FLOOD RISK ASSESSMENT

AND

DRAINAGE STRATEGY

for

RIBBLE VALLEY PROPERTY LIMITED

PROPOSED COMMERCIAL UNITS AND BATTERY STORAGE

on

LAND ASSOCIATED WITH HIGHER COLLEGE FARM

BLACKBURN ROAD, LONGRIDGE, PR3 2YY

OCTOBER 2023

REFORD

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CONTENTS

1. INTRODUCTION

1.1 This flood risk assessment and drainage strategy has been produced on behalf of Ribble Valley Property Limited in support of a planning application for proposed commercial units and battery storage on land associated with Higher College Farm, Blackburn Road, Longridge, PR3 2YY. A location plan is included within Appendix A.

1.2 The Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (NPPG) in relation to Flood Risk and Coastal Change, and describes the existing site conditions and proposed development. It assesses the potential sources of flooding to the site from tidal, fluvial, groundwater, surface water and other sources, taking a risk based approach in accordance with National Policy.

1.3 The drainage strategy describes the existing site conditions and proposed development. It assesses the potential impact of proposals on existing drainage and includes a proposed strategy for the provision of new drainage to serve the proposed development.

Site summary

Site Name	Land associated with Higher College Farm
Location	Blackburn Road, Longridge, PR3 2YY
NGR (approx.)	SD615371
Application site area	1.53ha approx.
Development type	Commercial units and battery storage
Vulnerability	Less Vulnerable
Indicative Flood Zone	Flood Zone 1
Local Planning Authority	Ribble Valley Borough Council

2. DESCRIPTION OF THE SITE

Existing site

2.1 The proposal relates to a roughly rectangular piece of land of an area approx. 1.53ha at Higher College Farm that lies to the east of Longridge and to the south of Blackburn Road.

2.2 The site currently comprises an area of grassland used for pasture together with the residential dwelling and outbuildings at Higher College Farmhouse.

2.3 The site has a fall to the south, the level on the northern boundary of the site being in the order of 112m AOD and on the southern boundary being in the order of 108m AOD.

2.4 A drain has been identified in documents online lying along the site's western boundary and flows to the south from the site's south western corner as an ordinary watercourse to discharge into the River Ribble approx. 3.8km away.

2.5 The Spade Mill reservoirs lie immediately to the north of Blackburn Road, opposite the site. The reservoirs are within embankment.

Proposed development

2.6 The proposed development is for the erection of 40no. commercial units and 1no. battery storage and maintenance unit with associated parking and access.

2.7 It is proposed that the access into the developed site will be from a new access onto Blackburn Road.

3. SCOPE OF THE ASSESSMENT

Flood risk planning policy

3.1 The National Planning Policy Framework (NPPF) sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Supporting Planning Practice Guidance (PPG) is also available.

3.2 The NPPF sets out the vulnerability to flooding of different land uses. It encourages development to be located away from areas at highest risk (whether existing or future), and states that where development is necessary in such areas, the development should be made safe for its lifetime. It also stresses the importance of preventing increases in flood risk offsite to the wider catchment area.

3.3 The NPPF also states that alternative sources of flooding, other than fluvial (river flooding), should also be considered when preparing a Flood Risk Assessment.

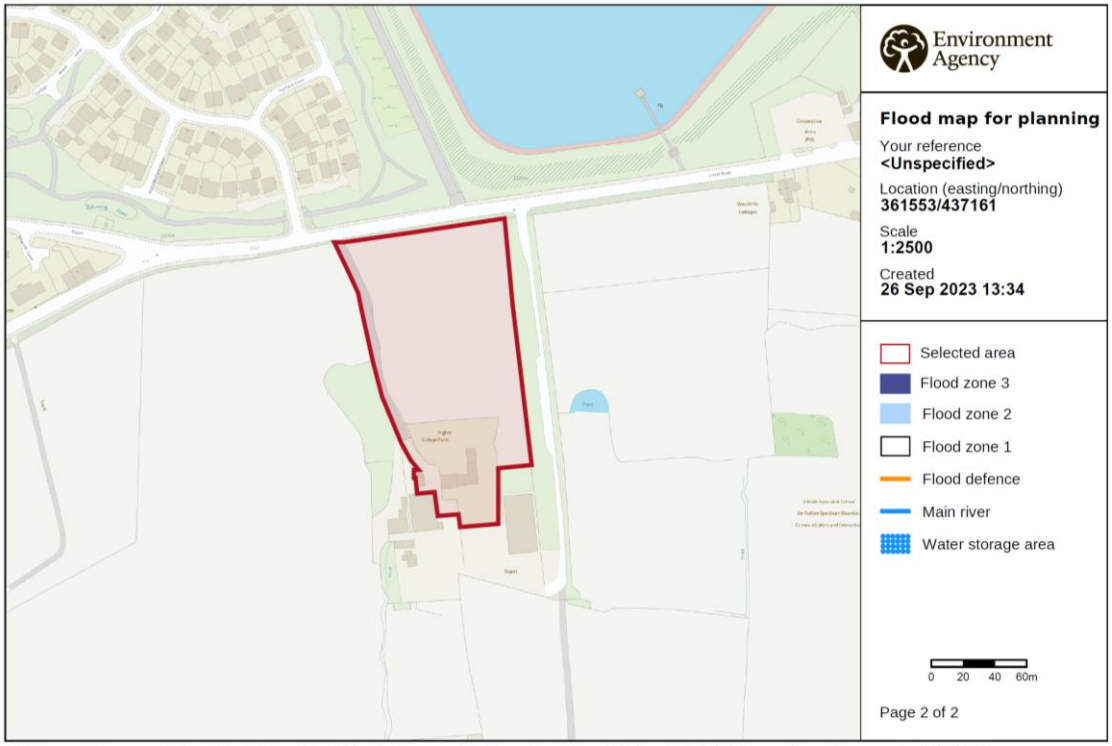
3.4 As set out in NPPF, local planning authorities should only consider development in flood risk areas appropriate where informed by a site specific Flood Risk Assessment. This document will identify and assess the risk associated with all forms of flooding to and from the development. Where necessary it will demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

3.5 This Flood Risk Assessment is written in accordance with the NPPF.

Flood zones

3.6 In investigating the flood risk relating to the site, the Environment Agency flood zone mapping identifies the proposed development site lies within Flood Zone 1. Flood Zone 1 is the lowest risk and is identified as land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).

3.7 An extract from the Environment Agency's Flood Zone Map for Planning is shown below with the approx. boundary of the area for development identified.



Strategic Flood Risk Assessment

3.8 The site is within the area covered by the Ribble Valley Borough Council Revised Strategic Flood Risk Level 1 Assessment, April 2017.

Sequential Test

3.9 A requirement of NPPF is that all plans should apply a sequential, risk-based approach to the location of development, taking into account the current and future impacts of climate change so as to avoid, where possible, flood risk to people and property. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding.

3.10 Strategic Flood Risk Assessments (SFRA) refine information on the probability of flooding, taking other sources of flooding and the impacts of climate change into account. They provide the basis for applying the Sequential Test, on the basis of the flood zones in the PPG Table 1.

3.11 The flood zones are the starting point for this sequential approach. As already stated, the Environment Agency's flood mapping identifies the site as lying within Flood Zone 1, the lowest risk.

