.0	0.0
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)									
0.000	900.0	0.0	0.165	900.0	0.0									
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 1389 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>9.875</td><td>0.040</td><td>0.0</td><td>0.5</td><td>0.5</td><td>69.7</td><td>Flood Risk</td></tr><tr><td>30 min Summer</td><td>9.886</td><td>0.051</td><td>0.0</td><td>0.7</td><td>0.7</td><td>90.1</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>9.898</td><td>0.063</td><td>0.0</td><td>1.0</td><td>1.0</td><td>110.9</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>9.912</td><td>0.077</td><td>0.0</td><td>1.2</td><td>1.2</td><td>134.6</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>9.920</td><td>0.085</td><td>0.0</td><td>1.3</td><td>1.3</td><td>148.4</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>9.925</td><td>0.090</td><td>0.0</td><td>1.4</td><td>1.4</td><td>157.5</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>9.931</td><td>0.096</td><td>0.0</td><td>1.4</td><td>1.4</td><td>168.0</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>9.933</td><td>0.098</td><td>0.0</td><td>1.5</td><td>1.5</td><td>172.4</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>9.934</td><td>0.099</td><td>0.0</td><td>1.5</td><td>1.5</td><td>173.8</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>9.934</td><td>0.099</td><td>0.0</td><td>1.5</td><td>1.5</td><td>173.7</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>9.933</td><td>0.098</td><td>0.0</td><td>1.5</td><td>1.5</td><td>171.5</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>9.931</td><td>0.096</td><td>0.0</td><td>1.4</td><td>1.4</td><td>167.7</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>9.928</td><td>0.093</td><td>0.0</td><td>1.4</td><td>1.4</td><td>162.7</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>9.925</td><td>0.090</td><td>0.0</td><td>1.4</td><td>1.4</td><td>157.9</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>9.920</td><td>0.085</td><td>0.0</td><td>1.3</td><td>1.3</td><td>148.6</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>9.915</td><td>0.080</td><td>0.0</td><td>1.3</td><td>1.3</td><td>140.5</td><td>Flood Risk</td></tr><tr><td>7200 min Summer</td><td>9.911</td><td>0.076</td><td>0.0</td><td>1.2</td><td>1.2</td><td>134.0</td><td>Flood Risk</td></tr><tr><td>8640 min Summer</td><td>9.908</td><td>0.073</td><td>0.0</td><td>1.2</td><td>1.2</td><td>128.7</td><td>Flood Risk</td></tr><tr><td>10080 min Summer</td><td>9.906</td><td>0.071</td><td>0.0</td><td>1.1</td><td>1.1</td><td>124.5</td><td>Flood Risk</td></tr><tr><td>15 min Winter</td><td>9.879</td><td>0.044</td><td>0.0</td><td>0.6</td><td>0.6</td><td>78.0</td><td>Flood Risk</td></tr><tr><td>30 min Winter</td><td>9.892</td><td>0.057</td><td>0.0</td><td>0.8</td><td>0.8</td><td>100.8</td><td>Flood Risk</td></tr><tr><td>60 min Winter</td><td>9.906</td><td>0.071</td><td>0.0</td><td>1.1</td><td>1.1</td><td>124.1</td><td>Flood Risk</td></tr><tr><td>120 min Winter</td><td>9.921</td><td>0.086</td><td>0.0</td><td>1.3</td><td>1.3</td><td>150.8</td><td>Flood Risk</td></tr><tr><td>180 min Winter</td><td>9.930</td><td>0.095</td><td>0.0</td><td>1.4</td><td>1.4</td><td>166.5</td><td>Flood Risk</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>173.460</td><td>0.0</td><td>27.2</td><td>19</td></tr><tr><td>30 min Summer</td><td>112.490</td><td>0.0</td><td>39.1</td><td>34</td></tr><tr><td>60 min Summer</td><td>69.747</td><td>0.0</td><td>73.7</td><td>64</td></tr><tr><td>120 min Summer</td><td>43.014</td><td>0.0</td><td>95.6</td><td>124</td></tr><tr><td>180 min Summer</td><td>32.102</td><td>0.0</td><td>109.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>25.923</td><td>0.0</td><td>118.4</td><td>242</td></tr><tr><td>360 min Summer</td><td>18.962</td><td>0.0</td><td>130.4</td><td>362</td></tr><tr><td>480 min Summer</td><td>15.013</td><td>0.0</td><td>137.3</td><td>482</td></tr><tr><td>600 min Summer</td><td>12.462</td><td>0.0</td><td>141.7</td><td>600</td></tr><tr><td>720 min Summer</td><td>10.673</td><td>0.0</td><td>144.6</td><td>720</td></tr><tr><td>960 min Summer</td><td>8.322</td><td>0.0</td><td>147.7</td><td>830</td></tr><tr><td>1440 min Summer</td><td>5.832</td><td>0.0</td><td>148.4</td><td>1068</td></tr><tr><td>2160 min Summer</td><td>4.092</td><td>0.0</td><td>201.8</td><td>1468</td></tr><tr><td>2880 min Summer</td><td>3.189</td><td>0.0</td><td>206.8</td><td>1872</td></tr><tr><td>4320 min Summer</td><td>2.249</td><td>0.0</td><td>208.3</td><td>2680</td></tr><tr><td>5760 min Summer</td><td>1.766</td><td>0.0</td><td>253.5</td><td>3464</td></tr><tr><td>7200 min Summer</td><td>1.475</td><td>0.0</td><td>262.4</td><td>4248</td></tr><tr><td>8640 min Summer</td><td>1.280</td><td>0.0</td><td>269.5</td><td>5008</td></tr><tr><td>10080 min Summer</td><td>1.139</td><td>0.0</td><td>273.9</td><td>5744</td></tr><tr><td>15 min Winter</td><td>173.460</td><td>0.0</td><td>32.1</td><td>19</td></tr><tr><td>30 min Winter</td><td>112.490</td><td>0.0</td><td>45.6</td><td>34</td></tr><tr><td>60 min Winter</td><td>69.747</td><td>0.0</td><td>85.1</td><td>64</td></tr><tr><td>120 min Winter</td><td>43.014</td><td>0.0</td><td>109.5</td><td>122</td></tr><tr><td>180 min Winter</td><td>32.102</td><td>0.0</td><td>124.4</td><td>180</td></tr></tbody></table>				Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	9.875	0.040	0.0	0.5	0.5	69.7	Flood Risk	30 min Summer	9.886	0.051	0.0	0.7	0.7	90.1	Flood Risk	60 min Summer	9.898	0.063	0.0	1.0	1.0	110.9	Flood Risk	120 min Summer	9.912	0.077	0.0	1.2	1.2	134.6	Flood Risk	180 min Summer	9.920	0.085	0.0	1.3	1.3	148.4	Flood Risk	240 min Summer	9.925	0.090	0.0	1.4	1.4	157.5	Flood