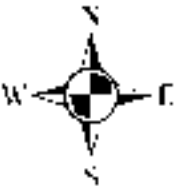




PPA0009236 Water plan 1



LEGEND

Clean network:			
	Shut valve		Stop tap
	Pressure reducing valve		Water Treatment Works
	Meter		Water Pumping Station
	Bulk meter		Existing main
	Hydrant		Non-operational main
	Cap end		Raw Water
	Air valve		
HL - Water main symbol colour indicates the type			
LIGHT BLUE		- Trunk	
DARK BLUE		- Distribution	
YELLOW		- Raw Water	

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

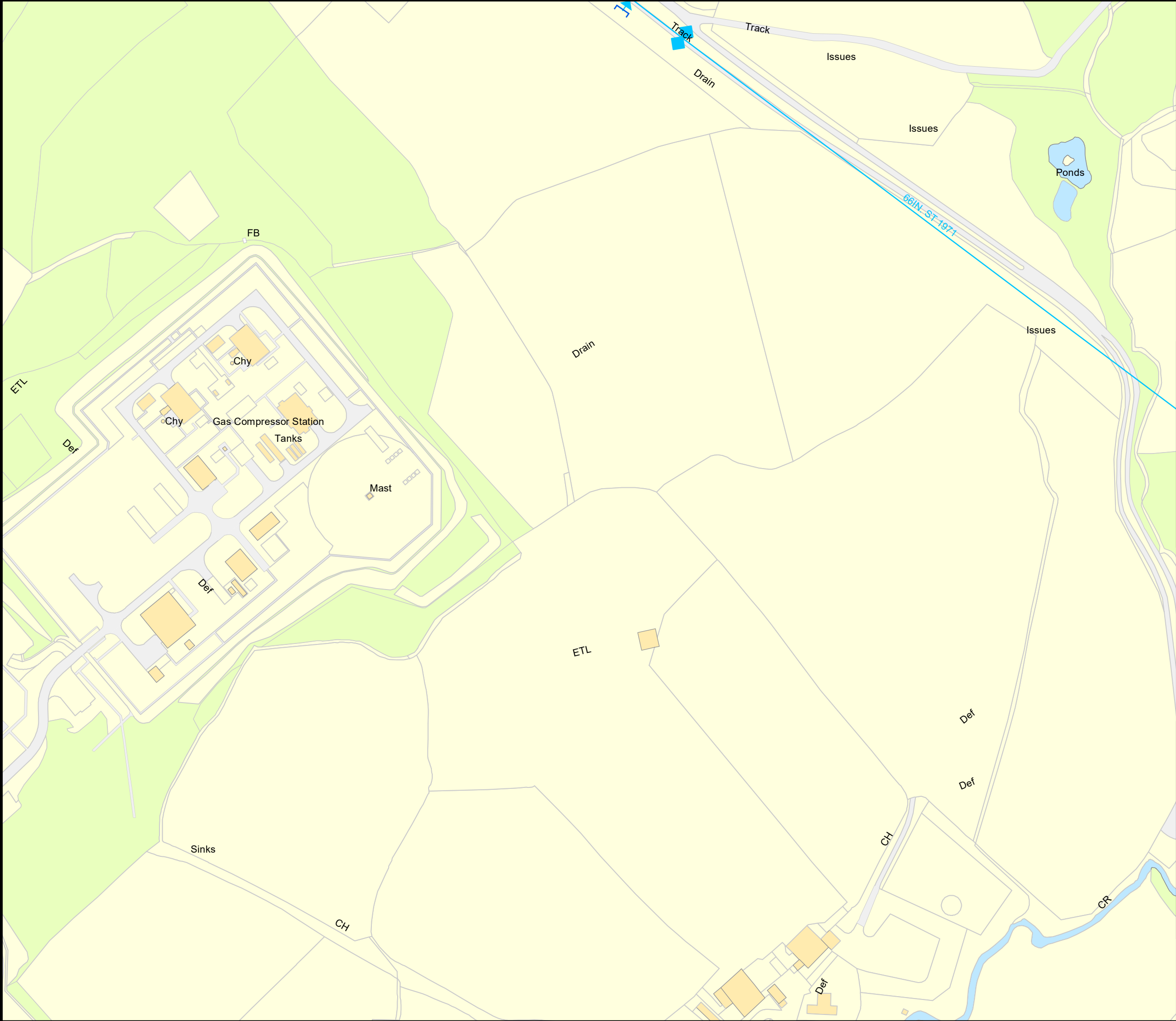
Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref: 264567,200717  
Map scale: 1:2275  
Printed by: Stacey Harris  
Printed on: 04 Mar 2025



PPA0009236 Water plan 2



LEGEND

Clean network:			
	Shut-off valve		Stop tap
	Pressure reducing valve		Water Treatment Works
	Meter		Water Pumping Station
	Bull's neck		Existing main
	Hydrant		Non-operational main
	Cap end		Raw Water
	Air valve	H/L - Water main symbol colour indicates file type	
		LIGHT BLUE - Trunk	
		DARK BLUE - Distribution	
		YELLOW - Raw Water	

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS  
TO BE DETERMINED ON SITE.

