SURFACE WATER DRAINAGE STRATEGY

LOCATION:
Newlands Nursery, Chatburn

CLIENT:
Messrs P and C Bristol

DOCUMENT REF:
24337-SWDS-001

DATE:
June 2024

DART ENGINEERS LTD
CIVIL AND STRUCTURAL ENGINEERING

CONTENTS & AMENDMENT HISTORY

Revision	Description	Date	Author	Checked
A	First Issue	June 2024	A Dyson	R Thacker

1.0 INTRODUCTION

The Surface Water Drainage Strategy has been produced on behalf of Messrs P and C Bristol in relation to the proposed Polytunnel development at Newlands Nursery, Chatburn. The report will assess how Surface Water will be drained.

1.1 EXISTING SITE

He site is located to the NE of the village of Chatburn in Ribble Valley area of Lancashire. The site is an existing nursery with buildings and existing polytunnels. It sib bounded by Sawley Road to the east and agricultural land to other direction. A site location plan is shown in Figure 1.1 below.

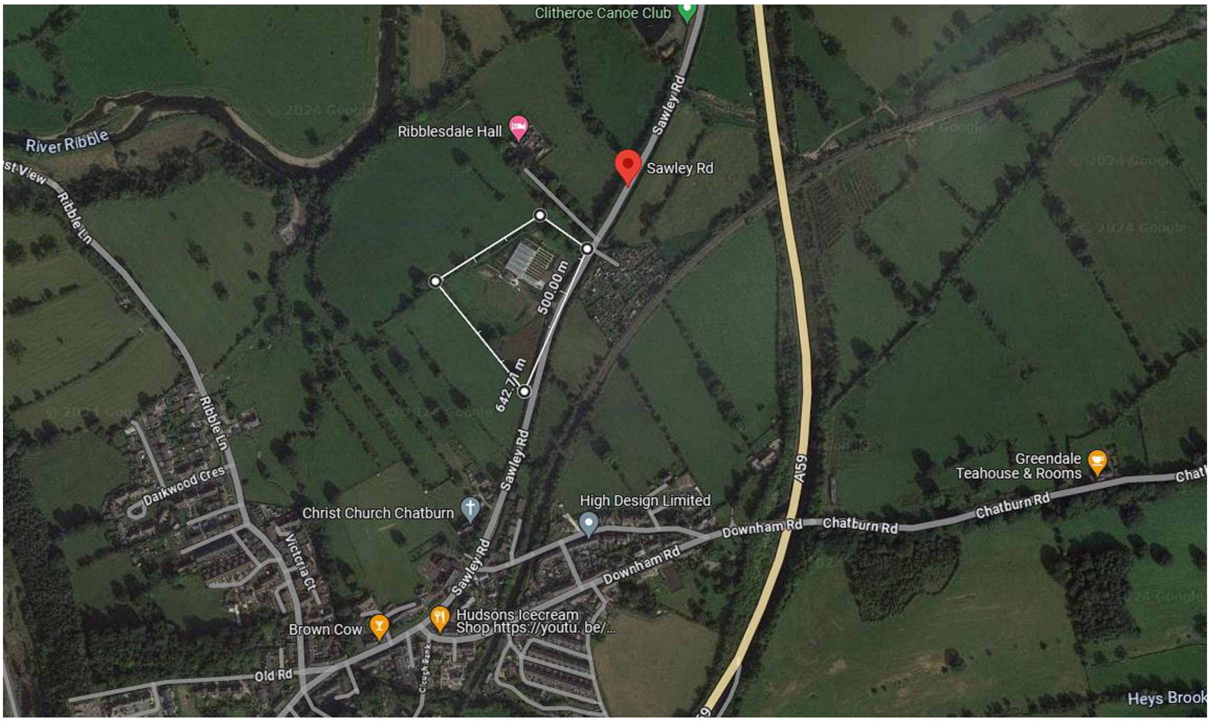

Figure 1.1 - Site Location

1.2 PROPOSED DEVELOPMENT

The proposed development is set to consist of 3 no. new 48.75m x 7.92m (160ft x 20ft) Polytunnels as an extension to the existing nursery. A site plan and elevations are contained in Appendix A.

1.3 SURFACE WATER DRAIANGE

Requirement H3 of the Building Regulations establishes a preferred hierarchy or the disposal of surface water. This is as follows, in order of preference, soakaway, watercourse, surface water sewer and combined sewer.