Risk	360 min Summer	9.931	0.096	0.0	1.4	1.4	168.0	Flood Risk	480 min Summer	9.933	0.098	0.0	1.5	1.5	172.4	Flood Risk	600 min Summer	9.934	0.099	0.0	1.5	1.5	173.8	Flood Risk	720 min Summer	9.934	0.099	0.0	1.5	1.5	173.7	Flood Risk	960 min Summer	9.933	0.098	0.0	1.5	1.5	171.5	Flood Risk	1440 min Summer	9.931	0.096	0.0	1.4	1.4	167.7	Flood Risk	2160 min Summer	9.928	0.093	0.0	1.4	1.4	162.7	Flood Risk	2880 min Summer	9.925	0.090	0.0	1.4	1.4	157.9	Flood Risk	4320 min Summer	9.920	0.085	0.0	1.3	1.3	148.6	Flood Risk	5760 min Summer	9.915	0.080	0.0	1.3	1.3	140.5	Flood Risk	7200 min Summer	9.911	0.076	0.0	1.2	1.2	134.0	Flood Risk	8640 min Summer	9.908	0.073	0.0	1.2	1.2	128.7	Flood Risk	10080 min Summer	9.906	0.071	0.0	1.1	1.1	124.5	Flood Risk	15 min Winter	9.879	0.044	0.0	0.6	0.6	78.0	Flood Risk	30 min Winter	9.892	0.057	0.0	0.8	0.8	100.8	Flood Risk	60 min Winter	9.906	0.071	0.0	1.1	1.1	124.1	Flood Risk	120 min Winter	9.921	0.086	0.0	1.3	1.3	150.8	Flood Risk	180 min Winter	9.930	0.095	0.0	1.4	1.4	166.5	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	173.460	0.0	27.2	19	30 min Summer	112.490	0.0	39.1	34	60 min Summer	69.747	0.0	73.7	64	120 min Summer	43.014	0.0	95.6	124	180 min Summer	32.102	0.0	109.0	182	240 min Summer	25.923	0.0	118.4	242	360 min Summer	18.962	0.0	130.4	362	480 min Summer	15.013	0.0	137.3	482	600 min Summer	12.462	0.0	141.7	600	720 min Summer	10.673	0.0	144.6	720	960 min Summer	8.322	0.0	147.7	830	1440 min Summer	5.832	0.0	148.4	1068	2160 min Summer	4.092	0.0	201.8	1468	2880 min Summer	3.189	0.0	206.8	1872	4320 min Summer	2.249	0.0	208.3	2680	5760 min Summer	1.766	0.0	253.5	3464	7200 min Summer	1.475	0.0	262.4	4248	8640 min Summer	1.280	0.0	269.5	5008	10080 min Summer	1.139	0.0	273.9	5744	15 min Winter	173.460	0.0	32.1	19	30 min Winter	112.490	0.0	45.6	34	60 min Winter	69.747	0.0	85.1	64	120 min Winter	43.014	0.0	109.5	122	180 min Winter	32.102	0.0	124.4	180
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																																																																																																	
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<u>Summary of Results for 100 year Return Period (+40%)</u> <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max E Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>240 min Winter</td><td>9.936</td><td>0.101</td><td>0.0</td><td>1.5</td><td>1.5</td><td>176.8</td><td>Flood Risk</td></tr><tr><td>360 min Winter</td><td>9.943</td><td>0.108</td><td>0.0</td><td>1.6</td><td>1.6</td><td>188.8</td><td>Flood Risk</td></tr><tr><td>480 min Winter</td><td>9.946</td><td>0.111</td><td>0.0</td><td>1.6</td><td>1.6</td><td>194.0</td><td>Flood Risk</td></tr><tr><td>600 min Winter</td><td>9.947</td><td>0.112</td><td>0.0</td><td>1.6</td><td>1.6</td><td>196.1</td><td>Flood Risk</td></tr><tr><td>720 min Winter</td><td>9.947</td><td>0.112</td><td>0.0</td><td>1.6</td><td>1.6</td><td>196.4</td><td>Flood Risk</td></tr><tr><td>960 min Winter</td><td>9.946</td><td>0.111</td><td>0.0</td><td>1.6</td><td>1.6</td><td>194.0</td><td>Flood Risk</td></tr><tr><td>1440 min Winter</td><td>9.942</td><td>0.107</td><td>0.0</td><td>1.5</td><td>1.5</td><td>187.6</td><td>Flood Risk</td></tr><tr><td>2160 min Winter</td><td>9.937</td><td>0.102</td><td>0.0</td><td>1.5</td><td>1.5</td><td>179.5</td><td>Flood Risk</td></tr><tr><td>2880 min Winter</td><td>9.933</td><td>0.098</td><td>0.0</td><td>1.5</td><td>1.5</td><td>171.4</td><td>Flood Risk</td></tr><tr><td>4320 min Winter</td><td>9.924</td><td>0.089</td><td>0.0</td><td>1.4</td><td>1.4</td><td>156.2</td><td>Flood Risk</td></tr><tr><td>5760 min Winter</td><td>9.917</td><td>0.082</td><td>0.0</td><td>1.3</td><td>1.3</td><td>143.7</td><td>Flood Risk</td></tr><tr><td>7200 min Winter</td><td>9.911</td><td>0.076</td><td>0.0</td><td>1.2</td><td>1.2</td><td>134.1</td><td>Flood Risk</td></tr><tr><td>8640 min Winter</td><td>9.907</td><td>0.072</td><td>0.0</td><td>1.2</td><td>1.2</td><td>126.6</td><td>Flood Risk</td></tr><tr><td>10080 min Winter</td><td>9.904</td><td>0.069</td><td>0.0</td><td>1.1</td><td>1.1</td><td>120.8</td><td>Flood Risk</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>240 min Winter</td><td>25.923</td><td>0.0</td><td>134.6</td><td>238</td></tr><tr><td>360 min Winter</td><td>18.962</td><td>0.0</td><td>147.9</td><td>356</td></tr><tr><td>480 min Winter</td><td>15.013</td><td>0.0</td><td>155.5</td><td>470</td></tr><tr><td>600 min Winter</td><td>12.462</td><td>0.0</td><td>160.3</td><td>584</td></tr><tr><td>720 min Winter</td><td>10.673</td><td>0.0</td><td>163.5</td><td>694</td></tr><tr><td>960 min Winter</td><td>8.322</td><td>0.0</td><td>166.9</td><td>904</td></tr><tr><td>1440 min Winter</td><td>5.832</td><td>0.0</td><td>167.2</td><td>1124</td></tr><tr><td>2160 min Winter</td><td>4.092</td><td>0.0</td><td>228.3</td><td>1576</td></tr><tr><td>2880 min Winter</td><td>3.189</td><td>0.0</td><td>234.0</td><td>2020</td></tr><tr><td>4320 min Winter</td><td>2.249</td><td>0.0</td><td>235.7</td><td>2856</td></tr><tr><td>5760 min Winter</td><td>1.766</td><td>0.0</td><td>285.8</td><td>3688</td></tr><tr><td>7200 min Winter</td><td>1.475</td><td>0.0</td><td>296.0</td><td>4464</td></tr><tr><td>8640 min Winter</td><td>1.280</td><td>0.0</td><td>304.2</td><td>5192</td></tr><tr><td>10080 min Winter</td><td>1.139</td><td>0.0</td><td>309.4</td><td>5952</td></tr></table>				Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status	240 min Winter	9.936	0.101	0.0	1.5	1.5	176.8	Flood Risk	360 min Winter	9.943	0.108	0.0	1.6	1.6	188.8	Flood Risk	480 min Winter	9.946	0.111	0.0	1.6	1.6	194.0	Flood Risk	600 min Winter	9.947	0.112	0.0	1.6	1.6	196.1	Flood Risk	720 min Winter	9.947	0.112	0.0	1.6	1.6	196.4	