



Our Ref: J-11721-01-AG
22 June 2017

Entrust Ltd.
Daresbury Innovation Centre
Keckwick Lane
Daresbury
Cheshire
WA4 4FS

RE: Proposed energy storage scheme at Hunshelf primary sub station, Barnsley – Flood Risk Assessment & Surface Water Drainage Strategy

Introduction

Entrust Ltd. are currently proposing to construct an Energy storage scheme on land at Hunshelf primary sub station, Barnsley. The proposal is to provide an energy storage scheme and associated infrastructure for connection to the national grid.

Nijhuis H₂OK Ltd. have been commissioned to provide a Flood Risk Assessment (FRA) and a surface water drainage strategy for the site. The aim of the report is to ensure that the development does not increase flood risk to areas downstream of the site, including a Sustainable Drainage System (SuDS) to mitigate any potential issues relating to runoff rates and flow routes.

This report comprises the FRA and SuDS strategy for the proposed development, in line with the National Planning Guidance.

Site Description

The site is located on the outskirts of Stockbridge, which is approximately 10 miles west of the town of Rotherham, South Yorkshire. The approximate OSGR for the site is SE 26271 00047. Presently the site comprises of an agricultural field typically used for grazing, adjacent to the Hunshelf primary sub station. A site location plan, showing the proposed site boundary, is shown in Figure 1 below; the site layout is included in **Annex A**.

The development proposal is to install storage containers to house rows of batteries, which allow electricity from the grid to be stored and fed back to the grid when required. The anticipated operational period of the containers is 25 years, after which the equipment is removed and the site is then used for typical agricultural purposes.

The Environment Agency (EA) indicative flood map (see Figure 2) shows the site and access are located within Flood Zone 1 (low probability). The site will introduce impermeable area on to existing greenfield area, as such the effects of this will be given further consideration.

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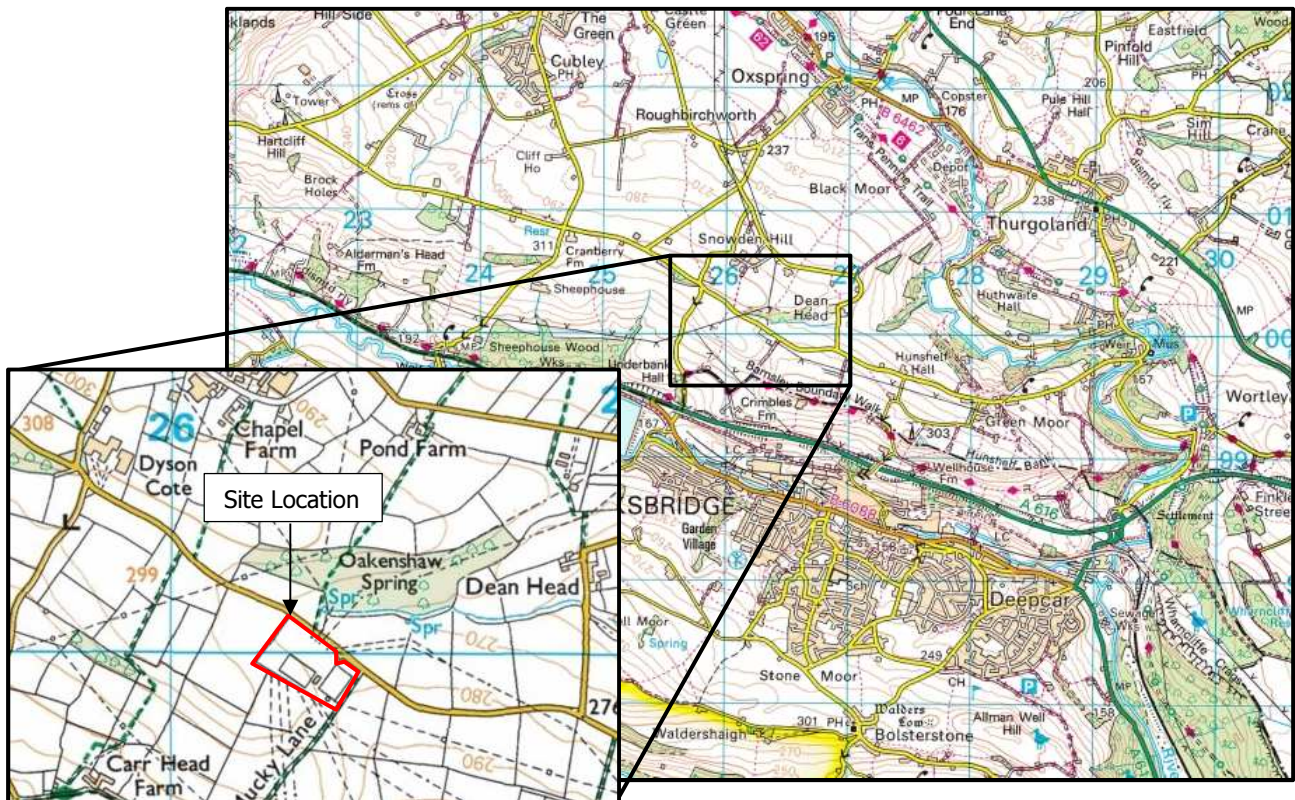