British Geological Society online mapping shows the ground conditions at the site location to be Devensian Till and Chatburn Limestone – both of these would usually not be suitable for infiltration methods as such it is assumed soakaways are not a viable option for surface water discharge.

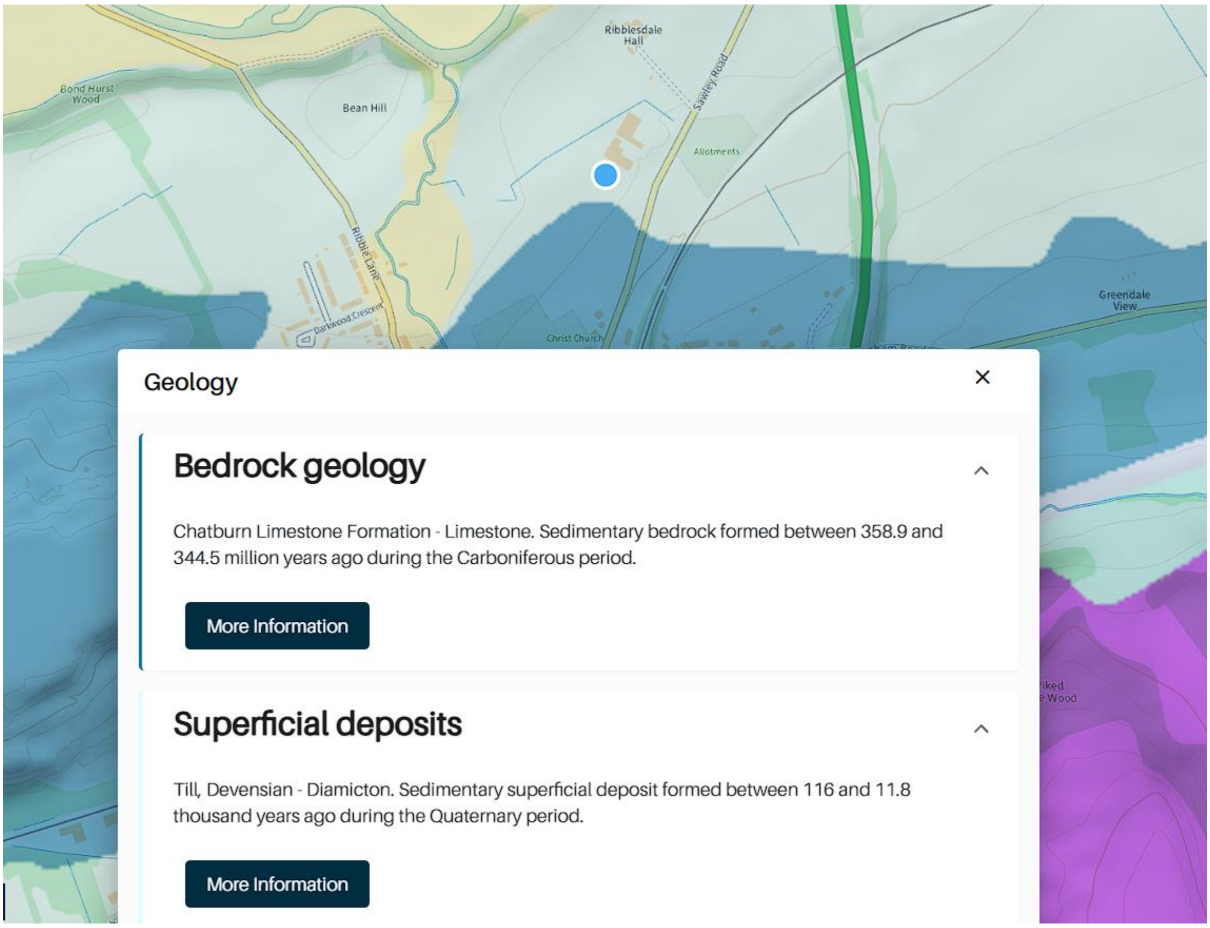

Figure 1.2 – BGS Geological Map

The second preferred option would be to discharge the surface water run-off from the development to a watercourse. There is a watercourse to the western boundary of site.

SW flows will be restricted to minimum Greenfield flow rate of 1l/s.

1.4 Climate Change

SuDs Guidance and SfA advises that an additional climate change allowance of 50% should be applied for residential developments.

1.5 Peak Flow Control

The impermeable area from the development has been calculated at approximately 1,160m3.