Flood Risk	960 min Winter	9.946	0.111	0.0	1.6	1.6	194.0	Flood Risk	1440 min Winter	9.942	0.107	0.0	1.5	1.5	187.6	Flood Risk	2160 min Winter	9.937	0.102	0.0	1.5	1.5	179.5	Flood Risk	2880 min Winter	9.933	0.098	0.0	1.5	1.5	171.4	Flood Risk	4320 min Winter	9.924	0.089	0.0	1.4	1.4	156.2	Flood Risk	5760 min Winter	9.917	0.082	0.0	1.3	1.3	143.7	Flood Risk	7200 min Winter	9.911	0.076	0.0	1.2	1.2	134.1	Flood Risk	8640 min Winter	9.907	0.072	0.0	1.2	1.2	126.6	Flood Risk	10080 min Winter	9.904	0.069	0.0	1.1	1.1	120.8	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	240 min Winter	25.923	0.0	134.6	238	360 min Winter	18.962	0.0	147.9	356	480 min Winter	15.013	0.0	155.5	470	600 min Winter	12.462	0.0	160.3	584	720 min Winter	10.673	0.0	163.5	694	960 min Winter	8.322	0.0	166.9	904	1440 min Winter	5.832	0.0	167.2	1124	2160 min Winter	4.092	0.0	228.3	1576	2880 min Winter	3.189	0.0	234.0	2020	4320 min Winter	2.249	0.0	235.7	2856	5760 min Winter	1.766	0.0	285.8	3688	7200 min Winter	1.475	0.0	296.0	4464	8640 min Winter	1.280	0.0	304.2	5192	10080 min Winter	1.139	0.0	309.4	5952
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<u>Rainfall Details</u> <table><tr><td>Rainfall Model</td><td>FEH</td></tr><tr><td>Return Period (years)</td><td>100</td></tr><tr><td>FEH Rainfall Version</td><td>2013</td></tr><tr><td>Site Location</td><td>GB 561475 174841 TQ 61475 74841</td></tr><tr><td>Data Type</td><td>Point</td></tr><tr><td>Summer Storms</td><td>Yes</td></tr><tr><td>Winter Storms</td><td>Yes</td></tr><tr><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>Shortest Storm (mins)</td><td>15</td></tr><tr><td>Longest Storm (mins)</td><td>10080</td></tr><tr><td>Climate Change %</td><td>+40</td></tr></table> <u>Time Area Diagram</u> Total Area (ha) 0.215 <table><tr><td>Time (mins)</td><td>Area</td></tr><tr><td>From: To:</td><td>(ha)</td></tr><tr><td>0 4</td><td>0.215</td></tr></table>			Rainfall Model	FEH	Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 561475 174841 TQ 61475 74841	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 (mins)	Area	From: To:	(ha)	0 4	0.215
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<u>Model Details</u> Storage is Online Cover Level (m) 10.000 <u>Cellular Storage Structure</u> Invert Level (m) 9.835 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.90 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>1950.0</td><td>0.0</td><td>0.165</td><td>1950.0</td><td>0.0</td></tr></table> <u>Orifice Outflow Control</u> Diameter (m) 0.051 Discharge Coefficient 0.600 Invert Level (m) 9.835			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	1950.0	0.0	0.165	1950.0	0.0
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)									
0.000	1950.0	0.0	0.165	1950.0	0.0									
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<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	9.721	0.221	10.0	264.2	Flood Risk
30 min Summer	9.774	0.274	10.0	340.4	Flood Risk
60 min Summer	9.822	0.322	10.0	415.1	Flood Risk
120 min Summer	9.871	0.371	10.0	495.9	Flood Risk
180 min Summer	9.895	0.395	10.0	538.4	Flood Risk
240 min Summer	9.908	0.408	10.0	562.1	Flood Risk
360 min Summer	9.918	0.418	10.0	578.7	Flood Risk
480 min Summer	9.914	0.414	10.0	572.2	Flood Risk
600 min Summer	9.907	0.407	10.0	560.2	Flood Risk
720 min Summer	9.900	0.400	10.0	546.5	Flood Risk
960 min Summer	9.882	0.382	10.0	515.7	Flood Risk
1440 min Summer	9.847	0.347	10.0	455.6	Flood Risk
2160 min Summer	9.799	0.299	10.0	378.6	Flood Risk
2880 min Summer	9.757	0.257	10.0	316.1	Flood Risk
4320 min Summer	9.695	0.195	9.9	227.9	O K
5760 min Summer	9.658	0.158	9.7	179.4	O K
7200 min Summer	9.640	0.140	8.7	157.5	O K
8640 min Summer	9.629	0.129	7.9	142.7	O K
10080 min Summer	9.620	0.120	7.2	131.9	O K
15 min Winter	9.721	0.221	10.0	264.2	Flood Risk
30 min Winter	9.774	0.274	10.0	340.5	Flood Risk
60 min Winter	9.822	0.322	10.0	415.2	Flood Risk
120 min Winter	9.870	0.370	10.0	495.8	Flood Risk
180 min Winter	9.895	0.395	10.0	538.2	Flood Risk
240 min Winter	9.908	0.408	10.0	561.7	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	173.460	0.0	254.6	28	
30 min Summer	112.490	0.0	333.6	42	
60 min Summer	69.747	0.0	431.1	70	
120 min Summer	43.014	0.0	533.1	128	
180 min Summer	32.102	0.0	597.4	188	
240 min Summer	25.923	0.0	643.5	246	
360 min Summer	18.962	0.0	706.2	362	
480 min Summer	15.013	0.0	745.4	460	
600 min Summer	12.462	0.0	773.2	512	
720 min Summer	10.673	0.0	794.3	572	
960 min Summer	8.322	0.0	825.0	688	
1440 min Summer	5.832	0.0	864.9	946	
2160 min Summer	4.092	0.0	925.5	1332	
2880 min Summer	3.189	0.0	960.8	1708	
4320 min Summer	2.249	0.0	1011.8	2388	
5760 min Summer	1.766	0.0	1068.9	3064	
7200 min Summer	1.475	0.0	1115.4	3752	
8640 min Summer	1.280	0.0	1159.2	4496	
10080 min Summer	1.139	0.0	1199.1	5240	
15 min Winter	173.460	0.0	254.6	28	
30 min Winter	112.490	0.0	333.6	42	
60 min Winter	69.747	0.0	431.1	70	
120 min Winter	43.014	0.0	533.1	126	
180 min Winter	32.102	0.0	597.4	184	
240 min Winter	25.923	0.0	643.5	240	
