



# Frodsham Solar

## Outline Drainage Strategy

(Previously included as Section 11 and Appendix N, O and P of ES Vol 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy – AS-019, AS-021, AS-023, AS-025, AS-027)

**March 2026**

PINS Ref: EN010153

Document Ref: EN010153/DR/8.33

**Planning Act 2008; and Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations Regulation 5(2)(q)**



**Revision P02**

# Document Control

Revision	Date	Prepared By	Reviewed / Approved By
P01	January 2026	Waterco Ltd	A Russell
P02	March 2026	Waterco Ltd	A Russell

© AXIS P.E.D. Ltd 2025. All rights reserved.

This document and its accompanying documents contain information which is confidential and is intended only for the use of the client. If you are not one of the intended recipients any disclosure, copying, distribution or action taken in reliance on the contents of the information is strictly prohibited.

Unless expressly agreed, any reproduction of material from this document must be requested and authorised in writing from AXIS P.E.D. Ltd. Authorised reproduction of material must include all copyright and proprietary notices in the same form and manner as the original and must not be modified in any way. Acknowledgement of the source of the material must also be included in all references.

**Prepared For:**  
**Frodsham Solar Ltd**

**Prepared By: Waterco Ltd**

## CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>2</b>
1.1	Purpose of this Document.....	2
<b>2.0</b>	<b>SURFACE AND FOUL WATER MANAGEMENT DRAINAGE STRATEGY.....</b>	<b>3</b>
2.2	Surface Water Management from Solar Panels .....	3
2.3	Surface Water Management from Supporting Infrastructure .....	4
2.4	Exceedance Flows .....	5
2.5	Overland Flows .....	5
2.6	Surface Water Treatment.....	6
2.7	Fire Water Management .....	7
2.8	Foul Water Drainage .....	8

## TABLES

<b>Table 1 – Pollution Hazard Indices .....</b>	<b>6</b>
<b>Table 2 – SuDS Mitigation Indices .....</b>	<b>6</b>

## APPENDICES

Appendix A: Greenfield Runoff Rates

Appendix B: MicroDrainage Simulations

Appendix C: Concept Drainage Sketch

## 1.0 INTRODUCTION

### 1.1 Purpose of this Document

- 1.1.1 This document has been prepared by Waterco on behalf of Frodsham Solar Limited ('the Applicant') in relation to an application for a Development Consent Order (DCO) for the Frodsham Solar Project ('the Proposed Development'). The application for the DCO will be submitted to the Planning Inspectorate, with the decision whether to grant a DCO being made by the Secretary of State for the Department for Energy Security and Net Zero (hereafter referred to as the 'Secretary of State') pursuant to the Planning Act 2008.
- 1.1.2 This document is submitted at Deadline 3 of the examination as per the **Rule 8 letter [PD-008]** issued by the Examining Authority ('ExA').
- 1.1.3 This Outline Drainage Strategy was originally included as part of **ES Vol 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [AS-019]**. Section 11 and Appendices N, O and P of the Flood Risk Assessment and Drainage Strategy have been extracted and submitted as this, separate, Outline Drainage Strategy. This has been done to give clarity and sufficient control within the certified documents in terms of how the drainage arrangements for the Proposed Development will be provided.
- 1.1.4 Accordingly, Appendices N, O and P of **ES Vol 2 Appendix 9-1: Flood Risk Assessment and Drainage Strategy [AS-019]** have been renamed as Appendices A, B and C (respectively) of this Outline Drainage Strategy.

---

## **2.0 SURFACE AND FOUL WATER MANAGEMENT DRAINAGE STRATEGY**

- 2.1.1 All drainage systems will be designed in accordance with the principles of CIRIA C753 publication 'The SuDS Manual' (2015).
- 2.1.2 The Site currently comprises a mixture of agricultural and drained marsh land, approximately half of which comprises former Manchester Ship Canal Dredging Deposit Grounds. Surface water runoff currently infiltrates into the ground or informally flows into existing watercourses on Site (rainwater runoff). The watercourses in the eastern extent of the Site discharge to the River Weaver via an EA operated pump. The watercourses in the elevated western extent of the Site discharge to the Manchester Ship Canal.
- 2.1.3 The proposed solar arrays will not create any significant change to the current surface water drainage regime and the majority of the Site will remain permeable. As vegetation becomes established under the PV Arrays there is likely to be a decrease in surface water runoff rates compared to the baseline scenario, as wildflower grassland provides better infiltration and water retention compared to the previous arable land use.

### **2.2 Surface Water Management from Solar Panels**

- 2.2.1 The proposed ground-mounted solar arrays will be elevated above the ground on steel frames, ensuring the ground beneath each panel remains permeable. The solar arrays will be laid in rows with 'rainwater' gaps between the rows of panels which will allow water to drain to the permeable ground beneath.
- 2.2.2 Runoff from the panels will result in negligible erosion at the base of each panel due to proposed land use comprising wildflower grassland as well as the flat nature of the Site. The flat nature of the Site would prevent any overland flows from forming.
- 2.2.3 It is therefore considered that the solar arrays will not result in an increase in the surface water runoff rates and volumes and will not alter the existing

greenfield drainage regime. This in accordance with paragraph 2.10.84 of NPS for Renewable for Renewable Energy (EN-3).

