

## **DRAINAGE IMPACT ASSESSMENT**

**FOR**

**PROPOSED ANAEROBIC DIGESTION PLANT**

**AT**

**THREE MAIDS**

**ON BEHALF OF**



**Project ref:** GGP-29348-DIA-Three Maids

**Date First Issued:** 20<sup>th</sup> October 2022

**Issue:** 06

**Revision Date:** 21<sup>st</sup> February 2024

**Prepared by:** J. Collins  
BSc. (Hons), MCIWEM.

**Checked by:** J. Collins  
BSc. (Hons), MCIWEM.

**GGP Consult**  
2 Hallam Road  
Priory Park East  
Hull  
HU4 7DY  
United Kingdom

**Tel:** +44 (0) 1482 627963

**Fax:** +44 (0) 1482 641736

**Email:** [jeremycollins@ggpconsult.co.uk](mailto:jeremycollins@ggpconsult.co.uk)

**Website:** [www.ggpconsult.co.uk](http://www.ggpconsult.co.uk)

## **CONTENTS**

1. Introduction
2. Description of Existing and Proposed Site
3. Catchment Areas
4. Design Philosophy
  - 4.1 Water Quality
5. Proposed Discharge Rates
6. Clean/Contaminated Bund Runoff
7. Clean Northern Surface Water Runoff - Option 1
8. Clean Northern Surface Water Runoff - Option 2
9. Contaminated Silage Clamp/Hardstanding Runoff
10. Silage Clamp Clean Cover Runoff
11. Plant Water Demand Against Annual Average Rainfall
12. Summary

## **APPENDICES**

- I Existing Topographical Survey
- II General Layout
- III Drainage Catchment Plan
- IV Proposed Drainage Layout
- V Bund Calculations
- VI Northern Cellular Storage Calculations
- VII Northern Cellular Storage/Bund Cascade Calculations
- VIII Yard & Process Tanks Calculations
- X Rainfall / Process Water flow Diagram
- XI Silage Clamp Runoff Soakaway

Document Revision Box			
Revision	Date	Description	Author
01	17 <sup>th</sup> October '22	First issued	DJC
02	15 <sup>th</sup> March 2023	Construction Package	JHC
03	6 <sup>th</sup> September 2023	Condition Discharge	JHC
04	29 <sup>th</sup> September 2023	Condition Discharge	JHC
05	2 <sup>nd</sup> January 2024	Construction Package	JHC
06	21 <sup>st</sup> February 2024	EA Permit Submission	JHC

## **1.0 Introduction**

GGP Consult has been instructed by Acorn Bioenergy Ltd to prepare a drainage impact assessment to establish the storage requirements associated with the operation function of the proposed anaerobic digestion plant.

The calculations will detail how surface water from the site will be managed, in compliance with local policy and an environmental permit.

## **2.0 Description of Existing and Proposed Site**

The site has an area of 4.52ha and is entirely greenfield.

A topographical survey has been undertaken within the site and shown the site falling from 100mAOD at the north west to 88mAOD to the south east.

Refer to Appendix I for the existing topographical survey.

It is proposed to develop an anaerobic digestion plant, consisting of 5nr digestate tank, silage clamps, a digestate lagoon, gas equipment, material storage buildings, cellular storage crates and infiltration system, offices, substrate tanks, parking and additional miscellaneous equipment.

Site access is to be achieved from the A272 to the north west of the development.

Refer to Appendix II for the general layout.

### 3.0 Catchment Areas

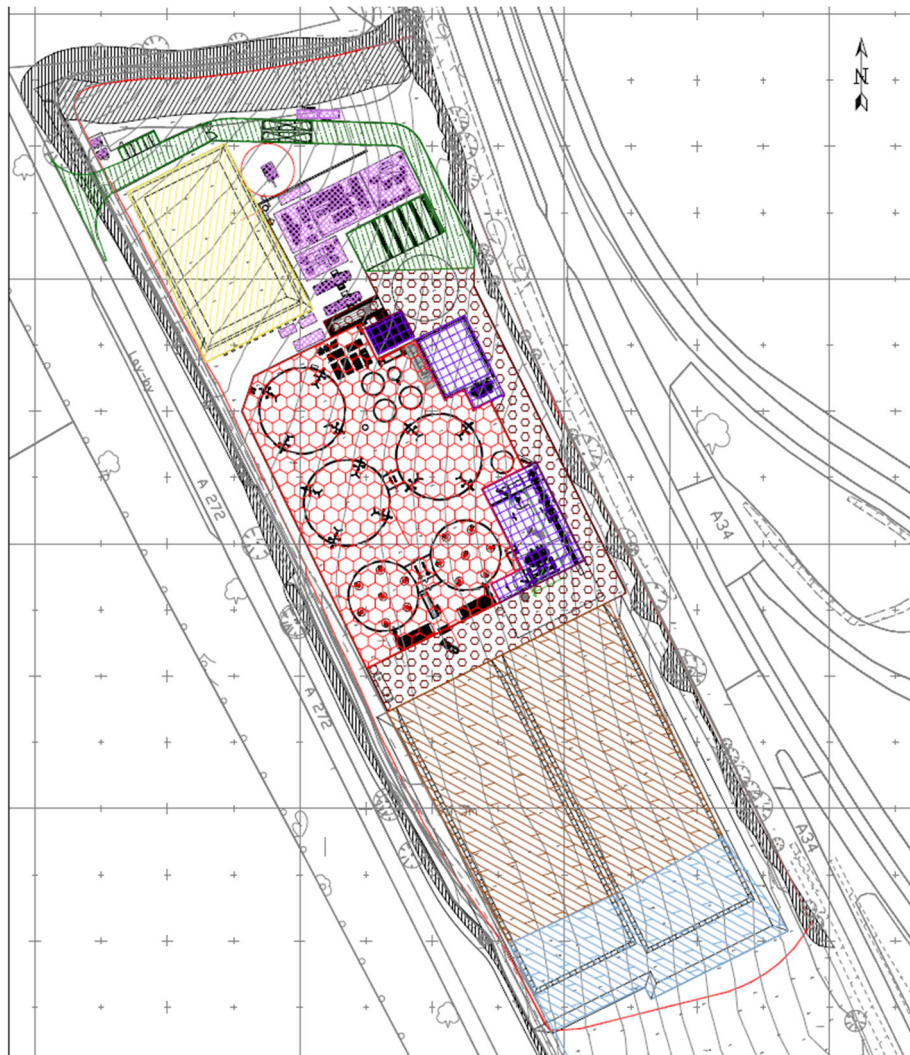
Various areas within the site will be subject to different operation functions, causing some areas being dirty and some clean, such that they require sealed drainage. Therefore, to improve water quality and optimise site efficiency, the site is split into catchments and subject to different drainage philosophies.

These catchments are classified in accordance with the environmental permit.

The site has been split into the following catchments in accordance with the best practice for environmental protection of land and water:

<b>Catchment Area</b>	<b>Area</b>
1 - Digestate Lagoon	3,042m <sup>2</sup>
2 - Clean Roof Runoff	1,437m <sup>2</sup>
3 - Clean Hardstanding with potential for petrochemical run-off	2,461m <sup>2</sup>
4 - Clean Equipment Runoff	1,457m <sup>2</sup>
5 - Clean/Contaminated Bund Runoff	8,323m <sup>2</sup>
6 - Dirty Silage Clamp Runoff	9,118m <sup>2</sup>
7 - Clean Silage Clamp Cover Runoff	3,696m <sup>2</sup>
8 – Dirty water Hardstanding Runoff	3,745m <sup>2</sup>
<b>Total Catchment</b>	<b>33,279.0m<sup>2</sup></b>

Refer to Appendix III for the proposed catchment plan.



#### 4.0 Design Philosophy

As stated within section 3.0, the site has been split into different catchments based on level of potential contamination. These catchments will be split into different drainage systems.

Two primary drainage systems will be adopted; clean and dirty.

In accordance with the approved SLR surface water drainage strategy, the site will be designed to contain all flows up to and including the 1:100 year event plus 40% climate change below ground.

**Dirty Water** runoff, caused by silage residue, from the silage clamps and sections of hardstanding area will be collected through a series of drainage channels, pipes, and chambers and be brought into a below ground holding pumping chamber. From this pumping chamber, runoff will be pumped to 3nr 400m<sup>3</sup> holding chambers within the bund where it will be reused within the process.

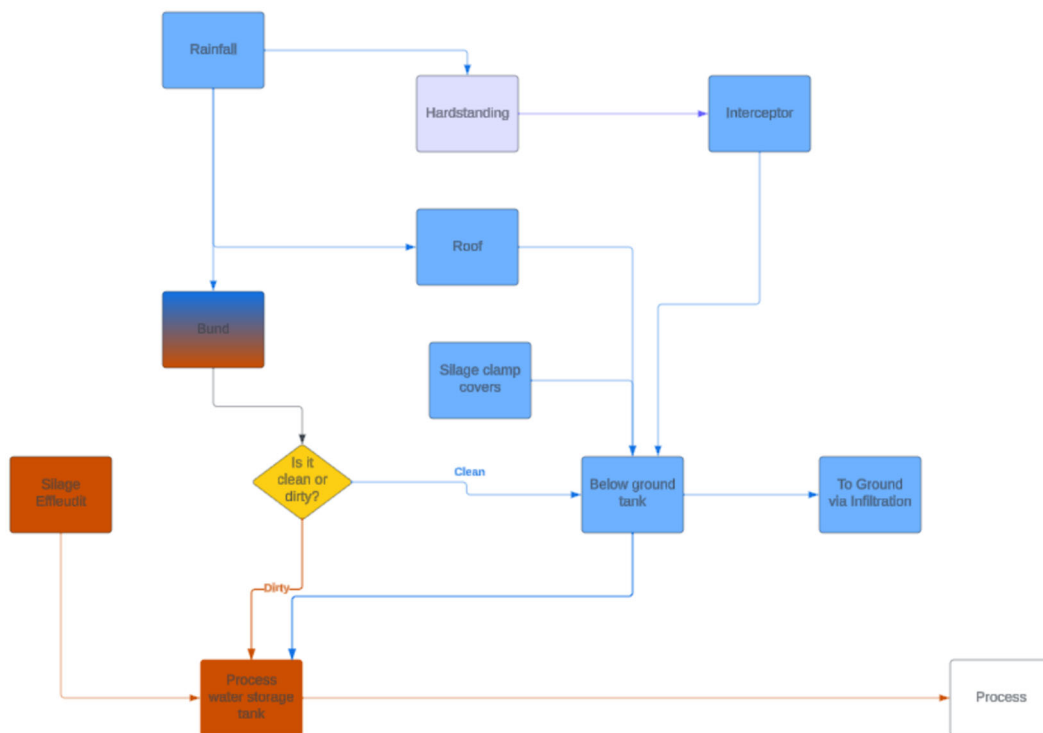
The process has a yearly demand of 42,000m<sup>3</sup>, equating to 1l/s continuous flow. This offers a sustainable drainage system, compliant with the hierarchy.

**Clean** runoff will be collected from buildings and sections of hardstanding and discharged into a cellular storage crates which will discharge surface water via infiltration. Petrochemicals may be present within the clean hardstanding runoff, which will be mitigated through a full retention petrol interceptor.

Runoff from the straw building will be captures and directed into a water storage tank for re-use in the straw processing.

**Bund** runoff has the potential to become contaminated through process residue. This will be collected through a channel drain and discharged into a pump chamber where it will be reused in the process. It may be tested and if clean released to the cellular storage crates as an emergency discharge during a heavy rainwater event.

To illustrate the principals adopted, the below rainfall / process flow diagram has been provided.



*Rainfall / Process Water flow diagram – See Appendix IX*

#### **4.1 Water Quality**

Due to the likelihood of contamination from the hardstanding and other open areas of the Site, it is recommended that SuDS source control and conveyance features are not adopted on the Site. Consequently, a full retention interceptor & catchpit will be adopted to mitigate runoff contaminants. Additionally, the proposed AD plant will operate under an Environmental Permit, with a strict operational & maintenance procedure in place. These procedures are developed to ensure compliance and protection of the local receptors.

As part of the environmental permit a detailed maintenance schedule will be regulated against. This shall cover the drainage, external surfacing, buildings & concrete containment bund as a minimum.

The drainage maintenance document typically outlines daily, weekly, biweekly, monthly, quarterly & year inspection work to be carried out, along with the necessary actions required.

Therefore, the proposed surface water drainage system shall conform and be regulated to a robust, audited & recorded operational & maintenance plan. This will ensure the performance of the drainage system is maintained throughout the life of the plant.

## **5.0 Proposed Discharge Rates**

As mentioned within section 4.0, it is proposed to discharge clean surface water through infiltration.

Infiltration tests have been carried out within the site. An infiltration rate of 0.07308m/hr to the north and 1.3212m/hr to the south.

The northern part of the site is deemed to be clean and shall drain into a below ground cellular storage tank with infiltration.

The southern part of the site is deemed to be contaminated and shall be collected and pumped into above ground process storage tanks for re-use within the process.

Refer to Appendix IV for the proposed drainage layout.

## **6.0 Clean/Contaminated Bund Runoff**

Rainfall collected within the bund has the potential to be contaminated through process residue. Therefore, runoff is collected and contained within the bund until it is sampled to determine if contamination is present.

If clean during extreme / heavy rainfall, runoff will be pumped to the cellular storage tanks. The preference will always be to re-use the water within the process clean or dirty. If dirty, runoff will be pumped into the AD process for reuse.

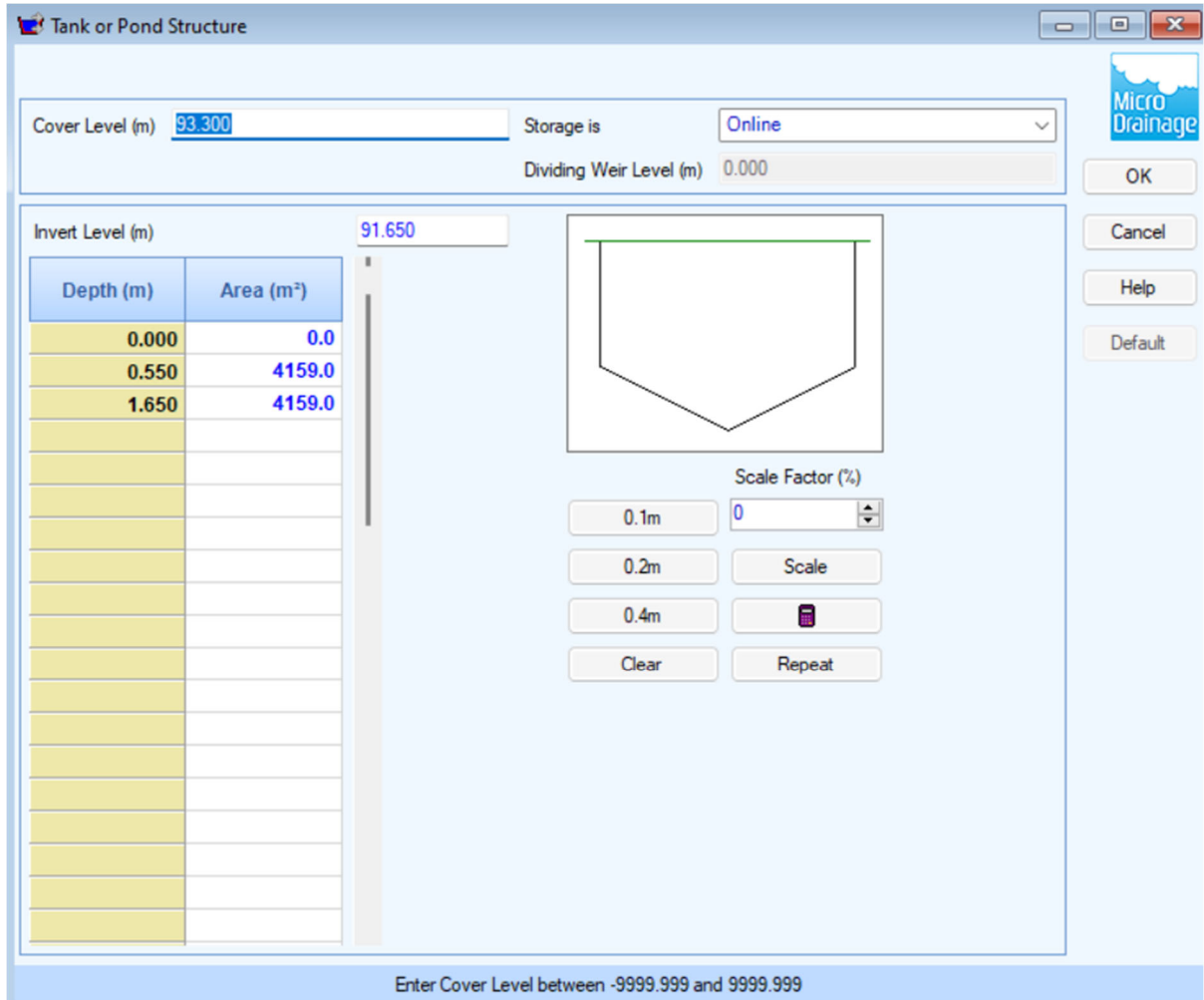
Runoff must be sampled prior to discharge, therefore, when the site is unmanned, the bund will store runoff until sampling can be undertaken. The longest period the site will be unmanned is over a 12hr night period.

Therefore, the bund will be modelled within no outfall with the 12hr storm events will be taken as the critical event.

The bund has a slab level of between 92.200m – 91.650m AOD with a lowest top wall level of 93.300mAOD.

The bund has an area of 8,323m<sup>2</sup>, 4,164m<sup>2</sup> of which is taken by the tanks, resulting in an available bund area of 4,159m<sup>2</sup>.

These parameters have been used to model the bund within MicroDrainage 'Source Control'. An extract of the structure can be seen below.



**MicroDrainage 'Source Control' Tank/Pond Structure**

The model has been run over a variety of storm events with the resultant volumes and depths detailed below.

<b>Storm Event</b>	<b>Volume</b>	<b>Depth</b>
1:1 Yr 12hr + 40%CC	279.4m <sup>3</sup>	394mm
1:2 Yr 12hr + 40%CC	334.9m <sup>3</sup>	418mm
1:10 Yr 12hr + 40%CC	469.1m <sup>3</sup>	468mm
1:30 Yr 12hr + 40%CC	586.7m <sup>3</sup>	504mm
1:100 Yr 12hr + 40%CC	749.8m <sup>3</sup>	547mm

Refer to Appendix V for the full bund calculations.



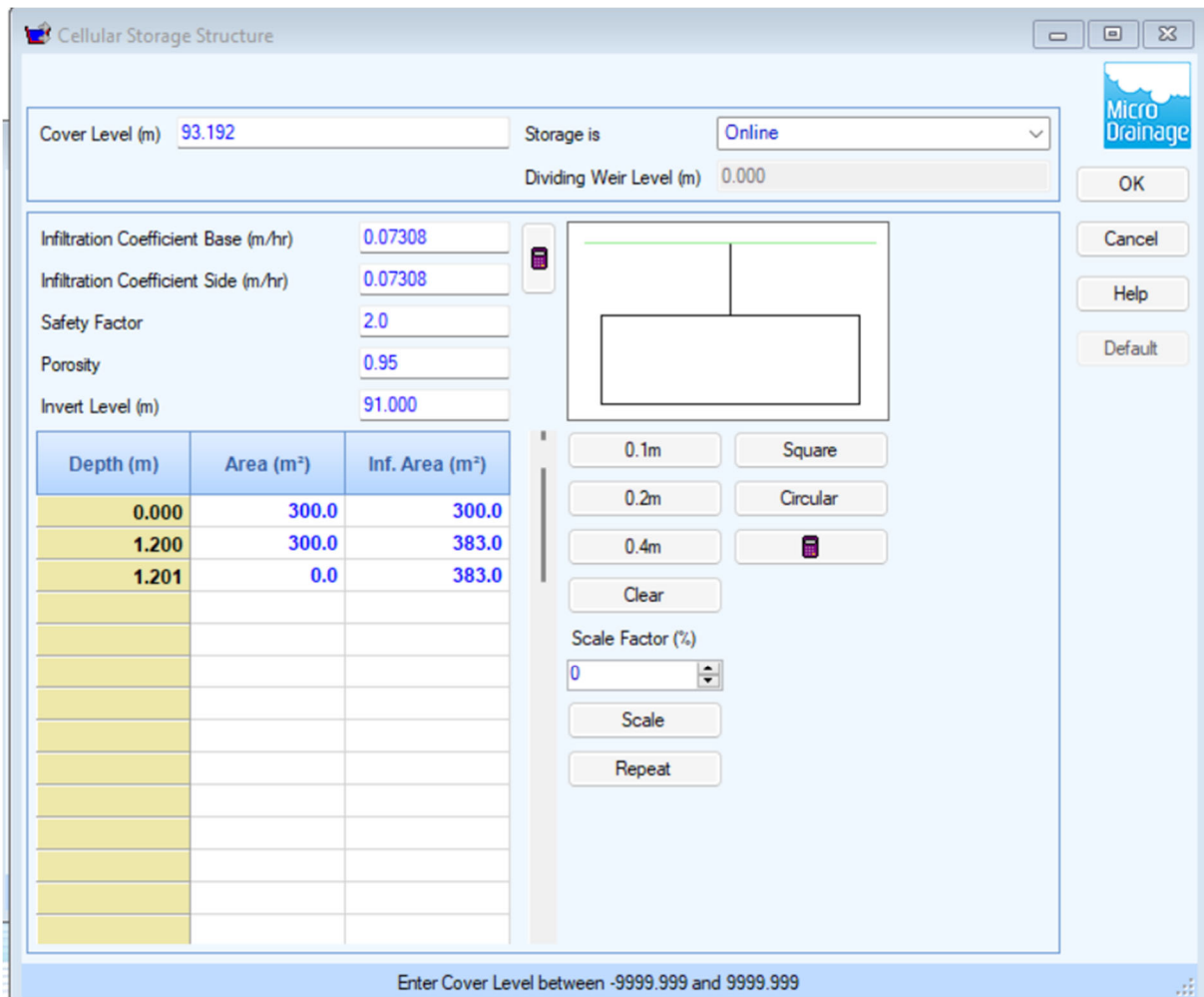
**7.0 Clean Northern Surface Water Runoff - Option 1**

Surface water runoff from the buildings and clean hardstanding areas to the north of the site will be collected through a series of rainwater pipes, pipes, chambers and gullies and be brought to the hardstanding turning area to the north of the site pass through the full retention separator and be discharged into a below ground cellular storage crate.