3.12 With reference to NPPF, Environment Agency Flood Maps and the SFRA, the site lies within an area identified as being potentially developable and following the sequential approach, all of the development is located within Flood Zone 1.

3.13 The current development proposals are classified as "Less Vulnerable". Table 3 within the PPG indicates Flood Risk Vulnerability and Flood Zone 'compatibility'. Using Zone 1 and the "Less Vulnerable" classification, the PPG considers that a development of this type would be deemed appropriate for development within Flood Zone 1.

3.14 Subject to the suitable assessment of flood risk, the development would be considered sequentially preferable in this location.

4. CONSULTATIONS AND DATA ACQUISITIONS

Environment Agency

4.1 The Environment Agency's flood zone mapping confirms that the site lies within an area of Flood Zone 1, the lowest risk. There is no record of any historic fluvial flooding occurring at the site identified on the Historical Flood Mapping on the gov.uk website.

United Utilities

4.2 There are no public sewers within the development site. The nearest public sewers lie to the northwest of the development site within the residential estate to the north of Blackburn Road. An extract from United Utilities sewer records is included within Appendix B.

4.3 It is noted that a surface water sewer is shown to cross Blackburn Road to discharge into a drain that has been identified in documents online lying along the development site's western boundary and ultimately the River Ribble.

Topographical Survey

4.4 A topographical survey of the development site is available and shows a fall to the south, the level on the northern boundary of the site being in the order of 112m AOD and on the southern boundary being in the order of 108m AOD.

Site Investigation

4.5 The online Soilscapes viewer has identified that the geology encountered will be slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage.

4.6 The BGS boreholes website identifies borehole records to the east and north of the development site associated with the Spade Mill Reservoir. The boreholes identify the ground conditions as a thick layer of stiff / hard brown clay.

4.7 Based upon the ground conditions identified, infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.

5. SOURCES OF FLOOD RISK

Potential Sources of Flood Risk

5.1 Potential sources of flood risk to the site are identified below. The significance of these sources is investigated further into Section 6.

Flood risk

5.2 The site to be developed is identified as lying within Flood Zone 1 on the Environment Agency's flood maps, land assessed as having an annual probability of river and / or sea flooding of less than 1 in 1000 (<0.1%).

5.3 A drain has been identified in documents online lying along the site's western boundary and flows to the south from the site's south western corner as an ordinary watercourse to discharge into the River Ribble approx. 3.8km away.

Canals, reservoirs and other artificial sources

5.4 There are no canals local to the site.

5.5 The Spade Mill reservoirs lie immediately to the north of Blackburn Road, opposite the site. The reservoirs are within embankment.

Groundwater

5.6 Groundwater flooding tends to occur after much longer periods of sustained high rainfall. The areas that are at risk tend to be those low-lying areas where the water table is shallow. Flooding tends to occur in areas that are underlain by major aquifers, although groundwater flooding is also noted in localised floodplain sands and gravels. The main causes of groundwater flooding are:

- Natural groundwater rising due to tidal influence, or exceptionally wet periods leading to rapid recharge;
- Groundwater rebound due to cessation of abstraction and mine dewatering;
- Existence of confined aquifers and springs.

Sewers

5.7 Flooding from a drainage system occurs when flow entering a system exceeds its discharge capacity or, in the case of surface water sewers, it cannot discharge due to high water level in the receiving watercourse. Sewer flooding is often caused by surface water discharging into the combined sewerage system, and it is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

5.8 There are no public sewers within the development site. The nearest public sewers lie to the northwest of the development site within the residential estate to the north of Blackburn Road.

5.9 It is noted that a surface water sewer is shown to cross Blackburn Road to discharge into a drain that has been identified in documents online lying along the development site's western boundary and ultimately the River Ribble.

Pluvial runoff

5.10 The Environment Agency Risk of Flooding from Surface Water map indicates the site is at a very low risk of surface water flooding. A high risk is identified along the western boundary of the site along the line of the drain that has been identified in documents online. A very low risk means that each year, this area has a chance of flooding of less than 1 in 1000 (>0.1%). A high risk means that this area has a chance of flooding of greater than 3.3% each year.

5.11 It should be noted that surface water flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm. In addition, local features can greatly affect the chance and severity of flooding.

Development drainage

5.12 Surface water (including the risk of sewers and culverted watercourses surcharging) poses the highest risk of more frequent flooding. Surface water drainage from new developments is critical in reducing the risk of localised flooding.

5.13 If surface water runoff is not managed appropriately, there may be an increased risk presented elsewhere from development drainage, and the aim should be to implement appropriate sustainable drainage systems (SuDS) to treat and contain flows and mimic the existing conditions.

5.14 Where possible the preference for dealing with surface water runoff from the developed site is for it to infiltrate back into the ground or alternatively to a waterbody or watercourse. Only if it is not possible for either of these options is surface water from the development to be allowed into public sewers.

5.15 The development of the site will increase the area of impermeable hardstanding on site and therefore has the potential to alter the surface water runoff regime of the site and to have an adverse effect on flood risk elsewhere in the wider catchment.

6. FLOOD RISK ASSESSMENT

6.1 This section of the Flood Risk Assessment looks at the flood risk to the site before any mitigation measures are put into place and hence identifies where mitigation will be required. Section 7 continues to explain the mitigation measures proposed and the residual risk following implementation of any proposed mitigation.

Risk of Flooding to Proposed Development

Flood Risk

6.2 The site to be developed is identified as lying within Flood Zone 1 on the Environment Agency's flood maps, the lowest risk.

6.3 There is no tidal or fluvial flood risk to the site and the risk of tidal or fluvial flooding to the proposed development is therefore very low.

Canals, reservoirs and other artificial sources

6.4 The Spade Mill reservoirs lie immediately to the north of Blackburn Road, opposite the site. The reservoirs are within embankment. The Environment Agency risk of flooding from reservoirs map identifies the site is at risk when river levels are normal. It is noted that reservoir flooding is extremely unlikely to happen. All large reservoirs are regularly inspected by reservoir panel engineers and the Environment Agency ensures that reservoirs are regularly inspected and essential safety work is undertaken as appropriate. As such the risk of failure of the reservoirs is considered to be low.

6.5 There are no canals or other artificial structures local to the site.

6.6 The risk of flooding from canals, reservoirs and other artificial sources is therefore considered to be low.

Groundwater

6.7 Groundwater flooding is not raised as a major issue in either the Wyre or Ribble Catchment Management Plans.

6.8 The Ribble Valley Borough Council Revised Strategic Flood Risk Level 1 Assessment, April 2017 states the following:

"Following consultation with the EA, no evidence of groundwater flooding in the area has been identified. While no risk has been demonstrated, this is not to say that unrecorded groundwater flooding events may have taken place or that groundwater flooding may not occur in the future, but using the best available information they are not considered to be a significant risk at this time."

6.9 The flood risk from groundwater is therefore considered to be low.

Sewer Flooding and Pluvial Runoff

6.10 There are no public sewers within the development site. The nearest public sewers lie to the northwest of the development site within the residential estate to the north of Blackburn Road. It is noted that a surface water sewer is shown to cross Blackburn Road to discharge into a drain that has been identified in documents online lying along the development site's western boundary and ultimately the River Ribble.

