

Our Reference: 3887

June 2024

Virtus,

London 14,

1 in 100 YEAR + 40% CLIMATE CHANGE ASSESSMENT.

Calculations have been carried out using MicroDrainage, Source Control to check the existing interlinked soakaways and the existing interlinked soakaways to be retained for the 1 :100 year event + 40 % climate change allowance using the information contained in the original engineer's "AS-BUILT" Drainage Layout, drawing number TRC – 2607 – 51 Rev AB the results of which can be seen in Appendix A.

Existing drained area = 25,940m²

Overall length of filter drain / soakaway contained in the existing soakaways = 1969m

Overall length of filter drain / soakaway required for 1:100yr+40% climate change allowance = **1450m**

Half drain time = **1420 minutes.**

Reduced drained area = 11,180m²

Overall length of filter drain / soakaway to be retained = 1101m

1:100yr+40% climate change allowance.

Half drain time = **952 minutes.**

Existing Impermeable Area = 25,940m²

Proposed Impermeable Area = 11,180 + 14,760 (New Soakaway) = 25,940m²

Contributing Areas have been highlighted in green in calculations.

It should be noted that the total site / application area is not included in these calculations as the drainage network includes the access road and adjacent Unit 5 as indicated on the original engineer's "AS-BUILT" Drainage Layout, drawing number TRC – 2607 – 51 Rev AB which can be seen in Appendix A.

Calculations have also been carried out using MicroDrainage Network to check the existing and modified drainage runs which discharge to each soakaway the results of which can be seen in Appendix B.

None of the existing drainage network to Soakaways 3 and 5 have been modelled as none is being retained for re-use. Soakaway 2 and 6 networks have been modelled to make a capacity check on the existing runs which now drain the New Soakaway and the impermeable area in these calculations is included the New Soakaway.

Calculations have also been carried out using MicroDrainage Network to check the new soakaway and connecting drainage network the results of which can be seen in Appendix C.

The 1 in 100 year + 40% climate change results show there to be some on site water storage which has been indicated on the Drainage Layout and Section Through The Gantry which are also included in Appendix C.

Appendix A:
EXISTING INTERLINKED SOAKAWAY AND RETAINED
INTERLINKED SOAKAWAY CALCULATIONS.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE INFORMATION NORMALLY ASSOCIATED WITH THE TYPES OF WORK SHOWN ON THIS DRAWING, THE FOLLOWING APPLIES:

CONSTRUCTION

IT IS CONSIDERED THAT THE PROPOSED WORKS ARE WITHIN THE SCOPE OF A COMPETENT CONTRACTOR AND AS SUCH NO UNUSUAL HAZARDS HAVE BEEN IDENTIFIED, WITH THE EXCEPTION OF THE FOLLOWING:

THE CONTRACTOR TO PROVIDE METHOD STATEMENTS TO HIGHLIGHT & MANAGE RISKS FOR ELEMENTS OF WORK INDICATED ON THIS DRAWING MAINLY WORKING AT DEPTH & THE REQUIRED TEMPORARY SUPPORT FOR EARTHWORKS

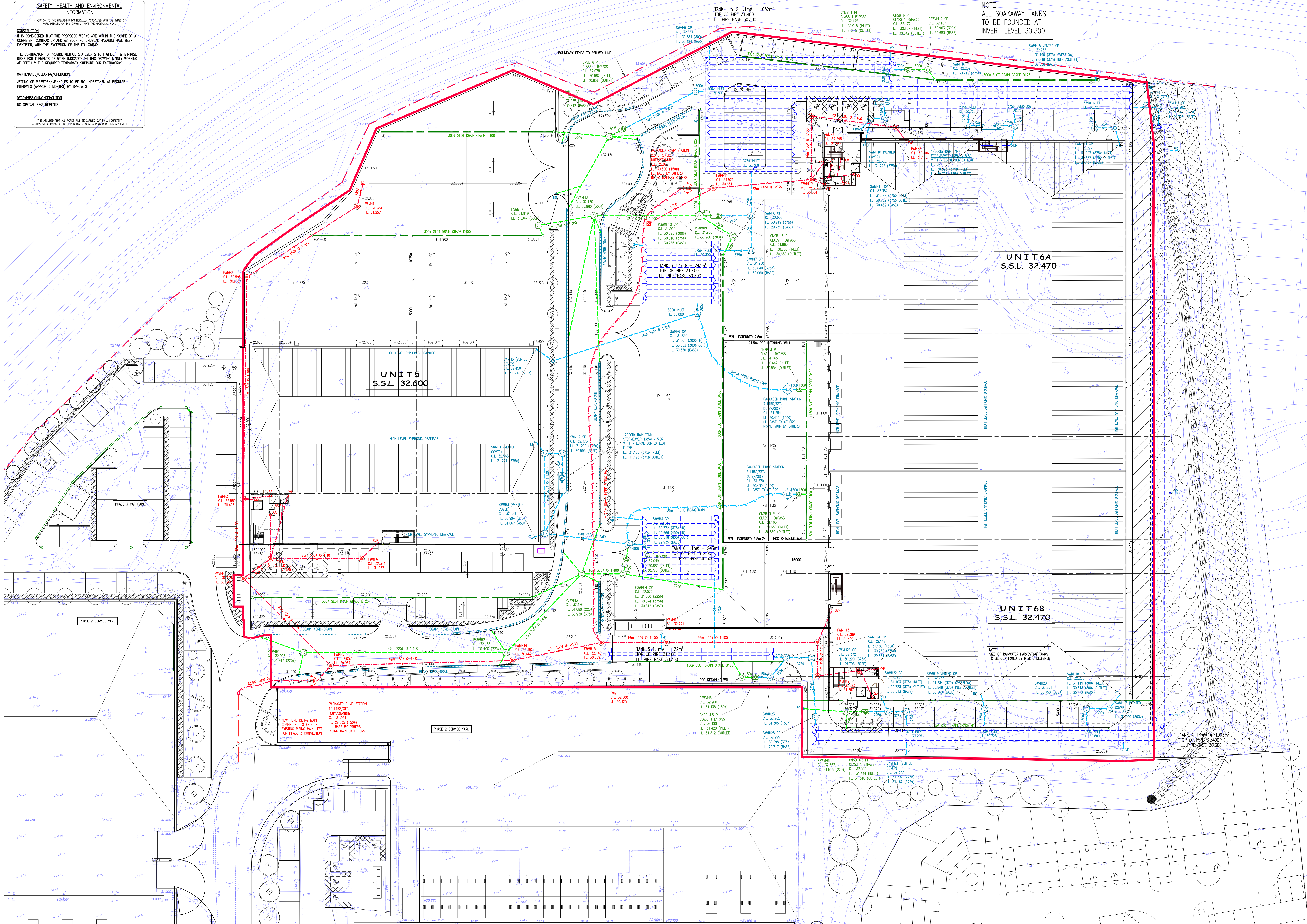
MAINTENANCE/CLEANING/OCCUPATION

JETTING OF PIPES/MANHOLES TO BE BY UNDERGROUNDS AT REGULAR INTERVALS (APPROX 6 MONTHS) BY SPECIALIST

DECOMMISSIONING/DEMOLITION

NO SPECIAL REQUIREMENTS

IT IS ASSURED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR HAVING THE APPROPRIATE TO AN APPROVED METHOD STATEMENT



NOTE:
ALL SOAKAWAY TANKS
TO BE FOUNDED AT
INVERT LEVEL 30.300

UNIT 6A
S.S.L. 32.470

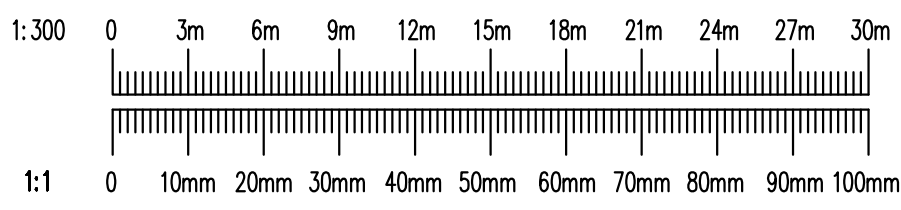
UNIT 6B
S.S.L. 32.470

UNIT 5
S.S.L. 32.600

SURFACE WATER DESIGN CRITERIA
On - Site Soakaways
designed for 1:100 year returns storm
+ 20% climate change
using an Infiltration Rate of 4.2×10^{-6}

NOTE:
ALL SOAKAWAY TANKS
TO BE FOUNDED AT
INVERT LEVEL 30.300

DRAINAGE LAYOUT
Scale 1:300



DRAINAGE NOTES

- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
- ALL DRAINAGE WORK TO BE CARRIED OUT IN ACCORDANCE WITH BS 8301, BS 8005 AND THE BUILDING REGULATIONS.
- ALL PIPES ARE TO HAVE SURROUND IN ACCORDANCE WITH THE BUILDING REGULATIONS.
- FOR EXACT LOCATION OF RAIN WATER AND FOUL WATER OUTLETS, REFER TO ARCHITECTS DRAWINGS.
- SURFACE WATER DRAINS SHALL BE EITHER H.D.P.E. RIGID DRAIN TWIN WALL CARRIER PIPE BY 'POLYPIPE PLC' (OR SIMILAR APPROVED) TO B.S. EN 1401-1 OR P.C.P. PIPES TO B.S. 5911 (PART 100) OR VITRIFIED CLAY TO B.S. 65
- FOUL WATER DRAINS SHALL BE EITHER P.V.C. PIPEWORK BY 'POLYPIPE PLC' (OR SIMILAR APPROVED) TO B.S. EN 1401-1 OR VITRIFIED CLAY TO B.S. EN 295
- ALL GRP UNDERGROUND TANKS ARE TO BE BEDDED ON AND ENCASED IN 250mm GEN 3 20mm AGG. CONCRETE STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.
- ROAD GULLY OUTLET & KERB/DRAIN PIPE INVERT LEVELS TO BE 600mm BELOW TOP OF GRATING LEVEL.
- ALL MANHOLE AND INSPECTION CHAMBER COVERS, FRAMES AND SLOTTED TYPE DRAINS IN TRAFFICED AREAS SHALL COMPLY TO EITHER B.S. 497 : PART 1 HEAVY DUTY COVERS TO W400, OR B.S. EN 124 GRADE D400 (11.5 TONNE WHEEL LOADING) SYNOVIC DRAINAGE TO HAVE VENTED COVERS
- FOR DRAINAGE CONSTRUCTION AND PIPE BED DETAILS REFER TO DRAWING No. 11
- ALL DRAINAGE BRANCHES TO BE 100mm FOR FOUL WATER & 150mm FOR SURFACE WATER UNLESS MARKED OTHERWISE
- ALL SOIL & VENT STACKS TO HAVE READABLE ACCESS 150mm ABOVE GROUND FLOOR SLAB LEVEL WITH REMOVABLE ACCESS PLATES
- ALL DRAINAGE CHANNELS TO HAVE ACCESS CHAMBER AT ENDS OF RUNS & EVERY 30m THEREAFTER
- ALL KERB DRAINAGE TO HAVE SUMP UNITS AT OUTLETS OF RUNS & HAVE RODDING ACCESS POINTS EVERY 30m THEREAFTER
- ALL SHALLOW DRAINAGE (<900mm COVER) AND DRAINAGE BELOW SLAB TO BE INCASED IN MIN 150mm CONCRETE SURROUND
- ALL CONCRETE SURROUNDS FOR THE DRAINAGE TO BE CLASS DCAZ (SULPHATE RESISTING)

LEGEND

- 1200mm MANHOLE & DRAIN RUN
FOUL WATER - RED
CLEAN SURFACE WATER - BLUE
DIRTY SURFACE WATER - GREEN
- 1500mm MANHOLE & DRAIN RUN
CLEAN SURFACE WATER - BLUE
DIRTY SURFACE WATER - GREEN
- 1800mm MANHOLE & DRAIN RUN
CLEAN SURFACE WATER - BLUE
DIRTY SURFACE WATER - GREEN
- EXISTING FOUL WATER DRAINAGE RUN & MANHOLE
- EXISTING CLEAN SURFACE WATER DRAINAGE RUN & MANHOLE
- HIGH LEVEL SYNOVIC DRAINAGE
PRIMARY/SECONDARY SYSTEM
- PACKAGED PUMP STATION
WITH RISING MAIN
- GATE SLOTTEDRAIN D400 OR SIMILAR
(200mm C40 CONCRETE SURROUND)
- ACCESS CHAMBER/OUTLET
- BEANY TYPE KERB DRAIN
(150mm C20 BED & M400)
- RODDABLE TRAPPED FLOOR GULLY
- SOIL & VENT PIPE
- SOIL STUB STACK INCL. MV
- PRESSURISED SYNOVIC COMPMP
- GRAVITY MANHOLE DOWNPIPE
- CONCRETE CLASS 1 BY-PASS
PETROL INTERCEPTION
- PROPOSED NEW SURFACE LEVELS
- EXISTING SURFACE LEVELS