Figure 1. Site Location Plan

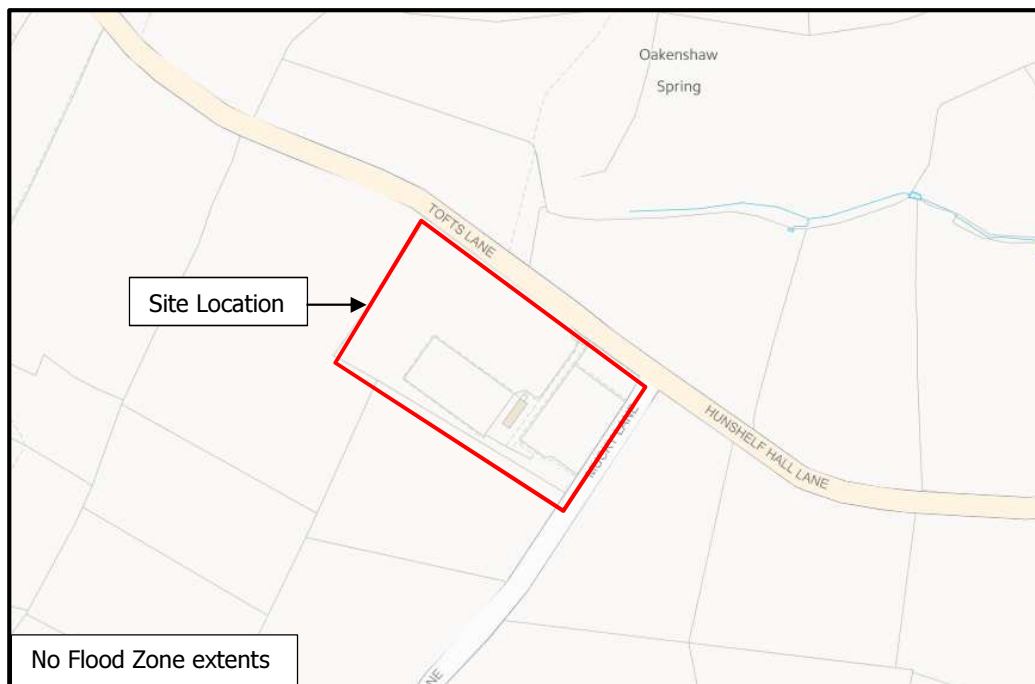


Figure 2. EA Indicative Flood Map

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Existing Hydrology

Surface Water Runoff

The site itself contains no apparent surface water features within it; however the Dean Brook runs north east from the northern boundary approximately 118m from the site, this then continues away from the site towards the east.

It is clear from the site topography that any surface water runoff from the site would ultimately find its way to the Dean Brook. Under natural conditions, surface water falling onto the subject site is likely to percolate into the subsoil, where it would flow slowly as groundwater towards the watercourse described above. Any excess runoff is likely to follow the same path above ground, until it either reaches the watercourse, or percolates into the subsoil.

Flood Risks and Mitigation Measures

Fluvial and Tidal Flooding

The site appears to be located within Flood Zone 1 (low risk) as per Figure 2 above. As such the site is not considered to be at risk from either fluvial or tidal flooding. Other flood mechanisms are considered below.

Groundwater Flooding

Groundwater flooding is linked to the ability of the ground to hold water and normally occurs where the water table meets the ground surface in low lying areas which are underlain by permeable rock. The EA indicative mapping (Figure 3), which identifies and classifies areas based on Bedrock and Superficial deposits, suggests a slightly elevated risk of groundwater flooding at the site, as the site appears to be located outside of any known aquifer areas. The Sheffield Strategic Flood Risk Assessment (SFRA) states the following:

'There are no known incidents of groundwater flooding in Sheffield, and it is considered reasonable to assume that the potential risk of groundwater flooding is extremely low.'

Assessment of OS mapping shows that there is a watercourse near to the site. Although ground investigations are yet to be conducted, the elevation of the site relative to the surrounding features suggests that groundwater flooding should not be significant issue as it is anticipated the nearby ditches/watercourses will act as sumps to aid in draining/lowering groundwater levels.

Given the above, it is considered that groundwater flooding does not pose a significant risk to the development and will not be considered further within this report.

Overland/Surface Water Flow

The Environment Agency map below (Figure 4) shows the risk of flooding from surface water for the site. It indicates that part of the site is at very low risk of flooding from surface water.

Additionally, any SuDS features implemented on the site will act to mitigate against potential surface water flooding within the site. As such this mechanism of flooding is not considered further.