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Map Ref: 265297,201012  
Map scale: 1:2275  
Printed by: Stacey Harris  
Printed on: 04 Mar 2025

**PPA0009236**

**Conditions For Development Near Water Mains**

**Location: land west of Rhydybandy Road, Rhydybandy Road, Morriston Swansea**

**Date: 04/03/2025**

The development of the site with our water main located as shown on the attached plan will involve certain conditions which must be strictly adhered to.

1. No structure is to be sited within a minimum distance of **25m** from the centre line of the 66" trunk watermain pipe. The pipeline must therefore be located and marked up accurately at an early stage so that the Developer or others understand clearly the limits to which they are confined with respect to the Company's apparatus. Arrangements can be made for Company staff to trace and peg out such water mains on request of the Developer.
2. Adequate precautions are to be taken to ensure the protection of the water main during the course of site development.
3. If heavy earthmoving machinery is to be employed, then the routes to be used in moving plant around the site should be clearly indicated. Suitable ramps or other protection will need to be provided to protect the water main from heavy plant.
4. The water main is to be kept free from all temporary buildings, building material and spoil heaps etc.
5. The existing ground cover on the water main should not be increased or decreased.
6. All chambers, covers, marker posts etc. are to be preserved in their present position.
7. Access to the Company's apparatus must be maintained at all times for inspection and maintenance purposes and must not be restricted in any way as a result of the development.
8. No work is to be carried out before this Company has approved the final plans and sections.

These are general conditions only and where appropriate, will be applied in conjunction with specific terms and conditions provided with our quotation and other associated documentation relating to this development.








