Reid Jones partnership

Consulting Civil & Structural Engineers

SURFACE WATER DRAINAGE SCHEME

FOR

SHACKLETONS GARDEN CENTRE LIMITED

EXTENSION AND REMODELLING OF HOME AND GARDEN CENTRE

FEBRUARY 2024

Project No.: 10301				
Issue Date	**Revision**	**Status**	**Issued By**	**Checked By**
23.02.2024		First Issue	H Reza	S J Reid
05.03.2024	A	Second Issue	H Reza	S J Reid

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QMS ISO 9001 : 2015 REGISTERED QUALITY MANAGEMENT

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APPENDICES

1. INTRODUCTION

1.1 This surface water drainage scheme has been produced on behalf of Shackletons Garden Centre Limited to discharge Conditions 11, 16 and 17 of the planning approval from Ribble Valley Borough Council (Reference 3/2020/0911) for a proposed two-storey extension to rear and re-modelling of home and garden centre at Shackletons Garden Centre, Clitheroe Road, Chatburn, BB7 4JY.

1.2 Condition 11 states the following:

The surface water from the approved car park should be collected within the site and drained to a suitable internal outfall. Prior to commencement of the development details of the drainage strategy shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall be implemented in accordance with the approved details prior to the first use of the extension hereby approved.

1.3 Condition 16 states the following:

The development permitted by this planning permission shall be carried out in accordance with the principles set out within the submitted flood risk assessment (24th November 2021 / 10301 – Revision 3 / Reid Jones Partnership). The measures shall be fully implemented prior to the first use of any building and in accordance with the timing arrangements embodied within the scheme.

1.4 Condition 17 states the following:

No development shall commence in any phase until a detailed, final surface water sustainable drainage strategy for the site has been submitted to, and approved in writing by, the local planning authority.

The detailed sustainable drainage strategy shall be based upon the site-specific flood risk assessment and indicative sustainable drainage strategy submitted and sustainable drainage principles and requirements set out in the National Planning Policy Framework, Planning Practice Guidance and Defra Technical Standards for Sustainable Drainage Systems and no surface water shall be allowed to discharge to

the public foul sewer(s), directly or indirectly. Those details shall include, as a minimum:

a) *Sustainable drainage calculations for peak flow control and volume control (1 in 1, 1 in 30 and 1 in 100 + 40% climate change) for the whole site, including all existing and proposed surface water drainage systems.*
b) *Final sustainable drainage plans appropriately labelled to include, as a minimum:*
    i. *Plan identifying areas contributing to the drainage network, including surface water flows from outside the curtilage as necessary;*
    ii. *Sustainable drainage system layout showing all pipe and structure references, dimensions, design levels, to include all existing and proposed surface water drainage systems up to and including the final outfall.*
    iii. *Details of all sustainable drainage components, including landscape drawings showing topography and slope gradient as appropriate;*
    iv. *Flood water exceedance routes in accordance with Defra Technical Standards for Sustainable Drainage Systems;*
    v. *Finished Floor Levels (FFL) in AOD with adjacent ground levels for all sides of each building to confirm minimum 150mm+ difference for FFL;*
    vi. *Details of proposals to collect and mitigate surface water runoff from the development boundary;*
    vii. *Measures taken to manage the quality of the surface water runoff to prevent pollution, protects groundwater and surface waters, and delivers suitably clean water to sustainable drainage components;*
c) *Where existing on-site surface water drainage systems are to be used, then evidence is required to confirm these systems are in a sufficient condition to accept additional surface water runoff generated from the development. The sustainable drainage strategy shall be implemented in accordance with the approved details.*

1.5 This drainage scheme is to discharge Conditions 11, 16 and 17 of the planning approval. It describes the existing site conditions and proposed development. It assesses the potential impact of proposals on existing drainage and includes a proposed scheme for the provision of new drainage to serve the proposed development.

2. BASE INFORMATION

Existing site

2.1 The proposal relates to the existing Shackletons Home and Garden Centre that is located to the southeast of Clitheroe Road, 500m south of Chatburn and 2.5km north of Clitheroe. Worston Road lies along the site's southwestern boundary. A location plan is included within Appendix A.