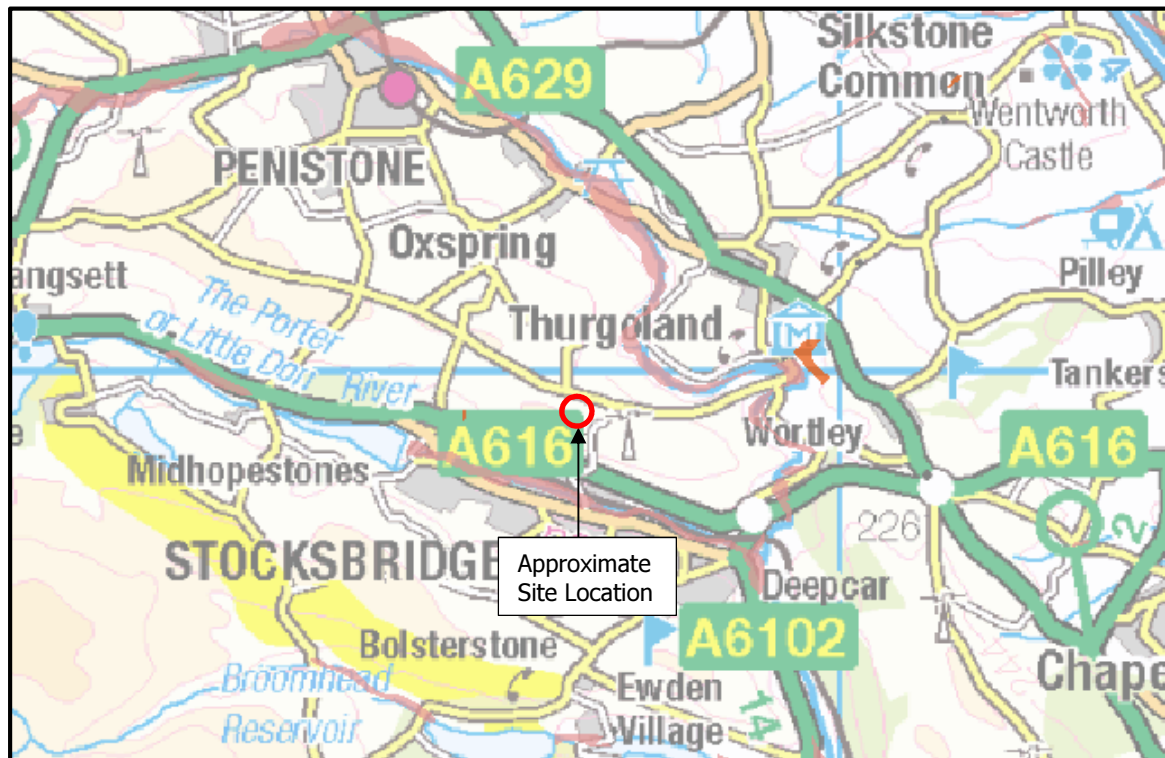


Figure 3. EA Aquifer Map Extract –Bedrock Designation



Figure 4. EA Surface Water Flooding Map

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Other Sources of Flood Risk

Inspection of OS mapping shows that there is little risk from flooding from other sources such as reservoirs or impounded waterbodies. Flood risk from other sources is considered to be very low and is not covered further in this report.

Flooding as a result of Development

Development and paving of permeable areas has potential to increase flood risk to properties down slope of the proposed development. The design of the proposed development surface water drainage system is key to mitigating these risks. By designing the site's surface water drainage infrastructure in accordance with SuDS best practice, the proposed development will not increase flood risk to third parties down slope.

The development comprises the installation of a number of containers and associated hard standing areas, therefore there is potential for around 876m² of impermeable surfaces to be introduced on the site.

Drainage Design – Infiltration System (Option 1)

The preferable drainage solution for the site would be to drain all surface water runoff from the development to ground soakaways designed to a 100 year return period storm with an allowance for climate change.

In order to provide a detailed design for such an infiltration system, site investigation would be required to ascertain the percolation rates of the site's sub-soil. As the site investigation has not yet been carried out, an estimated infiltration rate of 0.15m/hr has been used in order to produce an outline design of the soakaway system.

Although the site area is approximately just under 1ha in size, only a small proportion will be rendered impermeable. These will be the 26 containers conservatively estimated to be around 806m², the large transformer conservatively estimated to be 50m² and the ceramic insulators conservatively estimated to be 20m².

The infiltration drainage system makes use of a clean stone soakaway. Each container and each inverter/transformer is provided with a clean stone soakaway trench, whereby it is highlighted that any concrete plinth or land that the container is sat on should be gently sloped towards the soakaway.

Each container (31m²) is proposed to be served by a soakaway trench minimum 0.5m width x 7.48m length and 0.5m depth (1.9m³).

The transformer (50m²) is proposed to be served by a soakaway trench minimum 0.6m width x 9.10m length and 0.6m depth (3.3m³).

The ceramic Insulator (20m²) is proposed to be served by a soakaway trench minimum 0.6m width x 4.14m length and 0.5m depth (1.2m³).

The access track is proposed to be constructed from permeable material to allow natural infiltration to occur.

The infiltration drainage system is shown on Drawing 3001 within **Annex B**. Calculations for the soakaways are included within **Annex C**.

Percolation testing should be undertaken prior to the detailed design of the final drainage design system in order to confirm whether an infiltration based system is appropriate.

Drainage Design – Attenuation System (Option 2)

If infiltration rates are found to be poor or groundwater ingress is observed in trial holes, then surface water runoff from the development will need to be attenuated on site and discharged to a suitable receptor at an appropriate rate. In line with best practice, the runoff rate from the development should not exceed pre-development Greenfield runoff rates and should allow for climate change.

The Greenfield runoff rate for the site has been calculated, using the ICP-SUDS method, to be in the region of 2.1 l/s based on a 100 year storm. When the flow exceeds 2.1 l/s the system would back up into an attenuation tank sized to contain the 100 year + 30% climate change event. MicroDrainage calculations indicate a minimum tank size of 110m² using a 69mm Hydrobrake Optimum flow control device. It is proposed to direct the surface water to the attenuation tank via conveyance trenches on the downstream boundaries of the site.