Hardstanding areas will be discharged into a Klargestor NSFA030 Full Retention Separator to mitigate any collected petrochemicals.

The cellular storage has been designed to contain 342.1m<sup>3</sup> of runoff which will infiltrate runoff in the ground.

An extract of the MicroDrainage ‘Source Control’ cellular storage structure can be seen below.



**MicroDrainage ‘Source Control’ Cellular Structure**

The model has been run over a variety of storm events with the resultant volumes and depths detailed below.

Storm Event	Volume	Depth	Infiltration Rate
1:1 Yr 240hr + 40%CC	74.5m <sup>3</sup>	261mm	3.2l/s
1:2 Yr 240hr + 40%CC	96.7m <sup>3</sup>	339mm	3.3l/s
1:10 Yr 360hr + 40%CC	154.6m <sup>3</sup>	543mm	3.4l/s
1:30 Yr 480hr + 40%CC	208.1m <sup>3</sup>	730mm	3.6l/s
1:100 Yr 480hr + 40%CC	286.8m <sup>3</sup>	1,006mm	3.8l/s

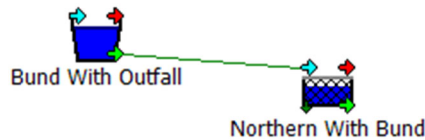
As shown above, all storm events are contained within the below ground cellular storage up to the 1:100 year event +40% CC.

Refer to Appendix VI for the full northern cellular storage calculations.

## 8.0 Clean Northern Surface Water Runoff - Option 2

If the collected bund runoff is clean, it is proposed to pump the collected runoff at a rate of 1.5l/s into the northern cellular storage crates. The 'cascade' function within Source Control has been used to model the flow from the bund into the cellular storage crates.

An extract of the cascade is shown below.



### MicroDrainage 'Source Control' Cascade

The 1:100 Yr +20%CC has been used to calculate the highest occurring volumes and discharge rates within the cellular storage crates.

Storm Event	Volume	Depth	Infiltration Rate
1:100 Yr 16hr + 40%CC	338.9 <sup>3</sup>	1189m	3.9l/s

As shown above, the swale contains all flows from the bund below ground when pumped at a rate of 1.5l/s.

Refer to Appendix VII for full northern cellular storage/bund cascade calculations.

**9.0 Contaminated Silage Clamp/Hardstanding Runoff**

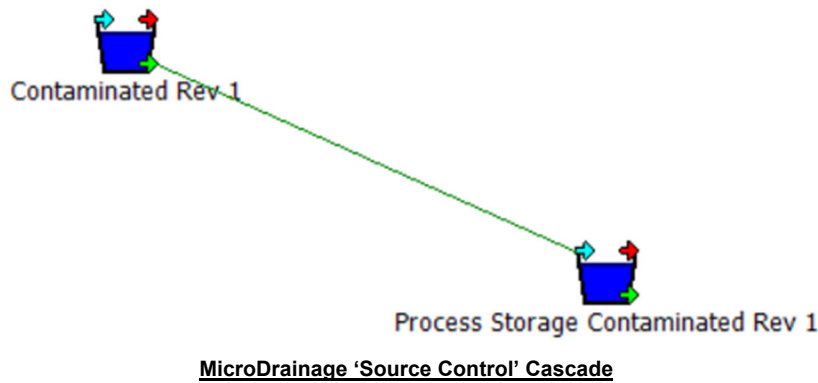
The runoff from the silage clamps and the surrounding hardstanding will be contaminated with leachate from the crop. As the contaminated runoff contains leachate, it has value to be reused within the process. Therefore, the site will use contaminated runoff as a main source of water.

Runoff will be collected through channel drains running along the front of the clamps where it will be discharged into an underground holding tank of 50m<sup>3</sup>. The area in front of the clamp may flood during storm event and been contained within the impermeable surface and kerbs / wall to the perimeter.

This will then be pumped into 3nr 400m<sup>3</sup> holding tanks within the bund where it will be used within the process at an increase rate of 2.0l/s. This provides a total storage capacity of 1250m<sup>3</sup>.

The 'cascade' function within Source Control has been used to model the flow from the Yard into the Process Water Tanks.

An extract of the cascade is shown below.



The model has been run over a variety of storm events with the resultant volumes and depths detailed overleaf.

As the site for a maximum unsupervised period of 12hrs, the peak and 12hr event will be analysed.

<b>Storm Event</b>	<b>Volume (Yard)</b>	<b>Volume (Process Tanks)</b>
1:2 Yr 12hr + 40%CC	51.9m <sup>3</sup>	393.5m <sup>3</sup>
1:10 Yr 12hr + 40%CC	52.0m <sup>3</sup>	585.5m <sup>3</sup>
1:30 Yr 12hr + 40%CC	52.0m <sup>3</sup>	754.3m <sup>3</sup>
1:100 Yr 12hr + 40%CC	52.0m <sup>3</sup>	988.5m <sup>3</sup>

The below also shows the peak storm for the yard with the volume in the process tank. Which would allow additional water to be pumped into the process tanks if required.

<b>Storm Event</b>	<b>Volume (Yard-Peak)</b>	<b>Volume (Process Tanks)</b>
1:2 Yr 30min + 40%CC	95.4m <sup>3</sup>	159.2m <sup>3</sup>
1:10 Yr 30min + 40%CC	165.5m <sup>3</sup>	243.8m <sup>3</sup>
1:30 Yr 60min + 40%CC	239.8m <sup>3</sup>	404.5m <sup>3</sup>
1:100 Yr 60min + 40%CC	349.5m <sup>3</sup>	535.7m <sup>3</sup>

Refer to Appendix VIII for silage clamp 2.0l/s calculations.

As shown within the above calculations, the contaminated drainage system will flood within the designed area and contained the full liquid volume up to and including the 1:100 year event +40CC.

## **10.0 Silage Clamp Clean Cover Runoff**

The rainwater falling on the silage clamp will be directed onto a cover which will fall shed to the filter trenches on top of the clamp embankments.

These filter trenches will be directed to the rear of the clamp only collecting approximately ¼ of the full clamp. This has been determined based on the volume of material used on a daily basis and the percentage the clamps will be full throughout the year.

The filter trenches shall be collected to a trench soakaway located at the lower embankment level allowing runoff from the cover to infiltrate into the permeable strata.

The trench soakaway shall be constructed using the following parameters,

Infiltration Rate:	1.322m/hr
Safety Factor:	2.0
Fill Porosity:	30% (4/20mm or Type 3 Stone)
Invert Level:	92.000m AOD
Trench Width:	0.6m
Length:	96.0m

The 1:100 Yr +20%CC has been used to calculate the highest occurring volumes and discharge rates within the cellular storage crates.

<b>Storm Event</b>	<b>Volume</b>	<b>Depth</b>
1:100 Yr 30min + 40%CC	39.6m <sup>3</sup>	94.292m AOD

Refer to Appendix VII for full northern cellular storage/bund cascade calculations.

## **11.0 Plant Water Demand Against Average Annual Rainfall**

The site has been designed to contain all flows up to and including the 1:100 year +40% CC below ground.

An assessment has been undertaken to compare the average annual rainfall (AAR) against the process' water demand to determine if the process demand is greater than the harvested water.

From reviewing the process, it is expected the process has a yearly operation demand of 42,000m<sup>3</sup>, equating to a continuous flow of 1l/s.

Dirty water runoff will be isolated, retained and reused within the process. The northern area will not encounter any potential contamination, this catchment will be deducted through the analysis.

AAR = 0.787

Area (Potential Contamination) = 23,795<sup>2</sup>

CC = 40%

Total annual rainfall (including climate change) = 26,217m<sup>3</sup>

As shown above, the plant has a greater demand than the yearly rainfall within the potential dirty water system with the addition of climate change.

Therefore, the collected runoff is recycled within the process, satisfying sustainability and drainage hierarchy requirements. Where possible the shortfall in water demand based on the average annual rainfall shall be collected from any clean water system and used within the AD process.

## **12.0 Summary**

Following a site wide attenuation assessment, it has been demonstrated that the site provides various drainage systems with sufficient attenuation capacity while not exceeding permitted discharge rates.

The proposed clean runoff will be collected and attenuated within a below ground cellular storage crates. This will contain the 1:100 year +40%CC below ground.

The plant will harvest dirty and clean water runoff to be reused within the process at a constant rate of 1l/s. This will be contained in an underground 50m<sup>3</sup> holding tank and 3nr 400m<sup>3</sup> holding tanks within the bund.

The process water rate shall be temporary increased to 2.0l/s during period of extreme rainfall events, i.e. 1:100year event plus 40% climate change.

All runoff within the bund will be collected and sampled prior to discharge. In a heavy rainfall event, if clean water may be discharged as an emergency into the clean cellular infiltration crates.

Systems and pumps will be monitored, and data logged via a computer system with alarms to alert operators on or off site.

The site will operate under an environment permit with strict recording, sampling, and maintenance under full review.

The drainage system within the site will be under full ownership of the plant owners/operators operating under an Environmental Permit, with a robust, audited and recorded operation and maintenance plan. This will ensure the performance of the drainage system is maintained throughout the life of the plant.

From GGP CONSULT

Report Checked by:-

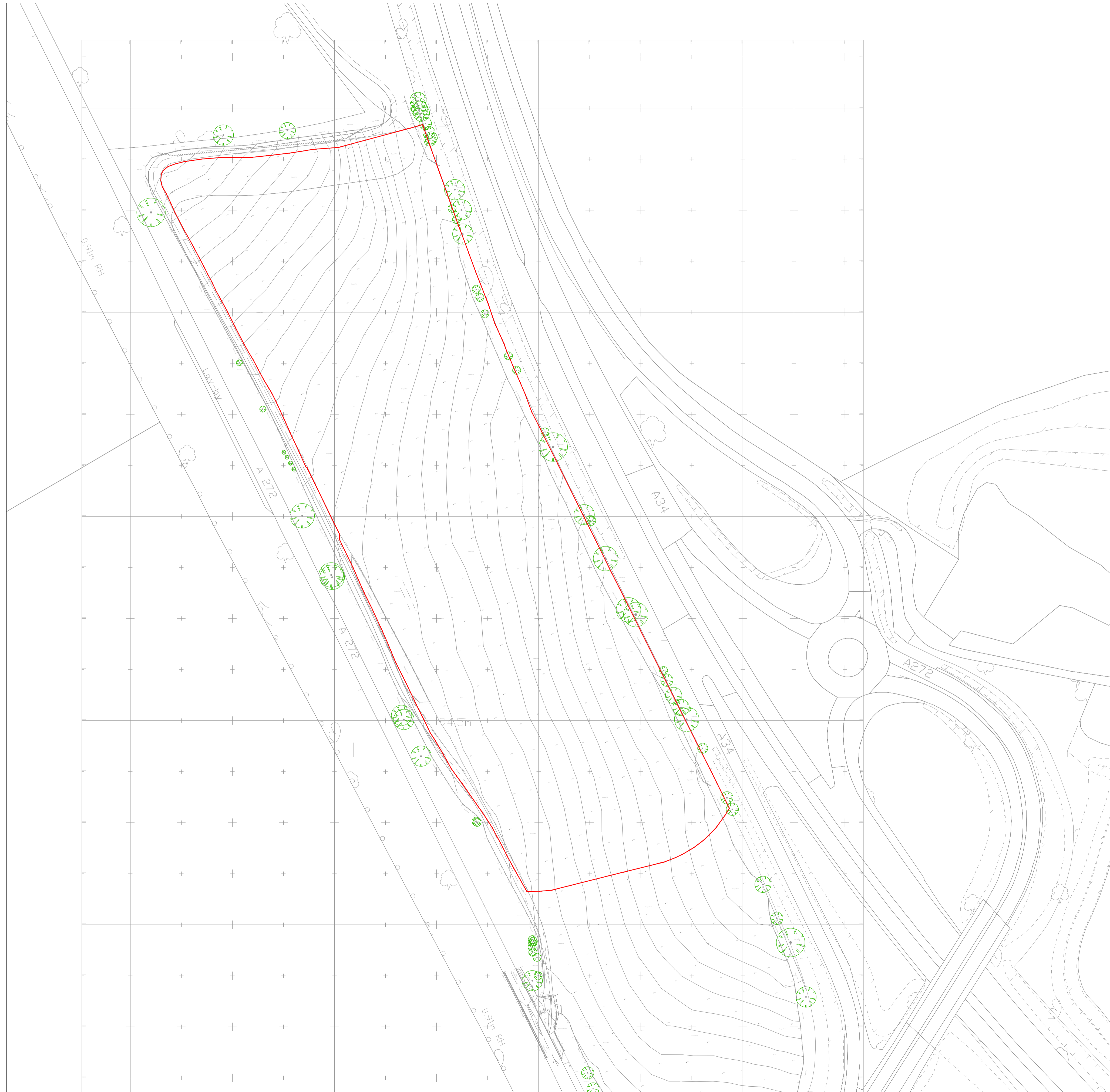


**J. H. Collins BSc. (Hons), MCIWEM**

Associate Director - Drainage & Infrastructure

## **APPENDIX I**

Existing Topographical Survey



**SURVEY NOTES**

This survey has been carried out using a Trimble S9 Total Station and fixed to OSTN15 / OSGM15 using Trimble R12 GPS.

All Dimensions are in millimeters.

Parts of the Surveyed Area are labeled as Overgrown. These areas have been surveyed as best possible. Some features may not be surveyed in these areas.

Trees are not drawn to scale. Trunk size diameter and spread are estimated and should be used as a guide only.

All building descriptions and construction type are indicative only and taken externally from ground level.

Drainage runs between inspection covers have not been investigated. Any shown are estimated and not confirmed. All pipe sizes and connections should also be confirmed with your local drainage authority before commencing any design work.

There may be inspection covers on site which were not visible at the time of survey. It is possible that they are buried or covered by dense vegetation. Please consult your local drainage authority if you have any doubts.

All below ground details have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

**General Notes**

Please check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Parish Land Surveys.

The accuracy of the digital data is the same as the plotting scale implies.

Parish Land Surveys holds the copyright to all the information contained within this document and their written consent must be obtained before copying or using the data other than for the purpose it was originally supplied.

All Survey Data to Ordnance Survey National Grid (OSTN15) (OSGM15).

**NOTES:-**

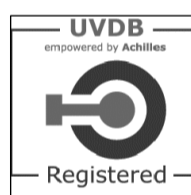
1. All dimensions must be checked on site and not scaled from this drawing.
2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.

Site Red Line Boundary (4.453ha)



Rev	Date	Description	DR	CH
A	13/09/23	ISSUED FOR APPROVAL	MK	JHC

© copyright



**CONSULTING ENGINEERS  
PROJECT MANAGEMENT**

2 Hallam Road  
Priory Park East  
HULL HU4 7DY  
United Kingdom

Telephone (+44) 01482 627963  
Fax (+44) 01482 641736  
Email info@ggpconsult.co.uk



Client  
AD Plant.  
Three Maids

Drawing Title  
Existing Topographical  
Survey Plan

Status APPROVAL

Scale 1:1000 @ A1 Date SEP '23

Drawn By MK Checked JHC Approved JHC

Orig. No.	Rev
29348/C/100	A

NOT FOR CONSTRUCTION

## **APPENDIX II**

General Layout

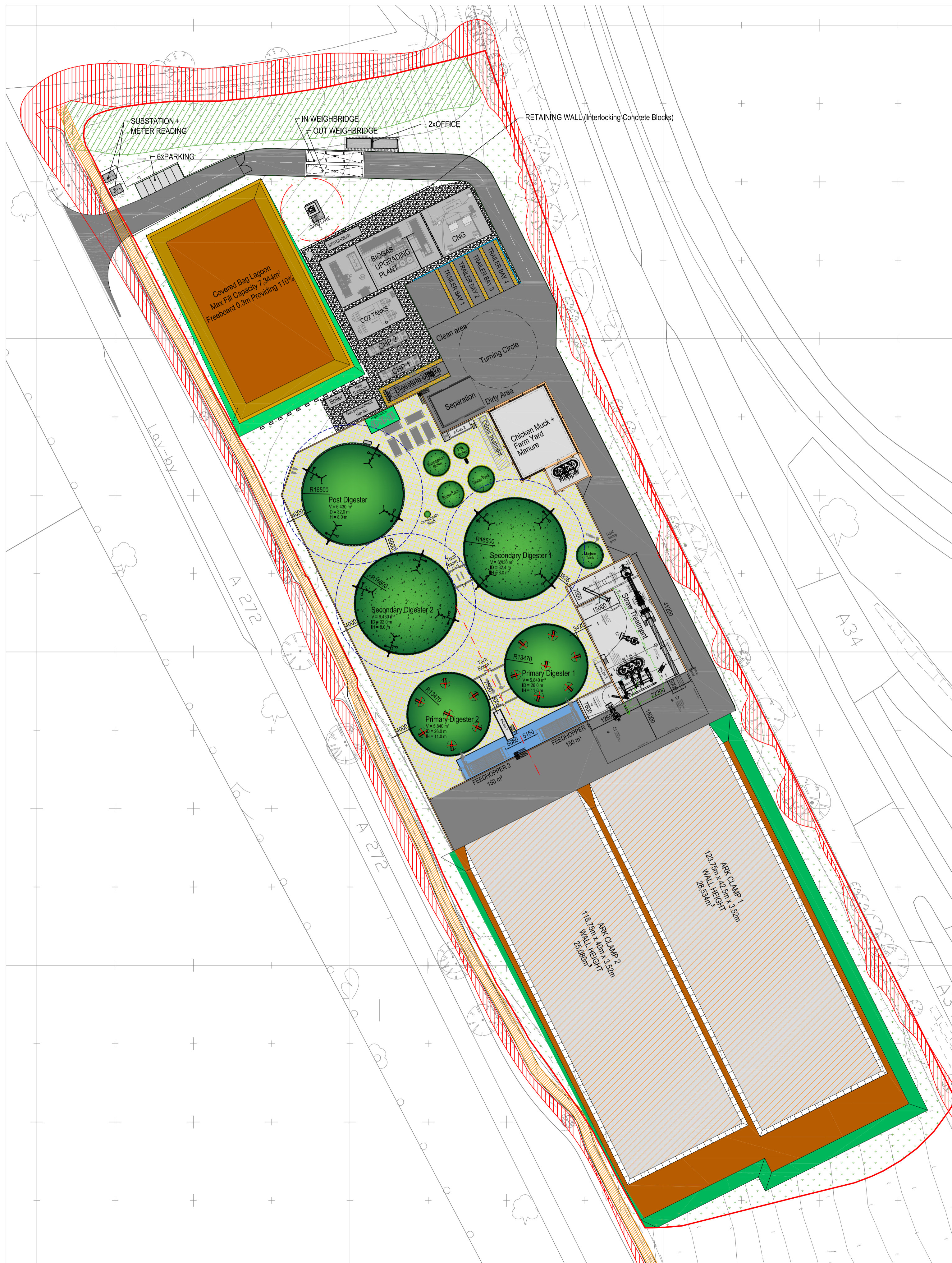




0 50m 100m 150m 200m 250m  
Scale 1:5000 @ A1



**SITE LOCATION PLAN**  
Scale: 1:5000 @ A1



**SITE PLAN**  
Scale: 1:750 @ A1

**FOR CONSTRUCTION**

- NOTES:-
- All dimensions must be checked on site and not scaled from this drawing.
  - The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
  - All levels shown on this drawing are relative to Agreed Topographic survey
  - This drawing is to be read in conjunction with 29348/100 Series Drawings.
  - All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