## 2.3 Surface Water Management from Supporting Infrastructure

- 2.3.1 The proposed PCU platforms will cover a minimal footprint and runoff from these will drain to a stone surround (filter trench or similar). The access tracks and any parking or turning areas will comprise porous stone material. If considered necessary at detailed design stage, filter drains would be provided adjacent to the roads to control any surface water runoff.
- 2.3.2 The proposed BESS compound and Frodsham Solar Substation compound will be formally drained. Given the impermeability of the underlying strata, it is proposed to discharge surface water from these compounds to an adjacent ordinary watercourse, as shown in **Appendix C**. Discharge will be made at a limited greenfield runoff rate.
- 2.3.3 Greenfield runoff rates have been estimated using the ICP SUDS method within MicroDrainage. A summary of the greenfield runoff rates is provided as **Appendix A**. The 1 in 1 year greenfield rate for the 2.49ha BESS compound area and substation is 10.6 l/s. A discharge rate of 10.6 l/s is therefore proposed.
- 2.3.4 In order to achieve a discharge rate of 10.6 l/s, attenuation storage will be required. Attenuation will be provided within the sub-grade of the compound's lined stone surfacing. An attenuation storage estimate has been provided using MicroDrainage software and is included as **Appendix B**.
- 2.3.5 An estimated storage volume of 2,201m<sup>3</sup> will be required to accommodate the 1 in 100 year plus 45% CC event. The storage estimate is based on a discharge rate of 10.6 l/s, storage within a sub-grade structure, an impermeable drainage area of 2.49ha and hydro-brake flow control.
- 2.3.6 Based on a compound area of 24,910m<sup>2</sup> and a void ratio of 30% (applicable to stone aggregate), a sub-grade depth of 295mm will be sufficient to provide

the 2,201m<sup>3</sup> of storage required to accommodate the 1 in 100 year plus 45% CC event.

2.3.7 Perforated pipes will be laid within the stone sub-grade as to direct water towards the flow control device.

2.3.8 A concept drainage sketch detailing the proposed surface water discharge location for the Frodsham Solar Substation compound drainage system is included in **Appendix C**. Requirement 10 of the draft DCO sets out that full details of the surface water drainage strategy (which must be substantially in accordance with this Outline Drainage Strategy) must be approved by CWACC in consultation with the Lead Local Flood Authority.

## 2.4 Exceedance Flows

2.4.1 The proposed drainage system of the BESS and Frodsham Solar Substation compound will be designed to accommodate the 1 in 100 year plus 45% CC event. Storm events in excess of the 1 in 100 year plus 45% CC event will be permitted to produce shallow depth flooding within the BESS and substation compound. Any above ground flooding resulting from a drainage system exceedance event will be contained within the BESS and substation compound through consideration of the boundary treatment i.e. a raised kerb or earth bunding.

## 2.5 Overland Flows

2.5.1 Watercourses or raised flood defences form the boundaries of the SADA. The Site is flat which would prevent any significant overland flows from forming. In the unlikely event of overland flows occurring during extreme rainfall events, overland flow would be intercepted by the watercourses on the boundaries of the SADA, or contained on Site by raised ground (flood defences) and would not be directed off-Site. The existing runoff / overland flow regime will therefore not change.

## 2.6 Surface Water Treatment

2.6.1 In accordance with the CIRIA C753 publication ‘The SuDS Manual’ (2015), other roofs (applicable to the containers accommodating the battery units, PCUs and buildings within the Frodsham Solar Substation compound) have a ‘low’ pollution hazard level, with low traffic roads (applicable to the access roads and permeable surfacing within the proposed BESS compound and substation) also classified as having a ‘low’ pollution hazard level. Table 1 shows the pollution hazard indices for each land use.

**Table 1 – Pollution Hazard Indices**

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other Roofs	Low	0.3	0.2	0.05
Low Traffic Roads	Low	0.5	0.4	0.4

Table extract taken from the CIRIA C753 publication ‘The SuDS Manual’ – Table 26.2

\* Indices values range from 0-1.

2.6.2 The access roads, BESS compound and substation will be formed from permeable stone surfacing. Table 2 demonstrates that permeable surfacing will provide sufficient treatment.

**Table 2 – SuDS Mitigation Indices**

Type of SuDS	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Surfaces	0.7	0.6	0.7

Table extract taken from the CIRIA C753 publication ‘The SuDS Manual’ – Table 26.3

## 2.7 Fire Water Management

2.7.1 The implementation of the BESS introduces the potential risk of contaminated fire water runoff. To mitigate this risk, the following measures will be implemented:

- i) An internal fire suppression system (sprinklers) will be built into the interior of each battery container unit.
- ii) A designated drain (gully) on the concrete slab beneath each battery container unit will direct the fire water into a designated piped drain. The piped drain will discharge to a lined fire water lagoon within the BESS compound.
- iii) A shut off valve will be placed on the fire water lagoon outfall and will be automated (set in the off position when fire water sprinklers are activated). This will prevent discharge of fire water to the wider water environment. An outfall from the fire water lagoon to the Site's drainage system is required to ensure the lagoon does not fill up with rainwater (ensuring the lagoon is empty and ready to accommodate fire water).
- iv) Following a fire, contaminated flows will be collected from the fire water lagoon and transported by tanker to an appropriate treatment facility or would be or treated on Site and reused as firewater provision. The lagoon and drainage system would be cleaned before the valve from the firewater lagoon is reopened.
- v) The base of the permeable stone surfacing in the BESS will be lined with an impermeable geotextile as a precautionary measure to prevent firewater polluting shallow / perched groundwater.

2.7.2 The proposed fire water management system will ensure fire water is dealt with by a designated system and separated from the Site's surface water drainage system.


## **2.8 Foul Water Drainage**

- 2.8.1 Domestic foul water generated during the construction and operational phases will be tankered off Site to an appropriate wastewater treatment plant. No connection to the local sewer network is proposed.


## **2.9 Monitoring**


- 2.9.1 Drainage features will be regularly monitored to ensure that they are operating effectively. The final surface water drainage strategy shall detail the maintenance schedule and the methods used to ensure the drainage features will continue to operate effectively and provide the necessary water quality controls.