6.11 The Environment Agency Risk of Flooding from Surface Water map indicates the site is at a very low risk of surface water flooding. A high risk is identified along the western boundary of the site along the line of the drain that has been identified in documents online. A very low risk means that each year, this area has a chance of flooding of less than 1 in 1000 (>0.1%). A high risk means that this area has a chance of flooding of greater than 3.3% each year.

6.12 The risk from sewer flooding and pluvial runoff to the developed site is therefore considered to be low.

Effect of the Development on the Wider Catchment

Development Drainage

6.13 The proposed development will introduce an area of impermeable hardstanding on site which has the potential to significantly alter the surface water runoff regime of the site and have an adverse effect on flood risk elsewhere in the wider catchment.

6.14 Based upon the ground conditions identified, infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.

6.15 Surface water runoff from the site will therefore be controlled to the existing pre-development Greenfield runoff rate prior to a discharge being made from the site. As such there will be no change to the flood risk upstream or downstream of this location.

6.16 Surface water requirements have been prepared and are discussed in Section 8 of this document. As a result of the mitigation measures, the risk of flooding from the development drainage is low.

7. PREDICTED IMPACTS AND MITIGATION

7.1 This section of the FRA sets out the mitigation measures recommended to reduce the risk of flooding to the proposed development and outlines any residual impacts.

Site arrangements

Access / Egress

7.2 The access to the site the site during an extreme event will be from the B6243 Blackburn Road which lies within Flood Zone 1 enabling clear access.

Upstream and downstream effects

7.3 There is no material effect on the floodplain due to the proposed development.

7.4 It is intended that surface water runoff from the site will be controlled to the existing pre-development Greenfield runoff rate prior to a discharge being made from the site. As such there will be no change to the flood risk upstream or downstream of this location and therefore there will be no additional risk to upstream or downstream properties.

8. DRAINAGE STRATEGY

Surface water drainage

8.1 Guidance for the disposal of surface water from a development site is for soakaways to be considered as the primary solution. If this is not practical, discharge to a waterbody or watercourse is to be considered as the next available alternative. Only if neither of these options is available, and other sustainable drainage methods not possible, should the use of the public sewerage system be considered.

8.2 The online Soilscapes viewer has identified that the geology encountered will be slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. Based upon the ground conditions identified, infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.

8.3 There are no watercourses within the applicant's ownership or immediately adjacent to the site. The nearest watercourse is a tributary of the Savick Brook that lies on the northern side of Longridge Road approx. 450m to the west of the development site.

8.4 There are no public sewers within the development site. The nearest public sewers lie to the northwest of the development site within the residential estate to the north of Blackburn Road.

8.5 A drain has been identified in documents online lying along the site's western boundary and flows to the south from the site's south western corner as an ordinary watercourse to discharge into the River Ribble approx. 3.8km away.

8.6 It is therefore intended that surface water runoff from the developed site will be controlled to the existing pre-development Greenfield runoff rate, Qbar, allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 50% on stored volumes to discharge into the drain that has been identified in documents online lying along the site's western boundary. The additional 50% is to allow for climate change and has been included in the surface water volume.

8.7 To determine the restricted surface water discharge rate from the developed site, the pre-development Greenfield runoff rates have been calculated using the 'Causeway Flow' programme. The calculations are based upon the area of the site that is to be developed for the commercial units and battery storage that has been measured as 1.14ha. The existing pre-development Greenfield runoff rates have been calculated as below:

Pre-development discharge

Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	1.140
SAAR (mm)	1185
Soil Index	4
SPR	0.47
Region	10
Betterment (%)	0
	Calc
QBar (l/s)	10.2

Return Period (years)	Growth Factor	Q (l/s)
1	0.87	8.9
30	1.70	17.3
100	2.08	21.2

8.8 A preliminary surface water drainage design has been carried out for the proposed site development for all events up to the 100 year critical rain storm plus 50% on stored volumes restricting the surface water runoff from the developed site to 10.2 l/s. Attenuation will be provided within the development site utilising underground storage within the car parking areas.

8.9 Given the nature of the proposed development, urban creep is not considered relevant and has therefore not been taken into account.

8.10 The preliminary surface water drainage design is included within Appendix C.

Foul water drainage

8.11 United Utilities sewer records identify the nearest public foul sewers lie to the northwest of the development site within the residential estate to the north of Blackburn Road. The 225mm diameter sewer continues to the west along Blackburn Road / Lower Lane at a distance of approx. 130m from the north western corner of the site.

8.12 It is therefore intended that foul water from the developed site will be collected by a piped system and be discharged into the 225mm diameter public foul sewer running to the west along Blackburn Road / Lower Lane. A pumping station will need to be located within the southern part of the development site in order for the connection to be made to the public sewer.

9. CONCLUSIONS

9.1 This flood risk assessment and drainage strategy has been produced on behalf of Ribble Valley Property Limited in support of a planning application for proposed commercial units and battery storage on land associated with Higher College Farm, Blackburn Road, Longridge, PR3 2YY.

Flood risk assessment

9.2 The Site lies within Flood Zone 1, the lowest risk, which is identified as land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).

9.3 There is no tidal or fluvial flood risk to the site.

9.4 The risk of flooding from canals, reservoirs and other artificial sources is considered to be low.

9.5 The flood risk from groundwater is considered to be low.

9.6 The risk from sewer flooding and pluvial runoff to the developed site is considered to be low.

9.7 The risk of flooding from the development drainage is low.

Drainage strategy

9.8 It is intended that surface water runoff from the developed site will be controlled to the existing pre-development Greenfield runoff rate, Qbar, allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 50% on stored volumes to discharge into the drain that has been identified in documents online lying along the site's western boundary.

9.9 It is intended that foul water from the developed site will be collected by a piped system and be discharged into the 225mm diameter public foul sewer running to the west along Blackburn Road / Lower Lane. A pumping station will need to be located within the southern part of the development site in order for the connection to be made to the public sewer.

APPENDIX A

› **IMPORTANT**

› © This drawing is copyright and remains the property of this practice
› Do not scale this drawing
› All dimensions to be checked on site
› Positions of existing services to be confirmed prior to proceeding

REVISION STATUS

S Information issued for feasibility or scheme design.
T Information issued for tender purposes only.
C Information issued for Construction.
NB: Only those drawings containing a C revision to be used for construction.

› **NOTES**

› REVISION	› DATE	› DESCRIPTION

› CLIENT
Ribble Valley Property Ltd

› PROJECT
Proposed Development of Land at
Higher College Farm, Longridge, PR3 2YY