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<u>Summary of Results for 100 year Return Period (+40%)</u> <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Control (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>360 min Winter</td><td>9.917</td><td>0.417</td><td>10.0</td><td>578.4</td><td>Flood Risk</td></tr><tr><td>480 min Winter</td><td>9.914</td><td>0.414</td><td>10.0</td><td>572.1</td><td>Flood Risk</td></tr><tr><td>600 min Winter</td><td>9.905</td><td>0.405</td><td>10.0</td><td>556.0</td><td>Flood Risk</td></tr><tr><td>720 min Winter</td><td>9.894</td><td>0.394</td><td>10.0</td><td>537.4</td><td>Flood Risk</td></tr><tr><td>960 min Winter</td><td>9.872</td><td>0.372</td><td>10.0</td><td>499.0</td><td>Flood Risk</td></tr><tr><td>1440 min Winter</td><td>9.825</td><td>0.325</td><td>10.0</td><td>419.8</td><td>Flood Risk</td></tr><tr><td>2160 min Winter</td><td>9.758</td><td>0.258</td><td>10.0</td><td>317.3</td><td>Flood Risk</td></tr><tr><td>2880 min Winter</td><td>9.704</td><td>0.204</td><td>10.0</td><td>240.5</td><td>Flood Risk</td></tr><tr><td>4320 min Winter</td><td>9.646</td><td>0.146</td><td>9.1</td><td>163.9</td><td>O K</td></tr><tr><td>5760 min Winter</td><td>9.623</td><td>0.123</td><td>7.4</td><td>136.0</td><td>O K</td></tr><tr><td>7200 min Winter</td><td>9.610</td><td>0.110</td><td>6.3</td><td>120.3</td><td>O K</td></tr><tr><td>8640 min Winter</td><td>9.601</td><td>0.101</td><td>5.5</td><td>109.5</td><td>O K</td></tr><tr><td>10080 min Winter</td><td>9.594</td><td>0.094</td><td>5.0</td><td>101.6</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>360 min Winter</td><td>18.962</td><td>0.0</td><td>706.2</td><td>354</td></tr><tr><td>480 min Winter</td><td>15.013</td><td>0.0</td><td>745.5</td><td>462</td></tr><tr><td>600 min Winter</td><td>12.462</td><td>0.0</td><td>773.3</td><td>562</td></tr><tr><td>720 min Winter</td><td>10.673</td><td>0.0</td><td>794.5</td><td>584</td></tr><tr><td>960 min Winter</td><td>8.322</td><td>0.0</td><td>825.3</td><td>726</td></tr><tr><td>1440 min Winter</td><td>5.832</td><td>0.0</td><td>865.4</td><td>1010</td></tr><tr><td>2160 min Winter</td><td>4.092</td><td>0.0</td><td>925.6</td><td>1404</td></tr><tr><td>2880 min Winter</td><td>3.189</td><td>0.0</td><td>960.9</td><td>1756</td></tr><tr><td>4320 min Winter</td><td>2.249</td><td>0.0</td><td>1012.2</td><td>2380</td></tr><tr><td>5760 min Winter</td><td>1.766</td><td>0.0</td><td>1068.9</td><td>3064</td></tr><tr><td>7200 min Winter</td><td>1.475</td><td>0.0</td><td>1115.5</td><td>3816</td></tr><tr><td>8640 min Winter</td><td>1.280</td><td>0.0</td><td>1159.4</td><td>4504</td></tr><tr><td>10080 min Winter</td><td>1.139</td><td>0.0</td><td>1199.9</td><td>5240</td></tr></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status	360 min Winter	9.917	0.417	10.0	578.4	Flood Risk	480 min Winter	9.914	0.414	10.0	572.1	Flood Risk	600 min Winter	9.905	0.405	10.0	556.0	Flood Risk	720 min Winter	9.894	0.394	10.0	537.4	Flood Risk	960 min Winter	9.872	0.372	10.0	499.0	Flood Risk	1440 min Winter	9.825	0.325	10.0	419.8	Flood Risk	2160 min Winter	9.758	0.258	10.0	317.3	Flood Risk	2880 min Winter	9.704	0.204	10.0	240.5	Flood Risk	4320 min Winter	9.646	0.146	9.1	163.9	O K	5760 min Winter	9.623	0.123	7.4	136.0	O K	7200 min Winter	9.610	0.110	6.3	120.3	O K	8640 min Winter	9.601	0.101	5.5	109.5	O K	10080 min Winter	9.594	0.094	5.0	101.6	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	360 min Winter	18.962	0.0	706.2	354	480 min Winter	15.013	0.0	745.5	462	600 min Winter	12.462	0.0	773.3	562	720 min Winter	10.673	0.0	794.5	584	960 min Winter	8.322	0.0	825.3	726	1440 min Winter	5.832	0.0	865.4	1010	2160 min Winter	4.092	0.0	925.6	1404	2880 min Winter	3.189	0.0	960.9	1756	4320 min Winter	2.249	0.0	1012.2	2380	5760 min Winter	1.766	0.0	1068.9	3064	7200 min Winter	1.475	0.0	1115.5	3816	8640 min Winter	1.280	0.0	1159.4	4504	10080 min Winter	1.139	0.0	1199.9	5240
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Model Details Storage is Online Cover Level (m) 10.000 Tank or Pond Structure Invert Level (m) 9.500 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr><tr><td>0.000</td><td>1000.0</td><td>0.500</td><td>2000.0</td></tr></table> Hydro-Brake® Optimum Outflow Control <table><tr><td>Unit Reference</td><td>MD-SHE-0152-1000-0500-1000</td></tr><tr><td>Design Head (m)</td><td>0.500</td></tr><tr><td>Design Flow (l/s)</td><td>10.0</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>152</td></tr><tr><td>Invert Level (m)</td><td>9.500</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td>225</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><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>0.500</td><td>10.0</td><td>Kick-Flo®</td><td>0.396</td><td>9.0</td></tr><tr><td>Flush-Flo™</td><td>0.225</td><td>10.0</td><td>Mean Flow over Head Range</td><td>-</td><td>7.9</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><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>5.5</td><td>0.800</td><td>12.5</td><td>2.000</td><td>19.3</td><td>4.000</td><td>26.9</td><td>7.000</td><td>35.3</td></tr><tr><td>0.200</td><td>10.0</td><td>1.000</td><td>13.9</td><td>2.200</td><td>20.2</td><td>4.500</td><td>28.5</td><td>7.500</td><td>36.5</td></tr><tr><td>0.300</td><td>9.8</td><td>1.200</td><td>15.1</td><td>2.400</td><td>21.1</td><td>5.000</td><td>30.0</td><td>8.000</td><td>37.7</td></tr><tr><td>0.400</td><td>9.0</td><td>1.400</td><td>16.3</td><td>2.600</td><td>21.9</td><td>5.500</td><td>31.2</td><td>8.500</td><td>38.9</td></tr><tr><td>0.500</td><td>10.0</td><td>1.600</td><td>17.3</td><td>3.000</td><td>23.4</td><td>6.000</td><td>32.6</td><td>9.000</td><td>40.1</td></tr><tr><td>0.600</td><td>10.9</td><td>1.800</td><td>18.3</td><td>3.500</td><td>25.2</td><td>6.500</td><td>34.0</td><td>9.500</td><td>41.2</td></tr></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	1000.0	0.500	2000.0	Unit Reference	MD-SHE-0152-1000-0500-1000	Design Head (m)	0.500	Design Flow (l/s)	10.0	Flush-Flo™	Calculated	Objective	Minimise upstream storage	Application	Surface	Sump Available	Yes	Diameter (mm)	152	Invert Level (m)	9.500	Minimum Outlet Pipe Diameter (mm)	225	Suggested Manhole Diameter (mm)	1200	Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.500	10.0	Kick-Flo®	0.396	9.0	Flush-Flo™	0.225	10.0	Mean Flow over Head Range	-	7.9	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)	0.100	5.5	0.800	12.5	2.000	19.3	4.000	26.9	7.000	35.3	0.200	10.0	1.000	13.9	2.200	20.2	4.500	28.5	7.500	36.5	0.300	9.8	1.200	15.1	2.400	21.1	5.000	30.0	8.000	37.7	0.400	9.0	1.400	16.3	2.600	21.9	5.500	31.2	8.500	38.9	0.500	10.0	1.600	17.3	3.000	23.4	6.000	32.6	9.000	40.1	0.600	10.9	1.800	18.3	3.500	25.2	6.500	34.0	9.500	41.2