AS BUILT

AB 08.12.14	AS BUILT ISSUE.	TC	JC
J 13.10.14	REVISED TO SUIT LATEST ARCHITECTS SITE PLAN.	TC	DOB
H 08.09.14	SPRINKLER TANKS DELETED	TC	KD
G 01.08.14	R.W.H.T. DETAILS UPDATED. COVER LEVELS TO INTERCEPTORS & PUMP STATIONS AMENDED	TC	DOB
F 28.07.14	MANHOLES SW6 + PSW10 REV'D	TC	DOB
E 18.07.14	ATTENTION TANKS 3 + 6 MOVED WITH MH'S TO SUIT.	TC	DOB
D 02.07.14	MANHOLES MOVED TO SUIT TREE LOCATIONS.	TC	DOB
C 09.06.14	MANHOLE REFERENCES ADDED.	TC	DOB
B 06.06.14	UPDATED LAYOUT/SOAKAWAYS	TC	CE
A 13.05.14	ISSUED FOR CONSTRUCTION	TC	CE
T3 10.12.13	DRAINAGE AMENDED TO SUIT SPRINKLER TANKS AND VEHICLE WASH AREAS.	TC	DOB
T2 31.10.13	UNIT C REVISED	TC	DOB
T1 28.10.13	ISSUED FOR TENDER	TC	DOB
P2 02.09.13	FOUL DRAINAGE AMENDED TO SUIT OFFICE LAYOUT.	TC	MD
P1 18.12.12	PRELIMINARY ISSUE	TC	CE
REV	DATE	DESCRIPTION	CHK

NOTE: Where a 'P' revision applies, this drawing is NOT to be used for construction

T. R. COLLIER & ASSOCIATES.
CONSULTING ENGINEERS

PROJECT
PHASE 3
PROLOGIS PARK, HAYES

TITLE
DRAINAGE LAYOUT
UNITS 5, 6A & 6B

ARCHITECT
MICHAEL SPARKS Associates

DRAWN	DESIGNED	CHECKED
CE	TC	TC
DATE	SCALE	STATUS
Mar 2010	1:300	AS BUILT

TRC - 2607 - 51

AB



Existing Soakaways 1 in 100 +40%

John Tooke & Partners			Page 1																																																																																																																																																																																					
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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 1420 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 Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>30.666</td><td>0.516</td><td>8.3</td><td>662.2</td><td>O K</td></tr><tr><td>30 min Summer</td><td>30.778</td><td>0.628</td><td>9.0</td><td>866.0</td><td>O K</td></tr><tr><td>60 min Summer</td><td>30.889</td><td>0.739</td><td>9.7</td><td>1072.9</td><td>O K</td></tr><tr><td>120 min Summer</td><td>30.998</td><td>0.848</td><td>10.3</td><td>1272.9</td><td>O K</td></tr><tr><td>180 min Summer</td><td>31.057</td><td>0.907</td><td>10.7</td><td>1377.9</td><td>O K</td></tr><tr><td>240 min Summer</td><td>31.093</td><td>0.943</td><td>10.9</td><td>1442.1</td><td>O K</td></tr><tr><td>360 min Summer</td><td>31.139</td><td>0.989</td><td>11.2</td><td>1520.1</td><td>O K</td></tr><tr><td>480 min Summer</td><td>31.165</td><td>1.015</td><td>11.4</td><td>1564.0</td><td>O K</td></tr><tr><td>600 min Summer</td><td>31.179</td><td>1.029</td><td>11.4</td><td>1587.1</td><td>O K</td></tr><tr><td>720 min Summer</td><td>31.185</td><td>1.035</td><td>11.5</td><td>1596.8</td><td>O K</td></tr><tr><td>960 min Summer</td><td>31.181</td><td>1.031</td><td>11.5</td><td>1591.0</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>31.156</td><td>1.006</td><td>11.3</td><td>1549.6</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>31.115</td><td>0.965</td><td>11.1</td><td>1479.8</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>31.073</td><td>0.923</td><td>10.8</td><td>1407.2</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>31.000</td><td>0.850</td><td>10.4</td><td>1276.8</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>30.939</td><td>0.789</td><td>10.0</td><td>1165.0</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>30.884</td><td>0.734</td><td>9.7</td><td>1063.6</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>138.153</td><td>0.0</td><td>27</td></tr><tr><td>30 min Summer</td><td>90.705</td><td>0.0</td><td>41</td></tr><tr><td>60 min Summer</td><td>56.713</td><td>0.0</td><td>70</td></tr><tr><td>120 min Summer</td><td>34.246</td><td>0.0</td><td>130</td></tr><tr><td>180 min Summer</td><td>25.149</td><td>0.0</td><td>190</td></tr><tr><td>240 min Summer</td><td>20.078</td><td>0.0</td><td>248</td></tr><tr><td>360 min Summer</td><td>14.585</td><td>0.0</td><td>366</td></tr><tr><td>480 min Summer</td><td>11.622</td><td>0.0</td><td>486</td></tr><tr><td>600 min Summer</td><td>9.738</td><td>0.0</td><td>604</td></tr><tr><td>720 min Summer</td><td>8.424</td><td>0.0</td><td>722</td></tr><tr><td>960 min Summer</td><td>6.697</td><td>0.0</td><td>960</td></tr><tr><td>1440 min Summer</td><td>4.839</td><td>0.0</td><td>1190</td></tr><tr><td>2160 min Summer</td><td>3.490</td><td>0.0</td><td>1564</td></tr><tr><td>2880 min Summer</td><td>2.766</td><td>0.0</td><td>1972</td></tr><tr><td>4320 min Summer</td><td>1.989</td><td>0.0</td><td>2812</td></tr><tr><td>5760 min Summer</td><td>1.573</td><td>0.0</td><td>3632</td></tr><tr><td>7200 min Summer</td><td>1.311</td><td>0.0</td><td>4408</td></tr></table>					Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	30.666	0.516	8.3	662.2	O K	30 min Summer	30.778	0.628	9.0	866.0	O K	60 min Summer	30.889	0.739	9.7	1072.9	O K	120 min Summer	30.998	0.848	10.3	1272.9	O K	180 min Summer	31.057	0.907	10.7	1377.9	O K	240 min Summer	31.093	0.943	10.9	1442.1	O K	360 min Summer	31.139	0.989	11.2	1520.1	O K	480 min Summer	31.165	1.015	11.4	1564.0	O K	600 min Summer	31.179	1.029	11.4	1587.1	O K	720 min Summer	31.185	1.035	11.5	1596.8	O K	960 min Summer	31.181	1.031	11.5	1591.0	O K	1440 min Summer	31.156	1.006	11.3	1549.6	O K	2160 min Summer	31.115	0.965	11.1	1479.8	O K	2880 min Summer	31.073	0.923	10.8	1407.2	O K	4320 min Summer	31.000	0.850	10.4	1276.8	O K	5760 min Summer	30.939	0.789	10.0	1165.0	O K	7200 min Summer	30.884	0.734	9.7	1063.6	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	138.153	0.0	27	30 min Summer	90.705	0.0	41	60 min Summer	56.713	0.0	70	120 min Summer	34.246	0.0	130	180 min Summer	25.149	0.0	190	240 min Summer	20.078	0.0	248	360 min Summer	14.585	0.0	366	480 min Summer	11.622	0.0	486	600 min Summer	9.738	0.0	604	720 min Summer	8.424	0.0	722	960 min Summer	6.697	0.0	960	1440 min Summer	4.839	0.0	1190	2160 min Summer	3.490	0.0	1564	2880 min Summer	2.766	0.0	1972	4320 min Summer	1.989	0.0	2812	5760 min Summer	1.573	0.0	3632	7200 min Summer	1.311	0.0	4408
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		LONDON 14			
Date 06/06/2024 14:20		Designed by SM			
File EX SOAKAWAYS 1 IN 100+40...		Checked by RS			
Innovyze		Source Control 2017.1.2			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	30.835	0.685	9.4	971.6	O K
10080 min Summer	30.789	0.639	9.1	887.1	O K
15 min Winter	30.710	0.560	8.6	742.5	O K
30 min Winter	30.835	0.685	9.4	971.7	O K
60 min Winter	30.961	0.811	10.1	1205.0	O K
120 min Winter	31.087	0.937	10.9	1432.1	O K
180 min Winter	31.158	1.008	11.3	1553.0	O K
240 min Winter	31.204	1.054	11.6	1627.9	O K
360 min Winter	31.265	1.115	12.0	1721.5	O K
480 min Winter	31.304	1.154	12.2	1776.6	O K
600 min Winter	31.328	1.178	12.4	1808.4	O K
720 min Winter	31.341	1.191	12.4	1825.3	O K
960 min Winter	31.346	1.196	12.5	1831.7	O K
1440 min Winter	31.313	1.163	12.3	1788.7	O K
2160 min Winter	31.256	1.106	11.9	1708.4	O K
2880 min Winter	31.198	1.048	11.6	1618.5	O K
4320 min Winter	31.088	0.938	10.9	1433.2	O K
5760 min Winter	30.998	0.848	10.3	1272.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.129	0.0	5200		
10080 min Summer	0.994	0.0	6048		
15 min Winter	138.153	0.0	26		
30 min Winter	90.705	0.0	41		
60 min Winter	56.713	0.0	70		
120 min Winter	34.246	0.0	128		
180 min Winter	25.149	0.0	186		
240 min Winter	20.078	0.0	244		
360 min Winter	14.585	0.0	360		
480 min Winter	11.622	0.0	476		
600 min Winter	9.738	0.0	590		
720 min Winter	8.424	0.0	704		
960 min Winter	6.697	0.0	926		
1440 min Winter	4.839	0.0	1334		
2160 min Winter	3.490	0.0	1664		
2880 min Winter	2.766	0.0	2132		
4320 min Winter	1.989	0.0	3032		
5760 min Winter	1.573	0.0	3920		
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	LONDON 14				
Date 06/06/2024 14:20	Designed by SM				
File EX SOAKAWAYS 1 IN 100+40...	Checked by RS				
Innovyze	Source Control 2017.1.2				
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	30.919	0.769	9.9	1127.8	O K
8640 min Winter	30.848	0.698	9.4	996.5	O K
10080 min Winter	30.784	0.634	9.0	878.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Winter	1.311	0.0	4760		
8640 min Winter	1.129	0.0	5616		
10080 min Winter	0.994	0.0	6360		
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	LONDON 14																													
Date 06/06/2024 14:20	Designed by SM																													
File EX SOAKAWAYS 1 IN 100+40...	Checked by RS																													
Innovyze		Source Control 2017.1.2																												
<u>Model Details</u> Storage is Online Cover Level (m) 32.200 <u>Filter Drain Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.01512</td> <td>Pipe Diameter (m)</td> <td>1.100</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.01512</td> <td>Pipe Depth above Invert (m)</td> <td>0.150</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>0.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>0.000</td> </tr> <tr> <td>Invert Level (m)</td> <td>30.150</td> <td>Cap Infiltration Depth (m)</td> <td>0.000</td> </tr> <tr> <td>Trench Width (m)</td> <td>1.7</td> <td>Number of Pipes</td> <td>1</td> </tr> <tr> <td>Trench Length (m)</td> <td>1450.0</td> <td></td> <td></td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.01512	Pipe Diameter (m)	1.100	Infiltration Coefficient Side (m/hr)	0.01512	Pipe Depth above Invert (m)	0.150	Safety Factor	2.0	Slope (1:X)	0.0	Porosity	0.30	Cap Volume Depth (m)	0.000	Invert Level (m)	30.150	Cap Infiltration Depth (m)	0.000	Trench Width (m)	1.7	Number of Pipes	1	Trench Length (m)	1450.0		
Infiltration Coefficient Base (m/hr)	0.01512	Pipe Diameter (m)	1.100																											
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Porosity	0.30	Cap Volume Depth (m)	0.000																											
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Trench Width (m)	1.7	Number of Pipes	1																											
Trench Length (m)	1450.0																													
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Existing Soakaways to be retained