› DRAWING TITLE
Location Plan

› SCALE	› DATE	› DRAWN	› CHECKED
1:1250@A3	Aug '23	PRH	

› DRG NO.	› REVISION
EAD_203_01	

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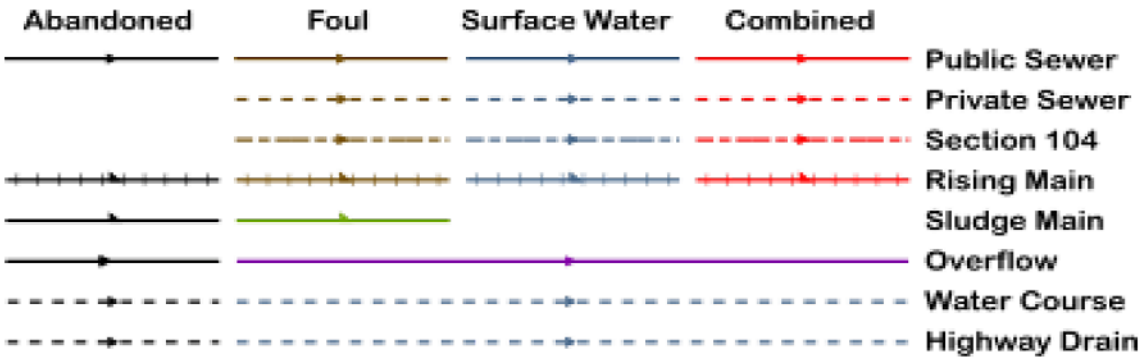
Evolve
Architectural Design

m 0 12.5 25 50 75 100 125
SCALE
1:1,250

APPENDIX B

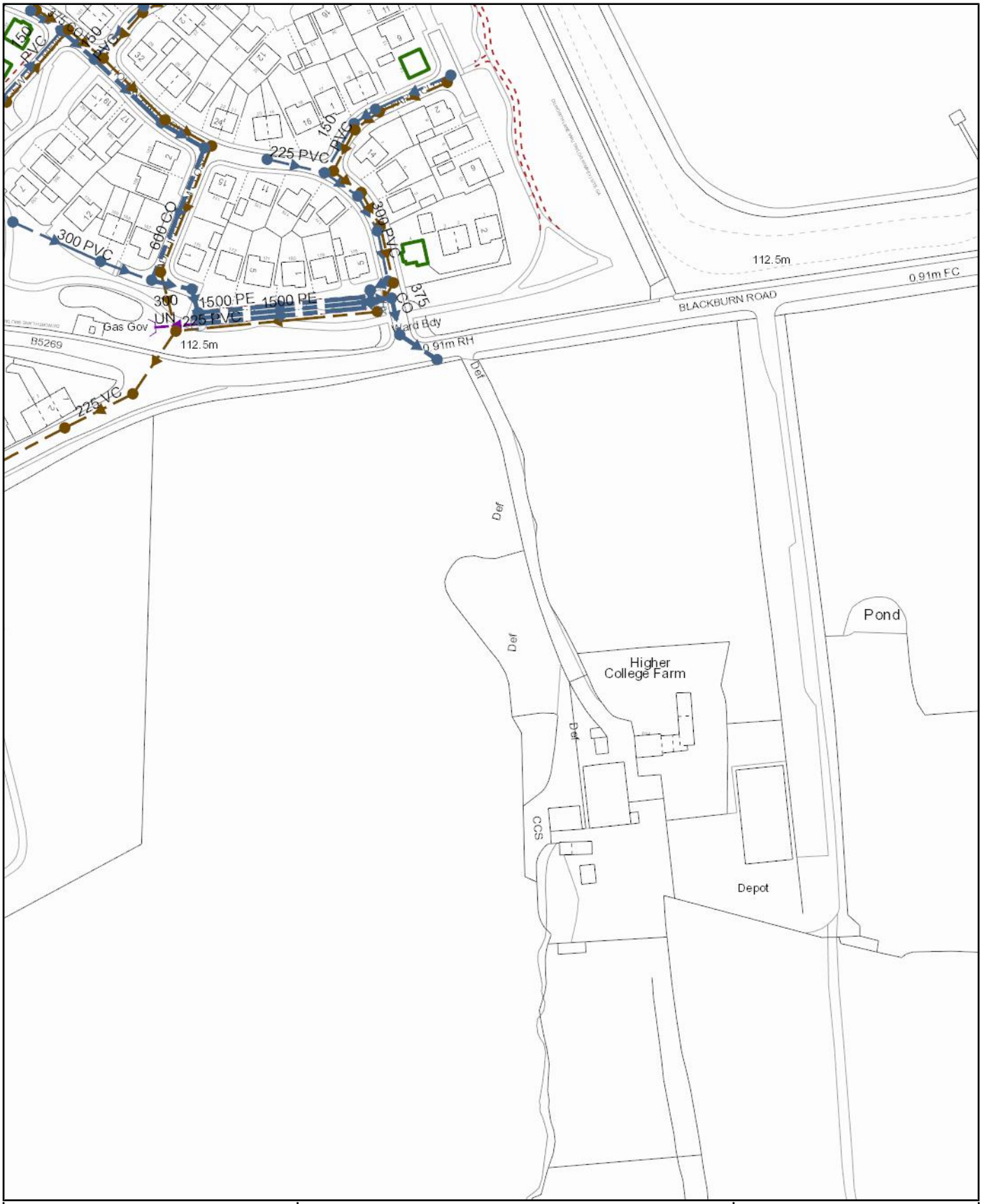
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

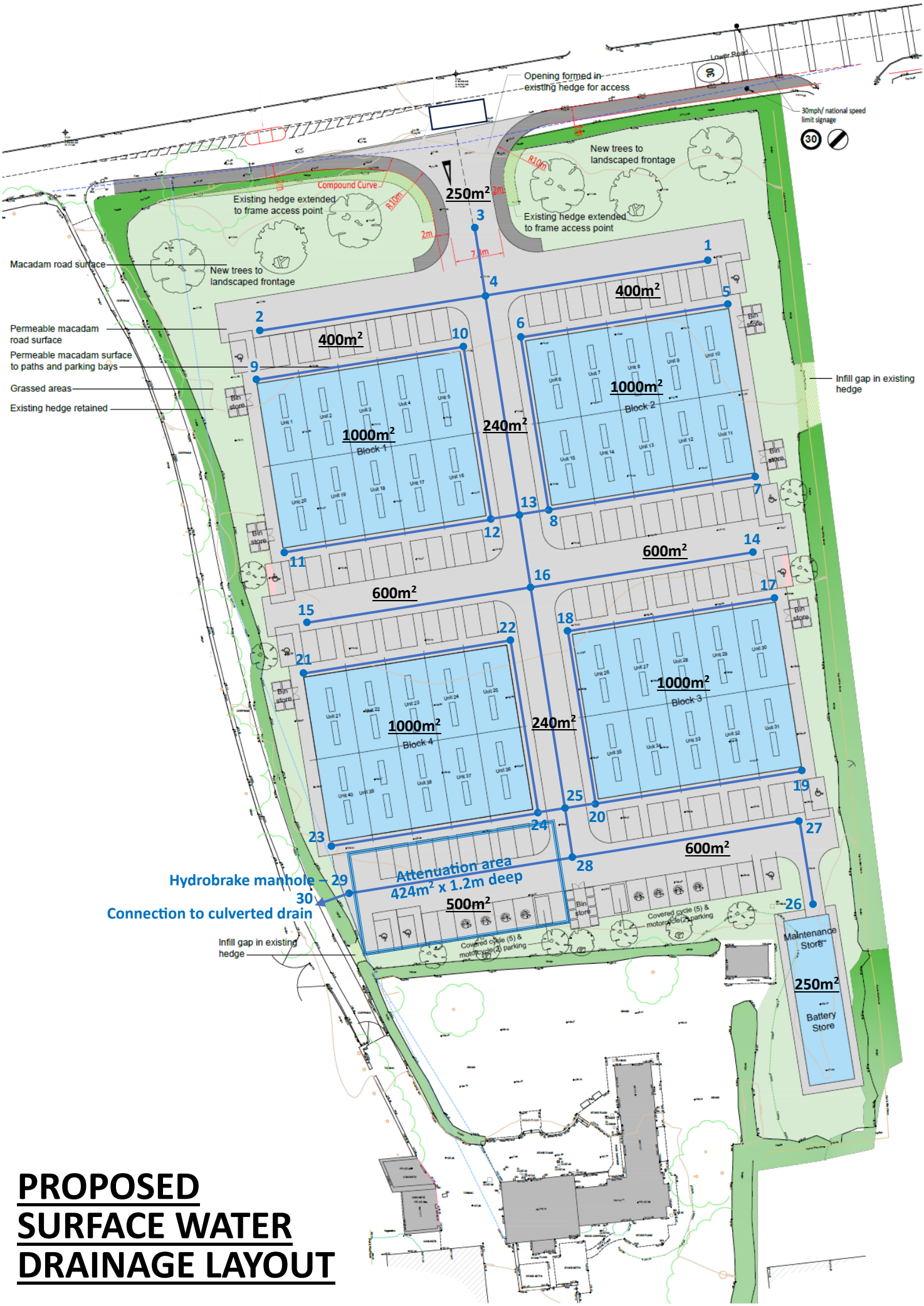
- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- ST Septic Tank
- CK Control Kiosk
- Change of Characteristic