## Appendix D

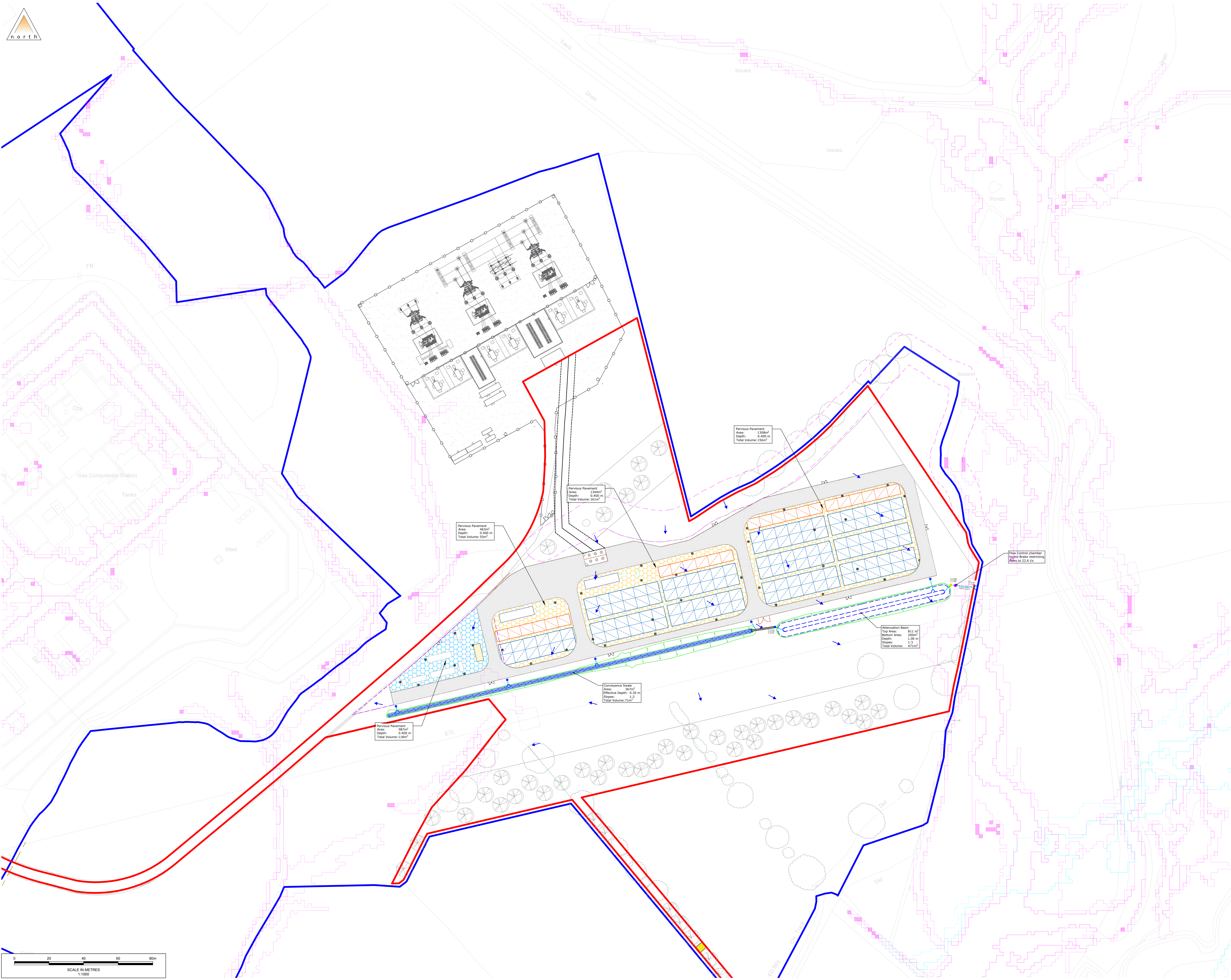
### Greenfield Runoff Calculation

Motion		Page 1																		
84 North Street																				
Guildford																				
Surrey GU1 4AU																				
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File 2303083 20012025 100Y+45% [CG S...	Checked by																			
Innovyze	Source Control 2020.1.3																			
<p><u>FEH Mean Annual Flood</u></p> <p>Input</p> <table><tr><td>QMED Method</td><td>2008</td><td>SAAR (mm)</td><td>1446</td><td>BFIHOST</td><td>0.440</td></tr><tr><td>Site Location</td><td>GB 474700 227450 SP 74700 27450</td><td>URBEXT (2000)</td><td>0.0000</td><td>FARL</td><td>1.000</td></tr><tr><td>Area (ha)</td><td>89.375</td><td>SPRHOST</td><td>45.140</td><td></td><td></td></tr></table> <p>Results</p> <p>QMED Rural (l/s) 1138.5 QMED Urban (l/s) 1138.5</p>			QMED Method	2008	SAAR (mm)	1446	BFIHOST	0.440	Site Location	GB 474700 227450 SP 74700 27450	URBEXT (2000)	0.0000	FARL	1.000	Area (ha)	89.375	SPRHOST	45.140		
QMED Method	2008	SAAR (mm)	1446	BFIHOST	0.440															
Site Location	GB 474700 227450 SP 74700 27450	URBEXT (2000)	0.0000	FARL	1.000															
Area (ha)	89.375	SPRHOST	45.140																	
©1982-2020 Innovyze																				

## **Appendix E**

Proposed Drainage Strategy





- Notes**
- All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
  - Any discrepancies shall be reported to the engineer immediately, so that clarification can be sought prior to the commencement of works.
  - This drawing shall be read in conjunction with all other relevant engineering details, drawings and specification.
  - The contractor is to keep a record of any variations made on site, including the relocation of sewers or drains, for their 'as built' drawings to be prepared upon project completion.
  - All works to adopted systems are to be carried out in accordance with Sewerage Sector Guidance Appendix C, Approved Version 2.1, 25 May 2021. All works to private drainage systems are to be in accordance with the Building Regulations Approved Document Part 'H' 2015 edition.
  - 900mm min cover to be provided for private pipes laid beneath agricultural land and public open space unless not practicable. 1200mm min cover to be provided for highways and parking areas with unrestricted access to vehicles with a gross vehicle weight in excess of 7.5 tonnes unless not practicable. Where unachievable, shallow private drains may require protection using ductile iron pipe, concrete surround or concrete slabs bedding the trench, subject to the NHBC inspector's requirements.
  - All pipes shall be laid soffit to soffit with outgoing pipes unless otherwise stated.
  - Manholes situated within areas accessible to motor vehicles are to be fitted with suitable strength covers and frames. Please refer to the manhole schedule for guidance on this.
  - This drawing has been based upon survey information supplied by ADMS and Motion cannot guarantee the accuracy of the data provided.
  - Adjacent areas of handstanding will comply with building regulations and divert water away from the buildings.
  - The top surface of the pervious pavement should finish at least 150mm below any adjoining DPC level. Advice should always be sought from the manufacturer.
  - The surface of the proposed main development site should finish minimum of 150mm below any buildings and equipment.
  - The Drainage Strategy is based on preliminary levels and is subject to detailed design.
  - The exact location of all private rainwater pipes are to be confirmed with the architect details prior to commencement of works.
  - Check Dams may be required for the pervious pavement sub-bases and attenuation basin to maximise attenuation. Spacing and construction details to be provided at the detailed design stage.
  - The Type C no infiltration pervious pavement sub-base will drain to underlying surface water perforated collector pipes or diffuser units. Construction details are to be provided at the detailed design stage.
  - A Purpose Designed Water Pollution Containment Device Chamber will be installed downstream of the last attenuation basin to contain site runoff such as fire water in an emergency.