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 1432 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>9.573</td><td>0.073</td><td>0.0</td><td>3.0</td><td>3.0</td><td>612.8</td><td>O K</td></tr><tr><td>30 min Summer</td><td>9.594</td><td>0.094</td><td>0.0</td><td>4.7</td><td>4.7</td><td>792.2</td><td>O K</td></tr><tr><td>60 min Summer</td><td>9.616</td><td>0.116</td><td>0.0</td><td>6.4</td><td>6.4</td><td>976.7</td><td>O K</td></tr><tr><td>120 min Summer</td><td>9.641</td><td>0.141</td><td>0.0</td><td>8.8</td><td>8.8</td><td>1189.6</td><td>O K</td></tr><tr><td>180 min Summer</td><td>9.656</td><td>0.156</td><td>0.0</td><td>10.3</td><td>10.3</td><td>1313.8</td><td>O K</td></tr><tr><td>240 min Summer</td><td>9.666</td><td>0.166</td><td>0.0</td><td>11.3</td><td>11.3</td><td>1395.3</td><td>O K</td></tr><tr><td>360 min Summer</td><td>9.677</td><td>0.177</td><td>0.0</td><td>12.4</td><td>12.4</td><td>1489.1</td><td>O K</td></tr><tr><td>480 min Summer</td><td>9.682</td><td>0.182</td><td>0.0</td><td>12.9</td><td>12.9</td><td>1529.1</td><td>O K</td></tr><tr><td>600 min Summer</td><td>9.684</td><td>0.184</td><td>0.0</td><td>13.1</td><td>13.1</td><td>1543.6</td><td>O K</td></tr><tr><td>720 min Summer</td><td>9.684</td><td>0.184</td><td>0.0</td><td>13.1</td><td>13.1</td><td>1543.8</td><td>O K</td></tr><tr><td>960 min Summer</td><td>9.682</td><td>0.182</td><td>0.0</td><td>12.9</td><td>12.9</td><td>1529.9</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>9.679</td><td>0.179</td><td>0.0</td><td>12.6</td><td>12.6</td><td>1505.0</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>9.675</td><td>0.175</td><td>0.0</td><td>12.2</td><td>12.2</td><td>1474.6</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>9.672</td><td>0.172</td><td>0.0</td><td>11.9</td><td>11.9</td><td>1444.5</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>9.665</td><td>0.165</td><td>0.0</td><td>11.2</td><td>11.2</td><td>1384.6</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>9.658</td><td>0.158</td><td>0.0</td><td>10.5</td><td>10.5</td><td>1331.9</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>9.653</td><td>0.153</td><td>0.0</td><td>10.0</td><td>10.0</td><td>1289.8</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>9.649</td><td>0.149</td><td>0.0</td><td>9.6</td><td>9.6</td><td>1253.5</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>9.645</td><td>0.145</td><td>0.0</td><td>9.2</td><td>9.2</td><td>1221.9</td><td>O K</td></tr><tr><td>15 min Winter</td><td>9.582</td><td>0.082</td><td>0.0</td><td>3.8</td><td>3.8</td><td>686.0</td><td>O K</td></tr><tr><td>30 min Winter</td><td>9.606</td><td>0.106</td><td>0.0</td><td>5.5</td><td>5.5</td><td>887.1</td><td>O K</td></tr><tr><td>60 min Winter</td><td>9.630</td><td>0.130</td><td>0.0</td><td>7.7</td><td>7.7</td><td>1093.5</td><td>O K</td></tr><tr><td>120 min Winter</td><td>9.658</td><td>0.158</td><td>0.0</td><td>10.5</td><td>10.5</td><td>1331.4</td><td>O K</td></tr><tr><td>180 min Winter</td><td>9.675</td><td>0.175</td><td>0.0</td><td>12.2</td><td>12.2</td><td>1470.4</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>173.460</td><td>0.0</td><td>177.3</td><td>27</td></tr><tr><td>30 min Summer</td><td>112.490</td><td>0.0</td><td>275.2</td><td>42</td></tr><tr><td>60 min Summer</td><td>69.747</td><td>0.0</td><td>555.7</td><td>72</td></tr><tr><td>120 min Summer</td><td>43.014</td><td>0.0</td><td>734.1</td><td>130</td></tr><tr><td>180 min Summer</td><td>32.102</td><td>0.0</td><td>847.9</td><td>188</td></tr><tr><td>240 min Summer</td><td>25.923</td><td>0.0</td><td>929.1</td><td>248</td></tr><tr><td>360 min Summer</td><td>18.962</td><td>0.0</td><td>1036.5</td><td>366</td></tr><tr><td>480 min Summer</td><td>15.013</td><td>0.0</td><td>1098.2</td><td>484</td></tr><tr><td>600 min Summer</td><td>12.462</td><td>0.0</td><td>1137.4</td><td>602</td></tr><tr><td>720 min Summer</td><td>10.673</td><td>0.0</td><td>1162.9</td><td>720</td></tr><tr><td>960 min Summer</td><td>8.322</td><td>0.0</td><td>1188.9</td><td>834</td></tr><tr><td>1440 min Summer</td><td>5.832</td><td>0.0</td><td>1190.6</td><td>1072</td></tr><tr><td>2160 min Summer</td><td>4.092</td><td>0.0</td><td>1665.3</td><td>1472</td></tr><tr><td>2880 min Summer</td><td>3.189</td><td>0.0</td><td>1699.9</td><td>1880</td></tr><tr><td>4320 min Summer</td><td>2.249</td><td>0.0</td><td>1698.2</td><td>2688</td></tr><tr><td>5760 min Summer</td><td>1.766</td><td>0.0</td><td>2148.7</td><td>3512</td></tr><tr><td>7200 min Summer</td><td>1.475</td><td>0.0</td><td>2218.4</td><td>4264</td></tr><tr><td>8640 min Summer</td><td>1.280</td><td>0.0</td><td>2270.1</td><td>5024</td></tr><tr><td>10080 min Summer</td><td>1.139</td><td>0.0</td><td>2295.4</td><td>5848</td></tr><tr><td>15 min Winter</td><td>173.460</td><td>0.0</td><td>215.7</td><td>27</td></tr><tr><td>30 min Winter</td><td>112.490</td><td>0.0</td><td>329.6</td><td>41</td></tr><tr><td>60 min Winter</td><td>69.747</td><td>0.0</td><td>648.4</td><td>70</td></tr><tr><td>120 min Winter</td><td>43.014</td><td>0.0</td><td>852.5</td><td>128</td></tr><tr><td>180 min Winter</td><td>32.102</td><td>0.0</td><td>982.4</td><td>186</td></tr></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	9.573	0.073	0.0	3.0	3.0	612.8	O K	30 min Summer	9.594	0.094	0.0	4.7	4.7	792.2	O K	60 min Summer	9.616	0.116	0.0	6.4	6.4	976.7	O K	120 