## Appendix A: Greenfield Runoff Rates


Waterco Ltd		Page 1
Eden Court	14740 - Frodsham Solar	
Lon Parcwr Business Park Denbighshire LL15 1NJ	ICP SUDS	
Date 09/04/2024	Designed by MW	
File	Checked by AW	
XP Solutions	Source Control 2020.1.3	
<u>ICP SUDS Mean Annual Flood</u>  Input  Return Period (years) 100 Soil 0.450 Area (ha) 2.490 Urban 0.000 SAAR (mm) 758 Region Number Region 9  <b>Results 1/s</b>  QBAR Rural 12.0 QBAR Urban 12.0  Q100 years 26.2  Q1 year 10.6 Q30 years 21.2 Q100 years 26.2		
©1982-2020 Innovyze		


## Appendix B: MicroDrainage Simulations

Waterco Ltd						Page 1	
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ			14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event				
Date 04/10/2024 File 14740 - UPDATED.SRCX			Designed by MJW Checked by AW				
XP Solutions				Source Control 2020.1.3			
<p><u>Summary of Results for 100 year Return Period (+45%)</u></p> <p>Half Drain Time : 1763 minutes.</p>							
<b>Storm Event</b>	<b>Max Level (m)</b>	<b>Max Depth (m)</b>	<b>Max Infiltration (l/s)</b>	<b>Max Control (l/s)</b>	<b>Max E Outflow (l/s)</b>	<b>Max Volume (m³)</b>	<b>Status</b>
15 min Summer	9.808	0.128	0.0	8.6	8.6	769.9	Flood Risk
30 min Summer	9.844	0.164	0.0	10.4	10.4	1042.3	Flood Risk
60 min Summer	9.881	0.201	0.0	10.6	10.6	1315.7	Flood Risk
120 min Summer	9.916	0.236	0.0	10.6	10.6	1578.2	Flood Risk
180 min Summer	9.937	0.257	0.0	10.6	10.6	1736.3	Flood Risk
240 min Summer	9.952	0.272	0.0	10.6	10.6	1846.1	Flood Risk
360 min Summer	9.971	0.291	0.0	10.6	10.6	1989.6	Flood Risk
480 min Summer	9.983	0.303	0.0	10.6	10.6	2077.4	Flood Risk
600 min Summer	9.990	0.310	0.0	10.6	10.6	2133.5	Flood Risk
720 min Summer	9.995	0.315	0.0	10.6	10.6	2169.2	Flood Risk
960 min Summer	9.999	0.319	0.0	10.7	10.7	2201.1	Flood Risk
1440 min Summer	9.998	0.318	0.0	10.7	10.7	2191.7	Flood Risk
2160 min Summer	9.992	0.312	0.0	10.6	10.6	2144.7	Flood Risk
2880 min Summer	9.986	0.306	0.0	10.6	10.6	2097.8	Flood Risk
<p><b>Storm Rain Flooded Discharge Time-Peak</b></p> <p><b>Event (mm/hr) Volume (m³) Volume (mins)</b></p>							
15 min Summer	144.785	0.0	466.9	24			
30 min Summer	94.850	0.0	638.5	39			
60 min Summer	58.929	0.0	1112.8	68			
120 min Summer	35.248	0.0	1320.7	128			
180 min Summer	25.960	0.0	1436.8	188			
240 min Summer	20.834	0.0	1510.3	246			
360 min Summer	15.196	0.0	1590.0	366			
480 min Summer	12.105	0.0	1623.8	486			
600 min Summer	10.127	0.0	1632.0	604			
720 min Summer	8.742	0.0	1624.0	724			
960 min Summer	6.912	0.0	1580.3	962			
1440 min Summer	4.959	0.0	1472.9	1400			
2160 min Summer	3.556	0.0	2651.0	1716			
2880 min Summer	2.813	0.0	2681.0	2084			
©1982-2020 Innovyze							

Waterco Ltd						Page 2	
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ			14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event				
Date 04/10/2024 File 14740 - UPDATED.SRCX			Designed by MJW Checked by AW				
XP Solutions		Source Control 2020.1.3					
<u>Summary of Results for 100 year Return Period (+45%)</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
4320 min Summer	9.972	0.292	0.0	10.6	10.6	1999.6	Flood Risk
5760 min Summer	9.958	0.278	0.0	10.6	10.6	1894.0	Flood Risk
7200 min Summer	9.945	0.265	0.0	10.6	10.6	1792.4	Flood Risk
8640 min Summer	9.932	0.252	0.0	10.6	10.6	1696.3	Flood Risk
10080 min Summer	9.920	0.240	0.0	10.6	10.6	1608.7	Flood Risk
15 min Winter	9.808	0.128	0.0	8.6	8.6	769.9	Flood Risk
30 min Winter	9.844	0.164	0.0	10.4	10.4	1042.7	Flood Risk
60 min Winter	9.881	0.201	0.0	10.6	10.6	1316.0	Flood Risk
120 min Winter	9.916	0.236	0.0	10.6	10.6	1578.6	Flood Risk
180 min Winter	9.937	0.257	0.0	10.6	10.6	1736.6	Flood Risk
240 min Winter	9.952	0.272	0.0	10.6	10.6	1846.1	Flood Risk
360 min Winter	9.971	0.291	0.0	10.6	10.6	1988.9	Flood Risk
480 min Winter	9.983	0.303	0.0	10.6	10.6	2076.2	Flood Risk
600 min Winter	9.990	0.310	0.0	10.6	10.6	2132.0	Flood Risk
720 min Winter	9.995	0.315	0.0	10.6	10.6	2167.8	Flood Risk
Storm Event	Rain Volume (mins)	Flooded Volume (m <sup>3</sup> )	Discharge (m <sup>3</sup> )	Time-Peak (mins)	Event (mm/hr)		
4320 min Summer	2.031	0.0	2575.0	2904			
5760 min Summer	1.620	0.0	3429.1	3744			
7200 min Summer	1.366	0.0	3541.6	4536			
8640 min Summer	1.192	0.0	3621.2	5280			
10080 min Summer	1.065	0.0	3657.8	6056			
15 min Winter	144.785	0.0	466.9	24			
30 min Winter	94.850	0.0	638.5	38			
60 min Winter	58.929	0.0	1112.8	68			
120 min Winter	35.248	0.0	1320.9	126			
180 min Winter	25.960	0.0	1437.3	184			
240 min Winter	20.834	0.0	1511.2	242			
360 min Winter	15.196	0.0	1592.2	360			
480 min Winter	12.105	0.0	1627.4	476			
600 min Winter	10.127	0.0	1637.4	594			
720 min Winter	8.742	0.0	1631.2	708			
©1982-2020 Innovyze							