2.2 The site extends to 2.5 hectares in size and comprises the existing store within the western part of the site surrounded by car parking areas. The eastern part of the site into which the garden centre is to be extended, comprises green fields.

2.3 The main entrance to the site is from Clitheroe Road. Service access is provided from Worston Road.

2.4 The site falls from south to north, a level of approx. 110m AOD at its eastern corner and a level approx. 98m AOD at its western corner. The existing site topography is shown on Reid Jones Partnership drawing No. 10301-100, which is included within Appendix B.

Site geology

2.5 The online Soilscapes Viewer has identified the site as lying in a region characterised by slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage that are not conducive to infiltration techniques.

2.6 British Geological Survey (BGS) maps indicate superficial deposits of till (Devensian Diamicton) overlying bedrock of Limestone and Mudstone (Clitheroe Limestone Formation And Hodder Mudstone Formation (undifferentiated) - Mudstone).

Understanding of existing drainage local to the site

2.7 United Utilities sewer records identify no public sewers draining by gravity local to the site. There is a rising main located within Clitheroe Road running to the southwest. The sewer records are included within Appendix C.

2.8 The nearest main rivers are Heys Brook, approximately 650m to the north-east of the site and Worston Brook, approximately 1km to the south, which is a tributary of the Mearley Brook.

2.9 A watercourse flows in open ditch and in culvert within the Pendle Trading Estate, which lies on the opposite side of Clitheroe Road to the existing garden centre. The watercourse flows to the west into the Mearley Brook.

2.10 The garden centre is served by an existing private drainage network, with separate systems for foul and surface water. Investigations have been carried out into both the on-site surface water drainage and the private sewer. The findings are indicated on RJP drawing No. 101 and Stanton Andrews drawing No. SK.05, which is included within Appendix D.

2.11 The on-site surface water system was largely silted up or manholes were inaccessible at the time, leading to limited data. However, the sewer in the footway was recorded as 150mm diameter and was able to be traced upstream from manhole EX2, to the north-east of the site entrance, to an existing manhole EX3. The incoming pipe to EX3 crossed under the highway from the north and was noted to be "collapsed" by the drainage company carrying out the investigation. It was also traced in the footway from EX2 towards the corner of Worston Road to an existing manhole EX1. At least one road gulley was noted to be connected into the sewer.

2.12 The outlet from EX2 crossed under the highway in a north-westerly direction to an existing manhole EX4 in the highway, adjacent to the kerb. From EX4, the pipe size was recorded to be 225mm diameter, and the outlet was indicated to head in a westerly direction.

2.13 Following the initial investigation detailed above, further work was undertaken to determine the route of the sough and the surface water discharge off-site at the north end of the site. The results of the further investigation are indicated on Stanton Andrews drawing No. SK.05, which is also included within Appendix D, and shows via dye tracing that the on-site drainage system discharges to the watercourse on the Pendle Trading Estate via the sough.

2.14 As noted, the only known discharge point for the existing surface water runoff from the established site and runoff from the highways is the sough which discharges into the watercourse.

2.15 Foul drainage from existing WCs and the kitchen is treated by on-site package sewage treatment plants, sited adjacent to the main building entrance. The treated effluent combines with the on-site surface water system before discharging into a private sewer in the footway at an existing manhole EX2.

Proposed development

2.16 The proposal is for the extension and remodelling of the existing home and garden centre, including additional indoor and outdoor retail space and increased café area and new play area. Additional car parking areas will also be provided.

3. PROPOSED SURFACE WATER DRAINAGE SCHEME

3.1 In accordance with the National Standards for Sustainable Drainage, the drainage scheme should incorporate the use of Sustainable Drainage (SUDS) where possible. The approach promotes the use infiltration features in the first instance. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference):

(i) a controlled discharge to a local waterbody or watercourse, or

(ii) a controlled discharge into the public sewer network (depending on availability and capacity).

3.2 The rate and volume of discharge should strive to provide betterment and be restricted to the pre-development values as far as practicable.

3.3 The online Soilscapes Viewer has identified the site as lying in a region characterised by slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage that are not conducive to infiltration techniques.

3.4 The garden centre is served by an existing private drainage network, with separate systems for foul and surface water. The on-site drainage system discharges into the watercourse on the Pendle Trading Estate via the sough. The sough also takes surface water runoff from the highways.