min Summer	9.641	0.141	0.0	8.8	8.8	1189.6	O K	180 min Summer	9.656	0.156	0.0	10.3	10.3	1313.8	O K	240 min Summer	9.666	0.166	0.0	11.3	11.3	1395.3	O K	360 min Summer	9.677	0.177	0.0	12.4	12.4	1489.1	O K	480 min Summer	9.682	0.182	0.0	12.9	12.9	1529.1	O K	600 min Summer	9.684	0.184	0.0	13.1	13.1	1543.6	O K	720 min Summer	9.684	0.184	0.0	13.1	13.1	1543.8	O K	960 min Summer	9.682	0.182	0.0	12.9	12.9	1529.9	O K	1440 min Summer	9.679	0.179	0.0	12.6	12.6	1505.0	O K	2160 min Summer	9.675	0.175	0.0	12.2	12.2	1474.6	O K	2880 min Summer	9.672	0.172	0.0	11.9	11.9	1444.5	O K	4320 min Summer	9.665	0.165	0.0	11.2	11.2	1384.6	O K	5760 min Summer	9.658	0.158	0.0	10.5	10.5	1331.9	O K	7200 min Summer	9.653	0.153	0.0	10.0	10.0	1289.8	O K	8640 min Summer	9.649	0.149	0.0	9.6	9.6	1253.5	O K	10080 min Summer	9.645	0.145	0.0	9.2	9.2	1221.9	O K	15 min Winter	9.582	0.082	0.0	3.8	3.8	686.0	O K	30 min Winter	9.606	0.106	0.0	5.5	5.5	887.1	O K	60 min Winter	9.630	0.130	0.0	7.7	7.7	1093.5	O K	120 min Winter	9.658	0.158	0.0	10.5	10.5	1331.4	O K	180 min Winter	9.675	0.175	0.0	12.2	12.2	1470.4	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	173.460	0.0	177.3	27	30 min Summer	112.490	0.0	275.2	42	60 min Summer	69.747	0.0	555.7	72	120 min Summer	43.014	0.0	734.1	130	180 min Summer	32.102	0.0	847.9	188	240 min Summer	25.923	0.0	929.1	248	360 min Summer	18.962	0.0	1036.5	366	480 min Summer	15.013	0.0	1098.2	484	600 min Summer	12.462	0.0	1137.4	602	720 min Summer	10.673	0.0	1162.9	720	960 min Summer	8.322	0.0	1188.9	834	1440 min Summer	5.832	0.0	1190.6	1072	2160 min Summer	4.092	0.0	1665.3	1472	2880 min Summer	3.189	0.0	1699.9	1880	4320 min Summer	2.249	0.0	1698.2	2688	5760 min Summer	1.766	0.0	2148.7	3512	7200 min Summer	1.475	0.0	2218.4	4264	8640 min Summer	1.280	0.0	2270.1	5024	10080 min Summer	1.139	0.0	2295.4	5848	15 min Winter	173.460	0.0	215.7	27	30 min Winter	112.490	0.0	329.6	41	60 min Winter	69.747	0.0	648.4	70	120 min Winter	43.014	0.0	852.5	128	180 min Winter	32.102	0.0	982.4	186
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																																																																																																
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360 min Summer	9.677	0.177	0.0	12.4	12.4	1489.1	O K																																																																																																																																																																																																																																																																																																																																
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2160 min Summer	9.675	0.175	0.0	12.2	12.2	1474.6	O K																																																																																																																																																																																																																																																																																																																																
2880 min Summer	9.672	0.172	0.0	11.9	11.9	1444.5	O K																																																																																																																																																																																																																																																																																																																																
4320 min Summer	9.665	0.165	0.0	11.2	11.2	1384.6	O K																																																																																																																																																																																																																																																																																																																																
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7200 min Summer	9.653	0.153	0.0	10.0	10.0	1289.8	O K																																																																																																																																																																																																																																																																																																																																
8640 min Summer	9.649	0.149	0.0	9.6	9.6	1253.5	O K																																																																																																																																																																																																																																																																																																																																
10080 min Summer	9.645	0.145	0.0	9.2	9.2	1221.9	O K																																																																																																																																																																																																																																																																																																																																
15 min Winter	9.582	0.082	0.0	3.8	3.8	686.0	O K																																																																																																																																																																																																																																																																																																																																
30 min Winter	9.606	0.106	0.0	5.5	5.5	887.1	O K																																																																																																																																																																																																																																																																																																																																