- Site Red Line Boundary (4.453ha)
- 15m Woodland Easement
- Tree Easement

Rev	Date	Description	DR	CH
C6	26/01/24	Tanking Layout amended	MK	JHC
C5	15/01/24	Odour moved	MK	JHC
C4	11/01/24	Switchgear updated to 40ft	MK	JHC
C3	11/01/24	Separation changed	MK	JHC
C2	18/12/23	ISSUED FOR CONSTRUCTION	MK	JHC
C1	08/12/23	ISSUED FOR CONSTRUCTION	MK	JHC

© copyright

**GGP CONSULT**  
CONSULTING ENGINEERS  
ARCHITECTS  
PROJECT MANAGEMENT  
2 Hallam Road  
Priory Park East  
HULL HU4 7DY  
United Kingdom  
Telephone (+44) 01482 627963  
Fax (+44) 01482 641736  
Email info@ggpconsult.co.uk



Client  
Job Title  
**AD Plant,  
Three Maids**

Drawing Title  
**Site Layout Plan**

Status  
For Construction

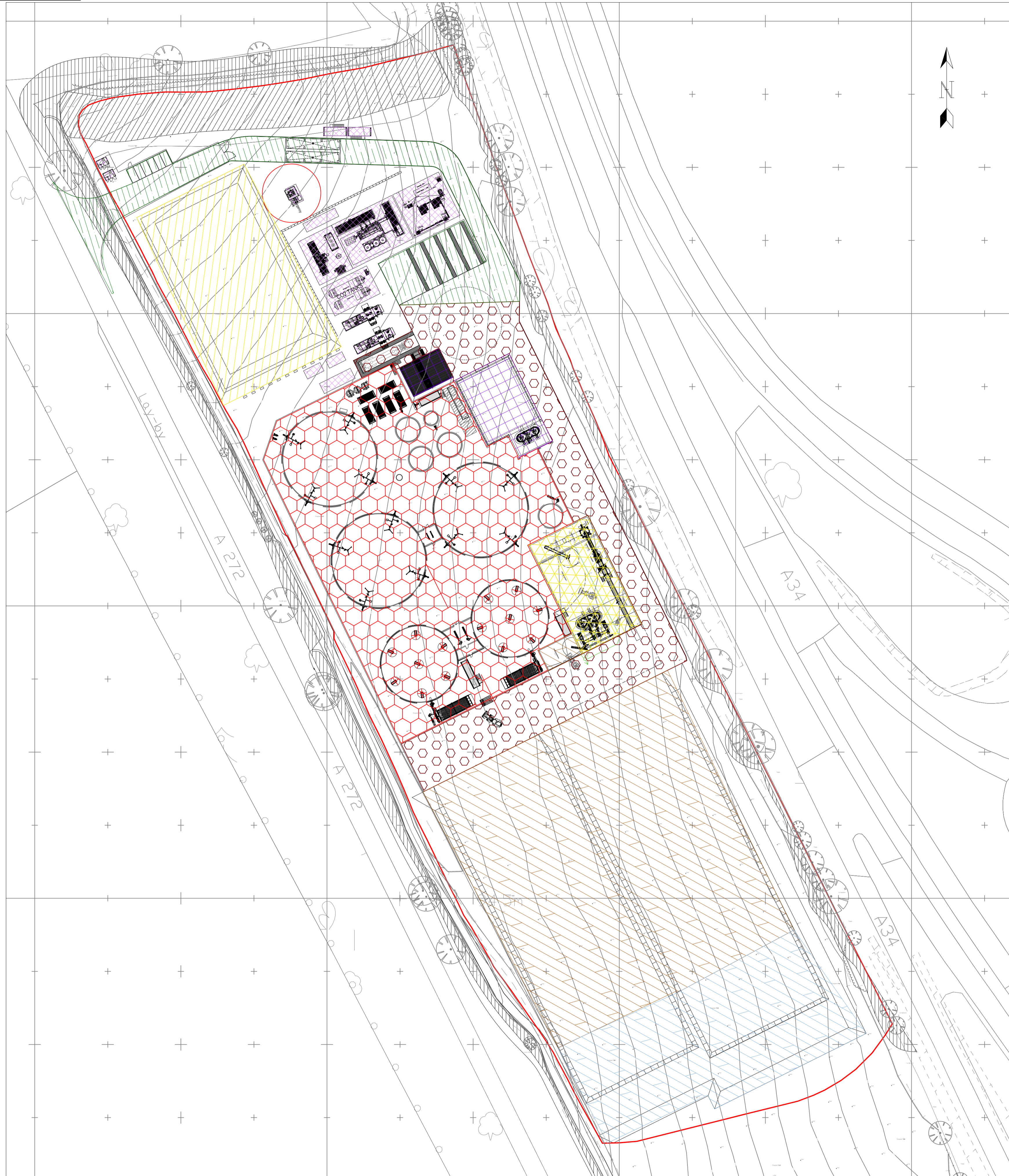
Scale AS NOTED @ A1 Date DEC '23

Drawn By MK Checked JHC Approved JHC

Dwg. No. 29348/C/101 Rev C6

**APPENDIX III**

Drainage Catchment Plan



SITE PLAN  
Scale: 1:750 @ A1

FOR EA PERMIT

- NOTES:-
1. All dimensions must be checked on site and not scaled from this drawing.
  2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
  3. All levels shown on this drawing are relative to Agreed Topographic survey
  4. This drawing is to be read in conjunction with 29348/100 Series Drawings.
  5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

- Site Red Line Boundary
- ▨ Denotes Digestate Lagoon Area - 3,042m<sup>2</sup>
- ▨ Denotes Clean w/Petrochemicals Hardstanding Runoff Area - 2,461m<sup>2</sup>
- ▨ Denotes Clean Equipment Runoff Area - 1,457m<sup>2</sup>
- ▨ Denotes Clean/Contaminated Bund Runoff Area - 8,323m<sup>2</sup>
- ▨ Denotes Dirty Silage Clamp Runoff Area - 9,220m<sup>2</sup>
- ▨ Denotes Contaminated Hardstanding Runoff Area - 3,745m<sup>2</sup>
- ▨ Denotes Clean Roof Runoff Area - 804m<sup>2</sup>
- ▨ Denotes Clean Silage Clamp Cover Runoff Area - 3,696m<sup>2</sup>
- ▨ Denotes Clean Runoff Straw Building - 956m<sup>2</sup>

EA1	26/02/24	EA PERMIT	WG	JHC
Rev	Date	Description	DR	CH

© copyright

**GGP**  
**CONSULT**

CONSULTING ENGINEERS  
ARCHITECTS  
PROJECT MANAGEMENT

2 Hallam Road  
Priory Park East  
HULL HU4 7DY  
United Kingdom

Telephone(+44) 01482 627963  
Fax (+44) 01482 641736  
Email info@ggpconsult.co.uk



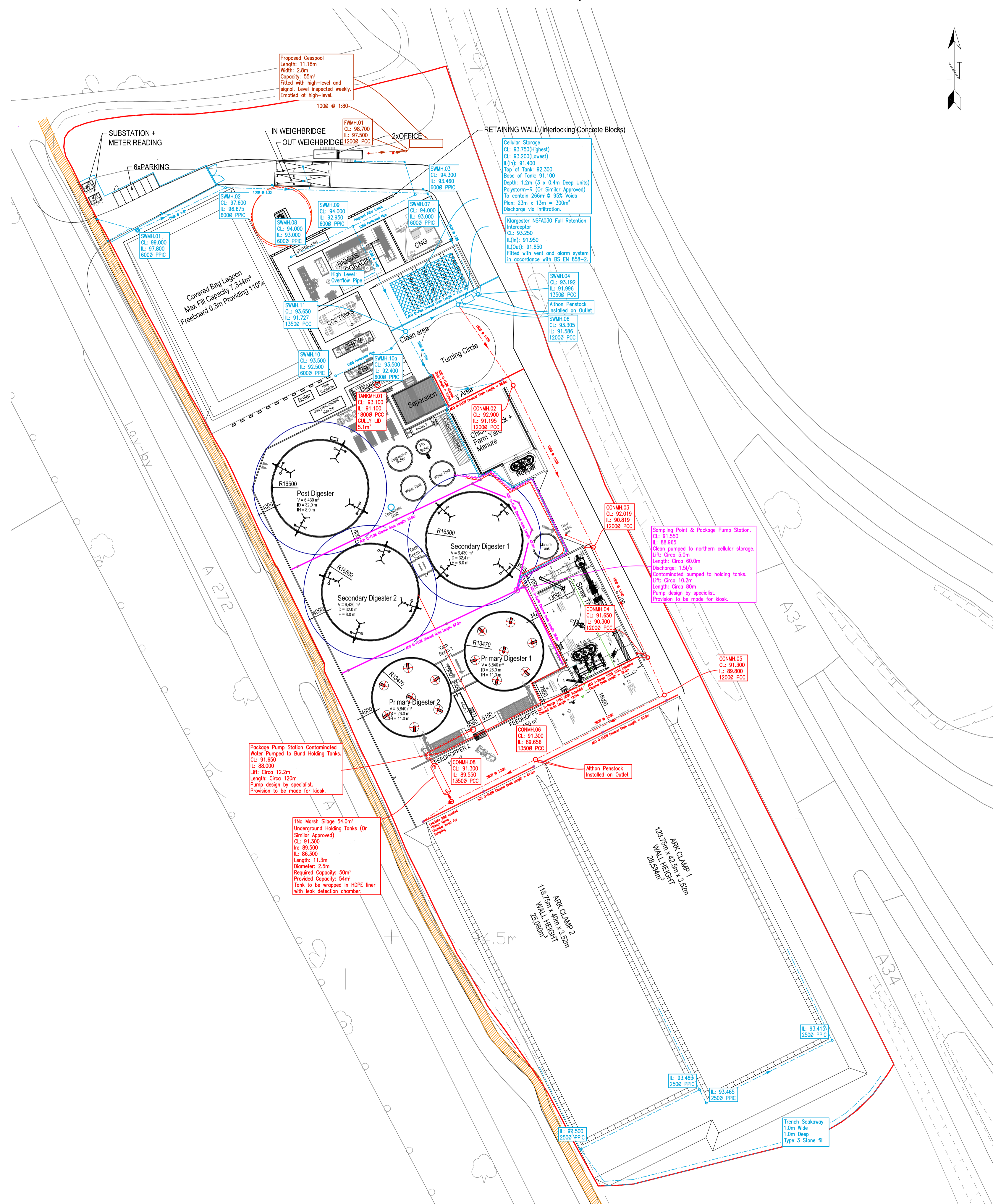
Client  
Job Title  
AD Plant.  
Three Maids

Drawing Title  
Drainage Catchment Plan

Status	EA PERMIT
Scale	AS NOTED @ A1
Date	DEC '23
Drawn By	WG
Checked	JHC
Approved	JHC
Dwg. No.	29348/C/103
Rev	EA1

## **APPENDIX IV**

Proposed Drainage Layout



- NOTES:-
- All dimensions must be checked on site and not scaled from this drawing.
  - The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
  - All levels shown on this drawing are relative to Agreed Topographic survey.
  - This drawing is to be read in conjunction with 29348/100 Series Drawings.
  - All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Legend:

- Site Red Line Boundary
- Clean Surface Water Sewer
- Clean Surface Water Chamber
- Clean Surface Water Headwall
- Clean Surface Water Drainage Channel
- Clean Surface Water Rainwater Pipe
- Clean Surface Water Rising Main
- Contaminated Surface Water Sewer
- Contaminated Surface Water Chamber
- Contaminated Surface Water Drainage Channel
- Contaminated Surface Water Rising Main
- Bund Surface Water Sewer
- Bund Surface Water Chamber
- Bund Surface Water Channel Drain
- Foul Water Sewer
- Foul Water Chamber
- Soil Vent Pipe

All pipes to be encased in concrete.  
All Clean manholes to be double sealed.

EA1 26/02/24 ISSUED FOR COMMENT

Rev	Date	Description	DR	CH

© copyright

**GGP CONSULT**  
CONSULTING ENGINEERS ARCHITECTS PROJECT MANAGEMENT  
2 Hallam Road  
Priory Park East  
HULL HU4 7DY  
United Kingdom  
Telephone (+44) 01482 627963  
Fax (+44) 01482 641736  
Email info@ggpconsult.co.uk

Audited  
**RISQS**



Job Title  
**AD Plant.  
Three Maids**

Drawing Title  
**Proposed Drainage Layout**

Status	EA Permit
Scale	1:750 @ A0
Date	DEC '23
Drawn By	W. BARNS
Checked	JHC
Approved	JHC
Orig. No.	29348/C/110
Rev	EA1

**SITE PLAN**  
Scale: 1:750 @ A1

FOR EA PERMIT

## **APPENDIX V**

Bund Calculations

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Bund Calcs W/ No Outfall,  
 Three Maids



Date 02/02/2024 17:00  
 File Bund No Outfall.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 1 year Return Period (+40%)

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.891	0.241	63.8	O K
30 min Summer	91.915	0.265	84.8	O K
60 min Summer	91.939	0.289	110.1	O K
120 min Summer	91.963	0.313	140.2	O K
180 min Summer	91.977	0.327	160.9	O K
240 min Summer	91.988	0.338	177.3	O K
360 min Summer	92.003	0.353	201.2	O K
480 min Summer	92.013	0.363	220.0	O K
600 min Summer	92.022	0.372	235.7	O K
720 min Summer	92.029	0.379	249.4	O K
960 min Summer	92.040	0.390	272.8	O K
1440 min Summer	92.057	0.407	309.7	O K
2160 min Summer	92.075	0.425	351.0	O K
2880 min Summer	92.088	0.438	383.8	O K
4320 min Summer	92.106	0.456	435.7	O K
5760 min Summer	92.120	0.470	477.1	O K
7200 min Summer	92.131	0.481	511.2	O K
8640 min Summer	92.140	0.490	539.7	O K
10080 min Summer	92.148	0.498	565.1	O K
15 min Winter	91.900	0.250	71.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	40.860	0.0	23
30 min Summer	27.161	0.0	38
60 min Summer	17.618	0.0	68
120 min Summer	11.222	0.0	128
180 min Summer	8.586	0.0	188
240 min Summer	7.095	0.0	248
360 min Summer	5.367	0.0	368
480 min Summer	4.401	0.0	488
600 min Summer	3.773	0.0	608
720 min Summer	3.327	0.0	728
960 min Summer	2.729	0.0	968
1440 min Summer	2.066	0.0	1448
2160 min Summer	1.561	0.0	2168
2880 min Summer	1.280	0.0	2888
4320 min Summer	0.969	0.0	4328
5760 min Summer	0.795	0.0	5768
7200 min Summer	0.682	0.0	7208
8640 min Summer	0.600	0.0	8648
10080 min Summer	0.538	0.0	10088
15 min Winter	40.860	0.0	23

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Bund Calcs W/ No Outfall,  
 Three Maids



Date 02/02/2024 17:00  
 File Bund No Outfall.SRCX

Designed by DJC  
 Checked by JHC


Innovyze Source Control 2019.1

Summary of Results for 1 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.925	0.275	95.0	O K
60 min Winter	91.950	0.300	123.3	O K
120 min Winter	91.975	0.325	157.1	O K
180 min Winter	91.990	0.340	180.2	O K
240 min Winter	92.001	0.351	198.6	O K
360 min Winter	92.016	0.366	225.3	O K
480 min Winter	92.027	0.377	246.3	O K
600 min Winter	92.036	0.386	264.0	O K
720 min Winter	92.044	0.394	279.4	O K
960 min Winter	92.055	0.405	305.5	O K
1440 min Winter	92.073	0.423	346.9	O K
2160 min Winter	92.091	0.441	393.2	O K
2880 min Winter	92.104	0.454	429.8	O K
4320 min Winter	92.124	0.474	488.0	O K
5760 min Winter	92.139	0.489	534.3	O K
7200 min Winter	92.150	0.500	572.6	O K
8640 min Winter	92.159	0.509	604.5	O K
10080 min Winter	92.167	0.517	632.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	27.161	0.0	38
60 min Winter	17.618	0.0	68
120 min Winter	11.222	0.0	128
180 min Winter	8.586	0.0	188
240 min Winter	7.095	0.0	248
360 min Winter	5.367	0.0	368
480 min Winter	4.401	0.0	488
600 min Winter	3.773	0.0	608
720 min Winter	3.327	0.0	728
960 min Winter	2.729	0.0	968
1440 min Winter	2.066	0.0	1448
2160 min Winter	1.561	0.0	2168
2880 min Winter	1.280	0.0	2888
4320 min Winter	0.969	0.0	4328
5760 min Winter	0.795	0.0	5768
7200 min Winter	0.682	0.0	7208
8640 min Winter	0.600	0.0	8648
10080 min Winter	0.538	0.0	10088



GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 17:00 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.833

<b>Time (mins) Area</b>			<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>	<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.416	4	8	0.417

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Bund Calcs W/ No Outfall,  
 Three Maids



Date 02/02/2024 17:00  
 File Bund No Outfall.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1


Model Details

Storage is Online Cover Level (m) 93.300

Tank or Pond Structure

Invert Level (m) 91.650

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	0.0	0.550	4159.0	1.650	4159.0


GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:58 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Summary of Results for 2 year Return Period (+40%)

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.912	0.262	82.5	O K
30 min Summer	91.938	0.288	109.2	O K
60 min Summer	91.962	0.312	139.5	O K
120 min Summer	91.986	0.336	174.6	O K
180 min Summer	92.001	0.351	198.2	O K
240 min Summer	92.012	0.362	216.5	O K
360 min Summer	92.026	0.376	244.1	O K
480 min Summer	92.037	0.387	265.6	O K
600 min Summer	92.045	0.395	283.5	O K
720 min Summer	92.053	0.403	299.0	O K
960 min Summer	92.064	0.414	325.2	O K
1440 min Summer	92.081	0.431	366.1	O K
2160 min Summer	92.098	0.448	411.7	O K
2880 min Summer	92.111	0.461	447.6	O K
4320 min Summer	92.129	0.479	503.7	O K
5760 min Summer	92.143	0.493	548.0	O K
7200 min Summer	92.153	0.503	584.6	O K
8640 min Summer	92.162	0.512	615.8	O K
10080 min Summer	92.170	0.520	643.4	O K
15 min Winter	91.922	0.272	92.4	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	52.843	0.0	23
30 min Summer	34.966	0.0	38
60 min Summer	22.323	0.0	68
120 min Summer	13.974	0.0	128
180 min Summer	10.574	0.0	188
240 min Summer	8.665	0.0	248
360 min Summer	6.512	0.0	368
480 min Summer	5.314	0.0	488
600 min Summer	4.538	0.0	608
720 min Summer	3.988	0.0	728
960 min Summer	3.253	0.0	968
1440 min Summer	2.441	0.0	1448
2160 min Summer	1.831	0.0	2168
2880 min Summer	1.493	0.0	2888
4320 min Summer	1.120	0.0	4328
5760 min Summer	0.914	0.0	5768
7200 min Summer	0.780	0.0	7208
8640 min Summer	0.684	0.0	8648
10080 min Summer	0.613	0.0	10088
15 min Winter	52.843	0.0	23

GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:58 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Summary of Results for 2 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.949	0.299	122.3	O K
60 min Winter	91.974	0.324	156.2	O K
120 min Winter	91.999	0.349	195.6	O K
180 min Winter	92.015	0.365	222.0	O K
240 min Winter	92.025	0.375	242.5	O K
360 min Winter	92.041	0.391	273.4	O K
480 min Winter	92.052	0.402	297.5	O K
600 min Winter	92.061	0.411	317.5	O K
720 min Winter	92.068	0.418	334.9	O K
960 min Winter	92.080	0.430	364.2	O K
1440 min Winter	92.097	0.447	410.0	O K
2160 min Winter	92.115	0.465	461.1	O K
2880 min Winter	92.128	0.478	501.3	O K
4320 min Winter	92.147	0.497	564.2	O K
5760 min Winter	92.162	0.512	613.7	O K
7200 min Winter	92.173	0.523	654.8	O K
8640 min Winter	92.182	0.532	689.7	O K
10080 min Winter	92.190	0.540	720.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	34.966	0.0	38
60 min Winter	22.323	0.0	68
120 min Winter	13.974	0.0	128
180 min Winter	10.574	0.0	188
240 min Winter	8.665	0.0	248
360 min Winter	6.512	0.0	368
480 min Winter	5.314	0.0	488
600 min Winter	4.538	0.0	608
720 min Winter	3.988	0.0	728
960 min Winter	3.253	0.0	968
1440 min Winter	2.441	0.0	1448
2160 min Winter	1.831	0.0	2168
2880 min Winter	1.493	0.0	2888
4320 min Winter	1.120	0.0	4328
5760 min Winter	0.914	0.0	5768
7200 min Winter	0.780	0.0	7208
8640 min Winter	0.684	0.0	8648
10080 min Winter	0.613	0.0	10088

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:58 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.833

<b>Time (mins) Area</b>			<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>	<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.416	4	8	0.417

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:58 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	


Model Details

Storage is Online Cover Level (m) 93.300

Tank or Pond Structure

Invert Level (m) 91.650

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	0.0	0.550	4159.0	1.650	4159.0

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:57 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Summary of Results for 10 year Return Period (+40%)

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.950	0.300	123.5	O K
30 min Summer	91.979	0.329	163.0	O K
60 min Summer	92.006	0.356	206.8	O K
120 min Summer	92.032	0.382	255.8	O K
180 min Summer	92.047	0.397	287.4	O K
240 min Summer	92.058	0.408	311.1	O K
360 min Summer	92.073	0.423	347.7	O K
480 min Summer	92.084	0.434	375.8	O K
600 min Summer	92.093	0.443	398.9	O K
720 min Summer	92.100	0.450	418.8	O K
960 min Summer	92.112	0.462	452.0	O K
1440 min Summer	92.129	0.479	502.9	O K
2160 min Summer	92.146	0.496	559.1	O K
2880 min Summer	92.158	0.508	602.4	O K
4320 min Summer	92.177	0.527	668.9	O K
5760 min Summer	92.190	0.540	720.2	O K
7200 min Summer	92.200	0.550	762.7	O K
8640 min Summer	92.209	0.559	799.4	O K
10080 min Summer	92.217	0.567	831.8	O K
15 min Winter	91.961	0.311	138.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	79.094	0.0	23
30 min Summer	52.183	0.0	38
60 min Summer	33.096	0.0	68
120 min Summer	20.474	0.0	128
180 min Summer	15.333	0.0	188
240 min Summer	12.449	0.0	248
360 min Summer	9.275	0.0	368
480 min Summer	7.518	0.0	488
600 min Summer	6.386	0.0	608
720 min Summer	5.586	0.0	728
960 min Summer	4.522	0.0	968
1440 min Summer	3.354	0.0	1448
2160 min Summer	2.486	0.0	2168
2880 min Summer	2.009	0.0	2888
4320 min Summer	1.487	0.0	4328
5760 min Summer	1.201	0.0	5768
7200 min Summer	1.017	0.0	7208
8640 min Summer	0.889	0.0	8648
10080 min Summer	0.793	0.0	10088
15 min Winter	79.094	0.0	23

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Bund Calcs W/ No Outfall,  
 Three Maids



Date 02/02/2024 16:57  
 File Bund No Outfall.SRCX

Designed by DJC  
 Checked by JHC


Innovyze Source Control 2019.1

Summary of Results for 10 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.992	0.342	182.6	O K
60 min Winter	92.020	0.370	231.6	O K
120 min Winter	92.047	0.397	286.5	O K
180 min Winter	92.063	0.413	321.9	O K
240 min Winter	92.074	0.424	348.4	O K
360 min Winter	92.090	0.440	389.4	O K
480 min Winter	92.101	0.451	420.9	O K
600 min Winter	92.110	0.460	446.8	O K
720 min Winter	92.118	0.468	469.1	O K
960 min Winter	92.130	0.480	506.2	O K
1440 min Winter	92.147	0.497	563.2	O K
2160 min Winter	92.165	0.515	626.2	O K
2880 min Winter	92.178	0.528	674.7	O K
4320 min Winter	92.197	0.547	749.2	O K
5760 min Winter	92.211	0.561	806.6	O K
7200 min Winter	92.222	0.572	854.2	O K
8640 min Winter	92.232	0.582	895.3	O K
10080 min Winter	92.241	0.591	931.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	52.183	0.0	38
60 min Winter	33.096	0.0	68
120 min Winter	20.474	0.0	128
180 min Winter	15.333	0.0	188
240 min Winter	12.449	0.0	248
360 min Winter	9.275	0.0	368
480 min Winter	7.518	0.0	488
600 min Winter	6.386	0.0	608
720 min Winter	5.586	0.0	728
960 min Winter	4.522	0.0	968
1440 min Winter	3.354	0.0	1448
2160 min Winter	2.486	0.0	2168
2880 min Winter	2.009	0.0	2888
4320 min Winter	1.487	0.0	4328
5760 min Winter	1.201	0.0	5768
7200 min Winter	1.017	0.0	7208
8640 min Winter	0.889	0.0	8648
10080 min Winter	0.793	0.0	10088



GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:57 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.833

<b>Time (mins) Area</b>			<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>	<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.416	4	8	0.417

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:57 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Model Details

Storage is Online Cover Level (m) 93.300

Tank or Pond Structure

Invert Level (m) 91.650

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	0.0	0.550	4159.0	1.650	4159.0

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		Bund Calcs W/ No Outfall, Three Maids
Date 02/02/2024 16:56 File Bund No Outfall.SRCX		Designed by DJC Checked by JHC
Innovyze	Source Control 2019.1	




Summary of Results for 30 year Return Period (+40%)

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.974	0.324	156.4	O K
30 min Summer	92.007	0.357	208.2	O K
60 min Summer	92.037	0.387	265.4	O K
120 min Summer	92.065	0.415	328.2	O K
180 min Summer	92.081	0.431	367.2	O K
240 min Summer	92.092	0.442	395.6	O K
360 min Summer	92.108	0.458	439.6	O K
480 min Summer	92.119	0.469	473.1	O K
600 min Summer	92.128	0.478	500.5	O K
720 min Summer	92.135	0.485	523.9	O K
960 min Summer	92.147	0.497	562.5	O K
1440 min Summer	92.164	0.514	621.1	O K
2160 min Summer	92.181	0.531	684.8	O K
2880 min Summer	92.193	0.543	733.2	O K
4320 min Summer	92.211	0.561	806.5	O K
5760 min Summer	92.224	0.574	862.2	O K
7200 min Summer	92.235	0.585	908.1	O K
8640 min Summer	92.245	0.595	947.8	O K
10080 min Summer	92.253	0.603	982.7	O K
15 min Winter	91.987	0.337	175.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	100.138	0.0	23
30 min Summer	66.644	0.0	38
60 min Summer	42.476	0.0	68
120 min Summer	26.265	0.0	128
180 min Summer	19.594	0.0	188
240 min Summer	15.832	0.0	248
360 min Summer	11.728	0.0	368
480 min Summer	9.466	0.0	488
600 min Summer	8.011	0.0	608
720 min Summer	6.988	0.0	728
960 min Summer	5.628	0.0	968
1440 min Summer	4.142	0.0	1448
2160 min Summer	3.045	0.0	2168
2880 min Summer	2.445	0.0	2888
4320 min Summer	1.793	0.0	4328
5760 min Summer	1.438	0.0	5768
7200 min Summer	1.211	0.0	7208
8640 min Summer	1.053	0.0	8648
10080 min Summer	0.936	0.0	10088
15 min Winter	100.138	0.0	23

2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
--	--	---


Date 02/02/2024 16:56 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
--	-----------------------------------	--

Innovyze	Source Control 2019.1
----------	-----------------------

Summary of Results for 30 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	92.021	0.371	233.2	O K
60 min Winter	92.052	0.402	297.2	O K
120 min Winter	92.081	0.431	367.6	O K
180 min Winter	92.098	0.448	411.3	O K
240 min Winter	92.109	0.459	443.1	O K
360 min Winter	92.125	0.475	492.4	O K
480 min Winter	92.137	0.487	529.9	O K
600 min Winter	92.146	0.496	560.6	O K
720 min Winter	92.154	0.504	586.7	O K
960 min Winter	92.166	0.516	630.0	O K
1440 min Winter	92.183	0.533	695.6	O K
2160 min Winter	92.201	0.551	767.0	O K
2880 min Winter	92.214	0.564	821.2	O K
4320 min Winter	92.234	0.584	903.3	O K
5760 min Winter	92.249	0.599	965.6	O K
7200 min Winter	92.261	0.611	1017.0	O K
8640 min Winter	92.272	0.622	1061.5	O K
10080 min Winter	92.281	0.631	1100.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	66.644	0.0	38
60 min Winter	42.476	0.0	68
120 min Winter	26.265	0.0	128
180 min Winter	19.594	0.0	188
240 min Winter	15.832	0.0	248
360 min Winter	11.728	0.0	368
480 min Winter	9.466	0.0	488
600 min Winter	8.011	0.0	608
720 min Winter	6.988	0.0	728
960 min Winter	5.628	0.0	968
1440 min Winter	4.142	0.0	1448
2160 min Winter	3.045	0.0	2168
2880 min Winter	2.445	0.0	2888
4320 min Winter	1.793	0.0	4328
5760 min Winter	1.438	0.0	5768
7200 min Winter	1.211	0.0	7208
8640 min Winter	1.053	0.0	8648
10080 min Winter	0.936	0.0	10088

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:56 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.833

<b>Time (mins) Area</b>			<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>	<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.416	4	8	0.417

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:56 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	


Model Details

Storage is Online Cover Level (m) 93.300

Tank or Pond Structure

Invert Level (m) 91.650

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	0.0	0.550	4159.0	1.650	4159.0


GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:30 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

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

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	92.004	0.354	202.5	O K
30 min Summer	92.040	0.390	272.2	O K
60 min Summer	92.074	0.424	348.8	O K
120 min Summer	92.105	0.455	431.2	O K
180 min Summer	92.122	0.472	480.5	O K
240 min Summer	92.133	0.483	514.9	O K
360 min Summer	92.149	0.499	568.6	O K
480 min Summer	92.160	0.510	609.0	O K
600 min Summer	92.169	0.519	641.8	O K
720 min Summer	92.177	0.527	669.4	O K
960 min Summer	92.188	0.538	714.9	O K
1440 min Summer	92.205	0.555	782.8	O K
2160 min Summer	92.222	0.572	855.2	O K
2880 min Summer	92.235	0.585	909.5	O K
4320 min Summer	92.255	0.605	990.0	O K
5760 min Summer	92.269	0.619	1050.1	O K
7200 min Summer	92.281	0.631	1099.4	O K
8640 min Summer	92.291	0.641	1142.2	O K
10080 min Summer	92.300	0.650	1179.7	O K
15 min Winter	92.017	0.367	226.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	129.682	0.0	23
30 min Summer	87.133	0.0	38
60 min Summer	55.837	0.0	68
120 min Summer	34.509	0.0	128
180 min Summer	25.637	0.0	188
240 min Summer	20.604	0.0	248
360 min Summer	15.169	0.0	368
480 min Summer	12.185	0.0	488
600 min Summer	10.272	0.0	608
720 min Summer	8.930	0.0	728
960 min Summer	7.152	0.0	968
1440 min Summer	5.221	0.0	1448
2160 min Summer	3.803	0.0	2168
2880 min Summer	3.033	0.0	2888
4320 min Summer	2.201	0.0	4328
5760 min Summer	1.751	0.0	5768
7200 min Summer	1.466	0.0	7208
8640 min Summer	1.270	0.0	8648
10080 min Summer	1.124	0.0	10088
15 min Winter	129.682	0.0	23

2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
--	--	---

Date 02/02/2024 16:30 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
--	-----------------------------------	--

Innovyze	Source Control 2019.1
----------	-----------------------

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

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	92.055	0.405	304.8	O K
60 min Winter	92.090	0.440	390.7	O K
120 min Winter	92.122	0.472	482.9	O K
180 min Winter	92.140	0.490	538.2	O K
240 min Winter	92.151	0.501	576.7	O K
360 min Winter	92.168	0.518	636.8	O K
480 min Winter	92.180	0.530	682.1	O K
600 min Winter	92.189	0.539	718.8	O K
720 min Winter	92.197	0.547	749.8	O K
960 min Winter	92.209	0.559	800.7	O K
1440 min Winter	92.227	0.577	876.7	O K
2160 min Winter	92.247	0.597	957.9	O K
2880 min Winter	92.262	0.612	1018.6	O K
4320 min Winter	92.283	0.633	1108.8	O K
5760 min Winter	92.299	0.649	1176.1	O K
7200 min Winter	92.313	0.663	1231.3	O K
8640 min Winter	92.324	0.674	1279.2	O K
10080 min Winter	92.334	0.684	1321.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	87.133	0.0	38
60 min Winter	55.837	0.0	68
120 min Winter	34.509	0.0	128
180 min Winter	25.637	0.0	188
240 min Winter	20.604	0.0	248
360 min Winter	15.169	0.0	368
480 min Winter	12.185	0.0	488
600 min Winter	10.272	0.0	608
720 min Winter	8.930	0.0	728
960 min Winter	7.152	0.0	968
1440 min Winter	5.221	0.0	1448
2160 min Winter	3.803	0.0	2168
2880 min Winter	3.033	0.0	2888
4320 min Winter	2.201	0.0	4328
5760 min Winter	1.751	0.0	5768
7200 min Winter	1.466	0.0	7208
8640 min Winter	1.270	0.0	8648
10080 min Winter	1.124	0.0	10088



2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Bund Calcs W/ No Outfall,  
 Three Maids



Date 02/02/2024 16:30  
 File Bund No Outfall.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

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)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.833

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	4 0.416	4	8 0.417

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To: (ha)
0	4 0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Bund Calcs W/ No Outfall, Three Maids	
Date 02/02/2024 16:30 File Bund No Outfall.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Model Details

Storage is Online Cover Level (m) 93.300

Tank or Pond Structure

Invert Level (m) 91.650

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	0.0	0.550	4159.0	1.650	4159.0

## **APPENDIX VI**

### Northern Cellular Storage Calculations

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:34  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 1 year Return Period (+40%)

Half Drain Time : 198 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.110	0.110	3.1	31.4	O K
30 min Summer	91.144	0.144	3.1	41.2	O K
60 min Summer	91.180	0.180	3.2	51.4	O K
120 min Summer	91.210	0.210	3.2	59.8	O K
180 min Summer	91.221	0.221	3.2	62.9	O K
240 min Summer	91.227	0.227	3.2	64.6	O K
360 min Summer	91.228	0.228	3.2	65.0	O K
480 min Summer	91.225	0.225	3.2	64.2	O K
600 min Summer	91.220	0.220	3.2	62.8	O K
720 min Summer	91.214	0.214	3.2	61.1	O K
960 min Summer	91.201	0.201	3.2	57.4	O K
1440 min Summer	91.174	0.174	3.2	49.5	O K
2160 min Summer	91.134	0.134	3.1	38.2	O K
2880 min Summer	91.102	0.102	3.1	29.0	O K
4320 min Summer	91.060	0.060	3.1	17.2	O K
5760 min Summer	91.047	0.047	2.9	13.3	O K
7200 min Summer	91.041	0.041	2.5	11.6	O K
8640 min Summer	91.036	0.036	2.2	10.3	O K
10080 min Summer	91.032	0.032	2.0	9.3	O K
15 min Winter	91.125	0.125	3.1	35.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	40.860	0.0	28
30 min Summer	27.161	0.0	41
60 min Summer	17.618	0.0	66
120 min Summer	11.222	0.0	122
180 min Summer	8.586	0.0	164
240 min Summer	7.095	0.0	196
360 min Summer	5.367	0.0	264
480 min Summer	4.401	0.0	332
600 min Summer	3.773	0.0	402
720 min Summer	3.327	0.0	470
960 min Summer	2.729	0.0	608
1440 min Summer	2.066	0.0	870
2160 min Summer	1.561	0.0	1248
2880 min Summer	1.280	0.0	1596
4320 min Summer	0.969	0.0	2260
5760 min Summer	0.795	0.0	2944
7200 min Summer	0.682	0.0	3672
8640 min Summer	0.600	0.0	4408
10080 min Summer	0.538	0.0	5144
15 min Winter	40.860	0.0	28

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:34  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 1 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.164	0.164	3.2	46.6	O K
60 min Winter	91.205	0.205	3.2	58.3	O K
120 min Winter	91.241	0.241	3.2	68.7	O K
180 min Winter	91.256	0.256	3.2	72.9	O K
240 min Winter	91.261	0.261	3.2	74.5	O K
360 min Winter	91.261	0.261	3.2	74.5	O K
480 min Winter	91.256	0.256	3.2	72.8	O K
600 min Winter	91.247	0.247	3.2	70.3	O K
720 min Winter	91.236	0.236	3.2	67.3	O K
960 min Winter	91.213	0.213	3.2	60.8	O K
1440 min Winter	91.167	0.167	3.2	47.5	O K
2160 min Winter	91.106	0.106	3.1	30.1	O K
2880 min Winter	91.063	0.063	3.1	17.9	O K
4320 min Winter	91.042	0.042	2.6	12.0	O K
5760 min Winter	91.035	0.035	2.1	9.9	O K
7200 min Winter	91.030	0.030	1.8	8.5	O K
8640 min Winter	91.026	0.026	1.6	7.5	O K
10080 min Winter	91.024	0.024	1.5	6.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	27.161	0.0	42
60 min Winter	17.618	0.0	66
120 min Winter	11.222	0.0	122
180 min Winter	8.586	0.0	176
240 min Winter	7.095	0.0	226
360 min Winter	5.367	0.0	284
480 min Winter	4.401	0.0	362
600 min Winter	3.773	0.0	438
720 min Winter	3.327	0.0	512
960 min Winter	2.729	0.0	658
1440 min Winter	2.066	0.0	928
2160 min Winter	1.561	0.0	1296
2880 min Winter	1.280	0.0	1600
4320 min Winter	0.969	0.0	2244
5760 min Winter	0.795	0.0	2944
7200 min Winter	0.682	0.0	3680
8640 min Winter	0.600	0.0	4408
10080 min Winter	0.538	0.0	5120

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:34  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.459

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area				
From:	To:	From:	To:	From:	To:	From:	To:				
0	4	0.157	4	8	0.157	8	12	0.000	12	16	0.145

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area	
From:	To:	
0	4	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Northern Clean W/ No Bund Three Maids	
Date 02/02/2024 18:34 File Northern With Bund.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Model Details

Storage is Online Cover Level (m) 93.192

Cellular Storage Structure

Invert Level (m) 91.000 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.07308 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.07308

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	300.0	300.0	1.201	0.0	383.0
1.200	300.0	383.0			

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:33  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 2 year Return Period (+40%)

Half Drain Time : 261 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.145	0.145	3.1	41.5	O K
30 min Summer	91.190	0.190	3.2	54.3	O K
60 min Summer	91.235	0.235	3.2	66.9	O K
120 min Summer	91.272	0.272	3.2	77.6	O K
180 min Summer	91.287	0.287	3.2	81.7	O K
240 min Summer	91.292	0.292	3.2	83.2	O K
360 min Summer	91.294	0.294	3.3	83.7	O K
480 min Summer	91.291	0.291	3.2	82.9	O K
600 min Summer	91.286	0.286	3.2	81.5	O K
720 min Summer	91.280	0.280	3.2	79.7	O K
960 min Summer	91.265	0.265	3.2	75.6	O K
1440 min Summer	91.234	0.234	3.2	66.7	O K
2160 min Summer	91.189	0.189	3.2	53.7	O K
2880 min Summer	91.148	0.148	3.1	42.3	O K
4320 min Summer	91.089	0.089	3.1	25.5	O K
5760 min Summer	91.056	0.056	3.1	16.1	O K
7200 min Summer	91.046	0.046	2.8	13.2	O K
8640 min Summer	91.041	0.041	2.5	11.7	O K
10080 min Summer	91.037	0.037	2.3	10.5	O K
15 min Winter	91.164	0.164	3.2	46.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	52.843	0.0	29
30 min Summer	34.966	0.0	43
60 min Summer	22.323	0.0	66
120 min Summer	13.974	0.0	124
180 min Summer	10.574	0.0	180
240 min Summer	8.665	0.0	216
360 min Summer	6.512	0.0	280
480 min Summer	5.314	0.0	346
600 min Summer	4.538	0.0	416
720 min Summer	3.988	0.0	484
960 min Summer	3.253	0.0	622
1440 min Summer	2.441	0.0	892
2160 min Summer	1.831	0.0	1280
2880 min Summer	1.493	0.0	1644
4320 min Summer	1.120	0.0	2336
5760 min Summer	0.914	0.0	2992
7200 min Summer	0.780	0.0	3672
8640 min Summer	0.684	0.0	4408
10080 min Summer	0.613	0.0	5144
15 min Winter	52.843	0.0	29