The uncontrolled SW run off generated from this area at a 1in1 year flow based on BS EN 852 and a rainfall intensity of 50mm/hr would be 16.1/s. However, to meet flood risk planning requirements it is not acceptable to discharge SW at an unrestricted rate and SW discharge must mimic Greenfield run off rates as close as possible therefore the minimum adoptable Greenfield rate of 1l/s is proposed.

As noted in section above it will be necessary to attenuate SW flows to prevent risk of flooding to neighbouring properties by restricting discharge and providing suitable storage as required.

The proposed development includes provision of 2 no. rainwater harvesting tanks each with 98m3 volume. It is proposed that 1no. of these tanks is purely used for rain water harvesting purposes and the other is dual use as rainwater harvesting and attenuation with a 1l/s flow control outfall to the adjacent watercourse.

Based on the above design criteria a summary of the required SW storage volumes is noted in the table below:

Rainfall Event	1in100 Year plus 50 % Climate Change
Attenuation Volume Required	94.5m3

Flow Calculations are attached in Appendix B of the report.

We would note that the above volumes may be subject to slight variance at the detailed design stage of the development drainage.

A Proposed Drainage Strategy is attached in Appendix C.

1.6 Pollution Control

The risk of pollution is considered low as the proposed site is to be used for horticultural purposes only.

Clean roof water drainage will be discharged into the below ground sewers via a closed system.

1.7 Designing for Exceedance

Overland flood exceedance flows will be mitigated by the provision of a positive SW system for the development and attenuation. However, where possible external levels should be set to channel flows away from polytunnels.

1.8 Operations and Maintenance

The SW sewer system will be maintained by the site owner.

2.0 APPENDICES

Appendix A – Proposed Site Layout

Appendix B – Flow Calculations

Appendix C – Drainage Strategy

Appendix A

Proposed Site Layout

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Drawing No: Bri.910.3452.01

Project: (Ref. No: Bri.910.3452.GH)

Planning - Application for 3 additional Poly Tunnels at:

Newlands Nursery
Sawley Road
Chatburn, BB7 4LD

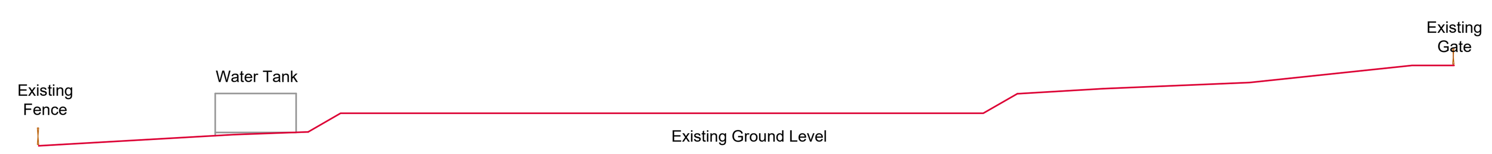
Title: Location Plan

Notes:
All work is to be carried out to the latest current British standard Codes of Practice and recognised working practices. All work and materials should comply with Health and Safety legislation. All dimensions are in millimetres except where explicitly shown otherwise. The contractor should check and certify all dimensions as work proceeds and notify the architect of any discrepencies. Do not scale off the drawings, if in doubt ask.

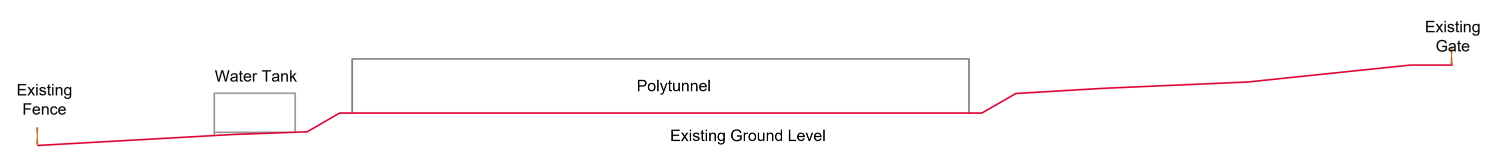
Client: Mr. P Bristol	**Drawn:** KA
Date: 16.04.2024	**Scale:** 1:1250 @ A4
Amendments:	