3.5 It is intended that surface water runoff from the completed garden centre development will be attenuated on site and a restricted discharge made into the watercourse on the Pendle Trading Estate via the sough.

3.6 The on-site surface water drainage system requires to be cleaned prior to accepting any discharges from the proposed surface water drainage for the development. Relevant maintenance also needs to be carried out by the off-site owners of the surface water drainage system.

3.7 Condition 16 on the decision notice states the following:

The development permitted by this planning permission shall be carried out in accordance with the principles set out within the submitted flood risk assessment (24th November 2021 / 10301 – Revision 3 / Reid Jones Partnership). The measures shall be fully implemented prior to the first use of any building and in accordance with the timing arrangements embodied within the scheme.

3.8 The conclusions from the approved flood risk assessment relating to the proposed surface water drainage system are as follows and the proposed surface water drainage for the developed site has been designed to the principles set out.

- As the existing surface water from the site discharges to a watercourse, it is proposed that the surface water discharge from the development is limited to a greenfield runoff and discharged into the same watercourse via the existing sough.
- Greenfield runoffs have been calculated for the proposed development area. The 1 in 1 year greenfield runoff is calculated to be 10.4 l/s and the 1 in 100 year greenfield runoff is 24.9 l/s. Qbar is calculated to be 12.0 l/s.
- To mitigate off-site flooding, it is recommended that the proposed surface water system is designed to contain a 1 in 100 year rainfall event, with an increase of 40% allowed for climate change. This is as stated within Condition 17.

3.9 The developed site will contain two separate surface water drainage systems, one covering the northern part of the site (the majority of the car parking areas and some building roofs) and the other covering the southern part of the site (mainly building roofs and some car parking areas). Each of the drainage runs will be restricted to 6.0 l/s and attenuation provided prior to a discharge (total 12.0 l/s) being made into the existing sough.

3.10 It is noted that surface water runoff from the existing building that fronts onto Worston Road, prior to development taking place, is discharged directly onto Worston Road creating a flood risk on the carriageway. It is therefore intended that all surface water runoff from the existing building roofs that front onto Worston Road will be collected by a new drain, to be laid alongside the existing building, and a connection

made into the proposed surface water drainage system, which will attenuate flows from this part of the site to 6.0 l/s. There will therefore be no direct discharge of surface water from the developed site onto Worston Road.

3.11 A surface water drainage design has been carried out for all events up to the 100 year critical rain storm plus 40% for climate change on stored volumes. The surface water runoff from the whole of the developed site has been restricted to a total of 12.0 l/s and attenuation provided using storage crates located under the external hardstanding areas. A surcharged outfall from the site has not been applied as the site is at the head of the drainage network and the surface water runoff from the site is being restricted to 12.0 l/s. The surface water drainage design is included within Appendix E.

3.12 Surface water falling onto the undrained soft landscaped areas will be retained on site with attenuation storage being provided by the topsoil layer, which will allow water to percolate into it where it will either be taken up by the vegetation or evaporate. The surface water within these areas of the site will therefore be dealt with close to where it falls, at source.

4. SUMMARY AND CONCLUSIONS

4.1 This surface water drainage scheme has been produced on behalf of Shackletons Garden Centre Limited to discharge Conditions 11, 16 and 17 of the planning approval from Ribble Valley Borough Council (Reference 3/2020/0911) for a proposed two-storey extension to rear and re-modelling of home and garden centre at Shackletons Garden Centre, Clitheroe Road, Chatburn, BB7 4JY.

4.2 The only known discharge point for the existing surface water runoff from the established site and runoff from the highways is the sough which discharges into the watercourse.

4.3 Surface water runoff from the completed garden centre development will therefore be attenuated on site and a restricted discharge made into the watercourse on the Pendle Trading Estate via the sough.

4.4 The developed site will contain two separate surface water drainage systems, one covering the northern part of the site (the majority of the car parking areas and some building roofs) and the other covering the southern part of the site (mainly building roofs and some car parking areas). Each of the drainage runs will be restricted to 6.0 l/s and attenuation provided prior to a discharge (total 12.0 l/s) being made into the existing sough.