**Legend**

- Planning Site Boundary
- Proposed Type C No Infiltration Pervious Pavement
- Proposed Type C No Infiltration Pervious Pavement
- New Surface Water Gravity Pipe
- New Surface Water Catchpit Chamber
- New Surface Water Linear Drainage with Sump Unit
- Exceedance flow route
- MH1 MicroDrainage MH No.
- Proposed Attenuation Basin
- New Surface Water Hydro-Brake Flow Control Chamber - Refer to MicroDrainage Calculations for 100 + 40% climate change critical flow rate
- Proposed Headwall
- Indicative Extent of Natural Resources Wales Flood Map For Planning Rivers Flood Zone 2 - chance of flooding in any year of between 1 in 100 and 1 in 1000 extent - Last Updated 28 November 2024
- Indicative Extent of Natural Resources Wales Flood Map For Planning Surface Water and Small Watercourse Flood Zone 2 - chance of flooding in any year of between 1 in 100 and 1 in 1000 extent - Last Updated 28 November 2024
- New Purpose Designed Water Pollution Containment Device Chamber
- Proposed Conveyance Swale
- Protection using concrete surround or paving slabs bridging the trench, subject to the NHBC inspector's requirements
- Earthworks associated with open SuDS
- 7m buffer from the ordinary watercourse top of bank

P04	Fourth Issue	ST	CG	JM	28/03/2025
P03	Third Issue	ST	CG	JM	13/03/2025
P02	Second Issue	ST	CG	JM	13/02/2025
P01	First Issue	ST	ST	JM	04/02/2025
Rev.	Description	Drm	Chk	App	Date