2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:33  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 2 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.215	0.215	3.2	61.4	O K
60 min Winter	91.266	0.266	3.2	75.8	O K
120 min Winter	91.312	0.312	3.3	88.8	O K
180 min Winter	91.331	0.331	3.3	94.4	O K
240 min Winter	91.339	0.339	3.3	96.7	O K
360 min Winter	91.339	0.339	3.3	96.6	O K
480 min Winter	91.334	0.334	3.3	95.3	O K
600 min Winter	91.326	0.326	3.3	92.9	O K
720 min Winter	91.315	0.315	3.3	89.9	O K
960 min Winter	91.291	0.291	3.2	83.0	O K
1440 min Winter	91.240	0.240	3.2	68.3	O K
2160 min Winter	91.167	0.167	3.2	47.6	O K
2880 min Winter	91.108	0.108	3.1	30.8	O K
4320 min Winter	91.049	0.049	3.0	13.8	O K
5760 min Winter	91.040	0.040	2.4	11.4	O K
7200 min Winter	91.034	0.034	2.1	9.7	O K
8640 min Winter	91.030	0.030	1.9	8.6	O K
10080 min Winter	91.027	0.027	1.6	7.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	34.966	0.0	43
60 min Winter	22.323	0.0	68
120 min Winter	13.974	0.0	122
180 min Winter	10.574	0.0	178
240 min Winter	8.665	0.0	234
360 min Winter	6.512	0.0	298
480 min Winter	5.314	0.0	374
600 min Winter	4.538	0.0	452
720 min Winter	3.988	0.0	528
960 min Winter	3.253	0.0	676
1440 min Winter	2.441	0.0	962
2160 min Winter	1.831	0.0	1348
2880 min Winter	1.493	0.0	1700
4320 min Winter	1.120	0.0	2216
5760 min Winter	0.914	0.0	2952
7200 min Winter	0.780	0.0	3672
8640 min Winter	0.684	0.0	4376
10080 min Winter	0.613	0.0	5152

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:33  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.459

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:	From:	To:
0	4	0.157	4	8	0.157	8	12
						0.000	12
							16
							0.145

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:33  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Model Details

Storage is Online Cover Level (m) 93.192

Cellular Storage Structure

Invert Level (m) 91.000 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.07308 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.07308

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	300.0	300.0	1.201	0.0	383.0
1.200	300.0	383.0			

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:32  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 10 year Return Period (+40%)

Half Drain Time : 395 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.224	0.224	3.2	63.7	O K
30 min Summer	91.293	0.293	3.3	83.4	O K
60 min Summer	91.361	0.361	3.3	102.9	O K
120 min Summer	91.422	0.422	3.3	120.4	O K
180 min Summer	91.449	0.449	3.4	127.9	O K
240 min Summer	91.460	0.460	3.4	131.2	O K
360 min Summer	91.464	0.464	3.4	132.2	O K
480 min Summer	91.461	0.461	3.4	131.4	O K
600 min Summer	91.455	0.455	3.4	129.7	O K
720 min Summer	91.448	0.448	3.4	127.7	O K
960 min Summer	91.432	0.432	3.3	123.1	O K
1440 min Summer	91.396	0.396	3.3	112.9	O K
2160 min Summer	91.341	0.341	3.3	97.1	O K
2880 min Summer	91.288	0.288	3.2	82.1	O K
4320 min Summer	91.198	0.198	3.2	56.4	O K
5760 min Summer	91.130	0.130	3.1	37.1	O K
7200 min Summer	91.084	0.084	3.1	24.0	O K
8640 min Summer	91.057	0.057	3.1	16.2	O K
10080 min Summer	91.048	0.048	2.9	13.6	O K
15 min Winter	91.252	0.252	3.2	71.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	79.094	0.0	29
30 min Summer	52.183	0.0	44
60 min Summer	33.096	0.0	72
120 min Summer	20.474	0.0	126
180 min Summer	15.333	0.0	184
240 min Summer	12.449	0.0	242
360 min Summer	9.275	0.0	324
480 min Summer	7.518	0.0	386
600 min Summer	6.386	0.0	452
720 min Summer	5.586	0.0	518
960 min Summer	4.522	0.0	656
1440 min Summer	3.354	0.0	928
2160 min Summer	2.486	0.0	1332
2880 min Summer	2.009	0.0	1728
4320 min Summer	1.487	0.0	2464
5760 min Summer	1.201	0.0	3168
7200 min Summer	1.017	0.0	3816
8640 min Summer	0.889	0.0	4416
10080 min Summer	0.793	0.0	5136
15 min Winter	79.094	0.0	29

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:32  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 10 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.330	0.330	3.3	94.1	O K
60 min Winter	91.409	0.409	3.3	116.4	O K
120 min Winter	91.481	0.481	3.4	137.2	O K
180 min Winter	91.515	0.515	3.4	146.9	O K
240 min Winter	91.532	0.532	3.4	151.7	O K
<b>360 min Winter</b>	<b>91.543</b>	<b>0.543</b>	<b>3.4</b>	<b>154.6</b>	<b>O K</b>
480 min Winter	91.537	0.537	3.4	153.1	O K
600 min Winter	91.529	0.529	3.4	150.7	O K
720 min Winter	91.519	0.519	3.4	147.9	O K
960 min Winter	91.494	0.494	3.4	140.9	O K
1440 min Winter	91.437	0.437	3.4	124.5	O K
2160 min Winter	91.349	0.349	3.3	99.4	O K
2880 min Winter	91.267	0.267	3.2	76.1	O K
4320 min Winter	91.136	0.136	3.1	38.7	O K
5760 min Winter	91.058	0.058	3.1	16.5	O K
7200 min Winter	91.045	0.045	2.8	12.7	O K
8640 min Winter	91.039	0.039	2.4	11.1	O K
10080 min Winter	91.035	0.035	2.1	9.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	52.183	0.0	43
60 min Winter	33.096	0.0	72
120 min Winter	20.474	0.0	126
180 min Winter	15.333	0.0	182
240 min Winter	12.449	0.0	238
<b>360 min Winter</b>	<b>9.275</b>	<b>0.0</b>	<b>348</b>
480 min Winter	7.518	0.0	446
600 min Winter	6.386	0.0	482
720 min Winter	5.586	0.0	558
960 min Winter	4.522	0.0	714
1440 min Winter	3.354	0.0	1012
2160 min Winter	2.486	0.0	1436
2880 min Winter	2.009	0.0	1828
4320 min Winter	1.487	0.0	2548
5760 min Winter	1.201	0.0	3064
7200 min Winter	1.017	0.0	3656
8640 min Winter	0.889	0.0	4408
10080 min Winter	0.793	0.0	5144

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:32  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.459

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area				
From:	To:	From:	To:	From:	To:	From:	To:				
0	4	0.157	4	8	0.157	8	12	0.000	12	16	0.145

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area	
From:	To:	
0	4	0.000

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:32  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1


Model Details

Storage is Online Cover Level (m) 93.192

Cellular Storage Structure

Invert Level (m) 91.000 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.07308 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.07308

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	300.0	300.0	1.201	0.0	383.0
1.200	300.0	383.0			

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Northern Clean W/ No Bund Three Maids	
Date 02/02/2024 18:31 File Northern With Bund.SRCX	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Summary of Results for 30 year Return Period (+40%)

Half Drain Time : 508 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.287	0.287	3.2	81.7	O K
30 min Summer	91.379	0.379	3.3	108.0	O K
60 min Summer	91.472	0.472	3.4	134.5	O K
120 min Summer	91.558	0.558	3.4	158.9	O K
180 min Summer	91.597	0.597	3.5	170.1	O K
240 min Summer	91.615	0.615	3.5	175.3	O K
360 min Summer	91.627	0.627	3.5	178.7	O K
480 min Summer	91.623	0.623	3.5	177.5	O K
600 min Summer	91.616	0.616	3.5	175.4	O K
720 min Summer	91.607	0.607	3.5	172.9	O K
960 min Summer	91.588	0.588	3.5	167.4	O K
1440 min Summer	91.547	0.547	3.4	155.8	O K
2160 min Summer	91.484	0.484	3.4	138.0	O K
2880 min Summer	91.424	0.424	3.3	120.7	O K
4320 min Summer	91.314	0.314	3.3	89.5	O K
5760 min Summer	91.224	0.224	3.2	63.9	O K
7200 min Summer	91.155	0.155	3.2	44.2	O K
8640 min Summer	91.105	0.105	3.1	29.8	O K
10080 min Summer	91.071	0.071	3.1	20.2	O K
15 min Winter	91.323	0.323	3.3	92.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	100.138	0.0	30
30 min Summer	66.644	0.0	44
60 min Summer	42.476	0.0	72
120 min Summer	26.265	0.0	128
180 min Summer	19.594	0.0	186
240 min Summer	15.832	0.0	244
360 min Summer	11.728	0.0	360
480 min Summer	9.466	0.0	426
600 min Summer	8.011	0.0	488
720 min Summer	6.988	0.0	554
960 min Summer	5.628	0.0	684
1440 min Summer	4.142	0.0	958
2160 min Summer	3.045	0.0	1368
2880 min Summer	2.445	0.0	1764
4320 min Summer	1.793	0.0	2520
5760 min Summer	1.438	0.0	3240
7200 min Summer	1.211	0.0	3960
8640 min Summer	1.053	0.0	4592
10080 min Summer	0.936	0.0	5248
15 min Winter	100.138	0.0	30



2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:31  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Summary of Results for 30 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.427	0.427	3.3	121.6	O K
60 min Winter	91.533	0.533	3.4	152.0	O K
120 min Winter	91.634	0.634	3.5	180.6	O K
180 min Winter	91.682	0.682	3.5	194.5	O K
240 min Winter	91.707	0.707	3.5	201.6	O K
360 min Winter	91.730	0.730	3.6	207.9	O K
480 min Winter	91.730	0.730	3.6	208.1	O K
600 min Winter	91.720	0.720	3.6	205.2	O K
720 min Winter	91.707	0.707	3.5	201.6	O K
960 min Winter	91.682	0.682	3.5	194.3	O K
1440 min Winter	91.620	0.620	3.5	176.8	O K
2160 min Winter	91.523	0.523	3.4	148.9	O K
2880 min Winter	91.429	0.429	3.3	122.1	O K
4320 min Winter	91.265	0.265	3.2	75.5	O K
5760 min Winter	91.141	0.141	3.1	40.1	O K
7200 min Winter	91.063	0.063	3.1	17.9	O K
8640 min Winter	91.046	0.046	2.8	13.1	O K
10080 min Winter	91.041	0.041	2.5	11.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	66.644	0.0	44
60 min Winter	42.476	0.0	72
120 min Winter	26.265	0.0	126
180 min Winter	19.594	0.0	184
240 min Winter	15.832	0.0	240
360 min Winter	11.728	0.0	352
480 min Winter	9.466	0.0	462
600 min Winter	8.011	0.0	562
720 min Winter	6.988	0.0	586
960 min Winter	5.628	0.0	736
1440 min Winter	4.142	0.0	1042
2160 min Winter	3.045	0.0	1484
2880 min Winter	2.445	0.0	1904
4320 min Winter	1.793	0.0	2652
5760 min Winter	1.438	0.0	3344
7200 min Winter	1.211	0.0	3888
8640 min Winter	1.053	0.0	4408
10080 min Winter	0.936	0.0	5112

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:31  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.459

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:	From:	To:
0	4	0.157	4	8	0.157	8	12
						0.000	12
							16
							0.145

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:31  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Model Details

Storage is Online Cover Level (m) 93.192

Cellular Storage Structure

Invert Level (m) 91.000 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.07308 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.07308

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	300.0	300.0	1.201	0.0	383.0
1.200	300.0	383.0			

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:30  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

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

Half Drain Time : 681 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.375	0.375	3.3	106.9	O K
30 min Summer	91.501	0.501	3.4	142.9	O K
60 min Summer	91.631	0.631	3.5	179.8	O K
120 min Summer	91.752	0.752	3.6	214.2	O K
180 min Summer	91.809	0.809	3.6	230.5	O K
240 min Summer	91.837	0.837	3.6	238.4	O K
360 min Summer	91.863	0.863	3.7	245.8	O K
480 min Summer	91.863	0.863	3.7	246.1	O K
600 min Summer	91.853	0.853	3.6	243.1	O K
720 min Summer	91.841	0.841	3.6	239.8	O K
960 min Summer	91.815	0.815	3.6	232.3	O K
1440 min Summer	91.765	0.765	3.6	217.9	O K
2160 min Summer	91.691	0.691	3.5	196.9	O K
2880 min Summer	91.620	0.620	3.5	176.8	O K
4320 min Summer	91.490	0.490	3.4	139.5	O K
5760 min Summer	91.376	0.376	3.3	107.3	O K
7200 min Summer	91.282	0.282	3.2	80.4	O K
8640 min Summer	91.207	0.207	3.2	59.0	O K
10080 min Summer	91.147	0.147	3.1	42.0	O K
15 min Winter	91.422	0.422	3.3	120.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	129.682	0.0	30
30 min Summer	87.133	0.0	44
60 min Summer	55.837	0.0	74
120 min Summer	34.509	0.0	128
180 min Summer	25.637	0.0	186
240 min Summer	20.604	0.0	246
360 min Summer	15.169	0.0	362
480 min Summer	12.185	0.0	480
600 min Summer	10.272	0.0	548
720 min Summer	8.930	0.0	604
960 min Summer	7.152	0.0	726
1440 min Summer	5.221	0.0	996
2160 min Summer	3.803	0.0	1408
2880 min Summer	3.033	0.0	1816
4320 min Summer	2.201	0.0	2596
5760 min Summer	1.751	0.0	3344
7200 min Summer	1.466	0.0	4048
8640 min Summer	1.270	0.0	4760
10080 min Summer	1.124	0.0	5448
15 min Winter	129.682	0.0	30

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:30  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	91.564	0.564	3.4	160.8	O K
60 min Winter	91.712	0.712	3.5	202.9	O K
120 min Winter	91.852	0.852	3.6	242.9	O K
180 min Winter	91.921	0.921	3.7	262.5	O K
240 min Winter	91.957	0.957	3.7	272.8	O K
360 min Winter	91.996	0.996	3.7	283.8	O K
480 min Winter	92.006	1.006	3.8	286.8	O K
600 min Winter	92.001	1.001	3.7	285.4	O K
720 min Winter	91.987	0.987	3.7	281.4	O K
960 min Winter	91.952	0.952	3.7	271.3	O K
1440 min Winter	91.884	0.884	3.7	251.8	O K
2160 min Winter	91.774	0.774	3.6	220.6	O K
2880 min Winter	91.666	0.666	3.5	189.9	O K
4320 min Winter	91.470	0.470	3.4	133.9	O K
5760 min Winter	91.306	0.306	3.3	87.3	O K
7200 min Winter	91.178	0.178	3.2	50.9	O K
8640 min Winter	91.089	0.089	3.1	25.3	O K
10080 min Winter	91.049	0.049	3.0	14.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	87.133	0.0	44
60 min Winter	55.837	0.0	72
120 min Winter	34.509	0.0	128
180 min Winter	25.637	0.0	184
240 min Winter	20.604	0.0	242
360 min Winter	15.169	0.0	356
480 min Winter	12.185	0.0	468
600 min Winter	10.272	0.0	578
720 min Winter	8.930	0.0	680
960 min Winter	7.152	0.0	772
1440 min Winter	5.221	0.0	1080
2160 min Winter	3.803	0.0	1532
2880 min Winter	3.033	0.0	1964
4320 min Winter	2.201	0.0	2772
5760 min Winter	1.751	0.0	3520
7200 min Winter	1.466	0.0	4184
8640 min Winter	1.270	0.0	4760
10080 min Winter	1.124	0.0	5144

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:30  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

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)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.459

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:	From:	To:
0	4	0.157	4	8	0.157	8	12
						0.000	12
							16
							0.145

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
0	4
	0.000

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:30  
 File Northern With Bund.SRCX

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Model Details

Storage is Online Cover Level (m) 93.192

Cellular Storage Structure

Invert Level (m) 91.000 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.07308 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.07308

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	300.0	300.0	1.201	0.0	383.0
1.200	300.0	383.0			

## **APPENDIX VII**

Northern Cellular Storage/Bunds Cascade Calculations



GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		Bund Calcs W/ No Outfall, Three Maids
Date 02/02/2024 18:28 File		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1



Cascade Summary of Results for Bund With Outfall.SRCX

Upstream Structures	Outflow To			Overflow To	
(None)	Northern With Bund.SRCX			(None)	
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	92.002	0.352	1.5	200.5	O K
30 min Summer	92.039	0.389	1.5	268.8	O K
60 min Summer	92.071	0.421	1.5	342.8	O K
120 min Summer	92.101	0.451	1.5	419.8	O K
180 min Summer	92.116	0.466	1.5	463.7	O K
240 min Summer	92.125	0.475	1.5	492.6	O K
360 min Summer	92.139	0.489	1.5	535.6	O K
480 min Summer	92.148	0.498	1.5	565.2	O K
600 min Summer	92.154	0.504	1.5	587.2	O K
720 min Summer	92.159	0.509	1.5	604.2	O K
960 min Summer	92.166	0.516	1.5	628.0	O K
1440 min Summer	92.172	0.522	1.5	652.8	O K
2160 min Summer	92.174	0.524	1.5	660.6	O K
2880 min Summer	92.172	0.522	1.5	650.2	O K
4320 min Summer	92.161	0.511	1.5	611.7	O K
5760 min Summer	92.153	0.503	1.5	582.2	O K
7200 min Summer	92.146	0.496	1.5	557.9	O K
8640 min Summer	92.139	0.489	1.5	536.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	129.682	0.0	129.6	23
30 min Summer	87.133	0.0	129.6	38
60 min Summer	55.837	0.0	259.2	68
120 min Summer	34.509	0.0	259.2	128
180 min Summer	25.637	0.0	259.2	188
240 min Summer	20.604	0.0	259.2	246
360 min Summer	15.169	0.0	259.2	366
480 min Summer	12.185	0.0	259.2	486
600 min Summer	10.272	0.0	259.2	606
720 min Summer	8.930	0.0	259.2	726
960 min Summer	7.152	0.0	259.1	964
1440 min Summer	5.221	0.0	259.1	1444
2160 min Summer	3.803	0.0	518.3	2164
2880 min Summer	3.033	0.0	518.2	2880
4320 min Summer	2.201	0.0	513.0	3720
5760 min Summer	1.751	0.0	1011.6	4448
7200 min Summer	1.466	0.0	983.5	5192
8640 min Summer	1.270	0.0	951.0	5976


GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		Bund Calcs W/ No Outfall, Three Maids
Date 02/02/2024 18:28 File		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1



Cascade Summary of Results for Bund With Outfall.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	92.133	0.483	1.5	515.4	O K
15 min Winter	92.016	0.366	1.5	224.8	O K
30 min Winter	92.054	0.404	1.5	301.4	O K
60 min Winter	92.088	0.438	1.5	384.7	O K
120 min Winter	92.119	0.469	1.5	471.7	O K
180 min Winter	92.135	0.485	1.5	521.5	O K
240 min Winter	92.145	0.495	1.5	554.8	O K
360 min Winter	92.159	0.509	1.5	604.4	O K
480 min Winter	92.169	0.519	1.5	639.0	O K
600 min Winter	92.176	0.526	1.5	665.1	O K
720 min Winter	92.181	0.531	1.5	685.6	O K
960 min Winter	92.188	0.538	1.5	715.4	O K
1440 min Winter	92.197	0.547	1.5	749.4	O K
2160 min Winter	92.201	0.551	1.5	768.1	O K
2880 min Winter	92.201	0.551	1.5	767.4	O K
4320 min Winter	92.194	0.544	1.5	737.5	O K
5760 min Winter	92.182	0.532	1.5	690.8	O K
7200 min Winter	92.174	0.524	1.5	659.2	O K
8640 min Winter	92.166	0.516	1.5	629.3	O K
10080 min Winter	92.157	0.507	1.5	598.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	1.124	0.0	915.3	6856
15 min Winter	129.682	0.0	129.6	23
30 min Winter	87.133	0.0	129.6	37
60 min Winter	55.837	0.0	259.2	68
120 min Winter	34.509	0.0	259.2	126
180 min Winter	25.637	0.0	259.1	184
240 min Winter	20.604	0.0	259.1	244
360 min Winter	15.169	0.0	258.9	362
480 min Winter	12.185	0.0	258.8	480
600 min Winter	10.272	0.0	258.7	598
720 min Winter	8.930	0.0	258.6	716
960 min Winter	7.152	0.0	258.4	952
1440 min Winter	5.221	0.0	257.8	1418
2160 min Winter	3.803	0.0	515.9	2116
2880 min Winter	3.033	0.0	514.2	2796
4320 min Winter	2.201	0.0	509.5	4108
5760 min Winter	1.751	0.0	1020.2	5192
7200 min Winter	1.466	0.0	998.9	5616
8640 min Winter	1.270	0.0	972.9	6488
10080 min Winter	1.124	0.0	944.3	7456

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 18:28 File		
Bund Calcs W/ No Outfall, Three Maids		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1

Cascade Rainfall Details for Bund With Outfall.SRCX

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)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.833

<b>Time (mins) Area</b>			<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>	<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.416	4	8	0.417

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Bund Calcs W/ No Outfall,  
 Three Maids



Date 02/02/2024 18:28  
 File

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Cascade Model Details for Bund With Outfall.SRCX

Storage is Online Cover Level (m) 93.300

Tank or Pond Structure


Invert Level (m) 91.650

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	0.0	0.550	4159.0	1.640	4159.0

Pump Outflow Control

Invert Level (m) 91.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5000	0.900	1.5000	1.700	1.5000	2.500	1.5000
0.200	1.5000	1.000	1.5000	1.800	1.5000	2.600	1.5000
0.300	1.5000	1.100	1.5000	1.900	1.5000	2.700	1.5000
0.400	1.5000	1.200	1.5000	2.000	1.5000	2.800	1.5000
0.500	1.5000	1.300	1.5000	2.100	1.5000	2.900	1.5000
0.600	1.5000	1.400	1.5000	2.200	1.5000	3.000	1.5000
0.700	1.5000	1.500	1.5000	2.300	1.5000		
0.800	1.5000	1.600	1.5000	2.400	1.5000		

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Northern Clean W/ No Bund Three Maids	
Date 02/02/2024 18:27 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Summary of Results for Northern With Bund.SRCX

**Upstream Structures**                      **Outflow To**      **Overflow To**

Bund With Outfall.SRCX                      (None)                      (None)

Half Drain Time : 776 minutes.