4.5 A surface water drainage design has been carried out for all events up to the 100 year critical rain storm plus 40% for climate change on stored volumes. The surface water runoff from the whole of the developed site has been restricted to a total of 12.0 l/s and attenuation provided using storage crates located under the external hardstanding areas.

APPENDIX A

roof and site plan

revision	date	note
A	19.07.2019	issued for pre-app
B	10.2020	submitted for planning
C	01.2021	amendments for highways
D	11.2021	amendments for highways
E	02.2022	amendments for highways
F	02.2022	amendments for highways - worston rd access

broken red line surrounding the garden centre buildings indicates extent of existing arrangement (including polytunnels)

staff and servicing/delivery access moved along worston road (broken red line indicates existing) to suit proposed extensions to garden centre

red hatch indicates 2.4x43m visibility splays to staff/servicing access

5 no. staff cycle bays (10 spaces) added to staff/servicing entrance area to suit highways advice

service yard to incorporate delivery bay to maintain possibility of two-way traffic

turning head sized to accommodate articulated vehicles (indicative vehicle tracking illustrated in grey) - turning head to operate as a holding area should it be neccessary at busy periods

hatched area to service yard indicates storage area for goods delivered to site. broken lines indicate pallets/containers

existing hedge previously separating site (broken blue line) to be grubbed up and replanted along new boundary

customer vehicular access moved along clitheroe road (broken red line indicates existing) providing regularised parking arrangement and additional forecourt to sales area

red hatch indicates 2.4x65m visibility splays to customer access

site entrance landscaped to provide 'green' buffer whilst maintaining existing gas tank

parking arrangement reconfigured and orientated to face the garden centre - tree lined parking runs breaking up the hard surfacing - see drg.no.1859/PL10-11

arrows indicate principal entrance to garden centre along proposed 'market street' - entrance largely as existing (re-presented).

car parking beyond original hedge line (broken blue line) arranged to avoid disruption to existing tree root protection areas (broken magenta lines) - see drg.no.1859/PL11

tree canopy profile labelled 'trees removed' indicates grouping of low quality ash and hawthorn trees to be removed to suit arboricultural assessment/advice