Drawing Status: **FOR PLANNING  
NOT FOR CONSTRUCTION**



Project:  
Swansea North Battery Energy Storage System


Title:  
Proposed Drainage Strategy

Scale: 1:1000 (@ A1)  
Drawing:  
2303083-0500-01  
Revision:  
P04




## **Appendix F**

### MicroDrainage Model Results

Motion		Page 1																																																																																																																																																																																																																																																																																																																																																																																																																																														
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<p><u>Summary of Results for 100 year Return Period (+40%)</u></p> <p>Half Drain Time : 388 minutes.</p> <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>0.658</td><td>0.658</td><td>0.0</td><td>22.5</td><td>22.5</td><td>309.8</td><td>O K</td></tr><tr><td>30 min Summer</td><td>0.734</td><td>0.734</td><td>0.0</td><td>22.5</td><td>22.5</td><td>451.5</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>0.814</td><td>0.814</td><td>0.0</td><td>22.5</td><td>22.5</td><td>614.6</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>0.863</td><td>0.863</td><td>0.0</td><td>22.5</td><td>22.5</td><td>718.7</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>0.888</td><td>0.888</td><td>0.0</td><td>22.5</td><td>22.5</td><td>774.6</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>0.902</td><td>0.902</td><td>0.0</td><td>22.5</td><td>22.5</td><td>805.1</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>0.910</td><td>0.910</td><td>0.0</td><td>22.5</td><td>22.5</td><td>823.8</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>0.912</td><td>0.912</td><td>0.0</td><td>22.5</td><td>22.5</td><td>828.7</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>0.912</td><td>0.912</td><td>0.0</td><td>22.5</td><td>22.5</td><td>827.7</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>0.910</td><td>0.910</td><td>0.0</td><td>22.5</td><td>22.5</td><td>824.0</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>0.904</td><td>0.904</td><td>0.0</td><td>22.5</td><td>22.5</td><td>810.9</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>0.884</td><td>0.884</td><td>0.0</td><td>22.5</td><td>22.5</td><td>766.9</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>0.842</td><td>0.842</td><td>0.0</td><td>22.5</td><td>22.5</td><td>674.2</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>0.796</td><td>0.796</td><td>0.0</td><td>22.5</td><td>22.5</td><td>577.2</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>0.697</td><td>0.697</td><td>0.0</td><td>22.5</td><td>22.5</td><td>379.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>0.611</td><td>0.611</td><td>0.0</td><td>22.5</td><td>22.5</td><td>227.8</td><td>O K</td></tr><tr><td>15 min Winter</td><td>0.681</td><td>0.681</td><td>0.0</td><td>22.5</td><td>22.5</td><td>351.9</td><td>O K</td></tr><tr><td>30 min Winter</td><td>0.764</td><td>0.764</td><td>0.0</td><td>22.5</td><td>22.5</td><td>511.8</td><td>Flood Risk</td></tr><tr><td>60 min Winter</td><td>0.853</td><td>0.853</td><td>0.0</td><td>22.5</td><td>22.5</td><td>698.0</td><td>Flood Risk</td></tr><tr><td>120 min Winter</td><td>0.909</td><td>0.909</td><td>0.0</td><td>22.5</td><td>22.5</td><td>822.7</td><td>Flood Risk</td></tr><tr><td>180 min Winter</td><td>0.940</td><td>0.940</td><td>0.0</td><td>22.5</td><td>22.5</td><td>893.4</td><td>Flood Risk</td></tr><tr><td>240 min Winter</td><td>0.959</td><td>0.959</td><td>0.0</td><td>22.5</td><td>22.5</td><td>935.7</td><td>Flood Risk</td></tr><tr><td>360 min Winter</td><td>0.973</td><td>0.973</td><td>0.0</td><td>22.5</td><td>22.5</td><td>969.2</td><td>Flood Risk</td></tr><tr><td>480 min Winter</td><td>0.974</td><td>0.974</td><td>0.0</td><td>22.5</td><td>22.5</td><td>972.2</td><td>Flood Risk</td></tr><tr><td>600 min Winter</td><td>0.972</td><td>0.972</td><td>0.0</td><td>22.5</td><td>22.5</td><td>968.2</td><td>Flood Risk</td></tr><tr><td>720 min Winter</td><td>0.969</td><td>0.969</td><td>0.0</td><td>22.5</td><td>22.5</td><td>960.9</td><td>Flood Risk</td></tr><tr><td>960 min Winter</td><td>0.958</td><td>0.958</td><td>0.0</td><td>22.5</td><td>22.5</td><td>935.3</td><td>Flood Risk</td></tr><tr><td>1440 min Winter</td><td>0.924</td><td>0.924</td><td>0.0</td><td>22.5</td><td>22.5</td><td>855.9</td><td>Flood Risk</td></tr><tr><td>2160 min Winter</td><td>0.855</td><td>0.855</td><td>0.0</td><td>22.5</td><td>22.5</td><td>702.6</td><td>Flood Risk</td></tr><tr><td>2880 min Winter</td><td>0.781</td><td>0.781</td><td>0.0</td><td>22.5</td><td>22.5</td><td>546.2</td><td>Flood Risk</td></tr><tr><td>4320 min Winter</td><td>0.609</td><td>0.609</td><td>0.0</td><td>22.5</td><td>22.5</td><td>224.1</td><td>O K</td></tr><tr><td>5760 min Winter</td><td>0.267</td><td>0.267</td><td>0.0</td><td>22.2</td><td>22.2</td><td>69.1</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>106.008</td><td>0.0</td><td>331.6</td><td>25</td></tr><tr><td>30 min Summer</td><td>76.160</td><td>0.0</td><td>485.7</td><td>40</td></tr><tr><td>60 min Summer</td><td>52.668</td><td>0.0</td><td>680.1</td><td>68</td></tr><tr><td>120 min Summer</td><td>32.683</td><td>0.0</td><td>848.7</td><td>126</td></tr><tr><td>180 min Summer</td><td>24.864</td><td>0.0</td><td>971.1</td><td>184</td></tr><tr><td>240 min Summer</td><td>20.489</td><td>0.0</td><td>1068.7</td><td>242</td></tr><tr><td>360 min Summer</td><td>15.533</td><td>0.0</td><td>1217.4</td><td>324</td></tr><tr><td>480 min Summer</td><td>12.763</td><td>0.0</td><td>1334.9</td><td>388</td></tr><tr><td>600 min Summer</td><td>10.958</td><td>0.0</td><td>1433.4</td><td>454</td></tr><tr><td>720 min Summer</td><td>9.674</td><td>0.0</td><td>1519.1</td><td>522</td></tr><tr><td>960 min Summer</td><td>7.948</td><td>0.0</td><td>1664.5</td><td>662</td></tr><tr><td>1440 min Summer</td><td>6.007</td><td>0.0</td><td>1886.6</td><td>940</td></tr><tr><td>2160 min Summer</td><td>4.494</td><td>0.0</td><td>2116.0</td><td>1348</td></tr><tr><td>2880 min Summer</td><td>3.650</td><td>0.0</td><td>2288.4</td><td>1756</td></tr><tr><td>4320 min Summer</td><td>2.715</td><td>0.0</td><td>2546.1</td><td>2508</td></tr><tr><td>5760 min Summer</td><td>2.221</td><td>0.0</td><td>2770.7</td><td>3176</td></tr><tr><td>15 min Winter</td><td>106.008</td><td>0.0</td><td>374.0</td><td>25</td></tr><tr><td>30 min Winter</td><td>76.160</td><td>0.0</td><td>546.5</td><td>39</td></tr><tr><td>60 min Winter</td><td>52.668</td><td>0.0</td><td>764.3</td><td>68</td></tr><tr><td>120 min Winter</td><td>32.683</td><td>0.0</td><td>953.2</td><td>124</td></tr><tr><td>180 min Winter</td><td>24.864</td><td>0.0</td><td>1090.3</td><td>180</td></tr><tr><td>240 min Winter</td><td>20.489</td><td>0.0</td><td>1199.6</td><td>238</td></tr><tr><td>360 min Winter</td><td>15.533</td><td>0.0</td><td>1366.3</td><td>348</td></tr><tr><td>480 min Winter</td><td>12.763</td><td>0.0</td><td>1498.1</td><td>446</td></tr><tr><td>600 min Winter</td><td>10.958</td><td>0.0</td><td>1608.6</td><td>482</td></tr><tr><td>720 min Winter</td><td>9.674</td><td>0.0</td><td>1704.6</td><td>558</td></tr><tr><td>960 min Winter</td><td>7.948</td><td>0.0</td><td>1867.7</td><td>716</td></tr><tr><td>1440 min Winter</td><td>6.007</td><td>0.0</td><td>2116.9</td><td>1022</td></tr><tr><td>2160 min Winter</td><td>4.494</td><td>0.0</td><td>2374.6</td><td>1456</td></tr><tr><td>2880 min Winter</td><td>3.650</td><td>0.0</td><td>2568.5</td><td>1880</td></tr><tr><td>4320 min Winter</td><td>2.715</td><td>0.0</td><td>2858.6</td><td>2556</td></tr><tr><td>5760 min Winter</td><td>2.221</td><td>0.0</td><td>3111.6</td><td>3056</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	0.658	0.658	0.0	22.5	22.5	309.8	O K	30 min Summer	0.734	0.734	0.0	22.5	22.5	451.5	Flood Risk	60 min Summer	0.814	0.814	0.0	22.5	22.5	614.6	Flood Risk	120 min Summer	0.863	0.863	0.0	22.5	22.5	718.7	Flood Risk	180 min Summer	0.888	0.888	0.0	22.5	22.5	774.6	Flood Risk	240 min Summer	0.902	0.902	0.0	22.5	22.5	805.1	Flood Risk	360 min Summer	0.910	0.910	0.0	22.5	22.5	823.8	Flood Risk	480 min Summer	0.912	0.912	0.0	22.5	22.5	828.7	Flood Risk	600 min Summer	0.912	0.912	0.0	22.5	22.5	827.7	Flood Risk	720 min Summer	0.910	0.910	0.0	22.5	22.5	824.0	Flood Risk	960 min Summer	0.904	0.904	0.0	22.5	22.5	810.9	Flood Risk	1440 min Summer	0.884	0.884	0.0	22.5	22.5	766.9	Flood Risk	2160 min Summer	0.842	0.842	0.0	22.5	22.5	674.2	Flood Risk	2880 min Summer	0.796	0.796	0.0	22.5	22.5	577.2	Flood Risk	4320 min Summer	0.697	0.697	0.0	22.5	22.5	379.5	O K	5760 min Summer	0.611	0.611	0.0	22.5	22.5	227.8	O K	15 min Winter	0.681	0.681	0.0	22.5	22.5	351.9	O K	30 min Winter	0.764	0.764	0.0	22.5	22.5	511.8	Flood Risk	60 min Winter	0.853	0.853	0.0	22.5	22.5	698.0	Flood Risk	120 min Winter	0.909	0.909	0.0	22.5	22.5	822.7	Flood Risk	180 min Winter	0.940	0.940	0.0	22.5	22.5	893.4	Flood Risk	240 min Winter	0.959	0.959	0.0	22.5	22.5	935.7	Flood Risk	360 min Winter	0.973	0.973	0.0	22.5	22.5	969.2	Flood Risk	480 min Winter	0.974	0.974	0.0	22.5	22.5	972.2	Flood Risk	600 min Winter	0.972	0.972	0.0	22.5	22.5	968.2	Flood Risk	720 min Winter	0.969	0.969	0.0	22.5	22.5	960.9	Flood Risk	960 min Winter	0.958	0.958	0.0	22.5	22.5	935.3	Flood Risk	1440 min Winter	0.924	0.924	0.0	22.5	22.5	855.9	Flood Risk	2160 min Winter	0.855	0.855	0.0	22.5	22.5	702.6	Flood Risk	2880 min Winter	0.781	0.781	0.0	22.5	22.5	546.2	Flood Risk	4320 min Winter	0.609	0.609	0.0	22.5	22.5	224.1	O K	5760 min Winter	0.267	0.267	0.0	22.2	22.2	69.1	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	106.008	0.0	331.6	25	30 min Summer	76.160	0.0	485.7	40	60 min Summer	52.668	0.0	680.1	68	120 min Summer	32.683	0.0	848.7	126	180 min Summer	24.864	0.0	971.1	184	240 min Summer	20.489	0.0	1068.7	242	360 min Summer	15.533	0.0	1217.4	324	480 min Summer	12.763	0.0	1334.9	388	600 min Summer	10.958	0.0	1433.4	454	720 min Summer	9.674	0.0	1519.1	522	960 min Summer	7.948	0.0	1664.5	662	1440 min Summer	6.007	0.0	1886.6	940	2160 min Summer	4.494	0.0	2116.0	1348	2880 min Summer	3.650	0.0	2288.4	1756	4320 min Summer	2.715	0.0	2546.1	2508	5760 min Summer	2.221	0.0	2770.7	3176	15 min Winter	106.008	0.0	374.0	25	30 min Winter	76.160	0.0	546.5	39	60 min Winter	52.668	0.0	764.3	68	120 min Winter	32.683	0.0	953.2	124	180 min Winter	24.864	0.0	1090.3	180	240 min Winter	20.489	0.0	1199.6	238	360 min Winter	15.533	0.0	1366.3	348	480 min Winter	12.763	0.0	1498.1	446	600 min Winter	10.958	0.0	1608.6	482	720 min Winter	9.674	0.0	1704.6	558	960 min Winter	7.948	0.0	1867.7	716	1440 min Winter	6.007	0.0	2116.9	1022	2160 min Winter	4.494	0.0	2374.6	1456	2880 min Winter	3.650	0.0	2568.5	1880	4320 min Winter	2.715	0.0	2858.6	2556	5760 min Winter	2.221	0.0	3111.6	3056