Existing Site Plan - 1:500

Proposed Site Plan - 1:500

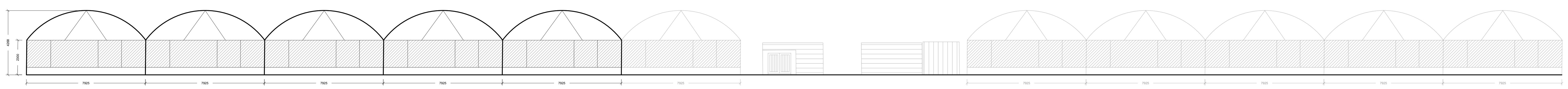


Existing Cross Section - 1:500

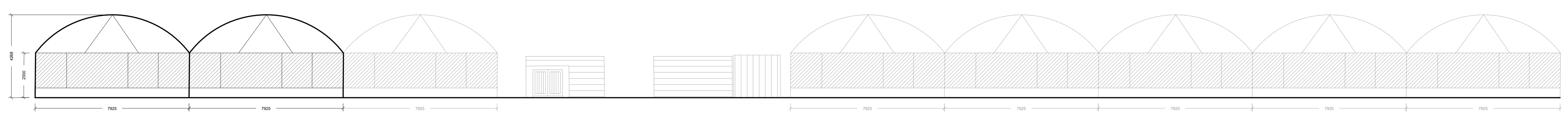


Proposed Cross Section - 1:500

Poly Tunnel Image



Proposed North Westerly View - 1:200



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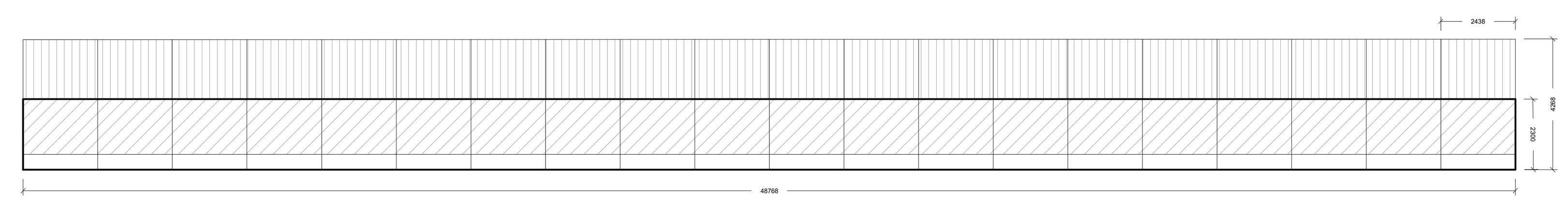
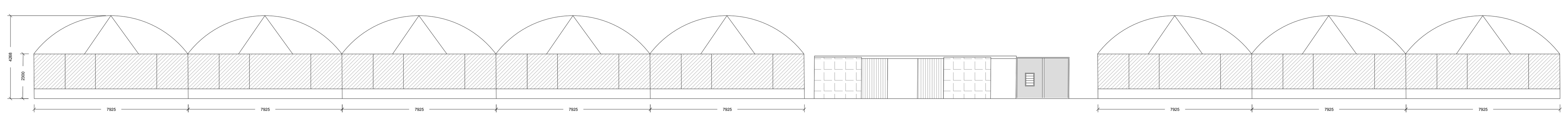


Existing South Westerly View - 1:200
Proposed South Westerly View - 1:200



Existing South Easterly View - 1:200

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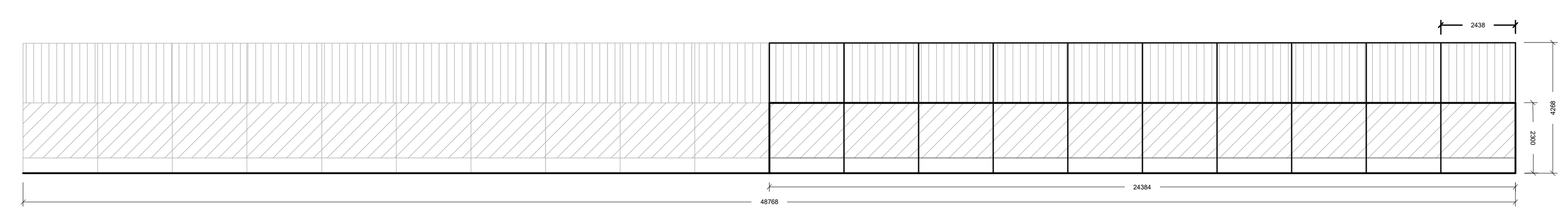
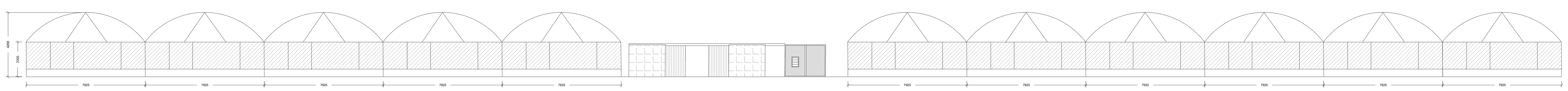