Waterco Ltd						Page 3	
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ			14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event				
Date 04/10/2024 File 14740 - UPDATED.SRCX			Designed by MJW Checked by AW				
XP Solutions			Source Control 2020.1.3				
<u>Summary of Results for 100 year Return Period (+45%)</u>							
<b>Storm Event</b>	<b>Max Level (m)</b>	<b>Max Depth (m)</b>	<b>Max Infiltration (l/s)</b>	<b>Max Control (l/s)</b>	<b>Max Σ Outflow (l/s)</b>	<b>Max Volume (m³)</b>	<b>Status</b>
960 min Winter	9.999	0.319	0.0	10.7	10.7	2200.6	Flood Risk
1440 min Winter	9.999	0.319	0.0	10.7	10.7	2196.2	Flood Risk
2160 min Winter	9.989	0.309	0.0	10.6	10.6	2121.5	Flood Risk
2880 min Winter	9.980	0.300	0.0	10.6	10.6	2056.0	Flood Risk
4320 min Winter	9.959	0.279	0.0	10.6	10.6	1899.8	Flood Risk
5760 min Winter	9.937	0.257	0.0	10.6	10.6	1733.5	Flood Risk
7200 min Winter	9.916	0.236	0.0	10.6	10.6	1577.7	Flood Risk
8640 min Winter	9.897	0.217	0.0	10.6	10.6	1436.6	Flood Risk
10080 min Winter	9.880	0.200	0.0	10.6	10.6	1311.7	Flood Risk
<b>Storm (mm/hr)</b>	<b>Rain Volume</b>	<b>Flooded Volume</b>	<b>Discharge (m³)</b>	<b>Time-Peak (mins)</b>	<b>Event</b>		
960 min Winter	6.912	0.0	1590.9	936	1440 min		
Winter	4.959	0.0	1488.9	1374			
2160 min Winter	3.556	0.0	2658.2	1756			
2880 min Winter	2.813	0.0	2694.7	2196			
4320 min Winter	2.031	0.0	2621.7	3116			
5760 min Winter	1.620	0.0	3435.1	3976			
7200 min Winter	1.366	0.0	3551.5	4760			
8640 min Winter	1.192	0.0	3636.4	5544			
10080 min Winter	1.065	0.0	3680.8	6352			
©1982-2020 Innovyze							

Waterco Ltd		Page 4
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event	
Date 04/10/2024 File 14740 - UPDATED.SRCX	Designed by MJW Checked by AW	
XP Solutions		Source Control 2020.1.3
<u>Rainfall Details</u>		
Rainfall Model		FEH
Return Period (years)		100
FEH Rainfall Version		2013
Site Location	GB 350792 378300 SJ 50792 78300	
Data Type		Point
Summer Storms		Yes
Winter Storms		Yes
Cv (Summer)		1.000
Cv (Winter)		1.000
Shortest Storm (mins)		15
Longest Storm (mins)		10080
Climate Change %		+45
<u>Time Area Diagram</u>		
Total Area (ha) 2.490		
<b>Time (mins)</b>	<b>Area</b>	<b>Time (mins)</b>
<b>From: To:</b>		<b>Area</b>
		<b>(ha) From: To: (ha)</b>
0	3	0.8303
		6
		0.8306
		9
		0.830
©1982-2020 Innovyze		

Waterco Ltd		Page 5															
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event																
Date 04/10/2024 File 14740 - UPDATED.SRCX	Designed by MJW Checked by AW																
XP Solutions	Source Control 2020.1.3																
<u>Model Details</u>																	
Storage is Online Cover Level (m) 10.000																	
<u>Porous Car Park Structure</u>																	
Infiltration Coefficient Base (m/hr) 0.00000																	
Membrane Percolation (mm/hr) 1000																	
Max Percolation (l/s) 6919.4																	
Safety Factor 2.0																	
Porosity 0.30																	
Invert Level (m) 9.680																	
Width (m) 50.0																	
Length (m) 498.2																	
Slope (1:X) 10000.0																	
Depression Storage (mm) 5																	
Evaporation (mm/day) 3																	
Membrane Depth (m) 0																	
<u>Hydro-Brake® Optimum Outflow Control</u>																	
Unit Reference MD-SHE-0158-1060-0320-1060																	
Design Head (m) 0.320																	
Design Flow (l/s) 10.6																	
Flush-Flo™ Calculated																	
Objective Minimise upstream storage																	
Application Surface																	
Sump Available Yes																	
Diameter (mm) 158																	
Invert Level (m) 9.675																	
Minimum Outlet Pipe Diameter (mm) 225																	
Suggested Manhole Diameter (mm) 1200																	
<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Control Points</th> <th style="text-align: left;">Head (m)</th> <th style="text-align: left;">Flow (l/s)</th> </tr> </thead> <tbody> <tr> <td>Design Point (Calculated)</td> <td>0.320</td> <td>10.6</td> </tr> <tr> <td>Flush-Flo™</td> <td>0.211</td> <td>10.6</td> </tr> <tr> <td>Kick-Flo®</td> <td>0.291</td> <td>10.1</td> </tr> <tr> <td>Mean Flow over Head Range</td> <td>-</td> <td>7.4</td> </tr> </tbody> </table>			Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.320	10.6	Flush-Flo™	0.211	10.6	Kick-Flo®	0.291	10.1	Mean Flow over Head Range	-	7.4
Control Points	Head (m)	Flow (l/s)															
Design Point (Calculated)	0.320	10.6															
Flush-Flo™	0.211	10.6															
Kick-Flo®	0.291	10.1															
Mean Flow over Head Range	-	7.4															
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																	
©1982-2020 Innovyze																	