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60 min Summer	69.747	0.0	555.7	72																																																																																																																																																																																																																																																																																																																																			
120 min Summer	43.014	0.0	734.1	130																																																																																																																																																																																																																																																																																																																																			
180 min Summer	32.102	0.0	847.9	188																																																																																																																																																																																																																																																																																																																																			
240 min Summer	25.923	0.0	929.1	248																																																																																																																																																																																																																																																																																																																																			
360 min Summer	18.962	0.0	1036.5	366																																																																																																																																																																																																																																																																																																																																			
480 min Summer	15.013	0.0	1098.2	484																																																																																																																																																																																																																																																																																																																																			
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720 min Summer	10.673	0.0	1162.9	720																																																																																																																																																																																																																																																																																																																																			
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1440 min Summer	5.832	0.0	1190.6	1072																																																																																																																																																																																																																																																																																																																																			
2160 min Summer	4.092	0.0	1665.3	1472																																																																																																																																																																																																																																																																																																																																			
2880 min Summer	3.189	0.0	1699.9	1880																																																																																																																																																																																																																																																																																																																																			
4320 min Summer	2.249	0.0	1698.2	2688																																																																																																																																																																																																																																																																																																																																			
5760 min Summer	1.766	0.0	2148.7	3512																																																																																																																																																																																																																																																																																																																																			
7200 min Summer	1.475	0.0	2218.4	4264																																																																																																																																																																																																																																																																																																																																			
8640 min Summer	1.280	0.0	2270.1	5024																																																																																																																																																																																																																																																																																																																																			
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60 min Winter	69.747	0.0	648.4	70																																																																																																																																																																																																																																																																																																																																			
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Pitman Associates Ltd