1 in 100 +40%

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File ADJUSTED SOAKAWAYS 1 IN ...		Checked by RS			
Innovyze		Source Control 2017.1.2			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Half Drain Time : 952 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	30.496	0.346	5.5	283.2	O K
30 min Summer	30.566	0.416	5.9	369.8	O K
60 min Summer	30.631	0.481	6.2	456.0	O K
120 min Summer	30.690	0.540	6.4	536.1	O K
180 min Summer	30.719	0.569	6.6	575.5	O K
240 min Summer	30.734	0.584	6.6	597.2	O K
360 min Summer	30.750	0.600	6.7	619.3	O K
480 min Summer	30.756	0.606	6.7	627.0	O K
600 min Summer	30.755	0.605	6.7	626.0	O K
720 min Summer	30.751	0.601	6.7	619.8	O K
960 min Summer	30.741	0.591	6.7	605.6	O K
1440 min Summer	30.718	0.568	6.6	574.9	O K
2160 min Summer	30.686	0.536	6.4	530.9	O K
2880 min Summer	30.658	0.508	6.3	491.5	O K
4320 min Summer	30.605	0.455	6.0	421.5	O K
5760 min Summer	30.558	0.408	5.8	360.1	O K
7200 min Summer	30.515	0.365	5.6	306.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	138.153	0.0	26		
30 min Summer	90.705	0.0	41		
60 min Summer	56.713	0.0	70		
120 min Summer	34.246	0.0	130		
180 min Summer	25.149	0.0	188		
240 min Summer	20.078	0.0	246		
360 min Summer	14.585	0.0	364		
480 min Summer	11.622	0.0	482		
600 min Summer	9.738	0.0	602		
720 min Summer	8.424	0.0	694		
960 min Summer	6.697	0.0	800		
1440 min Summer	4.839	0.0	1048		
2160 min Summer	3.490	0.0	1456		
2880 min Summer	2.766	0.0	1876		
4320 min Summer	1.989	0.0	2684		
5760 min Summer	1.573	0.0	3464		
7200 min Summer	1.311	0.0	4248		
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	LONDON 14				
Date 06/06/2024 14:42	Designed by SM				
File ADJUSTED SOAKAWAYS 1 IN ...	Checked by RS				
Innovyze	Source Control 2017.1.2				
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	30.476	0.326	5.4	258.9	O K
10080 min Summer	30.441	0.291	5.3	217.9	O K
15 min Winter	30.525	0.375	5.7	317.9	O K
30 min Winter	30.601	0.451	6.0	415.2	O K
60 min Winter	30.673	0.523	6.4	512.9	O K
120 min Winter	30.740	0.590	6.7	604.9	O K
180 min Winter	30.773	0.623	6.8	651.2	O K
240 min Winter	30.792	0.642	6.9	677.7	O K
360 min Winter	30.813	0.663	7.0	706.8	O K
480 min Winter	30.822	0.672	7.0	719.6	O K
600 min Winter	30.824	0.674	7.1	722.9	O K
720 min Winter	30.822	0.672	7.0	720.3	O K
960 min Winter	30.811	0.661	7.0	704.6	O K
1440 min Winter	30.784	0.634	6.9	666.8	O K
2160 min Winter	30.742	0.592	6.7	607.6	O K
2880 min Winter	30.701	0.551	6.5	551.0	O K
4320 min Winter	30.625	0.475	6.1	448.2	O K
5760 min Winter	30.558	0.408	5.8	359.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.129	0.0	5008		
10080 min Summer	0.994	0.0	5744		
15 min Winter	138.153	0.0	26		
30 min Winter	90.705	0.0	41		
60 min Winter	56.713	0.0	70		
120 min Winter	34.246	0.0	126		
180 min Winter	25.149	0.0	184		
240 min Winter	20.078	0.0	242		
360 min Winter	14.585	0.0	358		
480 min Winter	11.622	0.0	472		
600 min Winter	9.738	0.0	584		
720 min Winter	8.424	0.0	694		
960 min Winter	6.697	0.0	900		
1440 min Winter	4.839	0.0	1118		
2160 min Winter	3.490	0.0	1580		
2880 min Winter	2.766	0.0	2024		
4320 min Winter	1.989	0.0	2896		
5760 min Winter	1.573	0.0	3696		
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	LONDON 14				
Date 06/06/2024 14:42	Designed by SM				
File ADJUSTED SOAKAWAYS 1 IN ...	Checked by RS				
Innovyze	Source Control 2017.1.2				
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	30.497	0.347	5.5	283.5	O K
8640 min Winter	30.442	0.292	5.3	219.5	O K
10080 min Winter	30.393	0.243	5.1	166.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Winter	1.311	0.0	4472		
8640 min Winter	1.129	0.0	5200		
10080 min Winter	0.994	0.0	5952		
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Date 06/06/2024 14:42	Designed by SM																																											
File ADJUSTED SOAKAWAYS 1 IN ...	Checked by RS																																											
Innovyze		Source Control 2017.1.2																																										
Rainfall Details <table><tr><td>Rainfall Model</td><td>FSR</td><td>Winter Storms</td><td>Yes</td></tr><tr><td>Return Period (years)</td><td>100</td><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Region</td><td>England and Wales</td><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>M5-60 (mm)</td><td>20.000</td><td>Shortest Storm (mins)</td><td>15</td></tr><tr><td>Ratio R</td><td>0.400</td><td>Longest Storm (mins)</td><td>10080</td></tr><tr><td>Summer Storms</td><td>Yes</td><td>Climate Change %</td><td>+40</td></tr></table> Time Area Diagram Total Area (ha) 1.118 <table><thead><tr><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th></tr><tr><th>From:</th><th>To: (ha)</th><th>From:</th><th>To: (ha)</th><th>From:</th><th>To: (ha)</th></tr></thead><tbody><tr><td>0</td><td>4 0.372</td><td>4</td><td>8 0.373</td><td>8</td><td>12 0.373</td></tr></tbody></table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	20.000	Shortest Storm (mins)	15	Ratio R	0.400	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	From:	To: (ha)	From:	To: (ha)	From:	To: (ha)	0	4 0.372	4	8 0.373	8	12 0.373
Rainfall Model	FSR	Winter Storms	Yes																																									
Return Period (years)	100	Cv (Summer)	0.750																																									
Region	England and Wales	Cv (Winter)	0.840																																									
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Summer Storms	Yes	Climate Change %	+40																																									
Time (mins)	Area	Time (mins)	Area	Time (mins)	Area																																							
From:	To: (ha)	From:	To: (ha)	From:	To: (ha)																																							
0	4 0.372	4	8 0.373	8	12 0.373																																							
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	LONDON 14																													
Date 06/06/2024 14:42	Designed by SM																													
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<u>Model Details</u> Storage is Online Cover Level (m) 32.200 <u>Filter Drain Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.01512</td> <td>Pipe Diameter (m)</td> <td>1.100</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.01512</td> <td>Pipe Depth above Invert (m)</td> <td>0.150</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>0.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>0.000</td> </tr> <tr> <td>Invert Level (m)</td> <td>30.150</td> <td>Cap Infiltration Depth (m)</td> <td>0.000</td> </tr> <tr> <td>Trench Width (m)</td> <td>1.7</td> <td>Number of Pipes</td> <td>1</td> </tr> <tr> <td>Trench Length (m)</td> <td>1101.0</td> <td></td> <td></td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.01512	Pipe Diameter (m)	1.100	Infiltration Coefficient Side (m/hr)	0.01512	Pipe Depth above Invert (m)	0.150	Safety Factor	2.0	Slope (1:X)	0.0	Porosity	0.30	Cap Volume Depth (m)	0.000	Invert Level (m)	30.150	Cap Infiltration Depth (m)	0.000	Trench Width (m)	1.7	Number of Pipes	1	Trench Length (m)	1101.0		
Infiltration Coefficient Base (m/hr)	0.01512	Pipe Diameter (m)	1.100																											
Infiltration Coefficient Side (m/hr)	0.01512	Pipe Depth above Invert (m)	0.150																											
Safety Factor	2.0	Slope (1:X)	0.0																											
Porosity	0.30	Cap Volume Depth (m)	0.000																											
Invert Level (m)	30.150	Cap Infiltration Depth (m)	0.000																											
Trench Width (m)	1.7	Number of Pipes	1																											
Trench Length (m)	1101.0																													
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Appendix B:
EXISTING INTERLINKED SOAKAWAY AND
INTERLINKED SOAKAWAY NETWORK CALCULATIONS.