Scale:	1:2052	**SEWER RECORDS**	United Utilities Water for the North West
Date:	07/04/2021		
Address or Site Reference:	Lower Road Longridge		
Printed by:	Property Searches		

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

APPENDIX C



PROPOSED SURFACE WATER DRAINAGE LAYOUT

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.100	Minimum Backdrop Height (m)	3.000
Ratio-R	0.290	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.040	5.00	111.500	1200	1.425
2	0.040	5.00	111.500	1200	1.425
3	0.025	5.00	111.500	1200	1.425
4	0.020	5.00	111.200	1200	1.425
5	0.025	5.00	110.750	1200	1.425
6	0.025	5.00	110.750	1200	1.614
7	0.025	5.00	110.750	1200	1.425
8	0.025	5.00	110.750	1200	1.773
9	0.025	5.00	110.750	1200	1.425
10	0.025	5.00	110.750	1200	1.614
11	0.025	5.00	110.750	1200	1.425
12	0.025	5.00	110.750	1200	1.773
13	0.004	5.00	110.750	1200	1.803
14	0.060	5.00	110.000	1200	1.425
15	0.060	5.00	110.000	1200	1.425
16	0.020	5.00	110.000	1200	1.707
17	0.025	5.00	109.750	1200	1.425
18	0.025	5.00	109.750	1200	1.614
19	0.025	5.00	109.750	1200	1.425
20	0.025	5.00	109.750	1200	1.773
21	0.025	5.00	109.750	1200	1.425

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
22	0.025	5.00	109.750	1200	1.614
23	0.025	5.00	109.750	1200	1.425
24	0.025	5.00	109.750	1200	1.773
25	0.004	5.00	109.750	1200	1.953
26	0.025	5.00	109.200	1200	1.425
27	0.060	5.00	109.400	1200	1.696
28	0.050	5.00	109.400	1500	2.053
29			109.400	1500	2.152
30			108.500	1200	1.575

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	4	35.000	0.600	110.075	109.775	0.300	116.7	225	5.48	54.9
2.000	2	4	34.000	0.600	110.075	109.775	0.300	113.3	225	5.46	55.0
3.000	3	4	10.000	0.600	110.075	109.775	0.300	33.3	225	5.07	56.5
1.001	4	13	34.000	0.600	109.775	108.947	0.828	41.1	225	5.76	53.8
4.000	5	6	32.000	0.600	109.325	109.136	0.189	169.3	225	5.53	54.7
4.001	6	8	27.000	0.600	109.136	108.977	0.159	169.8	225	5.98	53.0
5.000	7	8	32.000	0.600	109.325	108.977	0.348	92.0	225	5.39	55.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.209	48.1	6.0	1.200	1.200	0.040	0.0
2.000	1.227	48.8	6.0	1.200	1.200	0.040	0.0
3.000	2.273	90.4	3.8	1.200	1.200	0.025	0.0
1.001	2.047	81.4	18.2	1.200	1.578	0.125	0.0
4.000	1.002	39.8	3.7	1.200	1.389	0.025	0.0
4.001	1.000	39.8	7.2	1.389	1.548	0.050	0.0
5.000	1.364	54.2	3.7	1.200	1.548	0.025	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.002	8	13	5.000	0.600	108.977	108.947	0.030	166.7	225	6.06	52.7
6.000	9	10	32.000	0.600	109.325	109.136	0.189	169.3	225	5.53	54.7
6.001	10	12	27.000	0.600	109.136	108.977	0.159	169.8	225	5.98	53.0
7.000	11	12	32.000	0.600	109.325	108.977	0.348	92.0	225	5.39	55.2
6.002	12	13	4.000	0.600	108.977	108.947	0.030	133.3	225	6.04	52.8
1.002	13	16	10.000	0.600	108.947	108.368	0.579	17.3	225	6.12	52.5
8.000	14	16	35.000	0.600	108.575	108.368	0.207	169.1	225	5.58	54.5
9.000	15	16	34.000	0.600	108.575	108.368	0.207	164.3	225	5.56	54.6
1.003	16	25	34.000	0.600	108.293	107.872	0.421	80.8	300	6.44	51.4
10.000	17	18	32.000	0.600	108.325	108.136	0.189	169.3	225	5.53	54.7
10.001	18	20	27.000	0.600	108.136	107.977	0.159	169.8	225	5.98	53.0
11.000	19	20	32.000	0.600	108.325	107.977	0.348	92.0	225	5.39	55.2
10.002	20	25	5.000	0.600	107.977	107.947	0.030	166.7	225	6.06	52.7
12.000	21	22	32.000	0.600	108.325	108.136	0.189	169.3	225	5.53	54.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
4.002	1.010	40.1	14.3	1.548	1.578	0.100	0.0
6.000	1.002	39.8	3.7	1.200	1.389	0.025	0.0
6.001	1.000	39.8	7.2	1.389	1.548	0.050	0.0
7.000	1.364	54.2	3.7	1.200	1.548	0.025	0.0
6.002	1.130	44.9	14.3	1.548	1.578	0.100	0.0
1.002	3.163	125.8	46.8	1.578	1.407	0.329	0.0
8.000	1.002	39.9	8.9	1.200	1.407	0.060	0.0
9.000	1.017	40.4	8.9	1.200	1.407	0.060	0.0
1.003	1.751	123.7	65.4	1.407	1.578	0.469	0.0
10.000	1.002	39.8	3.7	1.200	1.389	0.025	0.0
10.001	1.000	39.8	7.2	1.389	1.548	0.050	0.0
11.000	1.364	54.2	3.7	1.200	1.548	0.025	0.0
10.002	1.010	40.1	14.3	1.548	1.578	0.100	0.0
12.000	1.002	39.8	3.7	1.200	1.389	0.025	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
12.001	22	24	27.000	0.600	108.136	107.977	0.159	169.8	225	5.98	53.0
13.000	23	24	32.000	0.600	108.325	107.977	0.348	92.0	225	5.39	55.2
12.002	24	25	4.000	0.600	107.977	107.947	0.030	133.3	225	6.04	52.8
1.004	25	28	8.000	0.600	107.797	107.347	0.450	17.8	375	6.47	51.3
14.000	26	27	12.000	0.600	107.775	107.704	0.071	169.0	225	5.20	56.0
14.001	27	28	35.000	0.600	107.704	107.497	0.207	169.1	225	5.78	53.7
1.005	28	29	32.000	0.600	107.347	107.248	0.099	323.2	375	7.00	49.6
1.006	29	30	12.000	0.600	107.248	106.925	0.323	37.2	225	7.10	49.3