Existing North Easterly View - 1:200
Proposed North Easterly View - 1:200



Proposed South Easterly View - 1:200

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Title: Existing & Proposed Elevations, Site Plans.	
Drawing No: Bri.910.3452.02	**Drawn:** KA
Client: Mr. P Bristol	
Date: 22.05.2024	**Scale:** 1:200 & 1:500 @ A1
Amendments:	

Appendix B

Flow Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.116	4.00	100.000	1200	2.000

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	19.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m^3/ha)	0.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	50	0	0

Node 1 Online Orifice Control

Flap Valve	x	Design Depth (m)	2.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	98.000	Diameter (m)	0.018		

Node 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	49.0	0.0	2.000	49.0	0.0

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	690	99.892	1.892	7.0	94.8338	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
720 minute winter	1	Orifice	0.9	38.4

Results for 100 year +50% CC 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
15 minute summer	1	19	98.799	0.799	104.0	40.0570	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
15 minute summer	1	Orifice	0.6	8.5

Results for 100 year +50% CC 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	19	98.800	0.800	92.9	40.0986	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
15 minute winter	1	Orifice	0.6	8.5

Results for 100 year +50% CC 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1	34	99.046	1.046	91.2	52.4131	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
30 minute summer	1	Orifice	0.7	10.1

Results for 100 year +50% CC 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	33	99.046	1.046	70.5	52.4618	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
30 minute winter	1	Orifice	0.7	10.2

Results for 100 year +50% CC 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
60 minute summer	1	63	99.296	1.296	65.6	64.9694	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
60 minute summer	1	Orifice	0.8	12.2

Results for 100 year +50% CC 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
60 minute winter	1	63	99.297	1.297	46.0	65.0246	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
60 minute winter	1	Orifice	0.8	12.2

Results for 100 year +50% CC 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	1	124	99.538	1.538	42.6	77.1130	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
120 minute summer	1	Orifice	0.8	15.3

Results for 100 year +50% CC 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
120 minute winter	1	122	99.540	1.540	28.3	77.2148	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
120 minute winter	1	Orifice	0.8	15.3

Results for 100 year +50% CC 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	1	184	99.662	1.662	32.2	83.2981	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute summer	1	Orifice	0.9	17.9

Results for 100 year +50% CC 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	180	99.665	1.665	20.9	83.4882	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	1	Orifice	0.9	17.9

Results for 100 year +50% CC 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
240 minute summer	1	244	99.741	1.741	25.1	87.2593	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
240 minute summer	1	Orifice	0.9	20.3

Results for 100 year +50% CC 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
240 minute winter	1	240	99.742	1.742	16.7	87.3463	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
240 minute winter	1	Orifice	0.9	20.4

Results for 100 year +50% CC 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	1	360	99.815	1.815	18.7	91.0098	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute summer	1	Orifice	0.9	24.9

Results for 100 year +50% CC 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	352	99.822	1.822	12.2	91.3379	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute winter	1	Orifice	0.9	24.9

Results for 100 year +50% CC 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
480 minute summer	1	480	99.861	1.861	14.5	93.2854	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
480 minute summer	1	Orifice	0.9	29.5

Results for 100 year +50% CC 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
480 minute winter	1	472	99.878	1.878	9.7	94.1592	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
480 minute winter	1	Orifice	0.9	29.7

Results for 100 year +50% CC 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	1	600	99.873	1.873	11.8	93.9037	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
600 minute summer	1	Orifice	0.9	33.8

Results for 100 year +50% CC 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	1	585	99.882	1.882	8.0	94.3690	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
600 minute winter	1	Orifice	0.9	33.9

Results for 100 year +50% CC 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	1	705	99.876	1.876	10.4	94.0322	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
720 minute summer	1	Orifice	0.9	38.3

Results for 100 year +50% CC 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	690	99.892	1.892	7.0	94.8338	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
720 minute winter	1	Orifice	0.9	38.4

Results for 100 year +50% CC 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	1	810	99.866	1.866	8.4	93.5340	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute summer	1	Orifice	0.9	47.0