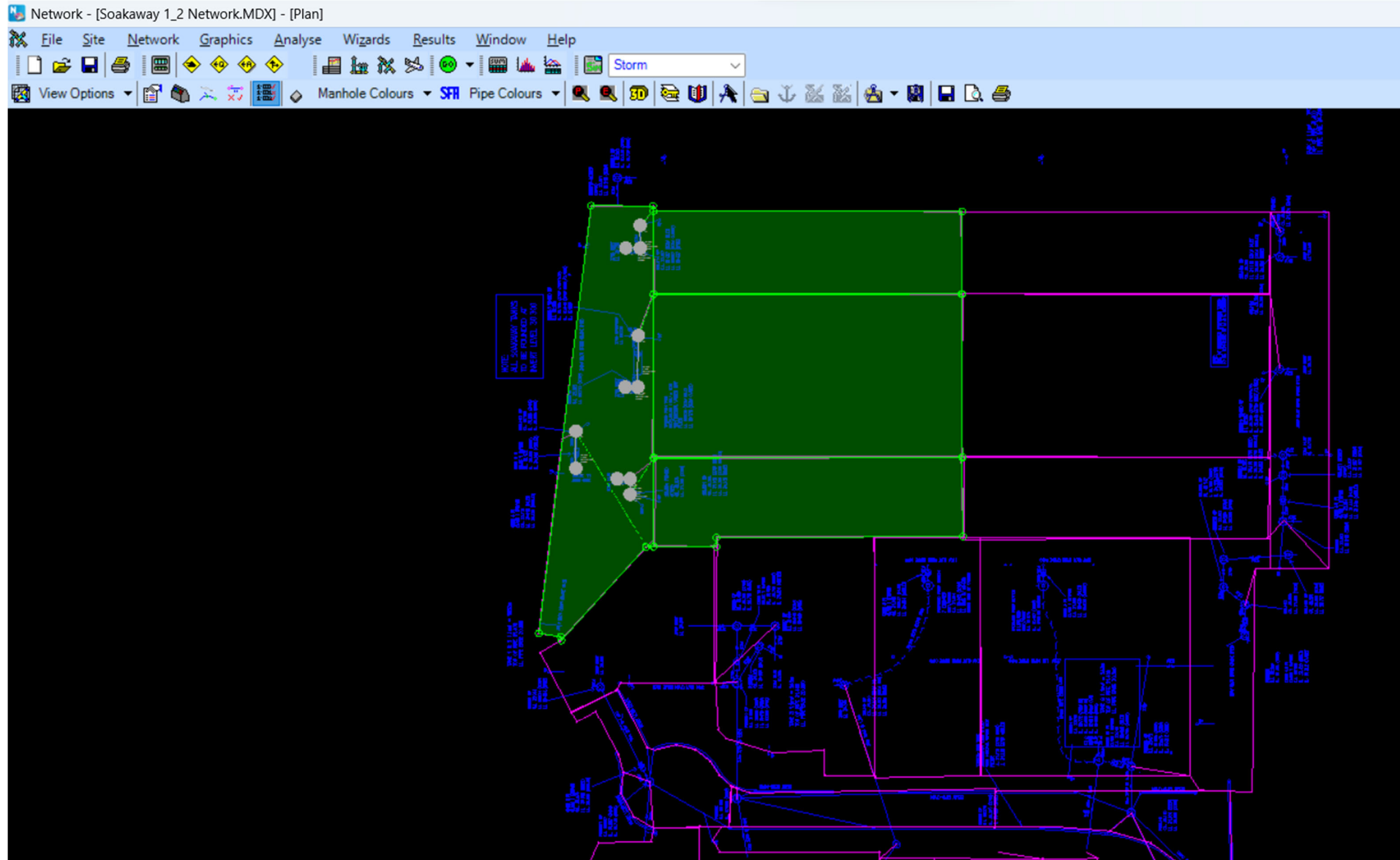
SOAKWAY 1 - 2 NETWORK 1 : 100 + 40%

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Date 28/09/2023 11:28					Designed by SM						
File Soakaway 1_2 Network.MDX					Checked by RS						
Innovyze					Network 2017.1.2						
<u>Existing Network Details for Storm</u>											
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	
S1.000	4.771	0.116	41.1	0.112	5.00	0.0	0.600	o	375	Pipe/Conduit	
S1.001	2.999	-0.038	-78.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.000	10.770	0.134	80.4	0.220	5.00	0.0	0.600	o	375	Pipe/Conduit	
S2.001	2.609	-0.013	-200.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.000	3.271	0.144	22.7	0.110	5.00	0.0	0.600	o	375	Pipe/Conduit	
S3.001	2.675	0.007	382.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S4.000	7.732	0.163	47.4	0.148	5.00	0.0	0.600	o	375	Pipe/Conduit	
<u>Network Results Table</u>											
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)						
S1.000	31.213	0.112	0.0	2.83	312.8						
S1.001	30.687	0.112	0.0	0.00	0.0						
S2.000	30.846	0.220	0.0	2.02	223.4						
S2.001	30.712	0.220	0.0	0.00	0.0						
S3.000	31.226	0.110	0.0	3.82	421.5						
S3.001	30.732	0.110	0.0	0.92	101.7						
S4.000	30.963	0.148	0.0	2.64	291.2						
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File Soakaway 1_2 Network.MDX				Checked by RS					
Innovyze				Network 2017.1.2					
<u>PIPELINE SCHEDULES for Storm</u>									
<u>Upstream Manhole</u>									
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	
S1.000	o	375	S1	32.271	31.213	0.683	Open Manhole	1200	
S1.001	o	375	S2	32.277	30.687	1.215	Open Manhole	1200	
S2.000	o	375	S3	32.256	30.846	1.035	Open Manhole	1200	
S2.001	o	375	S4	32.252	30.712	1.165	Open Manhole	1200	
S3.000	o	375	S5	32.376	31.226	0.775	Open Manhole	1200	
S3.001	o	375	S6	32.382	30.732	1.275	Open Manhole	1200	
S4.000	o	375	S7	32.183	30.963	0.845	Open Manhole	1200	
<u>Downstream Manhole</u>									
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	
S1.000	4.771	41.1	S2	32.277	31.097	0.805	Open Manhole	1200	
S1.001	2.999	-78.9	S	32.200	30.725	1.100	Open Manhole	0	
S2.000	10.770	80.4	S4	32.252	30.712	1.165	Open Manhole	1200	
S2.001	2.609	-200.7	S	32.200	30.725	1.100	Open Manhole	0	
S3.000	3.271	22.7	S6	32.382	31.082	0.925	Open Manhole	1200	
S3.001	2.675	382.1	S	32.200	30.725	1.100	Open Manhole	0	
S4.000	7.732	47.4	S	32.200	30.800	1.025	Open Manhole	0	
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File Soakaway 1_2 Network.MDX				Checked by RS																																																																								
Innovyze				Network 2017.1.2																																																																								
Area Summary for Storm <table><tr><th>Pipe Number</th><th>PIMP Type</th><th>PIMP Name</th><th>PIMP (%)</th><th>Gross Area (ha)</th><th>Imp. Area (ha)</th><th>Pipe Total (ha)</th></tr><tr><td>1.000</td><td>User</td><td>-</td><td>100</td><td>0.112</td><td>0.112</td><td>0.112</td></tr><tr><td>1.001</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>2.000</td><td>User</td><td>-</td><td>100</td><td>0.220</td><td>0.220</td><td>0.220</td></tr><tr><td>2.001</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>3.000</td><td>User</td><td>-</td><td>100</td><td>0.110</td><td>0.110</td><td>0.110</td></tr><tr><td>3.001</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>4.000</td><td>User</td><td>-</td><td>100</td><td>0.148</td><td>0.148</td><td>0.148</td></tr><tr><td colspan="4"></td><td>Total</td><td>Total</td><td>Total</td></tr><tr><td colspan="4"></td><td>0.589</td><td>0.589</td><td>0.589</td></tr></table>							Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)	1.000	User	-	100	0.112	0.112	0.112	1.001	-	-	100	0.000	0.000	0.000	2.000	User	-	100	0.220	0.220	0.220	2.001	-	-	100	0.000	0.000	0.000	3.000	User	-	100	0.110	0.110	0.110	3.001	-	-	100	0.000	0.000	0.000	4.000	User	-	100	0.148	0.148	0.148					Total	Total	Total					0.589	0.589	0.589
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)																																																																						
1.000	User	-	100	0.112	0.112	0.112																																																																						
1.001	-	-	100	0.000	0.000	0.000																																																																						
2.000	User	-	100	0.220	0.220	0.220																																																																						
2.001	-	-	100	0.000	0.000	0.000																																																																						
3.000	User	-	100	0.110	0.110	0.110																																																																						
3.001	-	-	100	0.000	0.000	0.000																																																																						
4.000	User	-	100	0.148	0.148	0.148																																																																						
				Total	Total	Total																																																																						
				0.589	0.589	0.589																																																																						
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Innovyze	Network 2017.1.2																																																																																																											
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																																																																																																												
<u>Simulation Criteria</u>																																																																																																												
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000																																																																																																												
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000																																																																																																												
Hot Start Level (mm) 0 Inlet Coefficient 0.800																																																																																																												
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000																																																																																																												
Foul Sewage per hectare (l/s) 0.000																																																																																																												
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0																																																																																																												
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0																																																																																																												
<u>Synthetic Rainfall Details</u>																																																																																																												
Rainfall Model FSR Ratio R 0.400																																																																																																												
Region England and Wales Cv (Summer) 0.750																																																																																																												
M5-60 (mm) 20.000 Cv (Winter) 0.840																																																																																																												
Margin for Flood Risk Warning (mm) 300.0 DVD Status ON																																																																																																												
Analysis Timestep Fine Inertia Status OFF																																																																																																												
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Profile(s) Summer and Winter																																																																																																												
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440																																																																																																												
Return Period(s) (years) 100																																																																																																												
Climate Change (%) 40																																																																																																												
<table><tr><th colspan="8"></th><th>Water</th></tr><tr><th>PN</th><th>US/MH</th><th></th><th>Return</th><th>Climate</th><th>First (X)</th><th>First (Y)</th><th>First (Z)</th><th>Overflow</th><th>Level</th></tr><tr><th></th><th>Name</th><th>Storm</th><th>Period</th><th>Change</th><th>Surcharge</th><th>Flood</th><th>Overflow</th><th>Act.</th><th>(m)</th></tr><tr><td>S1.000</td><td>S1</td><td>15 Winter</td><td>100</td><td>+40%</td><td></td><td></td><td></td><td></td><td>31.406</td></tr><tr><td>S1.001</td><td>S2</td><td>30 Winter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>31.100</td></tr><tr><td>S2.000</td><td>S3</td><td>15 Winter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>31.329</td></tr><tr><td>S2.001</td><td>S4</td><td>15 Winter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>31.204</td></tr><tr><td>S3.000</td><td>S5</td><td>15 Winter</td><td>100</td><td>+40%</td><td></td><td></td><td></td><td></td><td>31.405</td></tr><tr><td>S3.001</td><td>S6</td><td>15 Winter</td><td>100</td><td>+40%</td><td></td><td></td><td></td><td></td><td>30.991</td></tr><tr><td>S4.000</td><td>S7</td><td>15 Winter</td><td>100</td><td>+40%</td><td></td><td></td><td></td><td></td><td>31.170</td></tr></table>																		Water	PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level		Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	S1.000	S1	15 Winter	100	+40%					31.406	S1.001	S2	30 Winter	100	+40%	100/15 Summer				31.100	S2.000	S3	15 Winter	100	+40%	100/15 Summer				31.329	S2.001	S4	15 Winter	100	+40%	100/15 Summer				31.204	S3.000	S5	15 Winter	100	+40%					31.405	S3.001	S6	15 Winter	100	+40%					30.991	S4.000	S7	15 Winter	100	+40%					31.170
								Water																																																																																																				
PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level																																																																																																			
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S1.000	S1	15 Winter	100	+40%					31.406																																																																																																			
S1.001	S2	30 Winter	100	+40%	100/15 Summer				31.100																																																																																																			
S2.000	S3	15 Winter	100	+40%	100/15 Summer				31.329																																																																																																			
S2.001	S4	15 Winter	100	+40%	100/15 Summer				31.204																																																																																																			
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S4.000	S7	15 Winter	100	+40%					31.170																																																																																																			
<table><tr><th colspan="4"></th><th>Surcharged</th><th>Flooded</th><th colspan="2">Pipe</th><th colspan="2"></th></tr><tr><th>PN</th><th>US/MH</th><th>Depth</th><th>Volume</th><th>Flow /</th><th>Overflow</th><th>Pipe</th><th></th><th>Level</th><th></th></tr><tr><th></th><th>Name</th><th>(m)</th><th>(m³)</th><th>Cap.</th><th>(l/s)</th><th>Flow</th><th>Status</th><th>Exceeded</th><th></th></tr><tr><td>S1.000</td><td>S1</td><td>-0.182</td><td>0.000</td><td>0.52</td><td></td><td>69.1</td><td>OK</td><td></td><td></td></tr><tr><td>S1.001</td><td>S2</td><td>0.038</td><td>0.000</td><td>0.65</td><td></td><td>54.3</td><td>SURCHARGED</td><td></td><td></td></tr><tr><td>S2.000</td><td>S3</td><td>0.108</td><td>0.000</td><td>0.95</td><td></td><td>135.9</td><td>SURCHARGED</td><td></td><td></td></tr><tr><td>S2.001</td><td>S4</td><td>0.117</td><td>0.000</td><td>1.59</td><td></td><td>134.4</td><td>SURCHARGED</td><td></td><td></td></tr></table>														Surcharged	Flooded	Pipe				PN	US/MH	Depth	Volume	Flow /	Overflow	Pipe		Level			Name	(m)	(m³)	Cap.	(l/s)	Flow	Status	Exceeded		S1.000	S1	-0.182	0.000	0.52		69.1	OK			S1.001	S2	0.038	0.000	0.65		54.3	SURCHARGED			S2.000	S3	0.108	0.000	0.95		135.9	SURCHARGED			S2.001	S4	0.117	0.000	1.59		134.4	SURCHARGED																															
				Surcharged	Flooded	Pipe																																																																																																						
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SOAKWAY 2 NETWORK : 100 + 40%

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Innovyze							Network 2017.1.2			
<u>Existing Network Details for Storm</u>										
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
S1.000	22.402	0.128	175.0	0.138	5.00	0.0	0.600	o	300	Pipe/Conduit
S1.001	1.753	0.034	51.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.000	12.693	0.087	145.9	0.232	5.00	0.0	0.600	o	375	Pipe/Conduit
S2.001	24.127	0.150	160.8	0.018	0.00	0.0	0.600	o	375	Pipe/Conduit
S2.002	11.833	0.561	21.1	0.082	0.00	0.0	0.600	o	375	Pipe/Conduit
S2.003	9.937	-0.051	-194.8	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
<u>Network Results Table</u>										
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)					
S1.000	30.962	0.138	0.0	1.19	83.8					
S1.001	30.834	0.138	0.0	2.19	155.1					
S2.000	31.047	0.232	0.0	1.50	165.4					
S2.001	30.960	0.251	0.0	1.43	157.5					
S2.002	30.810	0.333	0.0	3.96	437.4					
S2.003	30.249	0.333	0.0	0.00	0.0					
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<u>PIPELINE SCHEDULES for Storm</u>								
<u>Upstream Manhole</u>								
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	32.078	30.962	0.816	Open Manhole	1200
S1.001	o	300	S2	32.064	30.834	0.930	Open Manhole	1200
S2.000	o	375	S3	31.919	31.047	0.497	Open Manhole	1200
S2.001	o	375	S4	32.160	30.960	0.825	Open Manhole	1200
S2.002	o	375	S5	31.990	30.810	0.805	Open Manhole	1200
S2.003	o	375	S6	32.039	30.249	1.415	Open Manhole	1200
<u>Downstream Manhole</u>								
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	22.402	175.0	S2	32.064	30.834	0.930	Open Manhole	1200
S1.001	1.753	51.6	S	31.950	30.800	0.850	Open Manhole	0
S2.000	12.693	145.9	S4	32.160	30.960	0.825	Open Manhole	1200
S2.001	24.127	160.8	S5	31.990	30.810	0.805	Open Manhole	1200
S2.002	11.833	21.1	S6	32.039	30.249	1.415	Open Manhole	1200
S2.003	9.937	-194.8	S	31.950	30.300	1.275	Open Manhole	0
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File SOAKAWAY 2 NETWORK.MDX				Checked by RS																																																																								
Innovyze				Network 2017.1.2																																																																								
Area Summary for Storm <table><thead><tr><th>Pipe Number</th><th>PIMP Type</th><th>PIMP Name</th><th>PIMP (%)</th><th>Gross Area (ha)</th><th>Imp. Area (ha)</th><th>Pipe Total (ha)</th></tr></thead><tbody><tr><td>1.000</td><td>User</td><td>-</td><td>100</td><td>0.086</td><td>0.086</td><td>0.086</td></tr><tr><td></td><td>User</td><td>-</td><td>100</td><td>0.052</td><td>0.052</td><td>0.138</td></tr><tr><td>1.001</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>2.000</td><td>User</td><td>-</td><td>100</td><td>0.232</td><td>0.232</td><td>0.232</td></tr><tr><td>2.001</td><td>User</td><td>-</td><td>100</td><td>0.018</td><td>0.018</td><td>0.018</td></tr><tr><td>2.002</td><td>User</td><td>-</td><td>100</td><td>0.082</td><td>0.082</td><td>0.082</td></tr><tr><td>2.003</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td></td><td></td><td></td><td></td><td>Total</td><td>Total</td><td>Total</td></tr><tr><td></td><td></td><td></td><td></td><td>0.471</td><td>0.471</td><td>0.471</td></tr></tbody></table>							Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)	1.000	User	-	100	0.086	0.086	0.086		User	-	100	0.052	0.052	0.138	1.001	-	-	100	0.000	0.000	0.000	2.000	User	-	100	0.232	0.232	0.232	2.001	User	-	100	0.018	0.018	0.018	2.002	User	-	100	0.082	0.082	0.082	2.003	-	-	100	0.000	0.000	0.000					Total	Total	Total					0.471	0.471	0.471
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)																																																																						
1.000	User	-	100	0.086	0.086	0.086																																																																						
	User	-	100	0.052	0.052	0.138																																																																						
1.001	-	-	100	0.000	0.000	0.000																																																																						
2.000	User	-	100	0.232	0.232	0.232																																																																						
2.001	User	-	100	0.018	0.018	0.018																																																																						
2.002	User	-	100	0.082	0.082	0.082																																																																						
2.003	-	-	100	0.000	0.000	0.000																																																																						
				Total	Total	Total																																																																						
				0.471	0.471	0.471																																																																						
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Summary of Critical Results by Maximum Level (Rank 1) for Storm									
Simulation Criteria									
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000			
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000			
Hot Start Level (mm)		0		Inlet Coefficient		0.800			
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000			
Foul Sewage per hectare (l/s)		0.000							
Number of Input Hydrographs		0		Number of Offline Controls		0			
Number of Online Controls		0		Number of Storage Structures		0			
Number of Time/Area Diagrams		0		Number of Real Time Controls		0			
Synthetic Rainfall Details									
Rainfall Model		FSR		Ratio R		0.400			
Region		England and Wales		Cv (Summer)		0.750			
M5-60 (mm)		20.000		Cv (Winter)		0.840			
Margin for Flood Risk Warning (mm)		300.0		DVD Status		ON			
Analysis Timestep		Fine		Inertia Status		OFF			
DTS Status		ON							
Profile(s)									
Duration(s) (mins)		15, 30, 60, 120, 240, 360, 480, 960, 1440		Summer and Winter					
Return Period(s) (years)		100							
Climate Change (%)		40							
Water									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
S1.000	S1	15 Winter	100	+40%	100/15 Summer				31.364
S1.001	S2	15 Winter	100	+40%	100/15 Summer				31.195
S2.000	S3	15 Winter	100	+40%	100/15 Summer				31.492
S2.001	S4	15 Winter	100	+40%	100/15 Summer				31.357
S2.002	S5	15 Winter	100	+40%					31.147
S2.003	S6	15 Winter	100	+40%	100/15 Summer				30.896
Surcharged Flooded								Pipe	
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
S1.000	S1	0.102	0.000	1.12		83.0	SURCHARGED		
S1.001	S2	0.061	0.000	1.35		83.0	SURCHARGED		
S2.000	S3	0.070	0.000	1.22		140.5	SURCHARGED		
S2.001	S4	0.022	0.000	1.12		151.5	SURCHARGED		
S2.002	S5	-0.038	0.000	0.66		193.0	OK		
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>			