Waterco Ltd		Page 6	
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ		14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event	
Date 04/10/2024 File 14740 - UPDATED.SRCX		Designed by MJW Checked by AW	
XP Solutions		Source Control 2020.1.3	
<u>Hydro-Brake® Optimum Outflow Control</u>			
calculations will be invalidated			
<b>Depth(m) Flo)</b> <b>(m) Flow (l/s)</b>	<b>(l/s)Depth</b> <b>(m)</b>	<b>Flow</b> <b>(l/s)Depth</b> <b>(m)</b>	<b>Flow(l/s)Depth</b> <b>(m)</b>
0.100	5.71.200	19.83.000	30.87.000 46.8
0.200	10.61.400	21.43.500	32.97.500 48.4
0.300	10.31.600	22.84.000	35.28.000 50.0
0.400	11.81.800	24.14.500	37.48.500 51.6
0.500	13.12.000	25.35.000	39.49.000 53.1
0.600	14.32.200	26.55.500	41.49.500 54.6
0.800	16.32.400	27.76.000	43.3
1.000	18.22.600	28.86.500	45.0
©1982-2020 Innovyze			

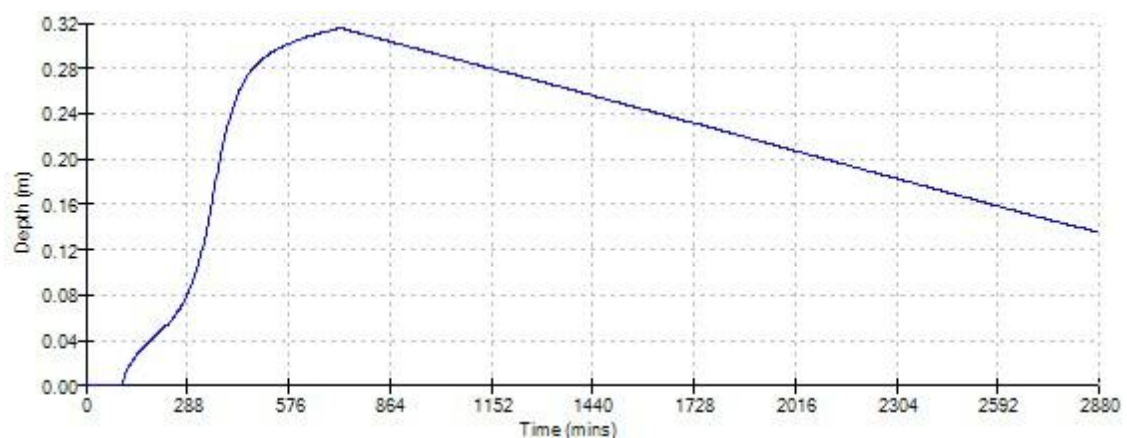
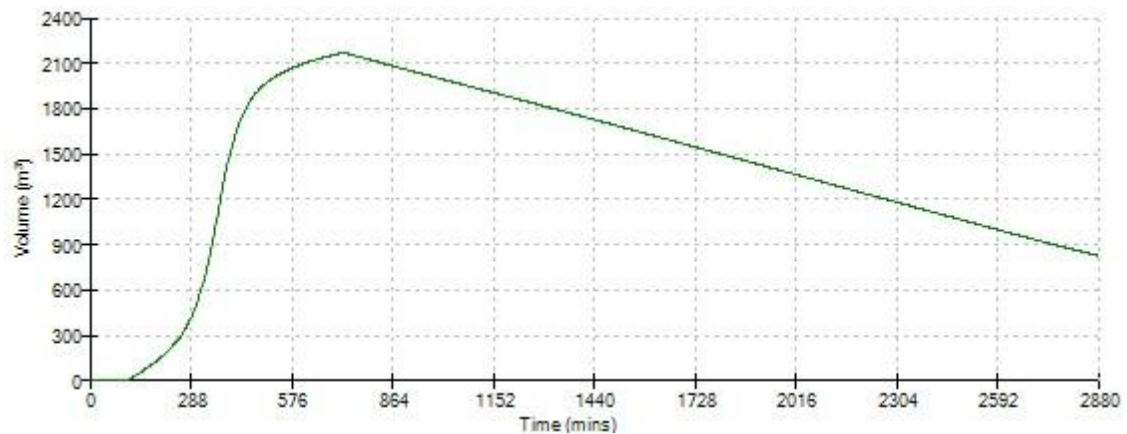
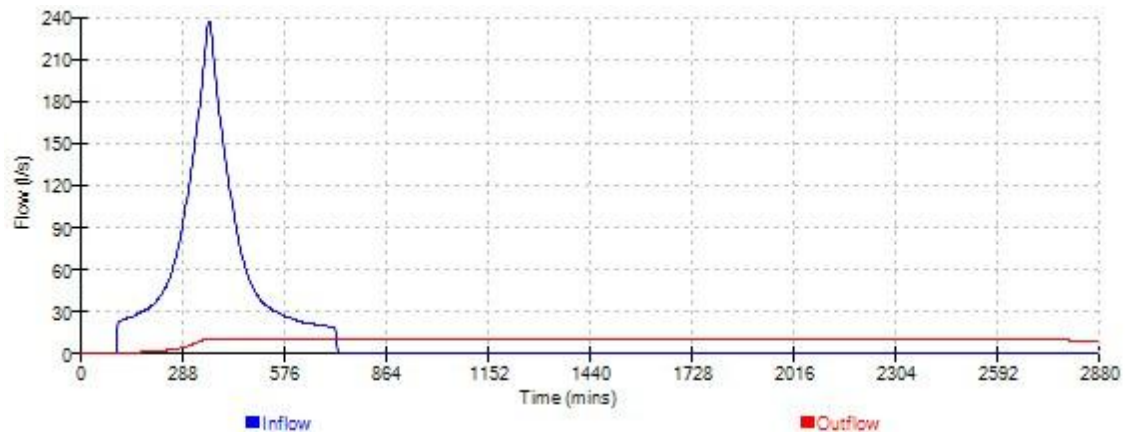