Results for 100 year +50% CC 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
960 minute winter	1	900	99.878	1.878	5.6	94.1638	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
960 minute winter	1	Orifice	0.9	47.2

Results for 100 year +50% CC 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
1440 minute summer	1	1080	99.844	1.844	6.0	92.4435	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m^3)
1440 minute summer	1	Orifice	0.9	63.3

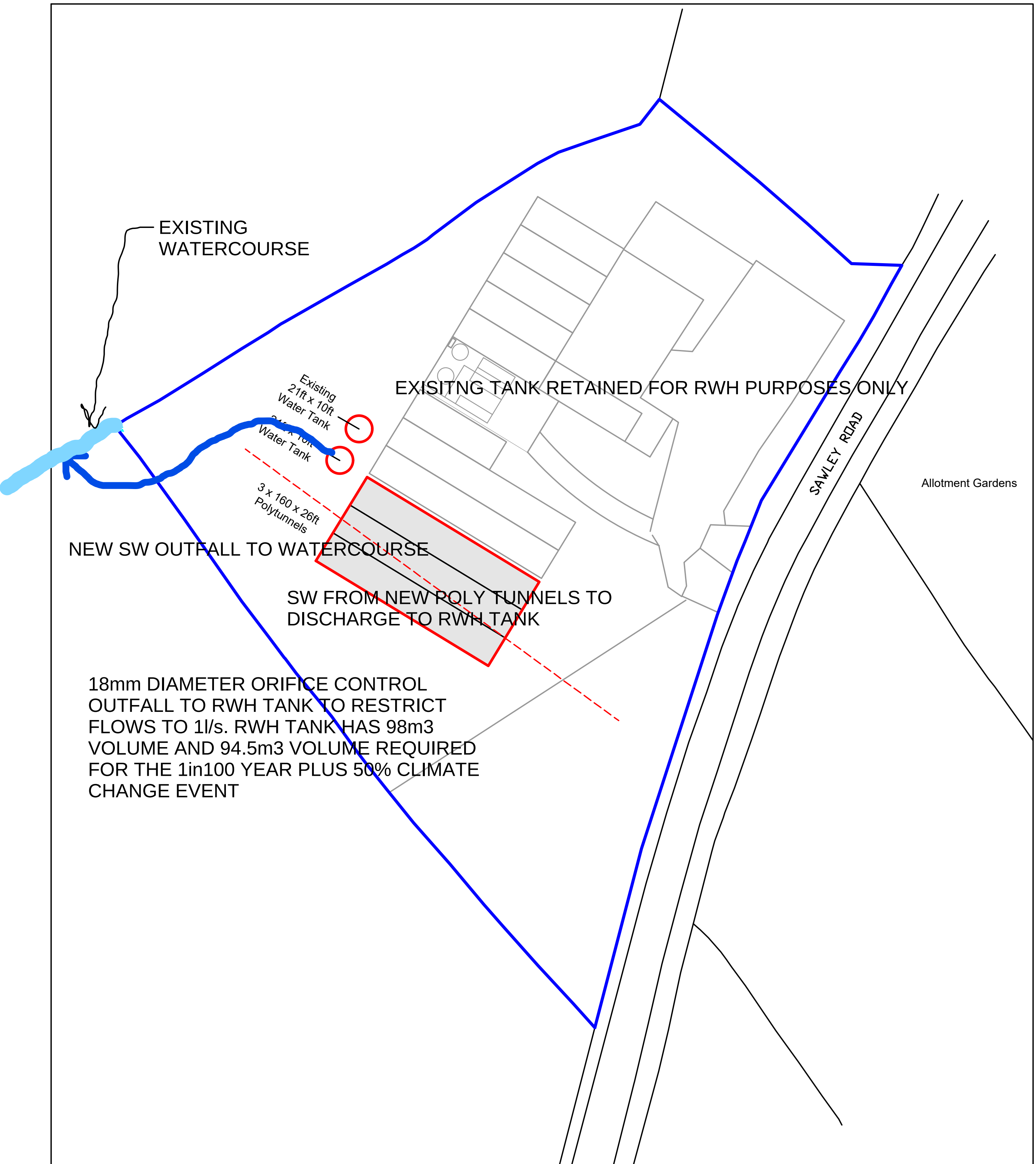
Results for 100 year +50% CC 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1	1110	99.835	1.835	4.0	91.9955	0.0000	OK

Link Event	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	1	Orifice	0.9	63.6

Appendix C

Drainage Strategy



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