Whilst an attenuation tank has been outlined above, a SuDS detention basin of a similar volume could also be used.

In line with Building Regulations the preferable option for disposal of surface water if infiltration techniques are not possible is to discharge into a nearby suitable watercourse. By inspection of OS mapping, there appears to be a suitable watercourse to the north of the site, which could be a potential connection point to allow for this discharge.

An indicative layout showing the attenuation system discussed above is included in **Annex B**.

Environmental Considerations

The use of heavy plant during construction may cause the topsoil to be disrupted which in turn can pose a pollution risk to local watercourses. An intense rainfall event may result in silt laden runoff being discharged from the site, potentially polluting local watercourses. The proposed drainage designs will incorporate silt traps located upstream of the soakaways/attenuation tank to ensure silt does not enter the groundwater/watercourse. During construction, it is advised that silt fences are installed to intercept silt laden runoff, if construction traffic of adverse weather is likely to cause disruption to the topsoil.

Exceedance Events

Drainage Design – Infiltration System (Option 1)

During any rainfall event in excess of the design storm described above, or should the drainage system become blocked, there is potential for surface water to discharge overland from the site. Such flow would run north east from the site into the nearby watercourse; this is where the existing surface water would runoff. It is anticipated that any additional flow above the 1 in 100 year storm event with a 30% allowance from climate change would be minimal and as such the effect of this will be negligible.

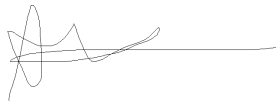
Drainage Design – Attenuation System (Option 2)

During any rainfall event in excess of the design storm described above, or should the flow control orifice become blocked, the attenuation system has potential to become surcharged. Should this occur, flow would enter the overflow pipe incorporated into the system, as such no excess flow would be seen at the surface as it would be discharged to the watercourse; this is where existing site runoff would flow in the pre-development scenario.

Conclusions

- The development is the construction of an Energy storage scheme on land on the outskirts of Minety, Malmesbury. The proposed development has been shown to lie within Flood Zone 1 and is not at direct risk of any anticipated flood mechanism.
- The site has potential to introduce around 876m² of impermeable area on Greenfield land, therefore special consideration has been given to surface water drainage of the site.
- In the absence of infiltration rates from a site investigation, an infiltration system has been outlined based on a conservative infiltration rate. Subject to confirmation of the infiltration rates following completion of a site investigation the soakaway will be resized.
- Should infiltration rates prove to be poor, or groundwater ingress is observed in trial holes, then the proposed development will drain at a controlled flow rate of 2.1 l/s, via an attenuation system, to an appropriate receptor.
- The proposed drainage layouts are shown on Drawing 3001 & 3002 included in **Annex B**.
- Provided the recommendations outlined in this report are adopted in the development proposal then there is the capacity to manage the surface water runoff from the development such that there will be no impact downstream areas as a result of the proposed development.

Yours sincerely
For and on behalf of Nijhuis H₂OK Ltd



Abi Gallacher
Graduate Engineer

Enc.	Annex A Annex B Annex C	Site Layout Conceptual SuDS Layout Calculations
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ANNEX A – SITE LAYOUT

426200

426300

400000

Hunshelf Energy Storage

Hunshelf Primary Sub Station, Tofts Lane,
Barnsley, S36 8WR

Entrust Site ID: 859

Site Layout Map

Legend

- Site_Boundary
- access
- 50MVA Transformer(5.3m)
- 2MWh Battery & PCS
- DNO
- Ceramic Insulators (2m approx.)
- Fence (2.5m)
- Gate
- Private_Ring
- 5*2MW Tranformer
- Bird box
- ▲ Hedgehog box
- ✕ Insect box
- ◆ Stag Beetle box
- Security Camera(2.5m)
- Ilex aquifolium(2m)
- Fagus sylvatica(2m)