Waterco Ltd		Page 7
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ		14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event
Date 04/10/2024 File 14740 - UPDATED.SRCX		Designed by MJW Checked by AW



XP Solutions Source Control 2020.1.3

Event: 720 min Summer

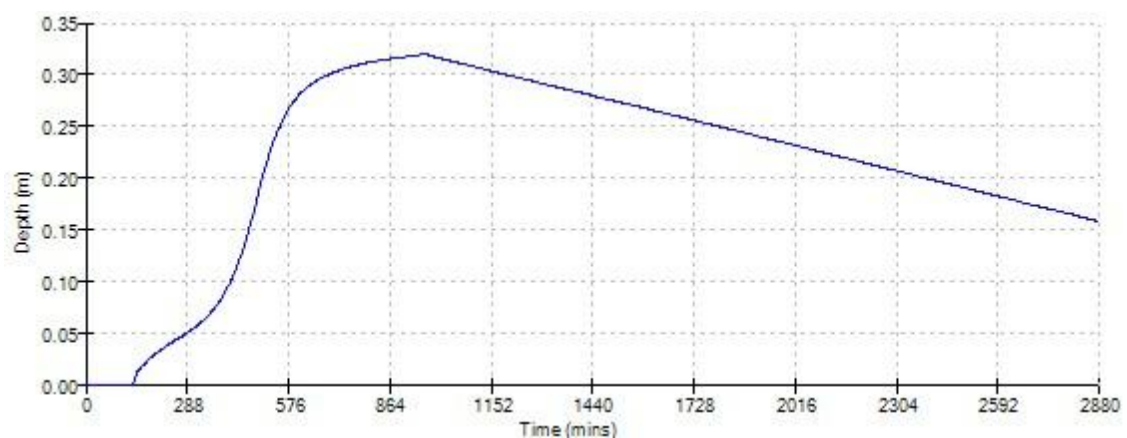
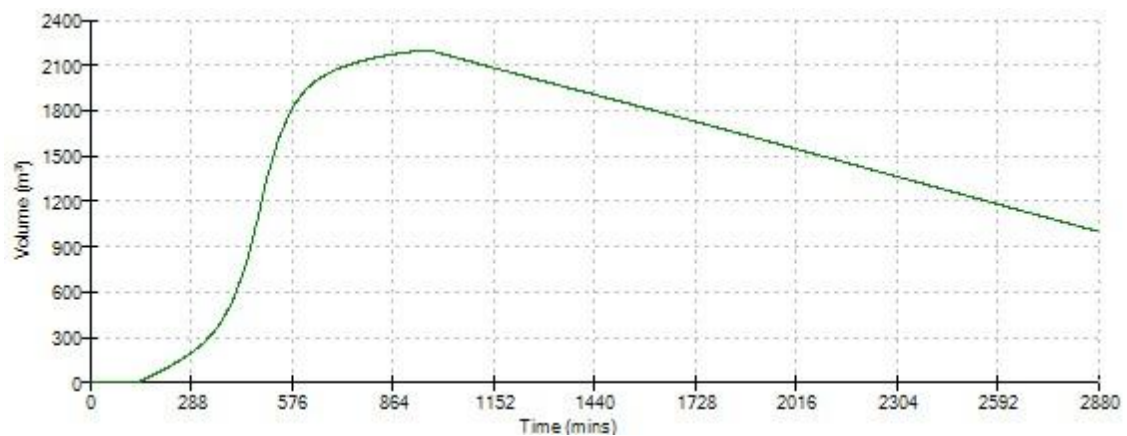
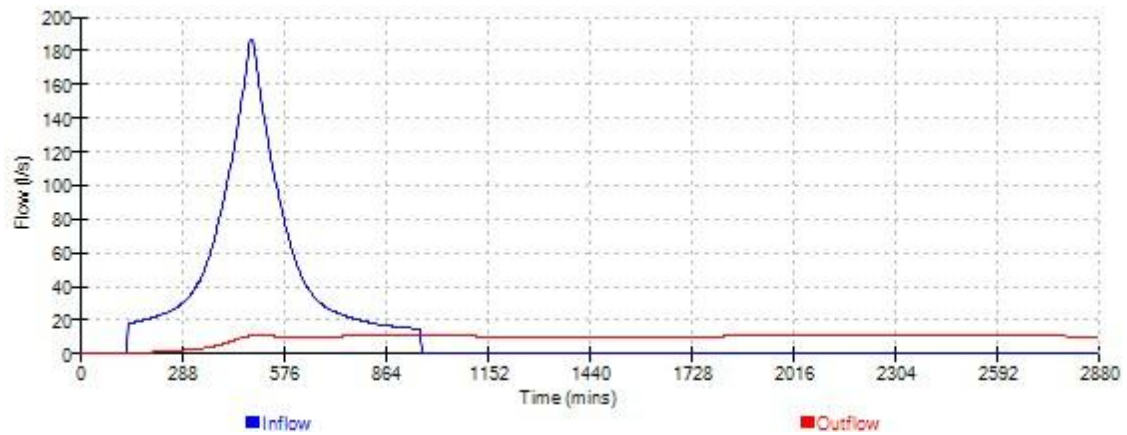