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	0.658	0.658	0.0	22.5	22.5	309.8	O K																																																																																																																																																																																																																																																																																																																																																																																																																																									
30 min Summer	0.734	0.734	0.0	22.5	22.5	451.5	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
60 min Summer	0.814	0.814	0.0	22.5	22.5	614.6	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
120 min Summer	0.863	0.863	0.0	22.5	22.5	718.7	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
180 min Summer	0.888	0.888	0.0	22.5	22.5	774.6	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
240 min Summer	0.902	0.902	0.0	22.5	22.5	805.1	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
360 min Summer	0.910	0.910	0.0	22.5	22.5	823.8	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
480 min Summer	0.912	0.912	0.0	22.5	22.5	828.7	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
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720 min Summer	0.910	0.910	0.0	22.5	22.5	824.0	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
960 min Summer	0.904	0.904	0.0	22.5	22.5	810.9	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
1440 min Summer	0.884	0.884	0.0	22.5	22.5	766.9	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
2160 min Summer	0.842	0.842	0.0	22.5	22.5	674.2	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
2880 min Summer	0.796	0.796	0.0	22.5	22.5	577.2	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
4320 min Summer	0.697	0.697	0.0	22.5	22.5	379.5	O K																																																																																																																																																																																																																																																																																																																																																																																																																																									
5760 min Summer	0.611	0.611	0.0	22.5	22.5	227.8	O K																																																																																																																																																																																																																																																																																																																																																																																																																																									
15 min Winter	0.681	0.681	0.0	22.5	22.5	351.9	O K																																																																																																																																																																																																																																																																																																																																																																																																																																									
30 min Winter	0.764	0.764	0.0	22.5	22.5	511.8	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
60 min Winter	0.853	0.853	0.0	22.5	22.5	698.0	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
120 min Winter	0.909	0.909	0.0	22.5	22.5	822.7	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
180 min Winter	0.940	0.940	0.0	22.5	22.5	893.4	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
240 min Winter	0.959	0.959	0.0	22.5	22.5	935.7	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
360 min Winter	0.973	0.973	0.0	22.5	22.5	969.2	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
480 min Winter	0.974	0.974	0.0	22.5	22.5	972.2	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
600 min Winter	0.972	0.972	0.0	22.5	22.5	968.2	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
720 min Winter	0.969	0.969	0.0	22.5	22.5	960.9	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
960 min Winter	0.958	0.958	0.0	22.5	22.5	935.3	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
1440 min Winter	0.924	0.924	0.0	22.5	22.5	855.9	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
2160 min Winter	0.855	0.855	0.0	22.5	22.5	702.6	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
2880 min Winter	0.781	0.781	0.0	22.5	22.5	546.2	Flood Risk																																																																																																																																																																																																																																																																																																																																																																																																																																									
4320 min Winter	0.609	0.609	0.0	22.5	22.5	224.1	O K																																																																																																																																																																																																																																																																																																																																																																																																																																									
5760 min Winter	0.267	0.267	0.0	22.2	22.2	69.1	O K																																																																																																																																																																																																																																																																																																																																																																																																																																									
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																																																																																																																																																																												
15 min Summer	106.008	0.0	331.6	25																																																																																																																																																																																																																																																																																																																																																																																																																																												
30 min Summer	76.160	0.0	485.7	40																																																																																																																																																																																																																																																																																																																																																																																																																																												
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120 min Summer	32.683	0.0	848.7	126																																																																																																																																																																																																																																																																																																																																																																																																																																												
180 min Summer	24.864	0.0	971.1	184																																																																																																																																																																																																																																																																																																																																																																																																																																												