Basemap: OS Mastermap 1250/2500/10000 scale

Digital Supplier: Nicolson Digital Ltd

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0 10 20 30 m

Scale @A3: 1:500



Date: 03/03/2017

Revision: V 1.1

Created by: Yogi S Murthi

Verified by: Neill Gates

Approved by: Kieran Tarpey

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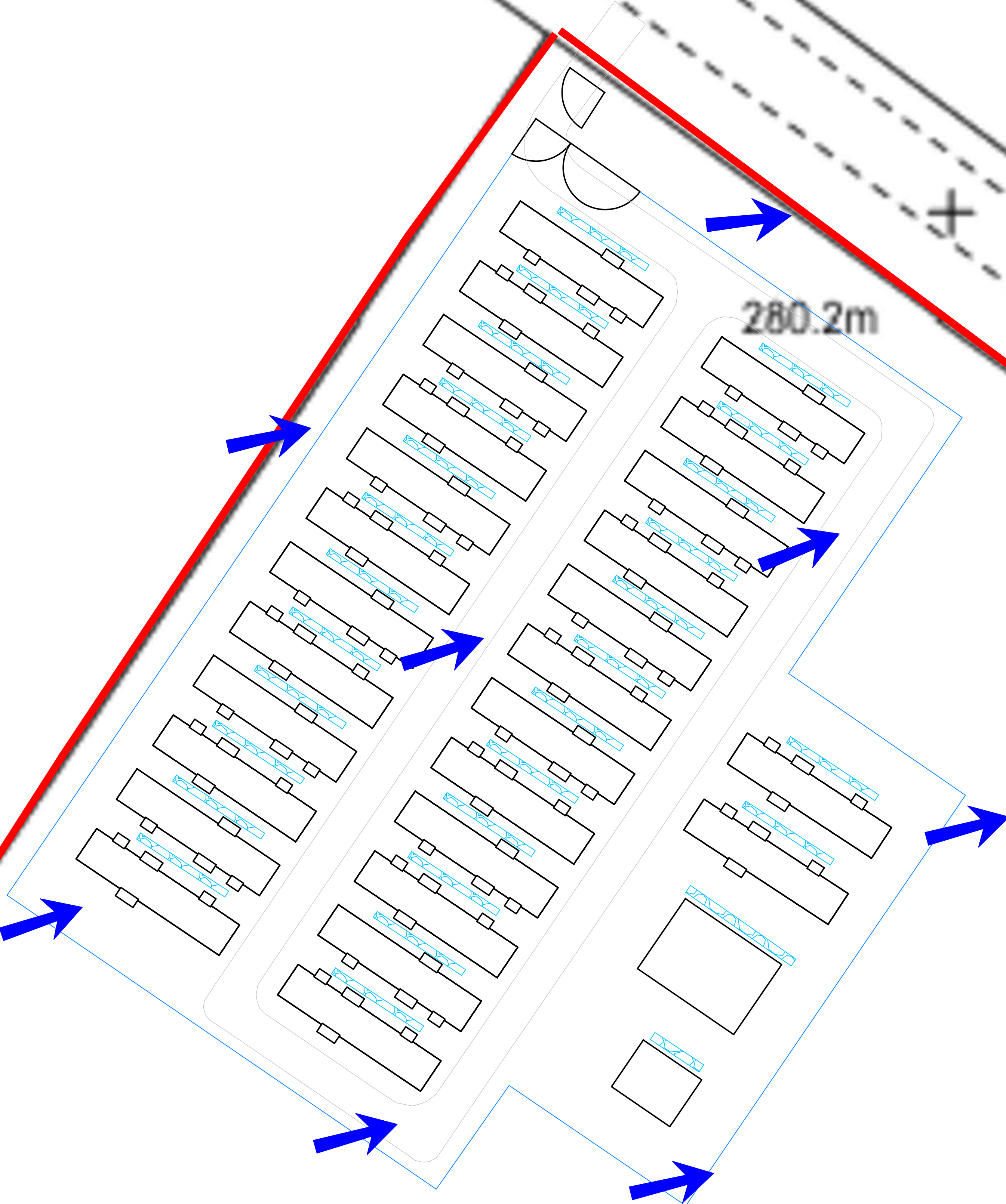
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Electricity Sub Station

ANNEX B – CONCEPTUAL SUDS DRAWINGS

ID	Area Type	Type	M5-60	r	Factor of Safety	Return Period (T)	Climate Change Adjust-ment	Impermeable Area to Each Soakaway	Soil Infiltration (Q)	Concrete Ring Size (mm)	Width (m)	Minimum Length (m)	Depth (m)	Half Empty Time (days, hours, minutes)	Soakaway Volume
SA1	ONE CONTAINER/INVERTER	Clean Stone	19.3	0.313	Minor Inconvenience	100	30%	31.0	1.500E-01		0.50	7.48	0.50	0d 01h 00m	(1.9 m3)
SA2	LARGE TRANSFORMER	Clean Stone	19.3	0.313	Minor Inconvenience	100	30%	50.0	1.500E-01		0.60	9.10	0.60	0d 01h 19m	(3.3 m3)
SA3	CERAMIC INSULATORS	Clean Stone	19.3	0.313	Minor Inconvenience	100	30%	20.0	1.500E-01		0.60	4.14	0.50	0d 00h 39m	(1.2 m3)



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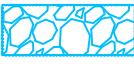
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- DESIGN RISK ASSESSMENT

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KEY

- SITE DEVELOPMENT BOUNDARY
-  PROPOSED SOAKAWAY CONSTRUCTED OF CLEAN STONE
-  INDICATIVE OVERLAND EXCEEDANCE FLOW ROUTING

22-06-17	AG	-	-	A	PRELIMINARY ISSUE
DATE:	DRWN.	CHKD.	APPR.	REV.	NOTES
PROJECT MANAGER:-					HANNAH SHORT
ASSISTANT:-					ABI GALLACHER
DRAWN DATE:-					JUNE 2017
SCALE & SHEET SIZE:-					1:200 @ A1

PRELIMINARY





- Waste to Value (AD/Biogas)
- Industrial Effluent Treatment
- Sewage Treatment

- Flood Risk Management / SUDS
- Design Consultancy
- Service and Maintenance

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CLIENT

ENTRUST LTD.