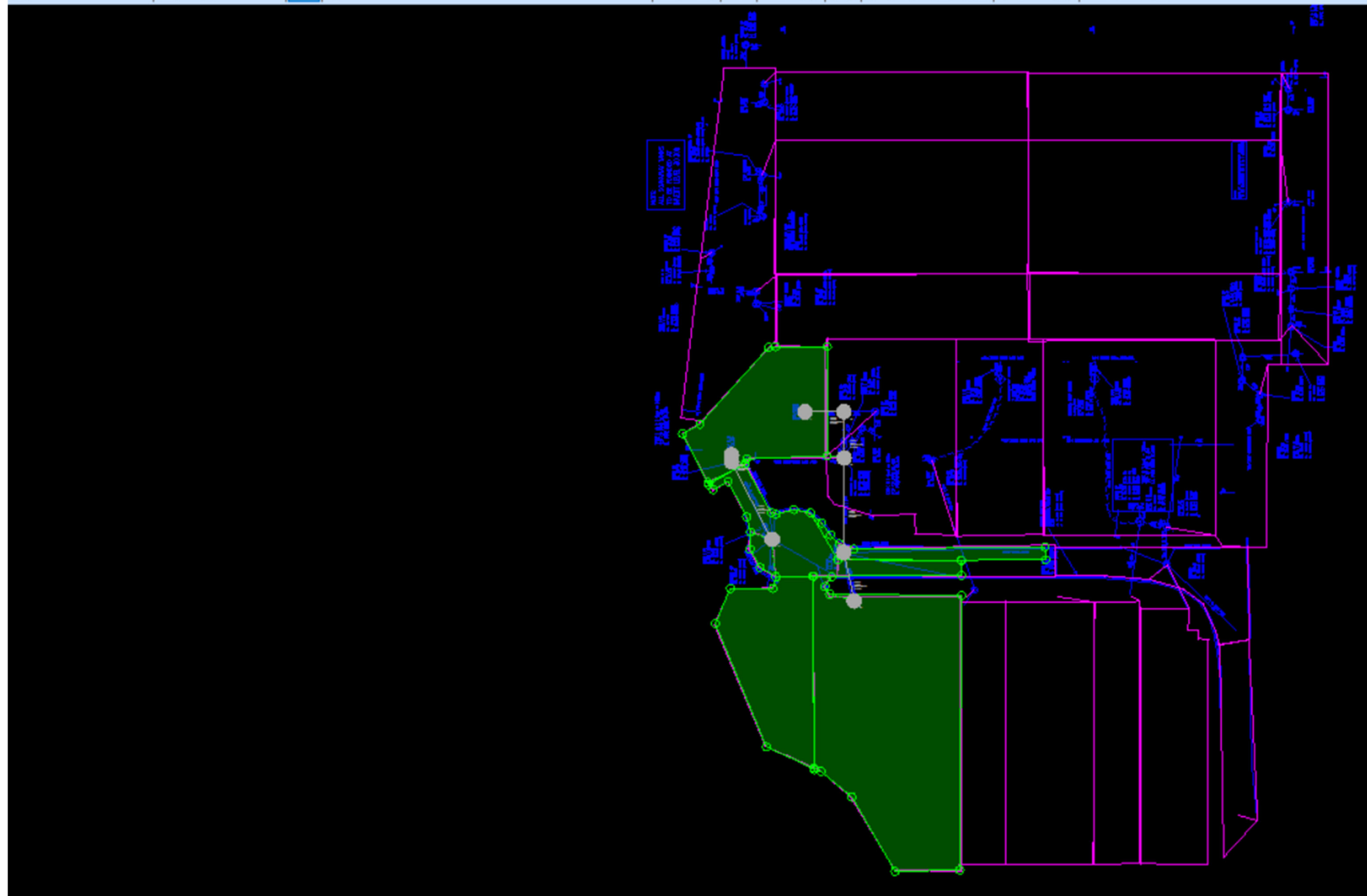


Network - [SOAKAWAY 2 NETWORK.MDX] - [Plan]

File Site Network Graphics Analyse Wizards Results Window Help

Storm

View Options Manhole Colours SFI Pipe Colours



SOAKWAY 4 NETWORK 1 : 100 + 40%

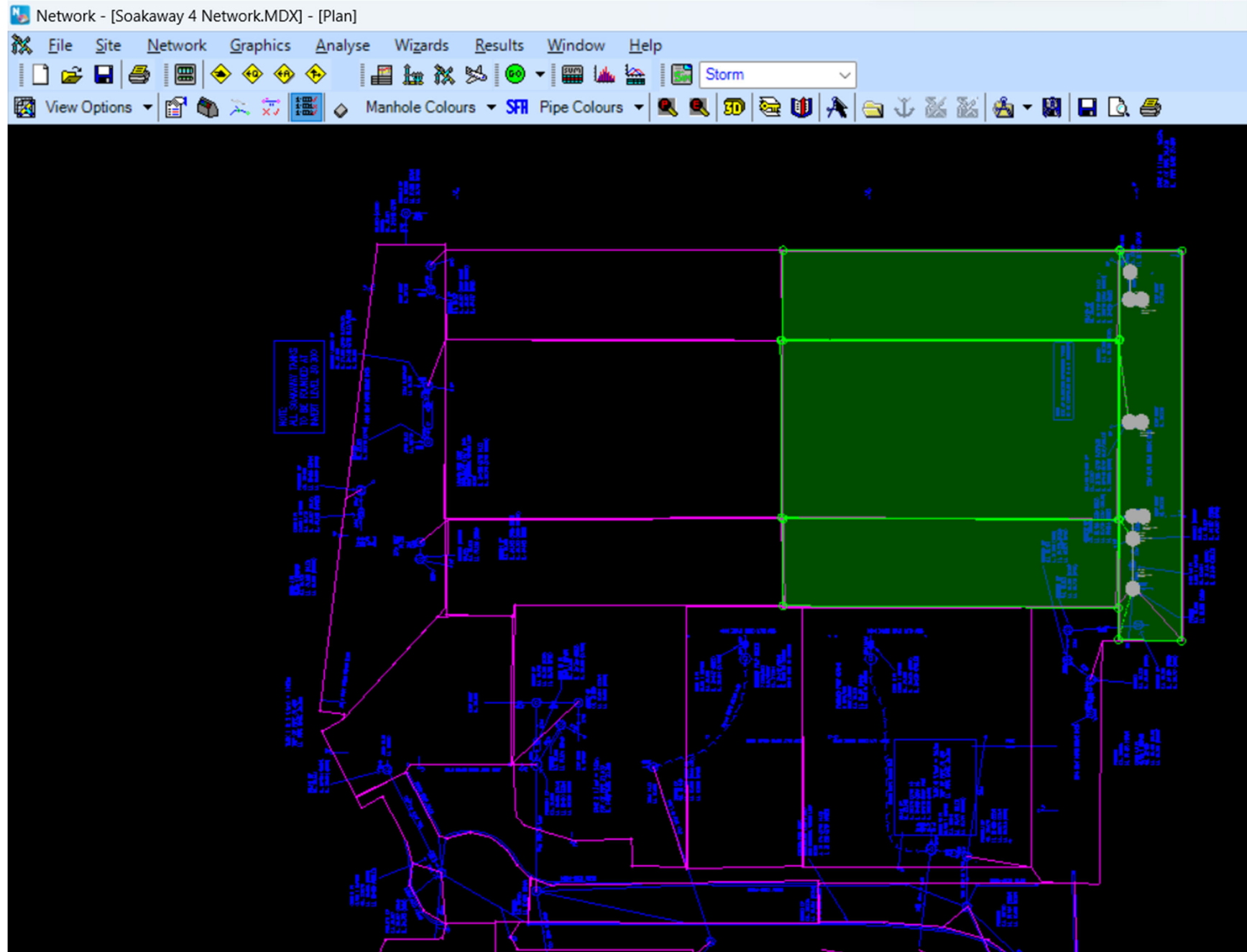
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<u>Existing Network Details for Storm</u>										
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	5.282	0.081	65.2	0.111	5.00	0.0	0.600	o	300	Pipe/Conduit
S1.001	2.273	1.018	2.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.000	9.580	0.218	43.9	0.089	5.00	0.0	0.600	o	225	Pipe/Conduit
S2.001	4.283	0.064	66.9	0.108	0.00	0.0	0.600	o	375	Pipe/Conduit
S2.002	2.068	0.378	5.5	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
S3.000	2.257	1.121	2.0	0.221	5.00	0.0	0.600	o	375	Pipe/Conduit
<u>Network Results Table</u>										
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)					
S1.000	31.200	0.111	0.0	1.95	137.8					
S1.001	31.818	0.111	0.0	10.60	749.0					
S2.000	31.515	0.089	0.0	1.98	78.7					
S2.001	31.167	0.198	0.0	2.22	244.9					
S2.002	31.103	0.198	0.0	7.79	860.3					
S3.000	31.846	0.221	0.0	12.85	1419.1					
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Innovyze				Network 2017.1.2					
<u>PIPELINE SCHEDULES for Storm</u>									
<u>Upstream Manhole</u>									
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	
S1.000	o	300	S1	32.394	31.200	0.894	Open Manhole	1200	
S1.001	o	300	S2	32.268	31.818	0.150	Open Manhole	1200	
S2.000	o	225	S3	32.362	31.515	0.622	Open Manhole	1200	
S2.001	o	375	S4	32.377	31.167	0.835	Open Manhole	1200	
S2.002	o	375	S5	32.253	31.103	0.775	Open Manhole	1200	
S3.000	o	375	S6	32.267	31.846	0.046	Open Manhole	1200	
<u>Downstream Manhole</u>									
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	
S1.000	5.282	65.2	S2	32.268	31.119	0.849	Open Manhole	1200	
S1.001	2.273	2.2	S	31.210	30.800	0.110	Open Manhole	0	
S2.000	9.580	43.9	S4	32.377	31.297	0.855	Open Manhole	1200	
S2.001	4.283	66.9	S5	32.253	31.103	0.775	Open Manhole	1200	
S2.002	2.068	5.5	S	31.210	30.725	0.110	Open Manhole	0	
S3.000	2.257	2.0	S	31.210	30.725	0.110	Open Manhole	0	
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File Soakaway 4 Network.MDX				Checked by RS																																																																	
Innovyze				Network 2017.1.2																																																																	
Area Summary for Storm <table><thead><tr><th>Pipe Number</th><th>PIMP Type</th><th>PIMP Name</th><th>PIMP (%)</th><th>Gross Area (ha)</th><th>Imp. Area (ha)</th><th>Pipe Total (ha)</th></tr></thead><tbody><tr><td>1.000</td><td>User</td><td>-</td><td>100</td><td>0.111</td><td>0.111</td><td>0.111</td></tr><tr><td>1.001</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>2.000</td><td>User</td><td>-</td><td>100</td><td>0.089</td><td>0.089</td><td>0.089</td></tr><tr><td>2.001</td><td>User</td><td>-</td><td>100</td><td>0.108</td><td>0.108</td><td>0.108</td></tr><tr><td>2.002</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>3.000</td><td>User</td><td>-</td><td>100</td><td>0.221</td><td>0.221</td><td>0.221</td></tr><tr><td colspan="4"></td><td>Total</td><td>Total</td><td>Total</td></tr><tr><td colspan="4"></td><td>0.529</td><td>0.529</td><td>0.529</td></tr></tbody></table>							Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)	1.000	User	-	100	0.111	0.111	0.111	1.001	-	-	100	0.000	0.000	0.000	2.000	User	-	100	0.089	0.089	0.089	2.001	User	-	100	0.108	0.108	0.108	2.002	-	-	100	0.000	0.000	0.000	3.000	User	-	100	0.221	0.221	0.221					Total	Total	Total					0.529	0.529	0.529
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)																																																															
1.000	User	-	100	0.111	0.111	0.111																																																															
1.001	-	-	100	0.000	0.000	0.000																																																															
2.000	User	-	100	0.089	0.089	0.089																																																															
2.001	User	-	100	0.108	0.108	0.108																																																															
2.002	-	-	100	0.000	0.000	0.000																																																															
3.000	User	-	100	0.221	0.221	0.221																																																															
				Total	Total	Total																																																															
				0.529	0.529	0.529																																																															
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
<u>Simulation Criteria</u>									
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000									
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000									
Hot Start Level (mm) 0 Inlet Coefficient 0.800									
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000									
Foul Sewage per hectare (l/s) 0.000									
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0									
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0									
<u>Synthetic Rainfall Details</u>									
Rainfall Model FSR Ratio R 0.400									
Region England and Wales Cv (Summer) 0.750									
M5-60 (mm) 20.000 Cv (Winter) 0.840									
Margin for Flood Risk Warning (mm) 300.0 DVD Status ON									
Analysis Timestep Fine Inertia Status OFF									
DTS Status ON									
Profile(s) Summer and Winter									
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440									
Return Period(s) (years) 100									
Climate Change (%) 40									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	
S1.000	S1	15 Winter	100	+40%	100/15 Summer	100/960 Summer			
S1.001	S2	15 Winter	100	+40%					
S2.000	S3	15 Winter	100	+40%					
S2.001	S4	15 Winter	100	+40%	100/15 Summer				
S2.002	S5	15 Winter	100	+40%					
S3.000	S6	15 Winter	100	+40%					
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	32.022	0.522	0.000	0.97		68.8	SURCHARGED	
S1.001	S2	31.925	-0.193	0.000	0.27		68.3	OK	
S2.000	S3	31.726	-0.014	0.000	0.85		55.2	OK	
S2.001	S4	31.565	0.023	0.000	1.16		124.4	SURCHARGED	
S2.002	S5	31.297	-0.181	0.000	0.51		123.3	OK	
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>							
	Water	Surcharged	Flooded		Pipe		
	US/MH	Level	Depth	Volume	Flow / Overflow	Flow	Level
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	Exceeded
S3.000	S6	31.995	-0.226	0.000	0.33	136.4	FLOOD RISK
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SOAKWAY 6 NETWORK : 100 + 40%