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
12.001	1.000	39.8	7.2	1.389	1.548	0.050	0.0
13.000	1.364	54.2	3.7	1.200	1.548	0.025	0.0
12.002	1.130	44.9	14.3	1.548	1.578	0.100	0.0
1.004	4.314	476.5	93.6	1.578	1.678	0.673	0.0
14.000	1.003	39.9	3.8	1.200	1.471	0.025	0.0
14.001	1.002	39.9	12.4	1.471	1.678	0.085	0.0
1.005	1.002	110.7	108.7	1.678	1.777	0.808	0.0
1.006	2.153	85.6	108.1	1.927	1.350	0.808	0.0

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.100	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.290	Skip Steady State	x	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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	0	0	0
30	0	0	0	100	50	0	0

Node 29 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	107.248	Product Number	CTL-SHE-0133-1020-1950-1020
Design Depth (m)	1.950	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	10.2	Min Node Diameter (mm)	1500

Node 29 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	107.248
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	424.0	0.0	1.200	424.0	0.0	1.201	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	110.122	0.047	4.8	0.0799	0.0000	OK
15 minute winter	2	10	110.122	0.047	4.8	0.0794	0.0000	OK
15 minute winter	3	10	110.103	0.028	3.0	0.0414	0.0000	OK
15 minute winter	4	11	109.839	0.064	14.8	0.0906	0.0000	OK
15 minute winter	5	10	109.366	0.041	3.0	0.0604	0.0000	OK
15 minute winter	6	11	109.193	0.057	5.9	0.0825	0.0000	OK
15 minute winter	7	10	109.360	0.035	3.0	0.0522	0.0000	OK
15 minute winter	8	11	109.071	0.094	11.4	0.1326	0.0000	OK
15 minute winter	9	10	109.366	0.041	3.0	0.0604	0.0000	OK
15 minute winter	10	11	109.193	0.057	5.9	0.0825	0.0000	OK
15 minute winter	11	10	109.360	0.035	3.0	0.0522	0.0000	OK
15 minute winter	12	11	109.069	0.092	11.4	0.1293	0.0000	OK
15 minute winter	13	11	109.040	0.093	37.6	0.1090	0.0000	OK
15 minute winter	14	10	108.639	0.064	7.3	0.1268	0.0000	OK
15 minute winter	15	10	108.639	0.064	7.3	0.1262	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	4	4.7	0.623	0.098	0.2682	
15 minute winter	2	2.000	4	4.7	0.626	0.096	0.2595	
15 minute winter	3	3.000	4	3.0	0.523	0.033	0.0602	
15 minute winter	4	1.001	13	14.6	1.204	0.179	0.4207	
15 minute winter	5	4.000	6	2.9	0.460	0.072	0.2049	
15 minute winter	6	4.001	8	5.7	0.495	0.144	0.3186	
15 minute winter	7	5.000	8	2.9	0.336	0.054	0.3133	
15 minute winter	8	4.002	13	11.3	0.724	0.280	0.0777	
15 minute winter	9	6.000	10	2.9	0.460	0.072	0.2049	
15 minute winter	10	6.001	12	5.7	0.505	0.144	0.3118	
15 minute winter	11	7.000	12	2.9	0.345	0.054	0.3051	
15 minute winter	12	6.002	13	11.3	0.737	0.251	0.0612	
15 minute winter	13	1.002	16	37.5	2.595	0.298	0.1444	
15 minute winter	14	8.000	16	7.0	0.744	0.177	0.3377	
15 minute winter	15	9.000	16	7.1	0.750	0.174	0.3265	