PROJECT

HUNSHELF ENERGY STORAGE SCHEME

DRAWING TITLE

CONCEPTUAL SURFACE WATER DRAINAGE SCHEME OPTION 1 - INFILTRATION

PROJECT No.	DRAWING No.	REV.
J-11721	3001	A

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KEY

- SITE DEVELOPMENT BOUNDARY
- CONVEYANCE TRENCH
- PROPOSED ATTENUATION TANK
- INDICATIVE OVERLAND EXCEEDANCE FLOW ROUTING
- PROPOSED FLOW CONTROL CHAMBER (1200Ø P.C.C.)

22-06-17	AG	HS	-	A	PRELIMINARY ISSUE
DATE	DRWN	CHKD	APPR	REV	NOTES
PROJECT MANAGER:-					HANNAH SHORT
ASSISTANT:-					ABI GALLACHER
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PROJECT		
HUNSHELF ENERGY STORAGE SCHEME		
DRAWING TITLE		
CONCEPTUAL SURFACE WATER DRAINAGE SCHEME OPTION 2 - ATTENUATION		
PROJECT No.	DRAWING No.	REV.
J-11721	3002	A

ANNEX C – CALCULATIONS

H2OK Systems Limited		Page 1
Nanjerrick Court Allet, Truro TR4 9DJ		
Date 21/06/2017 16:04 File	Designed by agallacher Checked by	
Micro Drainage		Source Control 2015.1
<p style="text-align: center;"><u>ICP SUDS Mean Annual Flood</u></p> <p style="text-align: center;">Input</p> <p>Return Period (years) 100 Soil 0.300 Area (ha) 0.290 Urban 0.000 SAAR (mm) 1018 Region Number Region 4</p> <p style="text-align: center;">Results 1/s</p> <p>QBAR Rural 0.8 QBAR Urban 0.8</p> <p>Q100 years 2.1</p> <p>Q1 year 0.7 Q30 years 1.6 Q100 years 2.1</p>		
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H2OK Systems Limited							Page 1
Nanjerrick Court Allet, Truro TR4 9DJ			Hunshelf				
Date 21/06/17 File Attenuation.srcx			Designed by AG Checked by				
Micro Drainage			Source Control 2015.1				
Summary of Results for 100 year Return Period (+30%)							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	104.558	0.558	2.1	0.0	2.1	61.4	O K
30 min Summer	104.758	0.758	2.1	0.0	2.1	83.3	O K
60 min Summer	104.961	0.961	2.1	2.1	4.2	105.7	O K
120 min Summer	105.147	1.147	2.2	18.7	21.0	110.2	O K
180 min Summer	105.295	1.295	2.4	24.8	27.2	110.3	O K
240 min Summer	105.297	1.297	2.4	24.9	27.3	110.3	O K
360 min Summer	105.244	1.244	2.3	22.9	25.2	110.3	O K
480 min Summer	105.214	1.214	2.3	21.7	24.0	110.2	O K
600 min Summer	105.180	1.180	2.3	20.3	22.5	110.2	O K
720 min Summer	105.095	1.095	2.2	15.4	17.6	110.1	O K
960 min Summer	105.068	1.068	2.2	12.3	14.5	110.1	O K
1440 min Summer	104.998	0.998	2.1	5.3	7.4	109.7	O K
2160 min Summer	104.976	0.976	2.1	3.3	5.4	107.4	O K
2880 min Summer	104.958	0.958	2.1	1.9	4.0	105.4	O K
4320 min Summer	104.906	0.906	2.1	0.0	2.1	99.7	O K
5760 min Summer	104.744	0.744	2.1	0.0	2.1	81.8	O K
7200 min Summer	104.547	0.547	2.1	0.0	2.1	60.2	O K
8640 min Summer	104.397	0.397	2.1	0.0	2.1	43.6	O K
10080 min Summer	104.296	0.296	2.1	0.0	2.1	32.6	O K
15 min Winter	104.627	0.627	2.1	0.0	2.1	69.0	O K
30 min Winter	104.851	0.851	2.1	0.0	2.1	93.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
15 min Summer	113.600	0.0	62.8	0.0	22		
30 min Summer	77.694	0.0	86.0	0.0	37		