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<u>Existing Network Details for Storm</u>										
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
S1.000	18.211	0.157	116.0	0.150	5.00	0.0	0.600	o	375	Pipe/Conduit
S1.001	19.018	0.222	85.7	0.079	0.00	0.0	0.600	o	450	Pipe/Conduit
S2.000	43.526	0.147	296.1	0.042	5.00	0.0	0.600	o	225	Pipe/Conduit
S2.001	27.598	0.020	1379.9	0.018	0.00	0.0	0.600	o	225	Pipe/Conduit
S2.002	9.476	0.056	169.2	0.148	0.00	0.0	0.600	o	375	Pipe/Conduit
S2.003	7.089	-0.011	-644.5	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.002	2.984	0.016	186.5	0.218	0.00	0.0	0.600	o	600	Pipe/Conduit
<u>Network Results Table</u>										
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)					
S1.000	31.224	0.150	0.0	1.68	185.7					
S1.001	30.994	0.229	0.0	2.20	349.5					
S2.000	31.247	0.042	0.0	0.75	30.0					
S2.001	31.100	0.060	0.0	0.34	13.7					
S2.002	30.930	0.208	0.0	1.39	153.5					
S2.003	30.874	0.208	0.0	0.00	0.0					
S1.002	30.516	0.656	0.0	1.78	503.3					
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<u>PIPELINE SCHEDULES for Storm</u>									
<u>Upstream Manhole</u>									
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	
S1.000	o	375	S1	32.565	31.224	0.966	Open Manhole	1200	
S1.001	o	450	S2	32.589	30.994	1.145	Open Manhole	1200	
S2.000	o	225	S3	32.006	31.247	0.534	Open Manhole	1200	
S2.001	o	225	S4	32.152	31.100	0.827	Open Manhole	1200	
S2.002	o	375	S5	32.180	30.930	0.875	Open Manhole	1200	
S2.003	o	375	S6	32.072	30.874	0.823	Open Manhole	1200	
S1.002	o	600	S7	32.016	30.516	0.900	Open Manhole	1200	
<u>Downstream Manhole</u>									
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	
S1.000	18.211	116.0	S2	32.589	31.067	1.147	Open Manhole	1200	
S1.001	19.018	85.7	S7	32.016	30.772	0.794	Open Manhole	1200	
S2.000	43.526	296.1	S4	32.152	31.100	0.827	Open Manhole	1200	
S2.001	27.598	1379.9	S5	32.180	31.080	0.875	Open Manhole	1200	
S2.002	9.476	169.2	S6	32.072	30.874	0.823	Open Manhole	1200	
S2.003	7.089	-644.5	S7	32.016	30.885	0.756	Open Manhole	1200	
S1.002	2.984	186.5	S8	32.000	30.500	0.900	Open Manhole	1200	
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Innovyze				Network 2017.1.2		
<u>Area Summary for Storm</u>						
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.150	0.150	0.150
1.001	User	-	100	0.079	0.079	0.079
2.000	User	-	100	0.042	0.042	0.042
2.001	User	-	100	0.018	0.018	0.018
2.002	User	-	100	0.107	0.107	0.107
	User	-	100	0.041	0.041	0.148
2.003	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.218	0.218	0.218
				Total	Total	Total
				0.656	0.656	0.656
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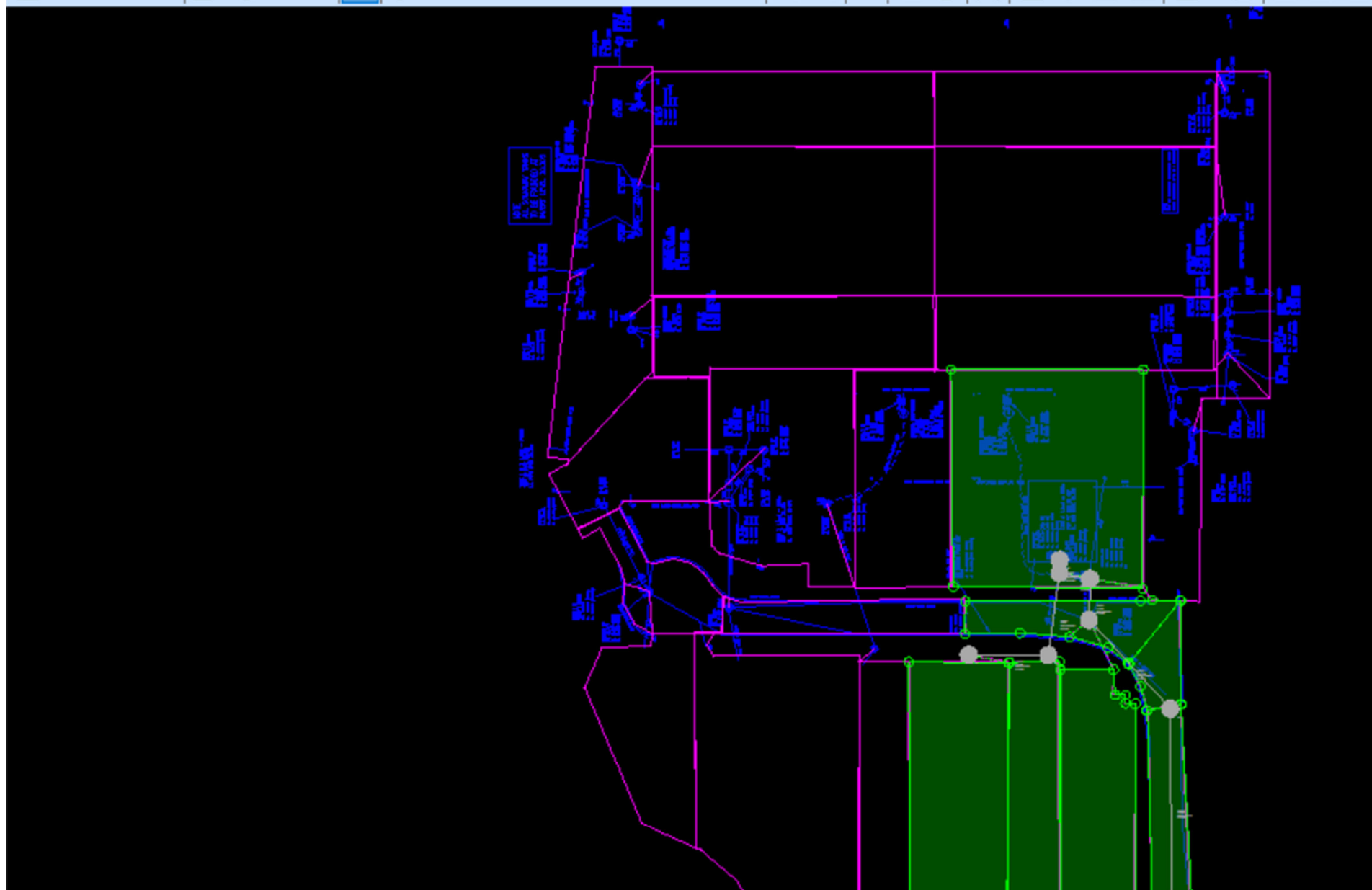
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Innovyze						Network 2017.1.2			
Summary of Critical Results by Maximum Level (Rank 1) for Storm									
Simulation Criteria									
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000									
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000									
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800									
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000									
Foul Sewage per hectare (l/s) 0.000									
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0									
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0									
Synthetic Rainfall Details									
Rainfall Model FSR Ratio R 0.400									
Region England and Wales Cv (Summer) 0.750									
M5-60 (mm) 20.000 Cv (Winter) 0.840									
Margin for Flood Risk Warning (mm) 300.0 DVD Status ON									
Analysis Timestep Fine Inertia Status OFF									
DTS Status ON									
Profile(s) Summer and Winter									
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440									
Return Period(s) (years) 100									
Climate Change (%) 40									
Water									
PN	US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	
	Name	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	
S1.000	S1 15 Winter	100	+40%					31.437	
S1.001	S2 15 Winter	100	+40%					31.303	
S2.000	S3 15 Winter	100	+40%	100/15 Summer				31.692	
S2.001	S4 15 Winter	100	+40%	100/15 Summer				31.588	
S2.002	S5 15 Winter	100	+40%	100/15 Summer				31.458	
S2.003	S6 15 Winter	100	+40%	100/15 Summer				31.352	
S1.002	S7 15 Winter	100	+40%	100/15 Summer				31.242	
Surcharged Flooded									
	US/MH	Depth	Volume	Flow /	Overflow	Pipe		Level	
PN	Name	(m)	(m³)	Cap.	(l/s)	Flow	Status	Exceeded	
						(l/s)			
S1.000	S1	-0.162	0.000	0.61		93.0	OK		
S1.001	S2	-0.141	0.000	0.53		141.8	OK		
S2.000	S3	0.220	0.000	0.86		24.6	SURCHARGED		
S2.001	S4	0.263	0.000	3.01		33.9	SURCHARGED		
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Network - [SOAKAWAY 6 NETWORK.MDX] - [Plan]

File Site Network Graphics Analyse Wizards Results Window Help

Storm

View Options Manhole Colours SFR Pipe Colours



Appendix C:
NEW SOAKAWAY AND NETWORK CALCULATIONS.