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	11	108.435	0.142	53.8	0.1943	0.0000	OK
15 minute winter	17	10	108.366	0.041	3.0	0.0604	0.0000	OK
15 minute winter	18	11	108.193	0.057	5.9	0.0825	0.0000	OK
15 minute winter	19	10	108.360	0.035	3.0	0.0522	0.0000	OK
15 minute winter	20	11	108.069	0.092	11.4	0.1303	0.0000	OK
15 minute winter	21	10	108.366	0.041	3.0	0.0604	0.0000	OK
15 minute winter	22	11	108.193	0.057	5.9	0.0825	0.0000	OK
15 minute winter	23	10	108.360	0.035	3.0	0.0523	0.0000	OK
15 minute winter	24	11	108.066	0.089	11.4	0.1260	0.0000	OK
15 minute winter	25	10	108.030	0.233	77.0	0.2734	0.0000	OK
15 minute winter	26	10	108.113	0.338	10.3	0.5013	0.0000	SURCHARGED
15 minute winter	27	10	108.078	0.374	24.2	0.6882	0.0000	SURCHARGED
15 minute winter	28	10	108.022	0.675	108.5	1.5207	0.0000	SURCHARGED
360 minute winter	29	248	107.459	0.211	19.3	85.4441	0.0000	OK
15 minute summer	30	1	106.925	0.000	4.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	1.003	25	52.6	1.655	0.425	1.1744	
15 minute winter	17	10.000	18	2.9	0.460	0.072	0.2049	
15 minute winter	18	10.001	20	5.7	0.513	0.144	0.3139	
15 minute winter	19	11.000	20	2.9	0.346	0.054	0.3076	
15 minute winter	20	10.002	25	12.0	0.837	0.299	0.0718	
15 minute winter	21	12.000	22	2.9	0.460	0.072	0.2049	
15 minute winter	22	12.001	24	5.7	0.529	0.144	0.3048	
15 minute winter	23	13.000	24	2.9	0.358	0.054	0.2968	
15 minute winter	24	12.002	25	12.2	0.900	0.272	0.0543	
15 minute winter	25	1.004	28	84.0	1.336	0.176	0.7288	
15 minute winter	26	14.000	27	8.3	0.342	0.207	0.4773	
15 minute winter	27	14.001	28	28.6	0.736	0.718	1.3920	
15 minute winter	28	1.005	29	127.3	2.180	1.150	1.8893	
360 minute winter	29	Hydro-Brake®	30	8.7				152.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	110.150	0.075	11.8	0.1263	0.0000	OK
15 minute winter	2	10	110.149	0.074	11.8	0.1254	0.0000	OK
15 minute winter	3	10	110.118	0.043	7.4	0.0641	0.0000	OK
15 minute winter	4	11	109.879	0.104	36.4	0.1464	0.0000	OK
15 minute winter	5	10	109.390	0.064	7.4	0.0955	0.0000	OK
15 minute winter	6	11	109.229	0.092	14.6	0.1332	0.0000	OK
15 minute winter	7	10	109.380	0.055	7.4	0.0820	0.0000	OK
15 minute winter	8	12	109.184	0.207	28.7	0.2930	0.0000	OK
15 minute winter	9	10	109.390	0.064	7.4	0.0955	0.0000	OK
15 minute winter	10	11	109.229	0.092	14.6	0.1332	0.0000	OK
15 minute winter	11	10	109.380	0.055	7.4	0.0821	0.0000	OK
15 minute winter	12	12	109.182	0.205	28.7	0.2901	0.0000	OK
15 minute winter	13	12	109.166	0.219	89.2	0.2568	0.0000	OK
15 minute winter	14	12	108.841	0.266	17.7	0.5254	0.0000	SURCHARGED
15 minute winter	15	12	108.841	0.266	17.7	0.5243	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	4	11.6	0.795	0.241	0.5111	
15 minute winter	2	2.000	4	11.6	0.799	0.237	0.4946	
15 minute winter	3	3.000	4	7.4	0.669	0.081	0.1152	
15 minute winter	4	1.001	13	35.8	1.457	0.439	0.9506	
15 minute winter	5	4.000	6	7.2	0.592	0.182	0.3939	
15 minute winter	6	4.001	8	14.3	0.592	0.360	0.7096	
15 minute winter	7	5.000	8	7.3	0.392	0.134	0.7202	
15 minute winter	8	4.002	13	26.3	0.873	0.656	0.1943	
15 minute winter	9	6.000	10	7.2	0.592	0.182	0.3940	
15 minute winter	10	6.001	12	14.3	0.600	0.360	0.7061	
15 minute winter	11	7.000	12	7.3	0.400	0.134	0.7161	
15 minute winter	12	6.002	13	26.4	0.881	0.587	0.1549	
15 minute winter	13	1.002	16	86.9	2.792	0.691	0.3960	
15 minute winter	14	8.000	16	17.5	0.801	0.440	1.3920	
15 minute winter	15	9.000	16	17.2	0.806	0.426	1.3522	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	12	108.806	0.513	118.8	0.7003	0.0000	SURCHARGED
15 minute winter	17	11	108.413	0.088	7.4	0.1300	0.0000	OK
15 minute winter	18	11	108.396	0.260	21.4	0.3741	0.0000	SURCHARGED
15 minute winter	19	11	108.388	0.063	7.4	0.0933	0.0000	OK
15 minute winter	20	10	108.381	0.404	32.9	0.5712	0.0000	SURCHARGED
15 minute winter	21	11	108.411	0.085	7.4	0.1266	0.0000	OK
15 minute winter	22	11	108.394	0.258	21.9	0.3713	0.0000	SURCHARGED
15 minute winter	23	11	108.385	0.060	7.4	0.0889	0.0000	OK
15 minute winter	24	10	108.381	0.403	29.4	0.5701	0.0000	SURCHARGED
15 minute winter	25	10	108.360	0.563	185.3	0.6597	0.0000	SURCHARGED
15 minute winter	26	10	108.338	0.563	23.6	0.8344	0.0000	SURCHARGED
15 minute winter	27	10	108.340	0.635	31.6	1.1687	0.0000	SURCHARGED
15 minute winter	28	10	108.261	0.914	219.4	2.0603	0.0000	SURCHARGED
360 minute winter	29	272	107.791	0.543	40.9	219.5029	0.0000	SURCHARGED
15 minute summer	30	1	106.925	0.000	8.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	1.003	25	120.9	1.870	0.977	2.3943	
15 minute winter	17	10.000	18	7.8	0.555	0.196	0.8653	
15 minute winter	18	10.001	20	17.9	0.546	0.451	1.0738	
15 minute winter	19	11.000	20	7.7	0.392	0.143	0.7814	
15 minute winter	20	10.002	25	31.8	0.979	0.791	0.1989	
15 minute winter	21	12.000	22	7.9	0.555	0.198	0.8574	
15 minute winter	22	12.001	24	18.0	0.561	0.451	1.0738	
15 minute winter	23	13.000	24	7.9	0.404	0.146	0.7720	
15 minute winter	24	12.002	25	32.0	1.044	0.711	0.1591	
15 minute winter	25	1.004	28	187.8	1.703	0.394	0.8824	
15 minute winter	26	14.000	27	-19.4	-0.558	-0.486	0.4773	
15 minute winter	27	14.001	28	26.5	0.854	0.665	1.3920	
15 minute winter	28	1.005	29	224.7	2.778	2.030	2.7456	
360 minute winter	29	Hydro-Brake®	30	10.2				284.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	110.161	0.086	15.3	0.1452	0.0000	OK
15 minute winter	2	10	110.160	0.085	15.3	0.1441	0.0000	OK
15 minute winter	3	10	110.124	0.049	9.5	0.0726	0.0000	OK
15 minute winter	4	11	109.896	0.121	47.1	0.1702	0.0000	OK
15 minute winter	5	13	109.470	0.145	9.5	0.2142	0.0000	OK
15 minute winter	6	13	109.470	0.334	18.8	0.4808	0.0000	SURCHARGED
15 minute winter	7	12	109.458	0.133	9.5	0.1964	0.0000	OK
15 minute winter	8	13	109.447	0.470	33.4	0.6646	0.0000	SURCHARGED
15 minute winter	9	13	109.467	0.142	9.5	0.2107	0.0000	OK
15 minute winter	10	13	109.468	0.332	18.8	0.4781	0.0000	SURCHARGED
15 minute winter	11	12	109.456	0.131	9.5	0.1940	0.0000	OK
15 minute winter	12	13	109.445	0.468	33.4	0.6611	0.0000	SURCHARGED
15 minute winter	13	13	109.421	0.474	93.3	0.5570	0.0000	SURCHARGED
15 minute winter	14	12	109.094	0.519	22.8	1.0231	0.0000	SURCHARGED
15 minute winter	15	12	109.092	0.517	22.8	1.0203	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	4	15.0	0.849	0.313	0.6208	
15 minute winter	2	2.000	4	15.0	0.853	0.308	0.6007	
15 minute winter	3	3.000	4	9.4	0.708	0.105	0.1397	
15 minute winter	4	1.001	13	46.2	1.470	0.568	1.0441	
15 minute winter	5	4.000	6	9.3	0.626	0.234	1.0676	
15 minute winter	6	4.001	8	20.9	0.609	0.526	1.0738	
15 minute winter	7	5.000	8	9.8	0.402	0.181	1.0255	
15 minute winter	8	4.002	13	34.9	0.994	0.868	0.1989	
15 minute winter	9	6.000	10	9.3	0.626	0.234	1.0594	
15 minute winter	10	6.001	12	21.0	0.616	0.527	1.0738	
15 minute winter	11	7.000	12	9.9	0.410	0.183	1.0197	
15 minute winter	12	6.002	13	35.1	0.992	0.782	0.1591	
15 minute winter	13	1.002	16	94.3	2.726	0.750	0.3977	
15 minute winter	14	8.000	16	20.5	0.784	0.515	1.3920	
15 minute winter	15	9.000	16	20.6	0.791	0.509	1.3522	