<b>Storm Event</b>	<b>Max Level (m)</b>	<b>Max Depth (m)</b>	<b>Max Infiltration (l/s)</b>	<b>Max Volume (m³)</b>	<b>Status</b>
15 min Summer	91.384	0.384	3.3	109.5	O K
30 min Summer	91.515	0.515	3.4	146.8	O K
60 min Summer	91.653	0.653	3.5	186.2	O K
120 min Summer	91.792	0.792	3.6	225.6	O K
180 min Summer	91.865	0.865	3.7	246.5	O K
240 min Summer	91.910	0.910	3.7	259.2	O K
360 min Summer	91.969	0.969	3.7	276.1	O K
480 min Summer	92.001	1.001	3.7	285.4	O K
600 min Summer	92.019	1.019	3.8	290.4	O K
720 min Summer	92.027	1.027	3.8	292.6	O K
960 min Summer	92.023	1.023	3.8	291.6	O K
1440 min Summer	91.996	0.996	3.7	283.8	O K
2160 min Summer	91.946	0.946	3.7	269.7	O K
2880 min Summer	91.900	0.900	3.7	256.6	O K
4320 min Summer	91.816	0.816	3.6	232.5	O K
5760 min Summer	91.736	0.736	3.6	209.9	O K
7200 min Summer	91.663	0.663	3.5	189.1	O K

<b>Storm Event</b>	<b>Rain (mm/hr)</b>	<b>Flooded Volume (m³)</b>	<b>Time-Peak (mins)</b>
15 min Summer	129.682	0.0	30
30 min Summer	87.133	0.0	45
60 min Summer	55.837	0.0	74
120 min Summer	34.509	0.0	134
180 min Summer	25.637	0.0	192
240 min Summer	20.604	0.0	248
360 min Summer	15.169	0.0	366
480 min Summer	12.185	0.0	484
600 min Summer	10.272	0.0	604
720 min Summer	8.930	0.0	722
960 min Summer	7.152	0.0	946
1440 min Summer	5.221	0.0	1168
2160 min Summer	3.803	0.0	1556
2880 min Summer	3.033	0.0	1964
4320 min Summer	2.201	0.0	2780
5760 min Summer	1.751	0.0	3592
7200 min Summer	1.466	0.0	4400

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:27  
 File

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Cascade Summary of Results for Northern With Bund.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
8640 min Summer	91.596	0.596	3.5	170.0	O K
10080 min Summer	91.534	0.534	3.4	152.3	O K
15 min Winter	91.431	0.431	3.3	122.9	O K
30 min Winter	91.578	0.578	3.5	164.7	O K
60 min Winter	91.734	0.734	3.6	209.2	O K
120 min Winter	91.891	0.891	3.7	254.1	O K
180 min Winter	91.977	0.977	3.7	278.3	O K
240 min Winter	92.029	1.029	3.8	293.3	O K
360 min Winter	92.101	1.101	3.8	313.7	O K
480 min Winter	92.142	1.142	3.8	325.6	O K
600 min Winter	92.167	1.167	3.9	332.7	O K
720 min Winter	92.182	1.182	3.9	336.7	O K
960 min Winter	92.189	1.189	3.9	338.9	O K
1440 min Winter	92.160	1.160	3.9	330.7	O K
2160 min Winter	92.100	1.100	3.8	313.4	O K
2880 min Winter	92.034	1.034	3.8	294.7	O K
4320 min Winter	91.910	0.910	3.7	259.5	O K
5760 min Winter	91.792	0.792	3.6	225.7	O K
7200 min Winter	91.683	0.683	3.5	194.7	O K
8640 min Winter	91.585	0.585	3.5	166.8	O K
10080 min Winter	91.496	0.496	3.4	141.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
8640 min Summer	1.270	0.0	5192
10080 min Summer	1.124	0.0	5952
15 min Winter	129.682	0.0	30
30 min Winter	87.133	0.0	45
60 min Winter	55.837	0.0	74
120 min Winter	34.509	0.0	132
180 min Winter	25.637	0.0	188
240 min Winter	20.604	0.0	246
360 min Winter	15.169	0.0	360
480 min Winter	12.185	0.0	476
600 min Winter	10.272	0.0	590
720 min Winter	8.930	0.0	704
960 min Winter	7.152	0.0	926
1440 min Winter	5.221	0.0	1330
2160 min Winter	3.803	0.0	1660
2880 min Winter	3.033	0.0	2120
4320 min Winter	2.201	0.0	3028
5760 min Winter	1.751	0.0	3872
7200 min Winter	1.466	0.0	4752
8640 min Winter	1.270	0.0	5536
10080 min Winter	1.124	0.0	6352

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:27  
 File

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Cascade Rainfall Details for Northern With Bund.SRCX

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)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.459

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area				
From:	To:	From:	To:	From:	To:	From:	To:				
0	4	0.157	4	8	0.157	8	12	0.000	12	16	0.145

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area	
From:	To:	
0	4	0.000

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Northern Clean W/ No Bund  
 Three Maids



Date 02/02/2024 18:27  
 File

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Cascade Model Details for Northern With Bund.SRCX

Storage is Online Cover Level (m) 93.192

Cellular Storage Structure


Invert Level (m) 91.000 Safety Factor 2.0  
 Infiltration Coefficient Base (m/hr) 0.07308 Porosity 0.95  
 Infiltration Coefficient Side (m/hr) 0.07308

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	300.0	300.0	1.201	0.0	383.0
1.200	300.0	383.0			



## **APPENDIX VIII**

Yard – Process Storage Calculations

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:43 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Summary of Results for Process Storage Contaminated 2.SRCX

<b>Upstream Structures</b>		<b>Outflow To</b>		<b>Overflow To</b>	
Contaminated 2.SRCX		(None)		(None)	
<b>Storm Event</b>	<b>Max Level (m)</b>	<b>Max Depth (m)</b>	<b>Max Control (l/s)</b>	<b>Max Volume (m³)</b>	<b>Status</b>
15 min Summer	92.692	0.692	2.0	103.7	O K
30 min Summer	92.938	0.938	2.0	140.7	O K
60 min Summer	93.209	1.209	2.0	181.4	O K
120 min Summer	93.507	1.507	2.0	226.0	O K
180 min Summer	93.697	1.697	2.0	254.6	O K
240 min Summer	93.836	1.836	2.0	275.4	O K
360 min Summer	94.009	2.009	2.0	301.3	O K
480 min Summer	94.124	2.124	2.0	318.6	O K
600 min Summer	94.205	2.205	2.0	330.8	O K
720 min Summer	94.263	2.263	2.0	339.5	O K
960 min Summer	94.332	2.332	2.0	349.8	O K
1440 min Summer	94.360	2.360	2.0	354.0	O K
2160 min Summer	94.323	2.323	2.0	348.4	O K
2880 min Summer	94.287	2.287	2.0	343.1	O K
4320 min Summer	94.208	2.208	2.0	331.2	O K
5760 min Summer	94.109	2.109	2.0	316.4	O K
7200 min Summer	93.997	1.997	2.0	299.6	O K
8640 min Summer	93.875	1.875	2.0	281.3	O K

<b>Storm Event</b>	<b>Rain (mm/hr)</b>	<b>Flooded Volume (m³)</b>	<b>Discharge Volume (m³)</b>	<b>Time-Peak (mins)</b>
15 min Summer	52.843	0.0	118.8	89
30 min Summer	34.966	0.0	157.3	103
60 min Summer	22.323	0.0	200.9	128
120 min Summer	13.974	0.0	251.5	180
180 min Summer	10.574	0.0	285.4	226
240 min Summer	8.665	0.0	311.9	276
360 min Summer	6.512	0.0	344.0	392
480 min Summer	5.314	0.0	343.6	510
600 min Summer	4.538	0.0	343.3	624
720 min Summer	3.988	0.0	343.0	742
960 min Summer	3.253	0.0	342.3	974
1440 min Summer	2.441	0.0	340.5	1442
2160 min Summer	1.831	0.0	593.1	1804
2880 min Summer	1.493	0.0	644.6	2188
4320 min Summer	1.120	0.0	623.8	3004
5760 min Summer	0.914	0.0	789.0	3832
7200 min Summer	0.780	0.0	842.0	4648
8640 min Summer	0.684	0.0	887.0	5472

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Contaminated  
 Three Maids



Date 02/02/2024 21:43  
 File


Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Cascade Summary of Results for Process Storage Contaminated 2.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	93.750	1.750	2.0	262.6	O K
15 min Winter	92.785	0.785	2.0	117.8	O K
30 min Winter	93.061	1.061	2.0	159.2	O K
60 min Winter	93.371	1.371	2.0	205.6	O K
120 min Winter	93.706	1.706	2.0	256.0	O K
180 min Winter	93.923	1.923	2.0	288.5	O K
240 min Winter	94.085	2.085	2.0	312.8	O K
360 min Winter	94.299	2.299	2.0	344.9	O K
480 min Winter	94.441	2.441	2.0	366.2	O K
600 min Winter	94.545	2.545	2.0	381.8	O K
720 min Winter	94.624	2.624	2.0	393.5	O K
960 min Winter	94.729	2.729	2.0	409.4	O K
<b>1440 min Winter</b>	<b>94.816</b>	<b>2.816</b>	<b>2.0</b>	<b>422.3</b>	<b>O K</b>
2160 min Winter	94.787	2.787	2.0	418.1	O K
2880 min Winter	94.709	2.709	2.0	406.3	O K
4320 min Winter	94.583	2.583	2.0	387.4	O K
5760 min Winter	94.414	2.414	2.0	362.1	O K
7200 min Winter	94.222	2.222	2.0	333.3	O K
8640 min Winter	94.016	2.016	2.0	302.4	O K
10080 min Winter	93.811	1.811	2.0	271.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	0.613	0.0	927.2	6272
15 min Winter	52.843	0.0	133.1	91
30 min Winter	34.966	0.0	172.2	106
60 min Winter	22.323	0.0	225.1	128
120 min Winter	13.974	0.0	281.8	184
180 min Winter	10.574	0.0	319.7	232
240 min Winter	8.665	0.0	343.8	278
360 min Winter	6.512	0.0	343.3	386
480 min Winter	5.314	0.0	342.7	502
600 min Winter	4.538	0.0	342.2	618
720 min Winter	3.988	0.0	341.7	732
960 min Winter	3.253	0.0	340.5	962
<b>1440 min Winter</b>	<b>2.441</b>	<b>0.0</b>	<b>338.1</b>	<b>1412</b>
2160 min Winter	1.831	0.0	664.0	2052
2880 min Winter	1.493	0.0	670.9	2348
4320 min Winter	1.120	0.0	639.2	3264
5760 min Winter	0.914	0.0	883.6	4184
7200 min Winter	0.780	0.0	942.9	5072
8640 min Winter	0.684	0.0	993.0	5936
10080 min Winter	0.613	0.0	1038.5	6776

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:43 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Rainfall Details for Process Storage Contaminated 2.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:43 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Model Details for Process Storage Contaminated 2.SRCX

Storage is Online Cover Level (m) 100.200

Tank or Pond Structure


Invert Level (m) 92.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	150.0	8.000	150.0

Pump Outflow Control

Invert Level (m) 88.000


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:32 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Summary of Results for Process Storage Contaminated Rev 10.SRCX

Upstream Structures		Outflow To		Overflow To	
Contaminated 10.SRCX		(None)	(None)		
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	93.075	1.075	2.0	161.3	O K
30 min Summer	93.442	1.442	2.0	216.4	O K
60 min Summer	93.847	1.847	2.0	277.0	O K
120 min Summer	94.280	2.280	2.0	342.1	O K
180 min Summer	94.543	2.543	2.0	381.4	O K
240 min Summer	94.733	2.733	2.0	410.0	O K
360 min Summer	94.999	2.999	2.0	449.9	O K
480 min Summer	95.176	3.176	2.0	476.3	O K
600 min Summer	95.304	3.304	2.0	495.7	O K
720 min Summer	95.402	3.402	2.0	510.3	O K
960 min Summer	95.537	3.537	2.0	530.5	O K
1440 min Summer	95.654	3.654	2.0	548.1	O K
2160 min Summer	95.637	3.637	2.0	545.6	O K
2880 min Summer	95.551	3.551	2.0	532.6	O K
4320 min Summer	95.413	3.413	2.0	511.9	O K
5760 min Summer	95.286	3.286	2.0	492.9	O K
7200 min Summer	95.155	3.155	2.0	473.2	O K
8640 min Summer	95.018	3.018	2.0	452.8	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	79.094	0.0	172.4	101
30 min Summer	52.183	0.0	172.3	117
60 min Summer	33.096	0.0	297.7	138
120 min Summer	20.474	0.0	344.8	186
180 min Summer	15.333	0.0	344.7	238
240 min Summer	12.449	0.0	344.5	286
360 min Summer	9.275	0.0	344.3	394
480 min Summer	7.518	0.0	344.1	514
600 min Summer	6.386	0.0	343.9	632
720 min Summer	5.586	0.0	343.7	750
960 min Summer	4.522	0.0	343.3	984
1440 min Summer	3.354	0.0	342.4	1456
2160 min Summer	2.486	0.0	686.3	2164
2880 min Summer	2.009	0.0	680.5	2500
4320 min Summer	1.487	0.0	652.4	3256
5760 min Summer	1.201	0.0	1037.9	4056
7200 min Summer	1.017	0.0	1098.5	4896
8640 min Summer	0.889	0.0	1151.5	5712

GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:32 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Summary of Results for Process Storage Contaminated Rev 10.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	94.880	2.880	2.0	432.1	O K
15 min Winter	93.216	1.216	2.0	182.4	O K
30 min Winter	93.625	1.625	2.0	243.8	O K
60 min Winter	94.081	2.081	2.0	312.2	O K
120 min Winter	94.576	2.576	2.0	386.4	O K
180 min Winter	94.873	2.873	2.0	430.9	O K
240 min Winter	95.090	3.090	2.0	463.5	O K
360 min Winter	95.408	3.408	2.0	511.2	O K
480 min Winter	95.621	3.621	2.0	543.1	O K
600 min Winter	95.780	3.780	2.0	566.9	O K
720 min Winter	95.903	3.903	2.0	585.5	O K
960 min Winter	96.081	4.081	2.0	612.1	O K
1440 min Winter	96.269	4.269	2.0	640.4	O K
2160 min Winter	96.338	4.338	2.0	650.7	O K
2880 min Winter	96.277	4.277	2.0	641.6	O K
4320 min Winter	96.041	4.041	2.0	606.2	O K
5760 min Winter	95.862	3.862	2.0	579.3	O K
7200 min Winter	95.658	3.658	2.0	548.7	O K
8640 min Winter	95.440	3.440	2.0	516.0	O K
10080 min Winter	95.215	3.215	2.0	482.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	0.793	0.0	1155.4	6512
15 min Winter	79.094	0.0	172.5	103
30 min Winter	52.183	0.0	172.3	123
60 min Winter	33.096	0.0	333.7	144
120 min Winter	20.474	0.0	344.6	186
180 min Winter	15.333	0.0	344.4	242
240 min Winter	12.449	0.0	344.1	292
360 min Winter	9.275	0.0	343.6	390
480 min Winter	7.518	0.0	343.2	506
600 min Winter	6.386	0.0	342.7	622
720 min Winter	5.586	0.0	342.3	740
960 min Winter	4.522	0.0	341.4	972
1440 min Winter	3.354	0.0	339.6	1432
2160 min Winter	2.486	0.0	682.1	2108
2880 min Winter	2.009	0.0	678.3	2756
4320 min Winter	1.487	0.0	663.1	3492
5760 min Winter	1.201	0.0	1161.6	4400
7200 min Winter	1.017	0.0	1230.4	5336
8640 min Winter	0.889	0.0	1245.6	6232
10080 min Winter	0.793	0.0	1202.2	7104

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:32 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Rainfall Details for Process Storage Contaminated Rev 10.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.000


<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000



GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:32 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Model Details for Process Storage Contaminated Rev 10.SRCX

Storage is Online Cover Level (m) 100.200

Tank or Pond Structure


Invert Level (m) 92.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	150.0	8.000	150.0

Pump Outflow Control

Invert Level (m) 88.000


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 20:44 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Summary of Results for Process Storage Contaminated Rev 30.SRCX

Upstream Structures		Outflow To		Overflow To	
Contaminated 30.SRCX		(None)	(None)		
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	93.384	1.384	2.0	207.6	O K
30 min Summer	93.866	1.866	2.0	279.9	O K
60 min Summer	94.396	2.396	2.0	359.5	O K
120 min Summer	94.970	2.970	2.0	445.5	O K
180 min Summer	95.304	3.304	2.0	495.6	O K
240 min Summer	95.536	3.536	2.0	530.4	O K
360 min Summer	95.880	3.880	2.0	582.0	O K
480 min Summer	96.108	4.108	2.0	616.2	O K
600 min Summer	96.277	4.277	2.0	641.5	O K
720 min Summer	96.407	4.407	2.0	661.0	O K
960 min Summer	96.591	4.591	2.0	688.6	O K
1440 min Summer	96.780	4.780	2.0	717.1	O K
2160 min Summer	96.830	4.830	2.0	724.6	O K
2880 min Summer	96.737	4.737	2.0	710.5	O K
4320 min Summer	96.507	4.507	2.0	676.0	O K
5760 min Summer	96.325	4.325	2.0	648.8	O K
7200 min Summer	96.164	4.164	2.0	624.6	O K
8640 min Summer	96.007	4.007	2.0	601.1	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	100.138	0.0	172.5	110
30 min Summer	66.644	0.0	172.4	129
60 min Summer	42.476	0.0	345.1	154
120 min Summer	26.265	0.0	344.9	192
180 min Summer	19.594	0.0	344.8	244
240 min Summer	15.832	0.0	344.7	298
360 min Summer	11.728	0.0	344.5	396
480 min Summer	9.466	0.0	344.3	514
600 min Summer	8.011	0.0	344.2	634
720 min Summer	6.988	0.0	344.0	752
960 min Summer	5.628	0.0	343.7	990
1440 min Summer	4.142	0.0	343.1	1462
2160 min Summer	3.045	0.0	687.7	2172
2880 min Summer	2.445	0.0	686.0	2872
4320 min Summer	1.793	0.0	669.4	3528
5760 min Summer	1.438	0.0	1241.7	4280
7200 min Summer	1.211	0.0	1286.9	5072
8640 min Summer	1.053	0.0	1240.8	5896

GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 20:44 File		
Innovyze		Source Control 2019.1

Cascade Summary of Results for Process Storage Contaminated Rev 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	95.849	3.849	2.0	577.4	O K
15 min Winter	93.561	1.561	2.0	234.1	O K
30 min Winter	94.101	2.101	2.0	315.2	O K
60 min Winter	94.697	2.697	2.0	404.5	O K
120 min Winter	95.342	3.342	2.0	501.3	O K
180 min Winter	95.729	3.729	2.0	559.3	O K
240 min Winter	95.991	3.991	2.0	598.6	O K
360 min Winter	96.388	4.388	2.0	658.2	O K
480 min Winter	96.665	4.665	2.0	699.7	O K
600 min Winter	96.868	4.868	2.0	730.3	O K
720 min Winter	97.028	5.028	2.0	754.3	O K
960 min Winter	97.263	5.263	2.0	789.4	O K
1440 min Winter	97.531	5.531	2.0	829.7	O K
2160 min Winter	97.675	5.675	2.0	851.2	O K
2880 min Winter	97.659	5.659	2.0	848.9	O K
4320 min Winter	97.403	5.403	2.0	810.4	O K
5760 min Winter	97.119	5.119	2.0	767.8	O K
7200 min Winter	96.895	4.895	2.0	734.3	O K
8640 min Winter	96.662	4.662	2.0	699.3	O K
10080 min Winter	96.420	4.420	2.0	663.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	0.936	0.0	1191.4	6712
15 min Winter	100.138	0.0	172.5	114
30 min Winter	66.644	0.0	172.4	135
60 min Winter	42.476	0.0	345.0	162
120 min Winter	26.265	0.0	344.7	202
180 min Winter	19.594	0.0	344.5	246
240 min Winter	15.832	0.0	344.2	302
360 min Winter	11.728	0.0	343.8	400
480 min Winter	9.466	0.0	343.4	508
600 min Winter	8.011	0.0	343.0	626
720 min Winter	6.988	0.0	342.7	742
960 min Winter	5.628	0.0	341.9	976
1440 min Winter	4.142	0.0	340.3	1440
2160 min Winter	3.045	0.0	683.3	2128
2880 min Winter	2.445	0.0	680.2	2800
4320 min Winter	1.793	0.0	672.0	4064
5760 min Winter	1.438	0.0	1343.1	4592
7200 min Winter	1.211	0.0	1310.5	5496
8640 min Winter	1.053	0.0	1273.6	6416
10080 min Winter	0.936	0.0	1233.6	7320

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 20:44 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Rainfall Details for Process Storage Contaminated Rev 30.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 20:44 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Model Details for Process Storage Contaminated Rev 30.SRCX

Storage is Online Cover Level (m) 100.200

Tank or Pond Structure


Invert Level (m) 92.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	150.0	8.000	150.0

Pump Outflow Control

Invert Level (m) 88.000


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 20:29 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Summary of Results for Process Storage Contaminated Rev 1.SRCX

Upstream Structures		Outflow To		Overflow To	
Contaminated 100.SRCX		(None)		(None)	
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	93.816	1.816	2.0	272.4	O K
30 min Summer	94.465	2.465	2.0	369.8	O K
60 min Summer	95.177	3.177	2.0	476.6	O K
120 min Summer	95.938	3.938	2.0	590.6	O K
180 min Summer	96.384	4.384	2.0	657.6	O K
240 min Summer	96.672	4.672	2.0	700.8	O K
360 min Summer	97.108	5.108	2.0	766.2	O K
480 min Summer	97.410	5.410	2.0	811.6	O K
600 min Summer	97.631	5.631	2.0	844.6	O K
720 min Summer	97.802	5.802	2.0	870.3	O K
960 min Summer	98.050	6.050	2.0	907.4	O K
1440 min Summer	98.325	6.325	2.0	948.7	O K
2160 min Summer	98.457	6.457	2.0	968.5	O K
2880 min Summer	98.413	6.413	2.0	961.9	O K
4320 min Summer	98.088	6.088	2.0	913.2	O K
5760 min Summer	97.803	5.803	2.0	870.4	O K
7200 min Summer	97.571	5.571	2.0	835.7	O K
8640 min Summer	97.373	5.373	2.0	806.0	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	129.682	0.0	172.5	122
30 min Summer	87.133	0.0	172.4	148
60 min Summer	55.837	0.0	345.2	180
120 min Summer	34.509	0.0	345.0	218
180 min Summer	25.637	0.0	344.9	254
240 min Summer	20.604	0.0	344.8	306
360 min Summer	15.169	0.0	344.7	408
480 min Summer	12.185	0.0	344.5	516
600 min Summer	10.272	0.0	344.4	636
720 min Summer	8.930	0.0	344.3	754
960 min Summer	7.152	0.0	344.0	992
1440 min Summer	5.221	0.0	343.6	1468
2160 min Summer	3.803	0.0	688.5	2180
2880 min Summer	3.033	0.0	687.6	2892
4320 min Summer	2.201	0.0	683.0	3972
5760 min Summer	1.751	0.0	1352.6	4640
7200 min Summer	1.466	0.0	1319.1	5376
8640 min Summer	1.270	0.0	1278.4	6160

GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 20:29 File		
Innovyze		Source Control 2019.1

Cascade Summary of Results for Process Storage Contaminated Rev 1.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	97.185	5.185	2.0	777.7	O K
15 min Winter	94.044	2.044	2.0	306.6	O K
30 min Winter	94.772	2.772	2.0	415.8	O K
60 min Winter	95.571	3.571	2.0	535.7	O K
120 min Winter	96.426	4.426	2.0	664.0	O K
180 min Winter	96.932	4.932	2.0	739.8	O K
240 min Winter	97.270	5.270	2.0	790.5	O K
360 min Winter	97.762	5.762	2.0	864.3	O K
480 min Winter	98.120	6.120	2.0	918.0	O K
600 min Winter	98.384	6.384	2.0	957.6	O K
720 min Winter	98.590	6.590	2.0	988.5	O K
960 min Winter	98.896	6.896	2.0	1034.4	O K
1440 min Winter	99.261	7.261	2.0	1089.2	O K
2160 min Winter	99.495	7.495	2.0	1124.2	O K
2880 min Winter	99.534	7.534	2.0	1130.2	O K
4320 min Winter	99.330	7.330	2.0	1099.5	O K
5760 min Winter	98.943	6.943	2.0	1041.5	O K
7200 min Winter	98.595	6.595	2.0	989.3	O K
8640 min Winter	98.333	6.333	2.0	949.9	O K
10080 min Winter	98.066	6.066	2.0	909.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	1.124	0.0	1233.1	6968
15 min Winter	129.682	0.0	172.5	130
30 min Winter	87.133	0.0	172.4	157
60 min Winter	55.837	0.0	345.1	190
120 min Winter	34.509	0.0	344.8	230
180 min Winter	25.637	0.0	344.6	264
240 min Winter	20.604	0.0	344.4	304
360 min Winter	15.169	0.0	344.0	416
480 min Winter	12.185	0.0	343.7	514
600 min Winter	10.272	0.0	343.3	628
720 min Winter	8.930	0.0	343.0	744
960 min Winter	7.152	0.0	342.3	980
1440 min Winter	5.221	0.0	340.9	1446
2160 min Winter	3.803	0.0	684.4	2144
2880 min Winter	3.033	0.0	681.8	2828
4320 min Winter	2.201	0.0	675.5	4156
5760 min Winter	1.751	0.0	1357.9	5376
7200 min Winter	1.466	0.0	1337.4	5776
8640 min Winter	1.270	0.0	1305.2	6664
10080 min Winter	1.124	0.0	1269.0	7576

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 20:29 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Rainfall Details for Process Storage Contaminated Rev 1.SRCX

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)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.000


<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000

Time Area Diagram

Total Area (ha) 0.000

<b>Time (mins) Area</b>		
<b>From:</b>	<b>To:</b>	<b>(ha)</b>
0	4	0.000



GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 20:29 File		
Innovyze		Source Control 2019.1

Cascade Model Details for Process Storage Contaminated Rev 1.SRCX

Storage is Online Cover Level (m) 100.200

Tank or Pond Structure


Invert Level (m) 92.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	150.0	8.000	150.0

Pump Outflow Control

Invert Level (m) 88.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	2.0000	1.700	2.0000	2.500	2.0000
0.200	2.0000	1.000	2.0000	1.800	2.0000	2.600	2.0000
0.300	2.0000	1.100	2.0000	1.900	2.0000	2.700	2.0000
0.400	2.0000	1.200	2.0000	2.000	2.0000	2.800	2.0000
0.500	2.0000	1.300	2.0000	2.100	2.0000	2.900	2.0000
0.600	2.0000	1.400	2.0000	2.200	2.0000	3.000	2.0000
0.700	2.0000	1.500	2.0000	2.300	2.0000		
0.800	2.0000	1.600	2.0000	2.400	2.0000		

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 21:42 File		
		Contaminated Three Maids
		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1

Cascade Summary of Results for Contaminated 2.SRCX

Upstream Structures	Outflow To	Overflow To			
(None)	Process Storage Contaminated 2.SRCX	(None)			
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	91.286	4.286	80.0	72.3	O K
30 min Summer	91.299	4.299	80.0	85.3	O K
60 min Summer	91.300	4.300	80.0	86.4	O K
120 min Summer	91.285	4.285	80.0	71.9	O K
180 min Summer	91.270	4.270	80.0	61.8	O K
240 min Summer	90.408	3.408	80.0	52.7	O K
360 min Summer	89.798	2.798	78.7	52.0	O K
480 min Summer	89.778	2.778	67.0	52.0	O K
600 min Summer	89.753	2.753	52.0	51.9	O K
720 min Summer	89.732	2.732	39.1	51.9	O K
960 min Summer	89.710	2.710	26.2	51.9	O K
1440 min Summer	87.498	0.498	20.0	24.9	O K
2160 min Summer	87.286	0.286	17.9	14.3	O K
2880 min Summer	87.264	0.264	14.6	13.2	O K
4320 min Summer	87.240	0.240	11.0	12.0	O K
5760 min Summer	87.227	0.227	9.0	11.3	O K
7200 min Summer	87.218	0.218	7.7	10.9	O K
8640 min Summer	87.212	0.212	6.8	10.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	52.843	0.0	118.9	20
30 min Summer	34.966	0.0	157.3	28
60 min Summer	22.323	0.0	200.9	44
120 min Summer	13.974	0.0	251.5	74
180 min Summer	10.574	0.0	285.5	102
240 min Summer	8.665	0.0	311.9	122
360 min Summer	6.512	0.0	351.7	182
480 min Summer	5.314	0.0	382.6	244
600 min Summer	4.538	0.0	408.4	312
720 min Summer	3.988	0.0	430.7	374
960 min Summer	3.253	0.0	468.4	522
1440 min Summer	2.441	0.0	527.3	762
2160 min Summer	1.831	0.0	593.1	1100
2880 min Summer	1.493	0.0	644.8	1468
4320 min Summer	1.120	0.0	725.6	2164
5760 min Summer	0.914	0.0	789.4	2864
7200 min Summer	0.780	0.0	842.2	3616
8640 min Summer	0.684	0.0	887.0	4312

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Contaminated  
 Three Maids



Date 02/02/2024 21:42  
 File


Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1

Cascade Summary of Results for Contaminated 2.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	87.207	0.207	6.0	10.3	O K
15 min Winter	91.295	4.295	80.0	80.6	O K
30 min Winter	91.307	4.307	80.0	95.4	O K
60 min Winter	91.304	4.304	80.0	91.3	O K
120 min Winter	91.273	4.273	80.0	63.5	O K
180 min Winter	91.106	4.106	80.0	53.4	O K
240 min Winter	89.782	2.782	69.1	52.0	O K
360 min Winter	89.759	2.759	55.6	52.0	O K
480 min Winter	89.747	2.747	48.4	51.9	O K
600 min Winter	89.726	2.726	35.5	51.9	O K
720 min Winter	89.714	2.714	28.3	51.9	O K
960 min Winter	87.557	0.557	20.0	27.9	O K
1440 min Winter	87.282	0.282	17.3	14.1	O K
2160 min Winter	87.253	0.253	13.0	12.7	O K
2880 min Winter	87.237	0.237	10.6	11.9	O K
4320 min Winter	87.220	0.220	8.0	11.0	O K
5760 min Winter	87.210	0.210	6.5	10.5	O K
7200 min Winter	87.204	0.204	5.6	10.2	O K
8640 min Winter	87.195	0.195	4.9	9.8	O K
10080 min Winter	87.178	0.178	4.3	8.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	0.613	0.0	926.9	5048
15 min Winter	52.843	0.0	133.2	20
30 min Winter	34.966	0.0	176.2	29
60 min Winter	22.323	0.0	225.0	46
120 min Winter	13.974	0.0	281.7	76
180 min Winter	10.574	0.0	319.7	86
240 min Winter	8.665	0.0	349.4	122
360 min Winter	6.512	0.0	393.8	184
480 min Winter	5.314	0.0	428.5	242
600 min Winter	4.538	0.0	457.4	314
720 min Winter	3.988	0.0	482.4	410
960 min Winter	3.253	0.0	524.6	544
1440 min Winter	2.441	0.0	590.6	734
2160 min Winter	1.831	0.0	664.3	1088
2880 min Winter	1.493	0.0	722.2	1456
4320 min Winter	1.120	0.0	812.7	2144
5760 min Winter	0.914	0.0	884.1	2864
7200 min Winter	0.780	0.0	943.2	3592
8640 min Winter	0.684	0.0	993.5	4368
10080 min Winter	0.613	0.0	1038.1	5112

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:42 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Rainfall Details for Contaminated 2.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 1.200

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.400		0.400		0.400

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area (ha)
From:	To:
0	4
	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Contaminated Three Maids		
Date 02/02/2024 21:42 File		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1

Cascade Model Details for Contaminated 2.SRCX

Storage is Online Cover Level (m) 91.775

Tank or Pond Structure


Invert Level (m) 87.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	50.0	1.001	1.1	4.220	1.1
1.000	50.0	4.219	1.1	4.345	2850.0

Pump Outflow Control

Invert Level (m) 87.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	20.0000	1.700	20.0000	2.500	20.0000
0.200	5.0000	1.000	20.0000	1.800	20.0000	2.600	20.0000
0.300	20.0000	1.100	20.0000	1.900	20.0000	2.700	20.0000
0.400	20.0000	1.200	20.0000	2.000	20.0000	2.800	80.0000
0.500	20.0000	1.300	20.0000	2.100	20.0000	2.900	80.0000
0.600	20.0000	1.400	20.0000	2.200	20.0000	3.000	80.0000
0.700	20.0000	1.500	20.0000	2.300	20.0000		
0.800	20.0000	1.600	20.0000	2.400	20.0000		

GGP Consult		Page 1
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:32 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	


Cascade Summary of Results for Contaminated 10.SRCX

**Upstream Structures**                      **Outflow To**                      **Overflow To**

(None) Process Storage Contaminated Rev 10.SRCX                      (None)

<b>Storm Event</b>	<b>Max Level (m)</b>	<b>Max Depth (m)</b>	<b>Max Control (l/s)</b>	<b>Max Volume (m<sup>3</sup>)</b>	<b>Status</b>
15 min Summer	91.321	4.321	80.0	119.0	O K
30 min Summer	91.333	4.333	80.0	143.6	O K
60 min Summer	91.334	4.334	80.0	147.1	O K
120 min Summer	91.326	4.326	80.0	129.1	O K
180 min Summer	91.314	4.314	80.0	105.5	O K
240 min Summer	91.298	4.298	80.0	84.3	O K
360 min Summer	91.254	4.254	80.0	56.5	O K
480 min Summer	89.922	2.922	80.0	52.1	O K
600 min Summer	89.782	2.782	69.1	52.0	O K
720 min Summer	89.776	2.776	65.8	52.0	O K
960 min Summer	89.750	2.750	49.9	51.9	O K
1440 min Summer	89.741	2.741	44.5	51.9	O K
2160 min Summer	87.656	0.656	20.0	32.8	O K
2880 min Summer	87.298	0.298	19.7	14.9	O K
4320 min Summer	87.264	0.264	14.6	13.2	O K
5760 min Summer	87.245	0.245	11.8	12.3	O K
7200 min Summer	87.233	0.233	10.0	11.7	O K
8640 min Summer	87.225	0.225	8.7	11.2	O K


<b>Storm Event</b>	<b>Rain (mm/hr)</b>	<b>Flooded Volume (m<sup>3</sup>)</b>	<b>Discharge Volume (m<sup>3</sup>)</b>	<b>Time-Peak (mins)</b>
15 min Summer	79.094	0.0	178.0	20
30 min Summer	52.183	0.0	234.8	30
60 min Summer	33.096	0.0	297.9	46
120 min Summer	20.474	0.0	368.5	78
180 min Summer	15.333	0.0	414.0	110
240 min Summer	12.449	0.0	448.1	138
360 min Summer	9.275	0.0	500.8	194
480 min Summer	7.518	0.0	541.3	238
600 min Summer	6.386	0.0	574.7	306
720 min Summer	5.586	0.0	603.3	366
960 min Summer	4.522	0.0	651.1	474
1440 min Summer	3.354	0.0	724.5	736
2160 min Summer	2.486	0.0	805.4	1148
2880 min Summer	2.009	0.0	867.8	1456
4320 min Summer	1.487	0.0	963.6	2180
5760 min Summer	1.201	0.0	1037.5	2864
7200 min Summer	1.017	0.0	1098.7	3640
8640 min Summer	0.889	0.0	1151.6	4392

GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 21:32 File		
Innovyze		Source Control 2019.1

Cascade Summary of Results for Contaminated 10.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	87.219	0.219	7.8	10.9	O K
15 min Winter	91.329	4.329	80.0	134.4	O K
30 min Winter	91.342	4.342	80.0	165.5	O K
60 min Winter	91.341	4.341	80.0	165.0	O K
120 min Winter	91.326	4.326	80.0	127.7	O K
180 min Winter	91.301	4.301	80.0	87.7	O K
240 min Winter	91.261	4.261	80.0	58.2	O K
360 min Winter	89.791	2.791	74.8	52.0	O K
480 min Winter	89.764	2.764	58.6	52.0	O K
600 min Winter	89.751	2.751	50.5	52.0	O K
720 min Winter	89.747	2.747	48.1	51.9	O K
960 min Winter	89.736	2.736	41.5	51.9	O K
1440 min Winter	87.838	0.838	20.0	41.9	O K
2160 min Winter	87.284	0.284	17.6	14.2	O K
2880 min Winter	87.262	0.262	14.3	13.1	O K
4320 min Winter	87.237	0.237	10.6	11.9	O K
5760 min Winter	87.224	0.224	8.6	11.2	O K
7200 min Winter	87.215	0.215	7.2	10.7	O K
8640 min Winter	87.209	0.209	6.3	10.4	O K
10080 min Winter	87.204	0.204	5.6	10.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	0.793	0.0	1198.3	5024
15 min Winter	79.094	0.0	199.3	21
30 min Winter	52.183	0.0	263.0	31
60 min Winter	33.096	0.0	333.6	50
120 min Winter	20.474	0.0	412.7	84
180 min Winter	15.333	0.0	463.6	114
240 min Winter	12.449	0.0	501.9	138
360 min Winter	9.275	0.0	560.9	170
480 min Winter	7.518	0.0	606.3	214
600 min Winter	6.386	0.0	643.6	278
720 min Winter	5.586	0.0	675.7	336
960 min Winter	4.522	0.0	729.3	468
1440 min Winter	3.354	0.0	811.4	824
2160 min Winter	2.486	0.0	902.0	1096
2880 min Winter	2.009	0.0	972.0	1472
4320 min Winter	1.487	0.0	1079.2	2188
5760 min Winter	1.201	0.0	1162.0	2896
7200 min Winter	1.017	0.0	1230.5	3568
8640 min Winter	0.889	0.0	1289.8	4352
10080 min Winter	0.793	0.0	1342.1	4976

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
Date 02/02/2024 21:32 File	Designed by DJC Checked by JHC	
Innovyze	Source Control 2019.1	

Cascade Rainfall Details for Contaminated 10.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.200


Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.400		0.400		0.400

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area (ha)
From:	To:
0	4
	0.000



GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Contaminated Three Maids		
Date 02/02/2024 21:32 File		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1

Cascade Model Details for Contaminated 10.SRCX

Storage is Online Cover Level (m) 91.775

Tank or Pond Structure

Invert Level (m) 87.000


Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	50.0	1.001	1.1	4.220	1.1
1.000	50.0	4.219	1.1	4.345	2850.0

Pump Outflow Control

Invert Level (m) 87.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	20.0000	1.700	20.0000	2.500	20.0000
0.200	5.0000	1.000	20.0000	1.800	20.0000	2.600	20.0000
0.300	20.0000	1.100	20.0000	1.900	20.0000	2.700	20.0000
0.400	20.0000	1.200	20.0000	2.000	20.0000	2.800	80.0000
0.500	20.0000	1.300	20.0000	2.100	20.0000	2.900	80.0000
0.600	20.0000	1.400	20.0000	2.200	20.0000	3.000	80.0000
0.700	20.0000	1.500	20.0000	2.300	20.0000		
0.800	20.0000	1.600	20.0000	2.400	20.0000		




GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 20:36 File		
Innovyze		Source Control 2019.1

Cascade Summary of Results for Contaminated 30.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	87.228	0.228	9.2	11.4	O K
15 min Winter	91.347	4.347	80.0	180.9	O K
30 min Winter	91.363	4.363	80.0	225.7	O K
60 min Winter	91.368	4.368	80.0	239.8	O K
120 min Winter	91.355	4.355	80.0	203.5	O K
180 min Winter	91.336	4.336	80.0	151.7	O K
240 min Winter	91.315	4.315	80.0	107.5	O K
360 min Winter	91.236	4.236	80.0	53.9	O K
480 min Winter	89.785	2.785	71.2	52.0	O K
600 min Winter	89.769	2.769	61.6	52.0	O K
720 min Winter	89.751	2.751	50.8	52.0	O K
960 min Winter	89.734	2.734	40.3	51.9	O K
1440 min Winter	89.723	2.723	33.7	51.9	O K
2160 min Winter	87.507	0.507	20.0	25.3	O K
2880 min Winter	87.282	0.282	17.3	14.1	O K
4320 min Winter	87.252	0.252	12.8	12.6	O K
5760 min Winter	87.235	0.235	10.2	11.7	O K
7200 min Winter	87.224	0.224	8.6	11.2	O K
8640 min Winter	87.217	0.217	7.5	10.8	O K
10080 min Winter	87.211	0.211	6.7	10.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	0.936	0.0	1415.6	5048
15 min Winter	100.138	0.0	252.3	21
30 min Winter	66.644	0.0	335.9	32
60 min Winter	42.476	0.0	428.2	52
120 min Winter	26.265	0.0	529.5	88
180 min Winter	19.594	0.0	592.5	120
240 min Winter	15.832	0.0	638.3	150
360 min Winter	11.728	0.0	709.3	196
480 min Winter	9.466	0.0	763.3	238
600 min Winter	8.011	0.0	807.5	252
720 min Winter	6.988	0.0	845.2	352
960 min Winter	5.628	0.0	907.6	488
1440 min Winter	4.142	0.0	1002.1	710
2160 min Winter	3.045	0.0	1104.9	1172
2880 min Winter	2.445	0.0	1183.0	1440
4320 min Winter	1.793	0.0	1301.2	2184
5760 min Winter	1.438	0.0	1391.0	2920
7200 min Winter	1.211	0.0	1465.1	3552
8640 min Winter	1.053	0.0	1529.2	4384
10080 min Winter	0.936	0.0	1585.5	5000

GGP Consult		Page 3
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Contaminated Three Maids		
Date 02/02/2024 20:36 File		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1

Cascade Rainfall Details for Contaminated 30.SRCX

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram


Total Area (ha) 1.200

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.400		0.400		0.400

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area (ha)
From:	To:
0	4
	0.000

GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Contaminated Three Maids		
Date 02/02/2024 20:36 File		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1

Cascade Model Details for Contaminated 30.SRCX

Storage is Online Cover Level (m) 91.775

Tank or Pond Structure

Invert Level (m) 87.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	50.0	1.001	1.1	4.220	1.1
1.000	50.0	4.219	1.1	4.345	2850.0

Pump Outflow Control

Invert Level (m) 87.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	20.0000	1.700	20.0000	2.500	20.0000
0.200	5.0000	1.000	20.0000	1.800	20.0000	2.600	20.0000
0.300	20.0000	1.100	20.0000	1.900	20.0000	2.700	20.0000
0.400	20.0000	1.200	20.0000	2.000	20.0000	2.800	80.0000
0.500	20.0000	1.300	20.0000	2.100	20.0000	2.900	80.0000
0.600	20.0000	1.400	20.0000	2.200	20.0000	3.000	80.0000
0.700	20.0000	1.500	20.0000	2.300	20.0000		
0.800	20.0000	1.600	20.0000	2.400	20.0000		

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY

Contaminated  
 Three Maids



Date 02/02/2024 20:29  
 File

Designed by DJC  
 Checked by JHC

Innovyze Source Control 2019.1


Cascade Summary of Results for Contaminated 100.SRCX

**Upstream Structures                      Outflow To                      Overflow To**

(None) Process Storage Contaminated Rev 1.SRCX                      (None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	91.361	4.361	80.0	219.2	O K
30 min Summer	91.381	4.381	80.0	278.1	O K
60 min Summer	91.391	4.391	80.0	307.1	O K
120 min Summer	91.385	4.385	80.0	288.7	O K
180 min Summer	91.373	4.373	80.0	254.2	O K
240 min Summer	91.360	4.360	80.0	218.6	O K
360 min Summer	91.339	4.339	80.0	157.3	O K
480 min Summer	91.316	4.316	80.0	110.0	O K
600 min Summer	91.292	4.292	80.0	77.3	O K
720 min Summer	91.260	4.260	80.0	58.0	O K
960 min Summer	89.785	2.785	71.2	52.0	O K
1440 min Summer	89.755	2.755	53.2	52.0	O K
2160 min Summer	89.732	2.732	39.1	51.9	O K
2880 min Summer	89.724	2.724	34.3	51.9	O K
4320 min Summer	87.458	0.458	20.0	22.9	O K
5760 min Summer	87.281	0.281	17.2	14.1	O K
7200 min Summer	87.263	0.263	14.4	13.1	O K
8640 min Summer	87.250	0.250	12.5	12.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	291.8	21
30 min Summer	87.133	0.0	392.1	32
60 min Summer	55.837	0.0	502.5	52
120 min Summer	34.509	0.0	621.2	86
180 min Summer	25.637	0.0	692.2	118
240 min Summer	20.604	0.0	741.7	152
360 min Summer	15.169	0.0	819.1	212
480 min Summer	12.185	0.0	877.3	270
600 min Summer	10.272	0.0	924.5	324
720 min Summer	8.930	0.0	964.4	376
960 min Summer	7.152	0.0	1029.9	482
1440 min Summer	5.221	0.0	1127.6	734
2160 min Summer	3.803	0.0	1232.0	1096
2880 min Summer	3.033	0.0	1310.2	1448
4320 min Summer	2.201	0.0	1426.2	2212
5760 min Summer	1.751	0.0	1512.7	2912
7200 min Summer	1.466	0.0	1583.7	3624
8640 min Summer	1.270	0.0	1645.3	4328

GGP Consult		Page 2
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Date 02/02/2024 20:29 File		
Innovyze		Source Control 2019.1

Cascade Summary of Results for Contaminated 100.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
10080 min Summer	87.240	0.240	11.0	12.0	O K
15 min Winter	91.372	4.372	80.0	252.5	O K
30 min Winter	91.396	4.396	80.0	319.6	O K
60 min Winter	91.406	4.406	80.0	349.5	O K
120 min Winter	91.397	4.397	80.0	321.9	O K
180 min Winter	91.377	4.377	80.0	266.2	O K
240 min Winter	91.357	4.357	80.0	209.9	O K
360 min Winter	91.321	4.321	80.0	118.6	O K
480 min Winter	91.268	4.268	80.0	61.0	O K
600 min Winter	89.789	2.789	73.3	52.0	O K
720 min Winter	89.772	2.772	63.4	52.0	O K
960 min Winter	89.752	2.752	51.1	52.0	O K
1440 min Winter	89.735	2.735	41.2	51.9	O K
2160 min Winter	89.715	2.715	29.2	51.9	O K
2880 min Winter	87.554	0.554	20.0	27.7	O K
4320 min Winter	87.271	0.271	15.6	13.5	O K
5760 min Winter	87.250	0.250	12.5	12.5	O K
7200 min Winter	87.236	0.236	10.4	11.8	O K
8640 min Winter	87.227	0.227	9.0	11.3	O K
10080 min Winter	87.220	0.220	8.0	11.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
10080 min Summer	1.124	0.0	1699.4	5136
15 min Winter	129.682	0.0	326.8	22
30 min Winter	87.133	0.0	439.2	33
60 min Winter	55.837	0.0	562.8	56
120 min Winter	34.509	0.0	695.7	92
180 min Winter	25.637	0.0	775.3	128
240 min Winter	20.604	0.0	830.8	160
360 min Winter	15.169	0.0	917.4	220
480 min Winter	12.185	0.0	982.6	266
600 min Winter	10.272	0.0	1035.4	298
720 min Winter	8.930	0.0	1080.1	360
960 min Winter	7.152	0.0	1153.5	472
1440 min Winter	5.221	0.0	1263.0	700
2160 min Winter	3.803	0.0	1379.9	1072
2880 min Winter	3.033	0.0	1467.4	1560
4320 min Winter	2.201	0.0	1597.3	2140
5760 min Winter	1.751	0.0	1694.3	2888
7200 min Winter	1.466	0.0	1773.8	3648
8640 min Winter	1.270	0.0	1842.8	4288
10080 min Winter	1.124	0.0	1903.3	4984

2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY	Contaminated Three Maids	
--	-----------------------------	---

Date 02/02/2024 20:29 File	Designed by DJC Checked by JHC	
-------------------------------	-----------------------------------	--

Innovyze	Source Control 2019.1
----------	-----------------------

Cascade Rainfall Details for Contaminated 100.SRCX

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)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.200


Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.400	4	8	0.400
			8	12	0.400

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From:	To:
(ha)	(ha)
0	4
	0.000



GGP Consult		Page 4
2 Hallam Road Priory Park East, Hull Humberside, HU4 7DY		
Contaminated Three Maids		
Date 02/02/2024 20:29 File		Designed by DJC Checked by JHC
Innovyze		Source Control 2019.1

Cascade Model Details for Contaminated 100.SRCX

Storage is Online Cover Level (m) 91.775

Tank or Pond Structure

Invert Level (m) 87.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	50.0	1.001	1.1	4.220	1.1
1.000	50.0	4.219	1.1	4.345	2850.0

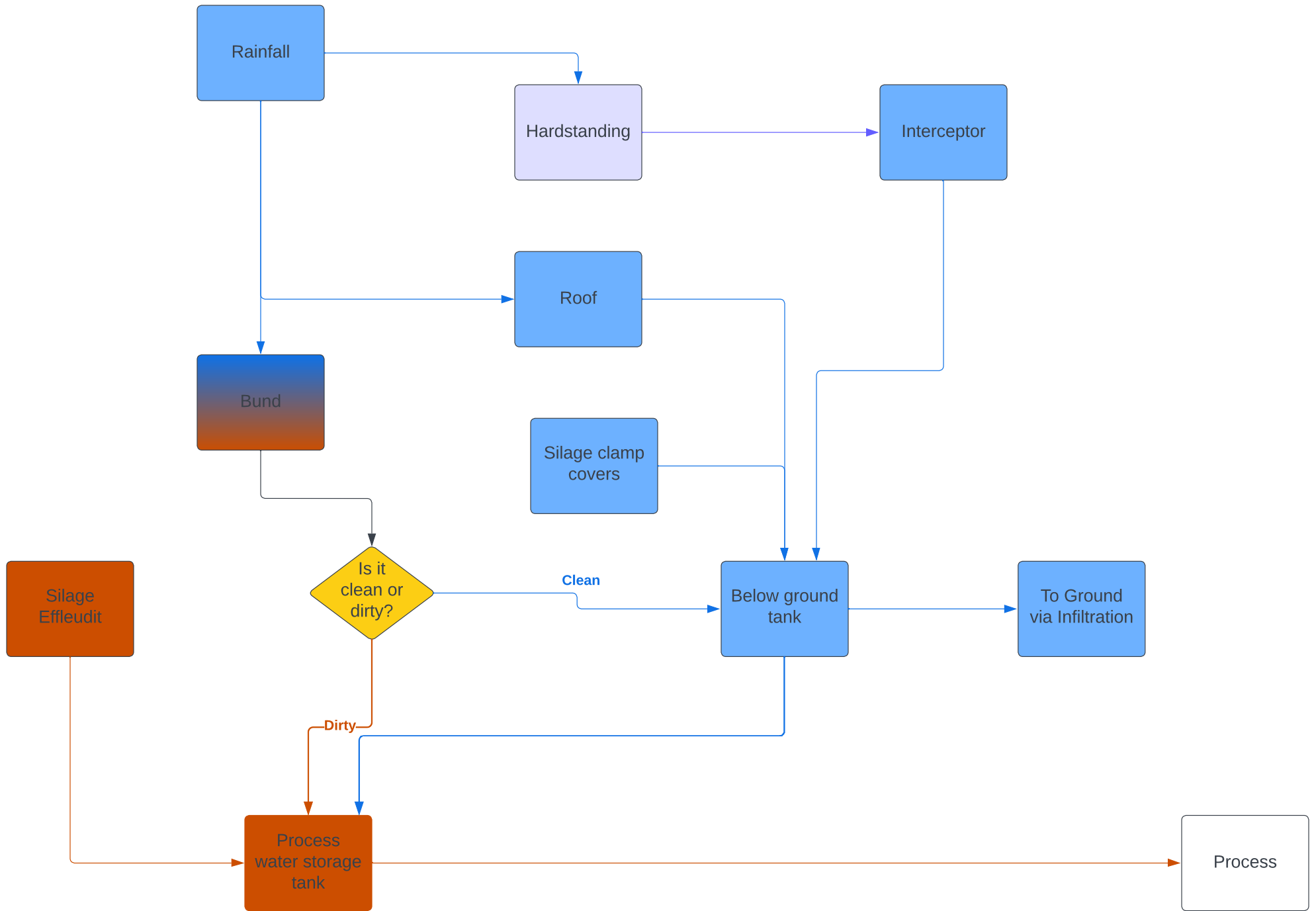
Pump Outflow Control

Invert Level (m) 87.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0000	0.900	20.0000	1.700	20.0000	2.500	20.0000
0.200	5.0000	1.000	20.0000	1.800	20.0000	2.600	20.0000
0.300	20.0000	1.100	20.0000	1.900	20.0000	2.700	20.0000
0.400	20.0000	1.200	20.0000	2.000	20.0000	2.800	80.0000
0.500	20.0000	1.300	20.0000	2.100	20.0000	2.900	80.0000
0.600	20.0000	1.400	20.0000	2.200	20.0000	3.000	80.0000
0.700	20.0000	1.500	20.0000	2.300	20.0000		
0.800	20.0000	1.600	20.0000	2.400	20.0000		

## **APPENDIX X**

Rainfall & Process Water Flow Diagram



## **APPENDIX XI**

Silage Clamp Cover Soakaway

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY



Date 03/02/2024 14:06  
 File Silage Clean.SRCX

Designed by JeremyCollins  
 Checked by

Innovyze Source Control 2019.1

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

Half Drain Time : 5 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	93.758	1.758	72.9	30.4	O K
30 min Summer	94.070	2.070	84.0	35.8	O K
60 min Summer	94.024	2.024	82.4	35.0	O K
120 min Summer	93.684	1.684	70.3	29.1	O K
180 min Summer	93.378	1.378	59.4	23.8	O K
240 min Summer	93.146	1.146	51.2	19.8	O K
360 min Summer	92.845	0.845	40.6	14.6	O K
480 min Summer	92.655	0.655	33.8	11.3	O K
600 min Summer	92.525	0.525	29.2	9.1	O K
720 min Summer	92.427	0.427	25.7	7.4	O K
960 min Summer	92.294	0.294	21.0	5.1	O K
1440 min Summer	92.142	0.142	15.6	2.4	O K
2160 min Summer	92.047	0.047	11.5	0.8	O K
2880 min Summer	92.037	0.037	9.2	0.6	O K
4320 min Summer	92.027	0.027	6.7	0.5	O K
5760 min Summer	92.022	0.022	5.4	0.4	O K
7200 min Summer	92.018	0.018	4.5	0.3	O K
8640 min Summer	92.016	0.016	3.9	0.3	O K
10080 min Summer	92.014	0.014	3.5	0.3	O K
15 min Winter	93.985	1.985	81.0	34.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	129.682	0.0	22
30 min Summer	87.133	0.0	29
60 min Summer	55.837	0.0	44
120 min Summer	34.509	0.0	74
180 min Summer	25.637	0.0	104
240 min Summer	20.604	0.0	134
360 min Summer	15.169	0.0	194
480 min Summer	12.185	0.0	254
600 min Summer	10.272	0.0	314
720 min Summer	8.930	0.0	374
960 min Summer	7.152	0.0	494
1440 min Summer	5.221	0.0	736
2160 min Summer	3.803	0.0	1096
2880 min Summer	3.033	0.0	1468
4320 min Summer	2.201	0.0	2144
5760 min Summer	1.751	0.0	2872
7200 min Summer	1.466	0.0	3552
8640 min Summer	1.270	0.0	4384
10080 min Summer	1.124	0.0	5088
15 min Winter	129.682	0.0	21

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	94.292	2.292	91.9	39.6	Flood Risk
60 min Winter	94.092	2.092	84.8	36.1	O K
120 min Winter	93.525	1.525	64.7	26.4	O K
180 min Winter	93.149	1.149	51.3	19.8	O K
240 min Winter	92.900	0.900	42.5	15.6	O K
360 min Winter	92.607	0.607	32.1	10.5	O K
480 min Winter	92.437	0.437	26.1	7.5	O K
600 min Winter	92.325	0.325	22.1	5.6	O K
720 min Winter	92.246	0.246	19.3	4.2	O K
960 min Winter	92.139	0.139	15.5	2.4	O K
1440 min Winter	92.046	0.046	11.4	0.8	O K
2160 min Winter	92.034	0.034	8.3	0.6	O K
2880 min Winter	92.027	0.027	6.6	0.5	O K
4320 min Winter	92.020	0.020	4.9	0.3	O K
5760 min Winter	92.016	0.016	3.9	0.3	O K
7200 min Winter	92.013	0.013	3.3	0.2	O K
8640 min Winter	92.012	0.012	2.9	0.2	O K
10080 min Winter	92.010	0.010	2.5	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	87.133	0.0	29
60 min Winter	55.837	0.0	44
120 min Winter	34.509	0.0	74
180 min Winter	25.637	0.0	106
240 min Winter	20.604	0.0	136
360 min Winter	15.169	0.0	196
480 min Winter	12.185	0.0	256
600 min Winter	10.272	0.0	316
720 min Winter	8.930	0.0	376
960 min Winter	7.152	0.0	496
1440 min Winter	5.221	0.0	738
2160 min Winter	3.803	0.0	1084
2880 min Winter	3.033	0.0	1400
4320 min Winter	2.201	0.0	2228
5760 min Winter	1.751	0.0	2968
7200 min Winter	1.466	0.0	3592
8640 min Winter	1.270	0.0	4296
10080 min Winter	1.124	0.0	5104

2 Hallam Road  
 Priory Park East, Hull  
 Humberside, HU4 7DY



Date 03/02/2024 14:06  
 File Silage Clean.SRCX

Designed by JeremyCollins  
 Checked by

Innovyze Source Control 2019.1

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)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.369

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area				
From:	To:	From:	To:	From:	To:	From:	To:				
0	4	0.093	4	8	0.092	8	12	0.092	12	16	0.092

2 Hallam Road  
Priory Park East, Hull  
Humberside, HU4 7DY



Date 03/02/2024 14:06  
File Silage Clean.SRCX

Designed by JeremyCollins  
Checked by

Innovyze Source Control 2019.1

Model Details

Storage is Online Cover Level (m) 94.500

Trench Soakaway Structure

Infiltration Coefficient Base (m/hr)	1.32200	Trench Width (m)	0.6
Infiltration Coefficient Side (m/hr)	1.32200	Trench Length (m)	96.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.30	Cap Volume Depth (m)	0.000
Invert Level (m)	92.000	Cap Infiltration Depth (m)	0.000