60 min Summer	50.758	0.0	112.9	2.6	64		
120 min Summer	31.960	0.0	142.2	24.1	84		
180 min Summer	23.967	0.0	159.9	35.8	112		
240 min Summer	19.391	0.0	172.5	42.5	144		
360 min Summer	14.402	0.0	192.2	50.4	206		
480 min Summer	11.641	0.0	207.2	53.6	268		
600 min Summer	9.859	0.0	219.3	54.2	332		
720 min Summer	8.602	0.0	229.6	53.5	396		
960 min Summer	6.929	0.0	246.6	50.2	528		
1440 min Summer	5.097	0.0	271.9	42.7	812		
2160 min Summer	3.740	0.0	299.7	31.3	1216		
2880 min Summer	2.997	0.0	320.3	19.9	1648		
4320 min Summer	2.189	0.0	350.9	0.1	2636		
5760 min Summer	1.753	0.0	374.9	0.0	3456		
7200 min Summer	1.477	0.0	394.6	0.0	4176		
8640 min Summer	1.283	0.0	411.5	0.0	4760		
10080 min Summer	1.140	0.0	426.4	0.0	5440		
15 min Winter	113.600	0.0	70.4	0.0	22		
30 min Winter	77.694	0.0	96.3	0.0	37		
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Nanjerrick Court Allet, Truro TR4 9DJ	Hunshelf						
Date 21/06/17 File Attenuation.srcx	Designed by AG Checked by						
Micro Drainage Source Control 2015.1							
<u>Summary of Results for 100 year Return Period (+30%)</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
60 min Winter	105.108	1.108	2.2	16.8	18.9	110.1	O K
120 min Winter	105.559	1.559	2.6	33.0	35.6	110.6	O K
180 min Winter	105.542	1.542	2.6	32.6	35.1	110.6	O K
240 min Winter	105.598	1.598	2.6	34.1	36.7	110.6	O K
360 min Winter	105.222	1.222	2.3	22.0	24.3	110.3	O K
480 min Winter	105.233	1.233	2.3	22.5	24.8	110.3	O K
600 min Winter	105.118	1.118	2.2	17.3	19.5	110.2	O K
720 min Winter	105.099	1.099	2.2	15.8	18.0	110.1	O K
960 min Winter	105.061	1.061	2.2	11.6	13.7	110.1	O K
1440 min Winter	105.002	1.002	2.1	5.7	7.8	110.0	O K
2160 min Winter	104.978	0.978	2.1	3.5	5.6	107.5	O K
2880 min Winter	104.960	0.960	2.1	2.1	4.1	105.6	O K
4320 min Winter	104.902	0.902	2.1	0.0	2.1	99.3	O K
5760 min Winter	104.629	0.629	2.1	0.0	2.1	69.2	O K
7200 min Winter	104.344	0.344	2.1	0.0	2.1	37.8	O K
8640 min Winter	104.212	0.212	2.0	0.0	2.0	23.3	O K
10080 min Winter	104.145	0.145	1.9	0.0	1.9	15.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
60 min Winter	50.758	0.0	126.4	14.6	52		
120 min Winter	31.960	0.0	159.3	41.0	80		
180 min Winter	23.967	0.0	179.2	54.7	110		
240 min Winter	19.391	0.0	193.3	63.0	140		
360 min Winter	14.402	0.0	215.3	73.2	200		
480 min Winter	11.641	0.0	232.1	78.1	262		
600 min Winter	9.859	0.0	245.7	80.0	324		
720 min Winter	8.602	0.0	257.2	80.0	388		
960 min Winter	6.929	0.0	276.2	76.7	518		
1440 min Winter	5.097	0.0	304.6	66.1	812		
2160 min Winter	3.740	0.0	335.7	49.1	1232		
2880 min Winter	2.997	0.0	358.8	31.4	1680		
4320 min Winter	2.189	0.0	393.0	0.0	2812		
5760 min Winter	1.753	0.0	419.9	0.0	3696		
7200 min Winter	1.477	0.0	442.0	0.0	4176		
8640 min Winter	1.283	0.0	460.9	0.0	4752		
10080 min Winter	1.140	0.0	477.6	0.0	5344		
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Rainfall Details