NEW SOAKAWAY AND NETWORK : 100 + 40%

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Innovyze	Network 2017.1.2													
<u>Time Area Diagram for Existing</u> <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></thead><tbody><tr><td>0-4</td><td>0.892</td><td>4-8</td><td>0.583</td><td>8-12</td><td>0.001</td></tr></tbody></table> Total Area Contributing (ha) = 1.476 Total Pipe Volume (m³) = 62.027			Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.892	4-8	0.583	8-12	0.001
Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)									
0-4	0.892	4-8	0.583	8-12	0.001									
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Network 2017.1.2

Micro Drainage

Existing Network Details for Existing

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
1.000	22.456	0.123	182.6	0.164	5.00	0.0	0.600	o	375	Pipe/Conduit
1.001	2.179	0.054	40.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
1.002	29.245	0.110	265.9	0.077	0.00	0.0	0.600	o	375	Pipe/Conduit
2.000	12.802	0.087	147.1	0.224	5.00	0.0	0.600	o	375	Pipe/Conduit
2.001	25.934	0.215	120.6	0.016	0.00	0.0	0.600	o	375	Pipe/Conduit
3.000	22.790	0.110	207.2	0.062	5.00	0.0	0.600	o	300	Pipe/Conduit
3.001	33.308	0.165	201.9	0.051	0.00	0.0	0.600	o	300	Pipe/Conduit
3.002	4.651	0.025	186.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
3.003	15.140	-1.425	-10.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
3.004	4.199	0.020	210.0	0.160	0.00	0.0	0.600	o	300	Pipe/Conduit
1.003	16.001	0.270	59.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
1.004	42.573	0.050	851.5	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
4.000	46.837	0.147	318.6	0.023	5.00	0.0	0.600	o	225	Pipe/Conduit
4.001	24.440	0.020	1222.0	0.037	0.00	0.0	0.600	o	225	Pipe/Conduit
4.002	10.555	0.185	57.1	0.152	0.00	0.0	0.600	o	375	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	30.957	0.164	0.0	1.34	147.7
1.001	30.834	0.164	0.0	2.86	315.9
1.002	30.780	0.241	0.0	1.11	122.2
2.000	31.047	0.224	0.0	1.49	164.7
2.001	30.960	0.241	0.0	1.65	182.1
3.000	30.275	0.062	0.0	1.09	76.9
3.001	30.165	0.113	0.0	1.10	78.0
3.002	30.000	0.113	0.0	1.15	81.2
3.003	29.975	0.113	0.0	0.00	0.0
3.004	30.765	0.272	0.0	1.08	76.4
1.003	30.670	0.754	0.0	3.17	895.6
1.004	30.400	0.754	0.0	0.83	233.7
4.000	31.247	0.023	0.0	0.73	28.9
4.001	31.100	0.060	0.0	0.37	14.5
4.002	30.930	0.213	0.0	2.40	265.4

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<u>Existing Network Details for Existing</u>											
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	
5.000	39.197	0.180	217.8	0.053	5.00	0.0	0.600	o	300	Pipe/Conduit	
5.001	11.051	0.050	221.0	0.053	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.003	7.556	0.250	30.2	0.096	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.004	40.288	0.070	575.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
6.000	17.987	0.057	315.6	0.080	5.00	0.0	0.600	o	375	Pipe/Conduit	
6.001	20.882	0.825	25.3	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.000	18.566	0.144	128.9	0.151	5.00	0.0	0.600	o	375	Pipe/Conduit	
7.001	14.587	0.305	47.8	0.076	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.002	28.320	0.275	103.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	13.071	0.050	261.4	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
<u>Network Results Table</u>											
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)						
5.000	31.050	0.053	0.0	1.06	75.0						
5.001	30.795	0.106	0.0	1.21	134.2						
4.003	30.670	0.415	0.0	3.71	589.8						
4.004	30.420	0.415	0.0	0.84	133.6						
6.000	31.307	0.080	0.0	1.01	112.1						
6.001	31.250	0.080	0.0	3.61	399.2						
7.000	31.224	0.151	0.0	1.59	176.1						
7.001	31.080	0.227	0.0	2.63	290.0						
7.002	30.700	0.227	0.0	1.79	197.2						
1.005	30.350	1.476	0.0	1.50	424.5						
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<u>PIPELINE SCHEDULES for Existing</u>								
<u>Upstream Manhole</u>								
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	375	E1	32.160	30.957	0.828	Open Manhole	1200
1.001	o	375	E2	32.140	30.834	0.931	Open Manhole	1200
1.002	o	375	E3	32.130	30.780	0.975	Open Manhole	1200
2.000	o	375	E4	31.919	31.047	0.497	Open Manhole	1200
2.001	o	375	E5	32.160	30.960	0.825	Open Manhole	1200
3.000	o	300	E6	31.200	30.275	0.625	Open Manhole	1200
3.001	o	300	E7	31.200	30.165	0.735	Open Manhole	1200
3.002	o	300	E8	32.500	30.000	2.200	Open Manhole	1200
3.003	o	150	E9	32.450	29.975	2.325	Open Manhole	1200
3.004	o	300	E10	32.180	30.765	1.115	Open Manhole	1200
1.003	o	600	E11	32.200	30.670	0.930	Open Manhole	1200
1.004	o	600	E12	32.200	30.400	1.200	Open Manhole	1200
4.000	o	225	E13	32.006	31.247	0.534	Open Manhole	1200
4.001	o	225	E14	32.185	31.100	0.860	Open Manhole	1200
<u>Downstream Manhole</u>								
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	22.456	182.6	E2	32.140	30.834	0.931	Open Manhole	1200
1.001	2.179	40.4	E3	32.130	30.780	0.975	Open Manhole	1200
1.002	29.245	265.9	E11	32.200	30.670	1.155	Open Manhole	1200
2.000	12.802	147.1	E5	32.160	30.960	0.825	Open Manhole	1200
2.001	25.934	120.6	E11	32.200	30.745	1.080	Open Manhole	1200
3.000	22.790	207.2	E7	31.200	30.165	0.735	Open Manhole	1200
3.001	33.308	201.9	E8	32.500	30.000	2.200	Open Manhole	1200
3.002	4.651	186.0	E9	32.450	29.975	2.175	Open Manhole	1200
3.003	15.140	-10.6	E10	32.180	31.400	0.630	Open Manhole	1200
3.004	4.199	210.0	E11	32.200	30.745	1.155	Open Manhole	1200
1.003	16.001	59.3	E12	32.200	30.400	1.200	Open Manhole	1200
1.004	42.573	851.5	E24	32.050	30.350	1.100	Open Manhole	1200
4.000	46.837	318.6	E14	32.185	31.100	0.860	Open Manhole	1200
4.001	24.440	1222.0	E15	32.180	31.080	0.875	Open Manhole	1200
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<u>PIPELINE SCHEDULES for Existing</u>									
<u>Upstream Manhole</u>									
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
4.002	o	375	E15	32.180	30.930	0.875	Open Manhole		1200
5.000	o	300	E16	32.150	31.050	0.800	Open Manhole		1200
5.001	o	375	E19	32.150	30.795	0.980	Open Manhole		1200
4.003	o	450	E20	32.150	30.670	1.030	Open Manhole		1200
4.004	o	450	E21	32.050	30.420	1.180	Open Manhole		1200
6.000	o	375	E22	32.450	31.307	0.768	Open Manhole		1200
6.001	o	375	E23	32.000	31.250	0.375	Open Manhole		1200
7.000	o	375	E17	32.565	31.224	0.966	Open Manhole		1200
7.001	o	375	E18	32.589	31.080	1.134	Open Manhole		1200
7.002	o	375	E24	32.150	30.700	1.075	Open Manhole		1200
1.005	o	600	E24	32.050	30.350	1.100	Open Manhole		1200
<u>Downstream Manhole</u>									
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
4.002	10.555	57.1	E20	32.150	30.745	1.030	Open Manhole		1200
5.000	39.197	217.8	E19	32.150	30.870	0.980	Open Manhole		1200
5.001	11.051	221.0	E20	32.150	30.745	1.030	Open Manhole		1200
4.003	7.556	30.2	E21	32.050	30.420	1.180	Open Manhole		1200
4.004	40.288	575.5	E24	32.050	30.350	1.250	Open Manhole		1200
6.000	17.987	315.6	E23	32.000	31.250	0.375	Open Manhole		1200
6.001	20.882	25.3	E24	32.050	30.425	1.250	Open Manhole		1200
7.000	18.566	128.9	E18	32.589	31.080	1.134	Open Manhole		1200
7.001	14.587	47.8	E24	32.150	30.775	1.000	Open Manhole		1200
7.002	28.320	103.0	E24	32.050	30.425	1.250	Open Manhole		1200
1.005	13.071	261.4	E	32.000	30.300	1.100	Open Manhole		0
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<u>Area Summary for Existing</u>						
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.142	0.142	0.142
	User	-	100	0.021	0.021	0.164
1.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.077	0.077	0.077
2.000	User	-	100	0.224	0.224	0.224
2.001	User	-	100	0.016	0.016	0.016
3.000	User	-	100	0.062	0.062	0.062
3.001	User	-	100	0.051	0.051	0.051
3.002	-	-	100	0.000	0.000	0.000
3.003	-	-	100	0.000	0.000	0.000
3.004	User	-	100	0.111	0.111	0.111
	User	-	100	0.048	0.048	0.160
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
4.000	User	-	100	0.021	0.021	0.021
	User	-	100	0.002	0.002	0.023
4.001	User	-	100	0.037	0.037	0.037
4.002	User	-	100	0.105	0.105	0.105
	User	-	100	0.047	0.047	0.152
5.000	User	-	100	0.053	0.053	0.053
5.001	User	-	100	0.053	0.053	0.053
4.003	User	-	100	0.046	0.046	0.046
	User	-	100	0.050	0.050	0.096
4.004	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.080	0.080	0.080
6.001	-	-	100	0.000	0.000	0.000
7.000	User	-	100	0.151	0.151	0.151
7.001	User	-	100	0.076	0.076	0.076
7.002	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.476	1.476	1.476
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Online Controls for Existing Pump Manhole: E9, DS/PN: 3.003, Volume (m³): 3.0 Invert Level (m) 29.975 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.200</td><td>25.0000</td><td>1.800</td><td>25.0000</td><td>3.400</td><td>25.0000</td><td>5.000</td><td>25.0000</td></tr><tr><td>0.400</td><td>25.0000</td><td>2.000</td><td>25.0000</td><td>3.600</td><td>25.0000</td><td>5.200</td><td>25.0000</td></tr><tr><td>0.600</td><td>25.0000</td><td>2.200</td><td>25.0000</td><td>3.800</td><td>25.0000</td><td>5.400</td><td>25.0000</td></tr><tr><td>0.800</td><td>25.0000</td><td>2.400</td><td>25.0000</td><td>4.000</td><td>25.0000</td><td>5.600</td><td>25.0000</td></tr><tr><td>1.000</td><td>25.0000</td><td>2.600</td><td>25.0000</td><td>4.200</td><td>25.0000</td><td>5.800</td><td>25.0000</td></tr><tr><td>1.200</td><td>25.0000</td><td>2.800</td><td>25.0000</td><td>4.400</td><td>25.0000</td><td>6.000</td><td>25.0000</td></tr><tr><td>1.400</td><td>25.0000</td><td>3.000</td><td>25.0000</td><td>4.600</td><td>25.0000</td><td></td><td></td></tr><tr><td>1.600</td><td>25.0000</td><td>3.200</td><td>25.0000</td><td>4.800</td><td>25.0000</td><td></td><td></td></tr></table> Pump Manhole: E24, DS/PN: 1.005, Volume (m³): 25.0 Invert Level (m) 30.350 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.200</td><td>0.0000</td><td>1.800</td><td>0.0000</td><td>3.400</td><td>0.0000</td><td>5.000</td><td>0.0000</td></tr><tr><td>0.400</td><td>0.0000</td><td>2.000</td><td>0.0000</td><td>3.600</td><td>0.0000</td><td>5.200</td><td>0.0000</td></tr><tr><td>0.600</td><td>0.0000</td><td>2.200</td><td>0.0000</td><td>3.800</td><td>0.0000</td><td>5.400</td><td>0.0000</td></tr><tr><td>0.800</td><td>0.0000</td><td>2.400</td><td>0.0000</td><td>4.000</td><td>0.0000</td><td>5.600</td><td>0.0000</td></tr><tr><td>1.000</td><td>0.0000</td><td>2.600</td><td>0.0000</td><td>4.200</td><td>0.0000</td><td>5.800</td><td>0.0000</td></tr><tr><td>1.200</td><td>0.0000</td><td>2.800</td><td>0.0000</td><td>4.400</td><td>0.0000</td><td>6.000</td><td>0.0000</td></tr><tr><td>1.400</td><td>0.0000</td><td>3.000</td><td>0.0000</td><td>4.600</td><td>0.0000</td><td></td><td></td></tr><tr><td>1.600</td><td>0.0000</td><td>3.200</td><td>0.0000</td><td>4.800</td><td>0.0000</td><td></td><td></td></tr></table> <tr><td colspan="8">©1982-2017 XP Solutions</td></tr>								Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.200	25.0000	1.800	25.0000	3.400	25.0000	5.000	25.0000	0.400	25.0000	2.000	25.0000	3.600	25.0000	5.200	25.0000	0.600	25.0000	2.200	25.0000	3.800	25.0000	5.400	25.0000	0.800	25.0000	2.400	25.0000	4.000	25.0000	5.600	25.0000	1.000	25.0000	2.600	25.0000	4.200	25.0000	5.800	25.0000	1.200	25.0000	2.800	25.0000	4.400	25.0000	6.000	25.0000	1.400	25.0000	3.000	25.0000	4.600	25.0000			1.600	25.0000	3.200	25.0000	4.800	25.0000			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.200	0.0000	1.800	0.0000	3.400	0.0000	5.000	0.0000	0.400	0.0000	2.000	0.0000	3.600	0.0000	5.200	0.0000	0.600	0.0000	2.200	0.0000	3.800	0.0000	5.400	0.0000	0.800	0.0000	2.400	0.0000	4.000	0.0000	5.600	0.0000	1.000	0.0000	2.600	0.0000	4.200	0.0000	5.800	0.0000	1.200	0.0000	2.800	0.0000	4.400	0.0000	6.000	0.0000	1.400	0.0000	3.000	0.0000	4.600	0.0000			1.600	0.0000	3.200	0.0000	4.800	0.0000			©1982-2017 XP Solutions							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																																																																																								
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Storage Structures for Existing