South Lodge

Exminster

Devon EX6 8AT

Date 21/09/2022 16:54

File Proposed Pitch tank.SRCX

Designed by Karl

Checked by

XP Solutions

Source Control 2020.1

Page 2



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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	9.686	0.186	0.0	13.3	13.3	1561.4	O K
360 min Winter	9.698	0.198	0.0	14.6	14.6	1666.4	O K
480 min Winter	9.704	0.204	0.0	15.0	15.0	1711.6	Flood Risk
600 min Winter	9.706	0.206	0.0	15.1	15.1	1729.3	Flood Risk
720 min Winter	9.706	0.206	0.0	15.1	15.1	1731.6	Flood Risk
960 min Winter	9.704	0.204	0.0	15.0	15.0	1711.9	Flood Risk
1440 min Winter	9.699	0.199	0.0	14.6	14.6	1671.4	O K
2160 min Winter	9.692	0.192	0.0	14.0	14.0	1616.5	O K
2880 min Winter	9.686	0.186	0.0	13.3	13.3	1561.4	O K
4320 min Winter	9.674	0.174	0.0	12.1	12.1	1459.4	O K
5760 min Winter	9.664	0.164	0.0	11.1	11.1	1375.6	O K
7200 min Winter	9.656	0.156	0.0	10.3	10.3	1309.4	O K
8640 min Winter	9.649	0.149	0.0	9.6	9.6	1254.7	O K
10080 min Winter	9.644	0.144	0.0	9.1	9.1	1208.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	25.923	0.0	1074.4	242
360 min Winter	18.962	0.0	1194.7	358
480 min Winter	15.013	0.0	1263.7	472
600 min Winter	12.462	0.0	1307.1	584
720 min Winter	10.673	0.0	1335.4	694
960 min Winter	8.322	0.0	1365.3	896
1440 min Winter	5.832	0.0	1369.9	1106
2160 min Winter	4.092	0.0	1898.7	1564
2880 min Winter	3.189	0.0	1939.5	2016
4320 min Winter	2.249	0.0	1939.3	2860
5760 min Winter	1.766	0.0	2430.8	3696
7200 min Winter	1.475	0.0	2510.7	4536
8640 min Winter	1.280	0.0	2571.5	5280
10080 min Winter	1.139	0.0	2604.2	6056

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South Lodge Exminster Devon EX6 8AT																																																								
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File Proposed Pitch tank.SRCX	Checked by																																																							
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<u>Rainfall Details</u> <table><tr><td>Rainfall Model</td><td>FEH</td></tr><tr><td>Return Period (years)</td><td>100</td></tr><tr><td>FEH Rainfall Version</td><td>2013</td></tr><tr><td>Site Location</td><td>GB 561475 174841 TQ 61475 74841</td></tr><tr><td>Data Type</td><td>Point</td></tr><tr><td>Summer Storms</td><td>Yes</td></tr><tr><td>Winter Storms</td><td>Yes</td></tr><tr><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>Shortest Storm (mins)</td><td>15</td></tr><tr><td>Longest Storm (mins)</td><td>10080</td></tr><tr><td>Climate Change %</td><td>+40</td></tr></table> <u>Time Area Diagram</u> Total Area (ha) 1.890 <table><thead><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr><tr><th>From:</th><th>To:</th><th>From:</th><th>To:</th><th>From:</th><th>To:</th></tr></thead><tbody><tr><td>0</td><td>4</td><td>0.630</td><td>4</td><td>8</td><td>0.630</td></tr><tr><td></td><td></td><td></td><td></td><td>8</td><td>12</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>0.630</td></tr></tbody></table>			Rainfall Model	FEH	Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 561475 174841 TQ 61475 74841	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 (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	From:	To:	From:	To:	From:	To:	0	4	0.630	4	8	0.630					8	12						0.630
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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 9.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	8850.0	0.0	0.300	8850.0	0.0	0.301	0.0	0.0

Orifice Outflow Control

Diameter (m) 0.140 Discharge Coefficient 0.600 Invert Level (m) 9.500

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2. Sub-catchment C

The following MicroDrainage printout shows how sub-catchment C can discharge to Robins Creek during times of high tide. The model is based on an indicative swale design which will be developed as part of the detailed design.

The level of surcharge at the outfall has been determined using a tidal hydrograph based on HAT, mean low water springs (MLWS) and the rule of twelfths and is shown in the following table.

Tide Height Calculator

Enter time in 00:00 format

Start Time	00:00	End Time	00:00
Start Level	3.98	End Level	-2.42

Calculate ▶

Start	End	Rule of 12	Change m/hr	Start Level	End Level
00:00	00:00	1	-0.53	3.98	3.45
00:00	00:00	2	-1.07	3.45	2.38
00:00	00:00	3	-1.60	2.38	0.78
00:00	00:00	3	-1.60	0.78	-0.82
00:00	00:00	2	-1.07	-0.82	-1.89
00:00	00:00	1	-0.53	-1.89	-2.42

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STORM SEWER DESIGN by the Modified Rational Method

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
S1.000	100.000	0.200	500.0	0.618	5.00	0.0	0.600	\	-10	Pipe/Conduit	
S1.001	100.000	0.100	1000.0	0.618	0.00	0.0	0.600	\	-10	Pipe/Conduit	
S1.002	50.000	0.100	500.0	0.618	0.00	0.0	0.600	\	-10	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	75.00	5.87	4.100	0.618	0.0	0.0	0.0	1.91	2867.1	125.5
S1.001	75.00	7.11	3.900	1.236	0.0	0.0	0.0	1.35	2021.9	251.1
S1.002	75.00	7.54	3.800	1.854	0.0	0.0	0.0	1.91	2867.1	376.6

Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \ / open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m²)
-10	\ /	3000	500	90.0		1.500	1.500

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	4.600	0.500	Junction		S1.000	4.100	-10				
S2	4.400	0.500	Junction		S1.001	3.900	-10	S1.000	3.900	-10	
S3	4.300	0.500	Junction		S1.002	3.800	-10	S1.001	3.800	-10	
S	4.500	0.800	Open Manhole	0		OUTFALL		S1.002	3.700	-10	

No coordinates have been specified, layout information cannot be produced.