©1982-2020 Innovyze


Waterco Ltd		Page 8
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ		14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event
Date 04/10/2024 File 14740 - UPDATED.SRCX		Designed by MJW Checked by AW
XP Solutions		Source Control 2020.1.3



Event: 960 min Summer



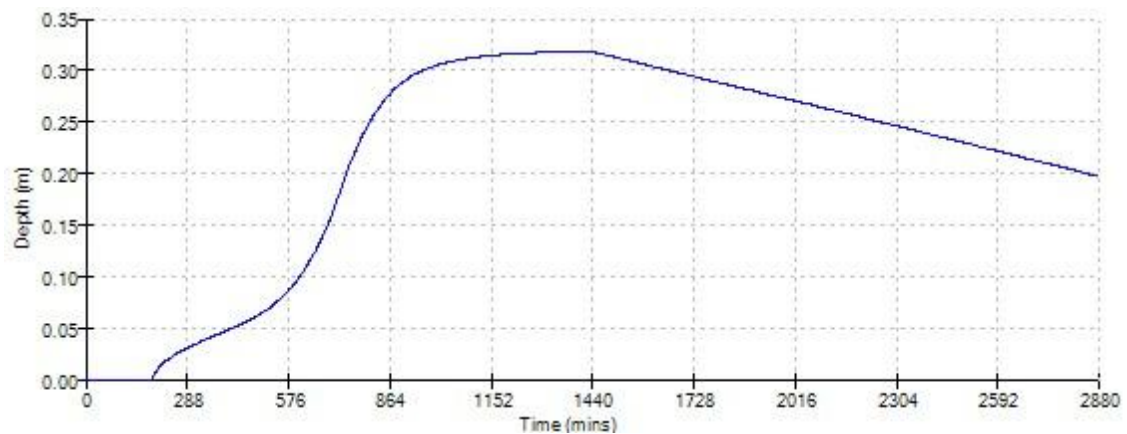
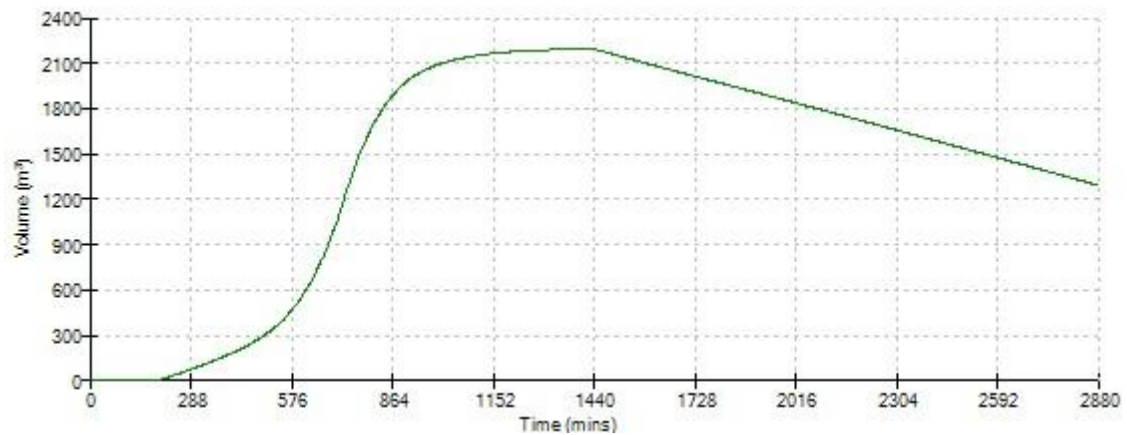
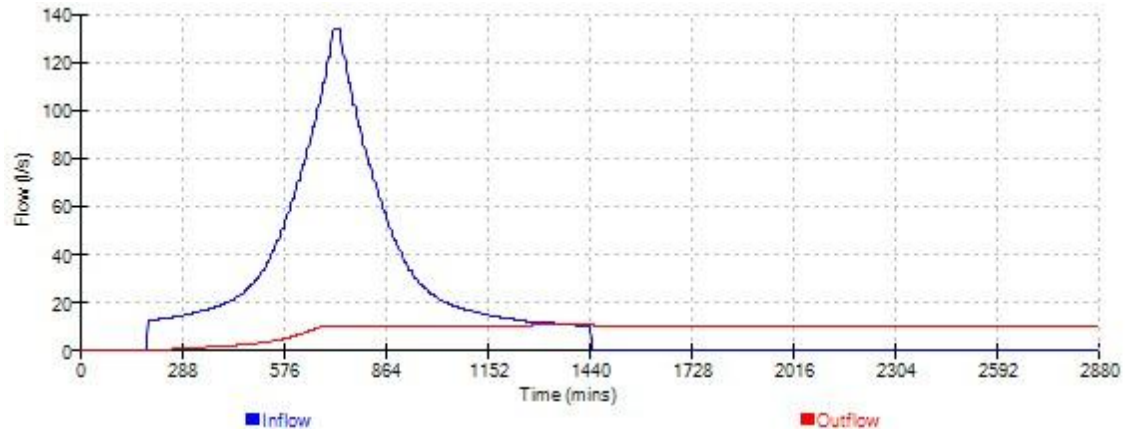
©1982-2020 Innovyze

Waterco Ltd		Page 9
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	14740 - Frodsham Solar Attenuation Storage 1 in 100 year + 45% CC event	
Date 04/10/2024 File 14740 - UPDATED.SRCX	Designed by MJW Checked by AW	