Cellular Storage Manhole: E24, DS/PN: 1.005

Invert Level (m) 30.300 Safety Factor 5.0

Infiltration Coefficient Base (m/hr) 0.01512 Porosity 0.97

Infiltration Coefficient Side (m/hr) 0.01512

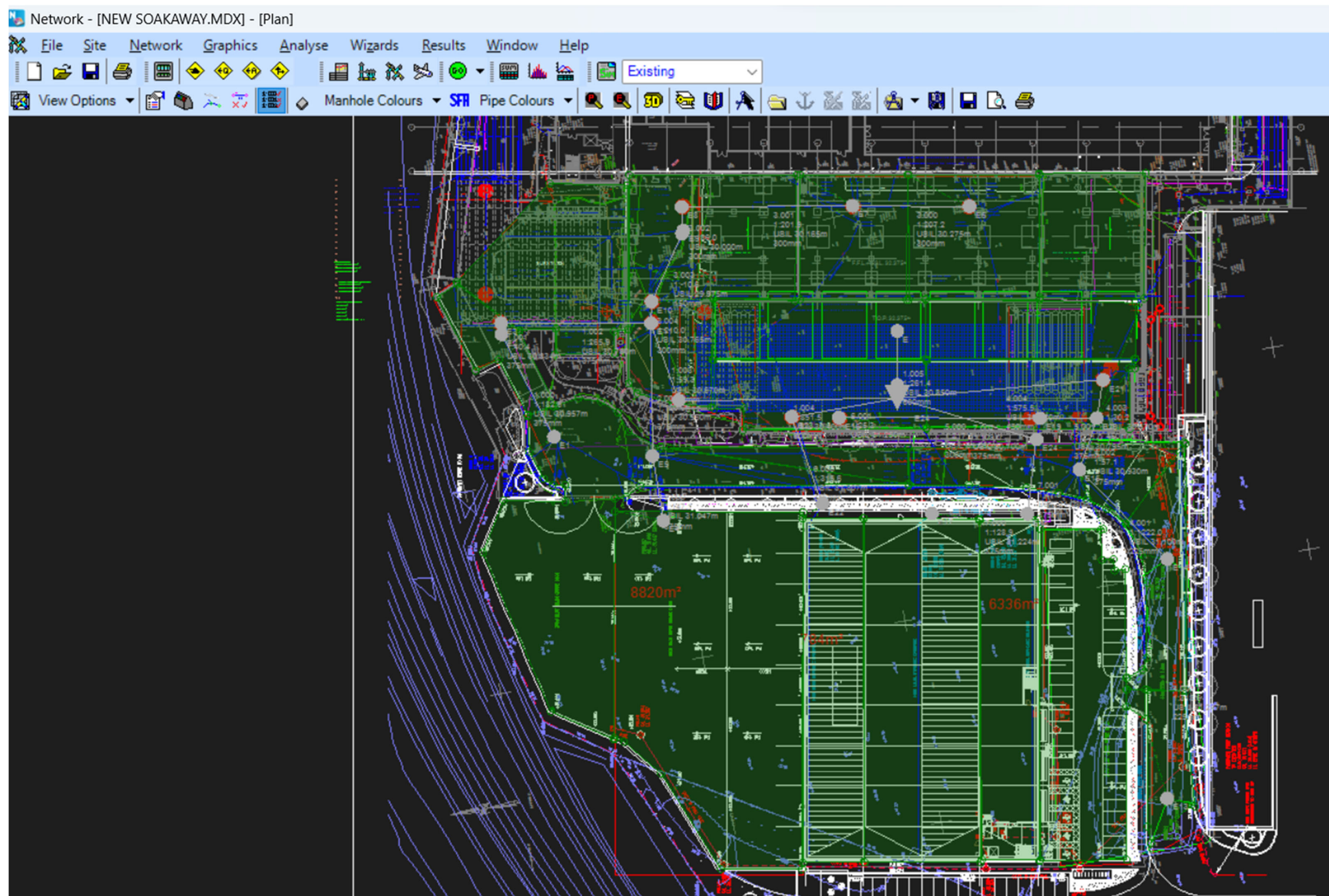
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	1290.2	1290.2	1.000	0.0	1458.7
0.900	1290.2	1458.7			

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Summary of Critical Results by Maximum Level (Rank 1) for Existing							
Simulation Criteria							
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000							
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000							
Hot Start Level (mm) 0 Inlet Coefficient 0.800							
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000							
Foul Sewage per hectare (l/s) 0.000							
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0							
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0							
Synthetic Rainfall Details							
Rainfall Model FSR Ratio R 0.400							
Region England and Wales Cv (Summer) 0.750							
M5-60 (mm) 20.000 Cv (Winter) 0.840							
Margin for Flood Risk Warning (mm) 300.0							
Analysis Timestep 2.5 Second Increment (Extended)							
DTS Status OFF							
DVD Status ON							
Inertia Status ON							
Profile(s) Summer and Winter							
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440							
Return Period(s) (years) 1, 30, 100							
Climate Change (%) 40, 40, 40							

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Existing</u>					
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Innovyze					Network 2017.1.2				
<u>Summary of Critical Results by Maximum Level (Rank 1) for Existing</u>									
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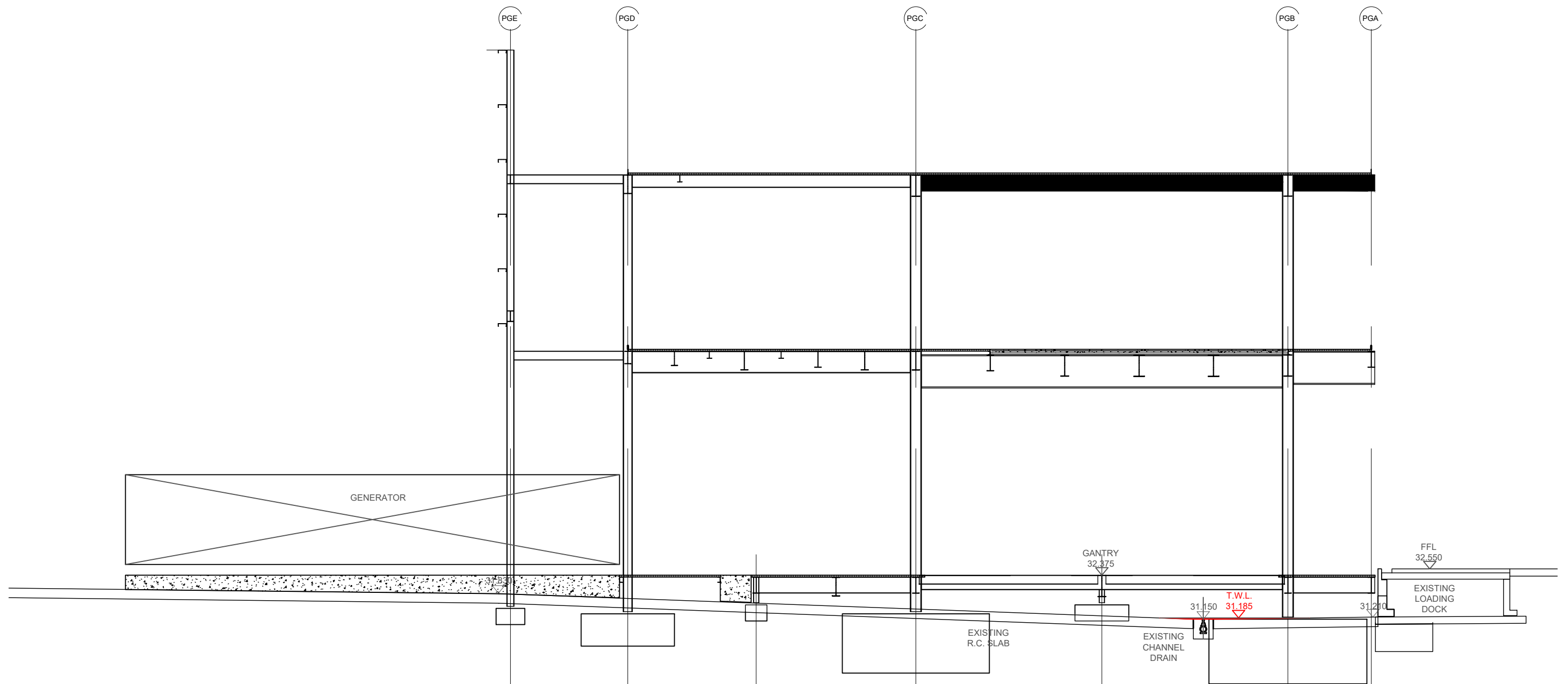
- 1) This drawing is to be read in conjunction with all relevant Architects and Engineers drawings and specifications.
- 2) Any discrepancies in dimensions or details, or between these drawings should be drawn to the attention of the Architect and/or the Engineer in writing for clarification.
- 3) The contractor is to verify locations, invert levels and diameter of existing drainage at tie-in points prior to the commencement of any site works.
- 4) All drainage works are to be installed in accordance with BS.8301/BS.EN.752.
- 5) Reference is to be made to the specification documents for materials and installation details.
- 6) This drawing is to be used for drainage information only.
- 7) Refer to Architects drawings for building and drainage setting out.
- 8) For foundation details see drawing number 3887/--- & ---.
- 9) Refer to site investigation report for ground conditions.
- 10) All excavations in excess of one metre deep are to have trench supports.
- 11) Trench excavations to be kept dry at all times.
- 12) For manhole and drainage installation details see standard drawing numbers SD/5-- etc.
- 13) All foul water drainage to be 100Ø @ 1:40 min. unless noted otherwise. All surface water drainage to be 150Ø @ 1:150 min. unless noted otherwise.
- 14) All foul and surface water drainage is to be laid with level soffits unless noted otherwise.
- 15) All drainage with less than 1.2m cover is to be fitted with a concrete surround.
- 16) All invert levels are to the outgoing pipe unless noted otherwise.
- 17) Full Retention Separators are to be Class 1, alarmed (mains) and fitted with oil level sensor / silt probe. The separator is to be vented and installed in accordance with the manufacturer's Installation details. For position of separator panel and vent stack refer to the Architect's drawings. For electrical supply refer to M & E drawings.
- 18) All redundant drainage is to be grubbed-up or sealed to the satisfaction of the local authority.
- 19) All drainage is to be fitted with access points immediately above finish floor / ground level.
- 20) The contractor is to carry out a survey of the existing sewers / drains to be abandoned up to the start / head of the run which may extend beyond the site boundary to establish that there are no live incoming connections prior to commencement of any site works.
- 21) Soakaway is to be Aco StormBrix HD or similar approved, be capable of supporting HGV loadings, wrapped in a permeable membrane and to be installed in accordance with the manufacturer's details and recommendations.
Soakaways are to be located a minimum of 5m from roads, building foundations and site boundary
- 22) All channel and kerb drains to be roddable and fitted with silt traps and removable silt buckets.

- | | | |
|--|------------|-----------------------------|
| REV | AMENDMENTS | DATE |
| | | DATE Oct 2022 |
| Virtus London 14
Proposed Data Centre | | SCALE 1:200 @ A0 |
| | | DRAWN BY <i>SM</i> |
| External Works
Proposed Drainage Layout | | DRG No
3887 / 601 |
- JOHN TOOKE & PARTNERS

CONSULTING ENGINEERS

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Aylesford, Kent, ME20 7NS

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SECTION THROUGH GANTRY