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	12	109.034	0.741	127.5	1.0110	0.0000	SURCHARGED
15 minute winter	17	11	108.583	0.258	10.8	0.3818	0.0000	SURCHARGED
15 minute winter	18	11	108.568	0.432	26.1	0.6228	0.0000	SURCHARGED
15 minute winter	19	11	108.538	0.213	9.5	0.3158	0.0000	OK
15 minute winter	20	11	108.527	0.550	34.1	0.7770	0.0000	SURCHARGED
15 minute winter	21	11	108.579	0.254	10.6	0.3761	0.0000	SURCHARGED
15 minute winter	22	11	108.563	0.427	25.3	0.6147	0.0000	SURCHARGED
15 minute winter	23	11	108.534	0.209	9.5	0.3093	0.0000	OK
15 minute winter	24	11	108.522	0.545	34.2	0.7704	0.0000	SURCHARGED
15 minute winter	25	11	108.490	0.693	204.0	0.8120	0.0000	SURCHARGED
15 minute winter	26	11	108.497	0.722	10.7	1.0697	0.0000	SURCHARGED
15 minute winter	27	11	108.490	0.786	32.4	1.4463	0.0000	SURCHARGED
15 minute winter	28	10	108.341	0.993	245.5	2.2393	0.0000	SURCHARGED
360 minute winter	29	296	107.987	0.739	52.9	299.1200	0.0000	SURCHARGED
15 minute summer	30	1	106.925	0.000	9.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	1.003	25	129.3	1.942	1.045	2.3943	
15 minute winter	17	10.000	18	10.5	0.547	0.264	1.2727	
15 minute winter	18	10.001	20	21.9	0.580	0.552	1.0738	
15 minute winter	19	11.000	20	10.8	0.389	0.200	1.2593	
15 minute winter	20	10.002	25	38.0	0.956	0.947	0.1989	
15 minute winter	21	12.000	22	10.6	0.547	0.266	1.2727	
15 minute winter	22	12.001	24	21.9	0.584	0.551	1.0738	
15 minute winter	23	13.000	24	10.9	0.401	0.201	1.2515	
15 minute winter	24	12.002	25	38.2	0.961	0.850	0.1591	
15 minute winter	25	1.004	28	205.9	1.867	0.432	0.8824	
15 minute winter	26	14.000	27	9.5	0.357	0.239	0.4773	
15 minute winter	27	14.001	28	31.5	0.791	0.789	1.3920	
15 minute winter	28	1.005	29	250.2	2.976	2.260	3.2512	
360 minute winter	29	Hydro-Brake®	30	10.2				301.8

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	110.569	0.494	22.9	0.8355	0.0000	SURCHARGED
15 minute winter	2	13	110.568	0.493	22.9	0.8346	0.0000	SURCHARGED
15 minute winter	3	13	110.555	0.480	14.3	0.7106	0.0000	SURCHARGED
15 minute winter	4	13	110.551	0.776	70.7	1.0953	0.0000	SURCHARGED
15 minute winter	5	13	110.409	1.083	14.3	1.6057	0.0000	SURCHARGED
15 minute winter	6	13	110.399	1.263	27.2	1.8200	0.0000	SURCHARGED
15 minute winter	7	13	110.379	1.054	14.3	1.5625	0.0000	SURCHARGED
15 minute winter	8	13	110.369	1.392	40.3	1.9666	0.0000	SURCHARGED
15 minute winter	9	13	110.405	1.080	14.3	1.6002	0.0000	SURCHARGED
15 minute winter	10	13	110.395	1.259	27.6	1.8145	0.0000	SURCHARGED
15 minute winter	11	13	110.375	1.050	14.3	1.5564	0.0000	SURCHARGED
15 minute winter	12	13	110.365	1.388	40.3	1.9611	0.0000	SURCHARGED
15 minute winter	13	13	110.333	1.386	111.2	1.6283	0.0000	SURCHARGED
15 minute winter	14	12	109.874	1.299	34.3	2.5626	0.0000	FLOOD RISK
15 minute winter	15	12	109.871	1.296	34.3	2.5574	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	4	22.5	0.886	0.469	1.3920	
15 minute winter	2	2.000	4	22.6	0.890	0.462	1.3522	
15 minute winter	3	3.000	4	14.2	0.760	0.157	0.3977	
15 minute winter	4	1.001	13	56.4	1.507	0.693	1.3522	
15 minute winter	5	4.000	6	10.2	0.662	0.255	1.2727	
15 minute winter	6	4.001	8	23.9	0.610	0.602	1.0738	
15 minute winter	7	5.000	8	11.5	0.416	0.211	1.2727	
15 minute winter	8	4.002	13	40.5	1.107	1.008	0.1989	
15 minute winter	9	6.000	10	10.2	0.662	0.255	1.2727	
15 minute winter	10	6.001	12	24.3	0.619	0.612	1.0738	
15 minute winter	11	7.000	12	11.8	0.424	0.218	1.2727	
15 minute winter	12	6.002	13	40.7	1.070	0.905	0.1591	
15 minute winter	13	1.002	16	115.7	2.908	0.920	0.3977	
15 minute winter	14	8.000	16	27.0	0.787	0.677	1.3920	
15 minute winter	15	9.000	16	27.0	0.793	0.668	1.3522	

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	12	109.777	1.484	155.6	2.0262	0.0000	FLOOD RISK
480 minute winter	17	448	109.192	0.867	2.0	1.2850	0.0000	SURCHARGED
480 minute winter	18	448	109.192	1.056	4.0	1.5219	0.0000	SURCHARGED
480 minute winter	19	448	109.192	0.867	2.0	1.2851	0.0000	SURCHARGED
480 minute winter	20	448	109.192	1.215	8.0	1.7167	0.0000	SURCHARGED
480 minute winter	21	448	109.192	0.867	2.0	1.2850	0.0000	SURCHARGED
480 minute winter	22	448	109.192	1.056	4.0	1.5219	0.0000	SURCHARGED
480 minute winter	23	448	109.192	0.867	2.0	1.2851	0.0000	SURCHARGED
480 minute winter	24	448	109.192	1.215	8.0	1.7167	0.0000	SURCHARGED
480 minute winter	25	448	109.192	1.395	54.1	1.6348	0.0000	SURCHARGED
480 minute winter	26	448	109.192	1.417	2.0	2.0999	0.0000	FLOOD RISK
480 minute winter	27	448	109.192	1.488	6.7	2.7362	0.0000	FLOOD RISK
480 minute winter	28	448	109.192	1.845	63.7	4.1577	0.0000	FLOOD RISK
480 minute winter	29	448	109.191	1.943	63.7	486.9938	0.0000	FLOOD RISK
15 minute summer	30	1	106.925	0.000	10.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	1.003	25	159.2	2.261	1.286	2.3943	
480 minute winter	17	10.000	18	2.0	0.406	0.050	1.2727	
480 minute winter	18	10.001	20	4.0	0.463	0.101	1.0738	
480 minute winter	19	11.000	20	2.0	0.292	0.037	1.2727	
480 minute winter	20	10.002	25	8.0	0.751	0.199	0.1989	
480 minute winter	21	12.000	22	2.0	0.406	0.050	1.2727	
480 minute winter	22	12.001	24	4.0	0.480	0.101	1.0738	
480 minute winter	23	13.000	24	2.0	0.305	0.037	1.2727	
480 minute winter	24	12.002	25	8.0	0.804	0.178	0.1591	
480 minute winter	25	1.004	28	53.1	1.093	0.111	0.8824	
480 minute winter	26	14.000	27	1.8	0.312	0.046	0.4773	
480 minute winter	27	14.001	28	6.5	0.640	0.163	1.3920	
480 minute winter	28	1.005	29	63.7	1.061	0.576	3.5295	
480 minute winter	29	Hydro-Brake®	30	10.2				347.9