XP Solutions

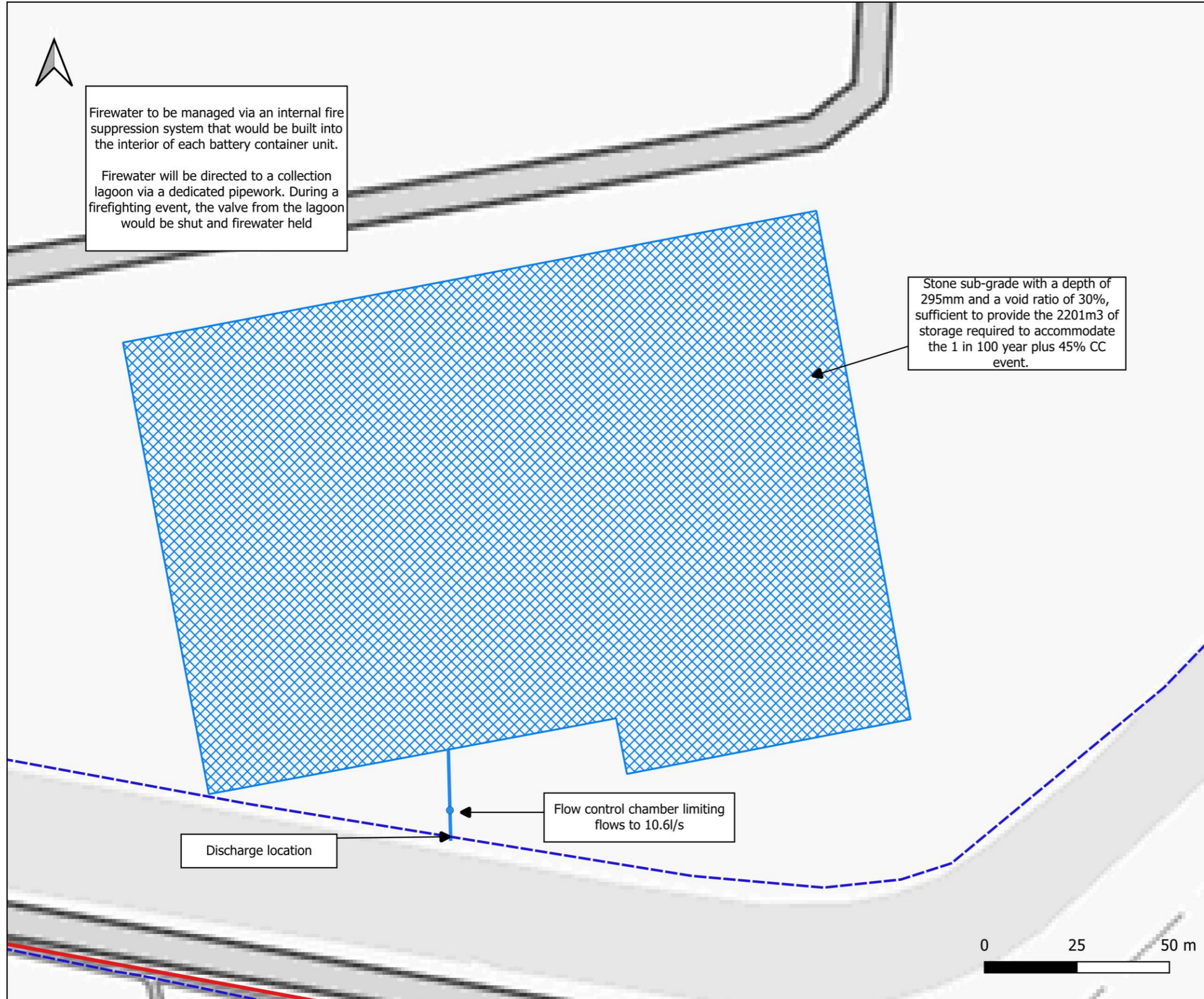
Source Control 2020.1.3

Event: 1440 min Summer



©1982-2020 Innovyze

## Appendix C: Concept Drainage Sketch



Notes:

- 1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
- 2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
- 3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
- 4) This drawing is an ammendment of the 3272-01-SK005 Landscape Masterplan Draft Rev J by Axis. This drawing provides a concept only and is not intended for detailed design.

- LEGEND**
- Proposed Permeable Stone Surfacing
  - Proposed Surface Water Drain
  - Hydrobrake
  - Ordinary Watercourses

CLIENT:

Frodsham Solar Ltd



SCHEME:

Frodsham Solar

PLOT TITLE:

Concept Drainage Sketch - Option 1

PLOT STATUS:	SKETCH	DATE:	18-10-2024
--------------	--------	-------	------------

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MW	AW	NJ	1:1000

PLOT NAME:	REVISION:
14740_Concept_Drainage_Sketch	-



Firewater to be managed via an internal fire suppression system that would be built into the interior of each battery container unit.

Firewater will be directed to a collection lagoon via a dedicated pipework. During a firefighting event, the valve from the lagoon would be shut and firewater held

Discharge location





Flow control chamber limiting flows to 10.6l/s


Stone sub-grade with a depth of 295mm and a void ratio of 30%, sufficient to provide the 2201m<sup>3</sup> of storage required to accommodate the 1 in 100 year plus 45% CC event.

Notes:

- 1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
- 2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
- 3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
- 4) This drawing is an ammendment of the 3272-01-SK005 Landscape Masterplan Draft Rev J by Axis. This drawing provides a concept only and is not intended for detailed design.

**LEGEND**

-  Proposed Permeable Stone Surfacing
-  Proposed Surface Water Drain
-  Hydrobrake
-  Ordinary Watercourse

CLIENT:		Frodsham Solar Ltd	
		 www.waterco.co.uk	
SCHEME:		Frodsham Solar	
PLOT TITLE:		Concept Drainage Sketch - Option 2	
PLOT STATUS:		SKETCH	DATE: 18-10-2024
DRAWN: MW	CHECKED: AW	APPROVED: NJ	PLOT SCALE AT A3: 1:1000
PLOT NAME: 14740_Concept_Drainage_Sketch		REVISION: -	