240 min Summer	20.489	0.0	1068.7	242																																																																																																																																																																																																																																																																																																																																																																																																																																												
360 min Summer	15.533	0.0	1217.4	324																																																																																																																																																																																																																																																																																																																																																																																																																																												
480 min Summer	12.763	0.0	1334.9	388																																																																																																																																																																																																																																																																																																																																																																																																																																												
600 min Summer	10.958	0.0	1433.4	454																																																																																																																																																																																																																																																																																																																																																																																																																																												
720 min Summer	9.674	0.0	1519.1	522																																																																																																																																																																																																																																																																																																																																																																																																																																												
960 min Summer	7.948	0.0	1664.5	662																																																																																																																																																																																																																																																																																																																																																																																																																																												
1440 min Summer	6.007	0.0	1886.6	940																																																																																																																																																																																																																																																																																																																																																																																																																																												
2160 min Summer	4.494	0.0	2116.0	1348																																																																																																																																																																																																																																																																																																																																																																																																																																												
2880 min Summer	3.650	0.0	2288.4	1756																																																																																																																																																																																																																																																																																																																																																																																																																																												
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5760 min Summer	2.221	0.0	2770.7	3176																																																																																																																																																																																																																																																																																																																																																																																																																																												
15 min Winter	106.008	0.0	374.0	25																																																																																																																																																																																																																																																																																																																																																																																																																																												
30 min Winter	76.160	0.0	546.5	39																																																																																																																																																																																																																																																																																																																																																																																																																																												
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180 min Winter	24.864	0.0	1090.3	180																																																																																																																																																																																																																																																																																																																																																																																																																																												
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600 min Winter	10.958	0.0	1608.6	482																																																																																																																																																																																																																																																																																																																																																																																																																																												
720 min Winter	9.674	0.0	1704.6	558																																																																																																																																																																																																																																																																																																																																																																																																																																												
960 min Winter	7.948	0.0	1867.7	716																																																																																																																																																																																																																																																																																																																																																																																																																																												
1440 min Winter	6.007	0.0	2116.9	1022																																																																																																																																																																																																																																																																																																																																																																																																																																												
2160 min Winter	4.494	0.0	2374.6	1456																																																																																																																																																																																																																																																																																																																																																																																																																																												
2880 min Winter	3.650	0.0	2568.5	1880																																																																																																																																																																																																																																																																																																																																																																																																																																												
4320 min Winter	2.715	0.0	2858.6	2556																																																																																																																																																																																																																																																																																																																																																																																																																																												
5760 min Winter	2.221	0.0	3111.6	3056																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Motion		Page 2
84 North Street Guildford Surrey GU1 4AU		
Date 28/03/2025 11:48 File	Designed by Chris Gray Checked by Jason Morgans	
Innovyze	Source Control 2020.1.3	


#### Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 265650 201000 SN 65650 01000	Shortest Storm (mins)	15
Data Type	Catchment	Longest Storm (mins)	5760
Summer Storms	Yes	Climate Change %	+40

#### Time Area Diagram

Total Area (ha) 1.776

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.592	4	8 0.592	8	12 0.592

Motion		Page 3
84 North Street Guildford Surrey GU1 4AU		
Date 28/03/2025 11:48	Designed by Chris Gray	
File	Checked by Jason Morgans	
Innovyze		Source Control 2020.1.3

Model Details

Storage is Online Cover Level (m) 1.000

Complex Structure

Tank or Pond

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	1.000	811.0

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Slope (1:X)	0.0
Membrane Percolation (mm/hr)	1000	Invert Level (m)	0.600	Depression Storage (mm)	5
Max Percolation (l/s)	1137.8	Width (m)	64.0	Evaporation (mm/day)	3
Safety Factor	2.0	Length (m)	64.0	Membrane Depth (m)	0

Swale

Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	0.700	Slope (1:X)	0.0
Infiltration Coefficient Side (m/hr)	0.00000	Base Width (m)	0.5	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Length (m)	215.0	Cap Infiltration Depth (m)	0.000
Porosity	1.00	Side Slope (1:X)	2.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0209-2260-1000-2260	Sump Available	Yes
Design Head (m)	1.000	Diameter (mm)	209
Design Flow (l/s)	22.6	Invert Level (m)	0.000
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1500
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	22.6	Kick-Flo®	0.725	19.4
Flush-Flo™	0.351	22.5	Mean Flow over Head Range	-	18.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.1	0.600	21.4	1.600	28.3	2.600	35.7	5.000	49.0	7.500	59.6
0.200	20.2	0.800	20.3	1.800	29.9	3.000	38.2	5.500	51.3	8.000	61.5
0.300	22.4	1.000	22.6	2.000	31.5	3.500	41.2	6.000	53.5	8.500	63.4
0.400	22.4	1.200	24.6	2.200	32.9	4.000	44.0	6.500	55.6	9.000	65.1
0.500	22.1	1.400	26.5	2.400	34.4	4.500	46.5	7.000	57.6	9.500	66.9

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