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)	19.300	Shortest Storm (mins)	15
Ratio R	0.316	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.297

Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)
0 4	0.148	4 8	0.149

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Model Details

Storage is Online Cover Level (m) 106.000

Tank or Pond Structure

Invert Level (m) 104.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	110.0	1.000	110.0	1.001	0.0

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0069-2100-1000-2100
Design Head (m)	1.000
Design Flow (l/s)	2.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	69
Invert Level (m)	104.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.1
Flush-Flo™	0.302	2.1
Kick-Flo®	0.614	1.7
Mean Flow over Head Range	-	1.8

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

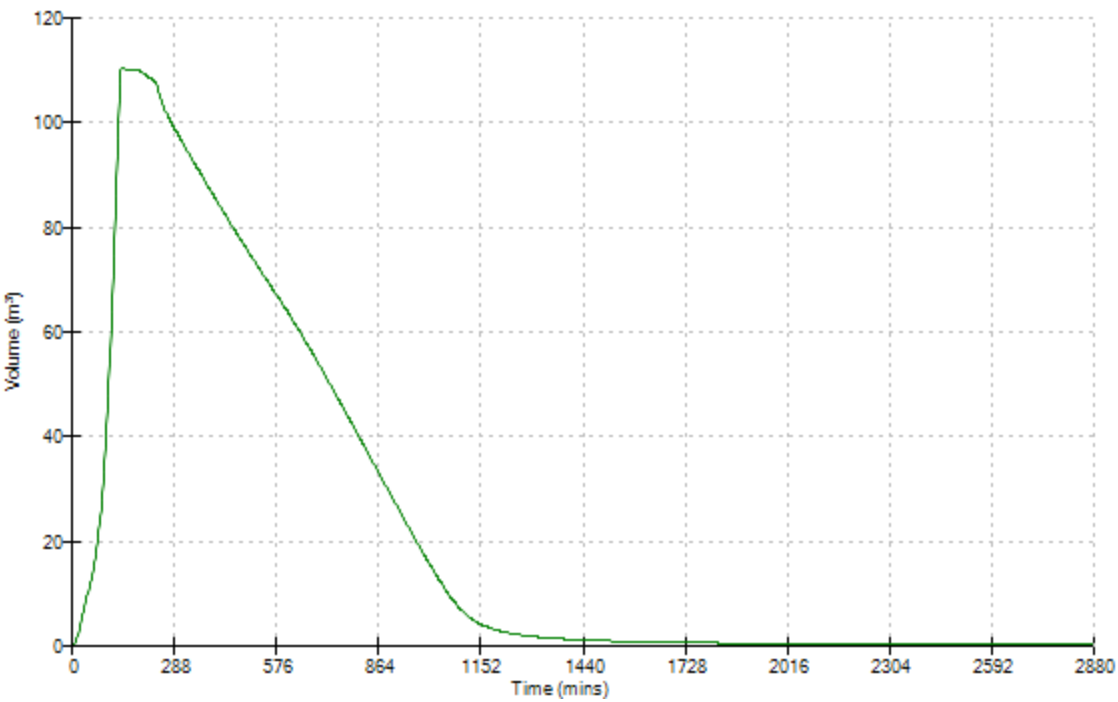
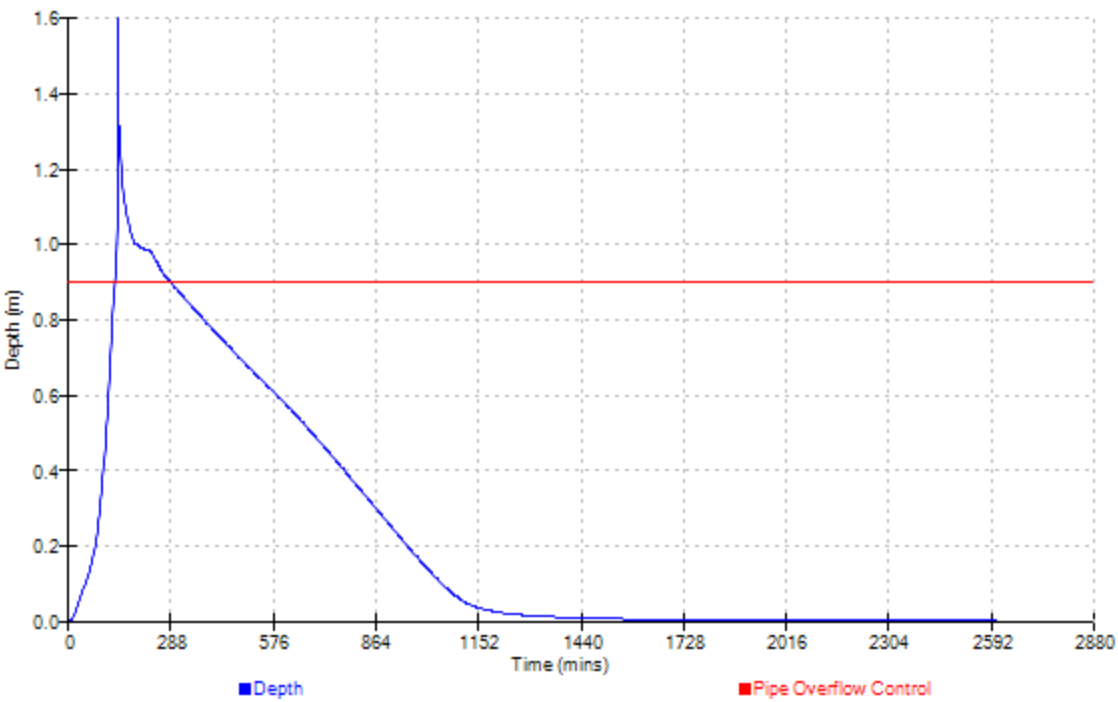
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200	2.0	1.400	2.4	3.500	3.7	7.500	5.3
0.300	2.1	1.600	2.6	4.000	4.0	8.000	5.5
0.400	2.1	1.800	2.7	4.500	4.2	8.500	5.7
0.500	2.0	2.000	2.9	5.000	4.4	9.000	5.8
0.600	1.7	2.200	3.0	5.500	4.6	9.500	6.0
0.800	1.9	2.400	3.1	6.000	4.8		
1.000	2.1	2.600	3.3	6.500	5.0		

Pipe Overflow Control

Diameter (m)	0.150	Entry Loss Coefficient	0.500
Slope (1:X)	100.0	Coefficient of Contraction	0.600
Length (m)	10.000	Upstream Invert Level (m)	104.900
Roughness k (mm)	0.600		

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Event: 240 min Winter



ID	Area Type	Type	M5-60	r	Factor of Safety	Return Period (T)	Climate Change Adjust-ment	Impermeable Area to Each Soakaway	Soil Infiltration (Q)	Concrete Ring Size (mm)	Width (m)	Minimun Length (m)	Depth (m)	Half Empty Time (days, hours, minutes)	Soakaway Volume
SA1	ONE CONTAINER/INVERTER	Clean Stone	19.3	0.313	Minor Inconvenience	100	30%	31.0	1.500E-01		0.50	7.48	0.50	0d 01h 00m	(1.9 m3)
SA2	LARGE TRANSFORMER	Clean Stone	19.3	0.313	Minor Inconvenience	100	30%	50.0	1.500E-01		0.60	9.10	0.60	0d 01h 19m	(3.3 m3)
SA3	CERAMIC INSULATORS	Clean Stone	19.3	0.313	Minor Inconvenience	100	30%	20.0	1.500E-01		0.60	4.14	0.50	0d 00h 39m	(1.2 m3)