proposed replacement tree planting to central island of overspill parking area

N

0m 10m 20m 30m 40m 50m scale

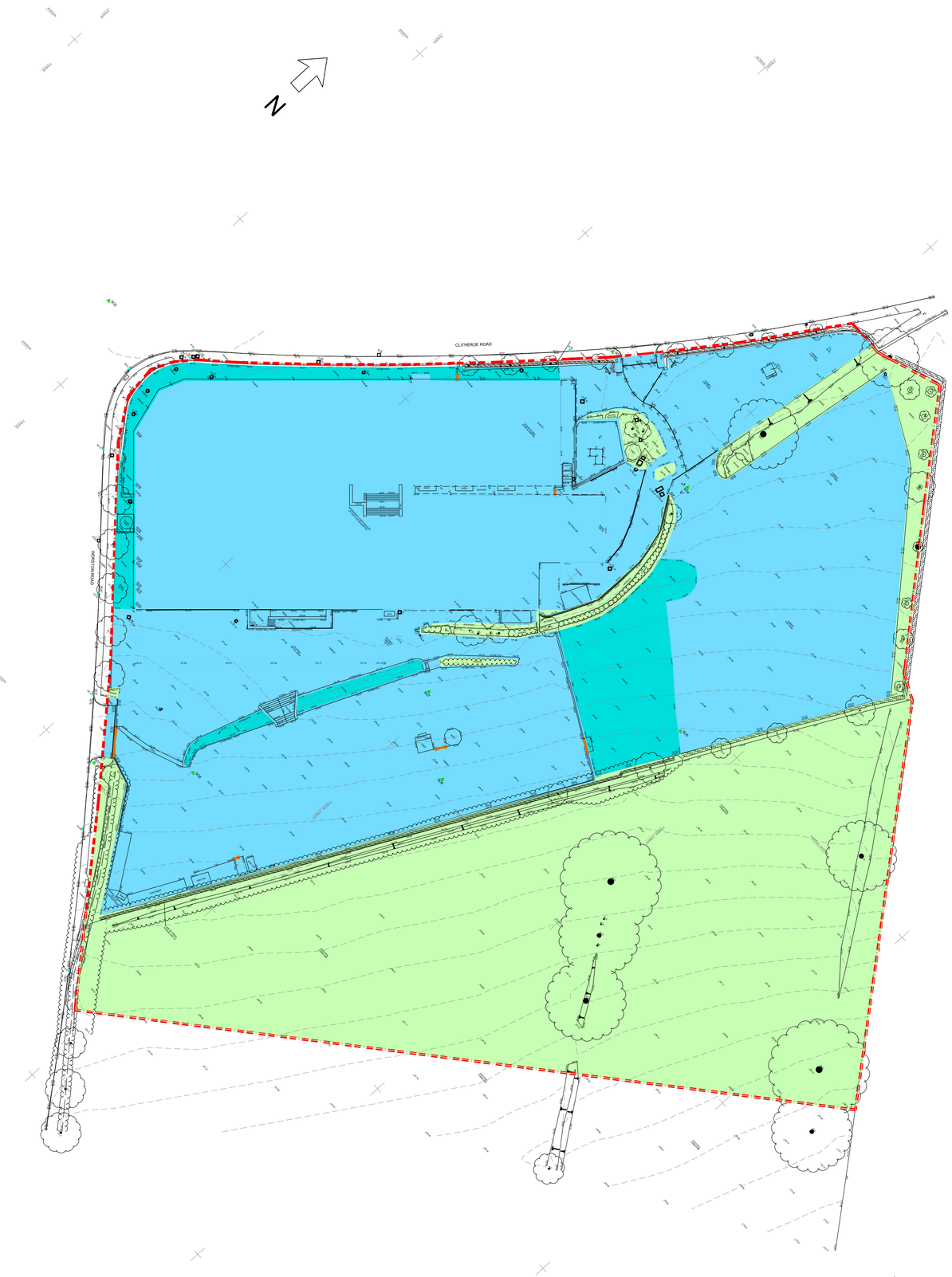
SA stanton andrews
architects
44 york street clitheroe BB7 2DL
t. 01200 444490 e. mail@stantonandrews.co.uk w. stantonandrews.co.uk
Chartered Practice

project	project number	drawing number
shackletons home & garden	18.59	PL.01

name: proposed site plan

scale	date	status	revision
1 to 500 @ A1	02.19	planning	F

APPENDIX B



0 10 20 30 40 50 METRES

SCALE BAR 1:500

PRELIMINARY DRAWING.
NOT FOR CONSTRUCTION.

NOTES

1. THIS DRAWING IS BASED ON SURVEY OPERATIONS DRAWING NO. 19B058/001A.

KEY		TOTAL AREA (ha)
	EXISTING PERMEABLE/ PLANTED/UNDEVELOPED AREA	0.95
	EXISTING SLATE CHIPPINGS	0.13
	EXISTING HARD PAVED SURFACING/ROOVES	1.27
	TOTAL SITE AREA	2.35

Rev	Details	Drawn By	Chk/App By	Date
P2	EXISTING PERMEABLE AND IMPERMEABLE AREAS HIGHLIGHTED	SD	SJR	28.10.21
P1	ISSUED FOR INFORMATION	SD	SJR	04.03.20

Client:
SHACKLETONS GARDEN CENTRE LIMITED

Project:
PROPOSED DEVELOPMENT AT SHACKLETONS GARDEN CENTRE, CHATBURN

Title:
EXISTING SITE TOPOGRAPHY

Issued For:
INFORMATION

Reid Jones partnership
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9 Orrell Road
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Scale: 1:500 @ (A1)

Project No:	Drawing No:	Issue:
10301	100	P2

APPENDIX C

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: [redacted]

E-mail: [redacted]

Reid Jones Partnership

9 Orrell Road
9 Orrell Road,
Orrell, Lancashire
WN5 8EY

FAO:

Your Ref: Shackleton's Garden Centre
Our Ref: UUPS-ORD-150980
Date: 13/02/2020

Dear Sirs

Location: SHACKLETONS GARDEN CENTRE CLITHEROE ROAD, CHATBURN, CLITHEROE, BB7 4JY

I acknowledge with thanks your request dated 12/02/2020 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

[redacted]

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

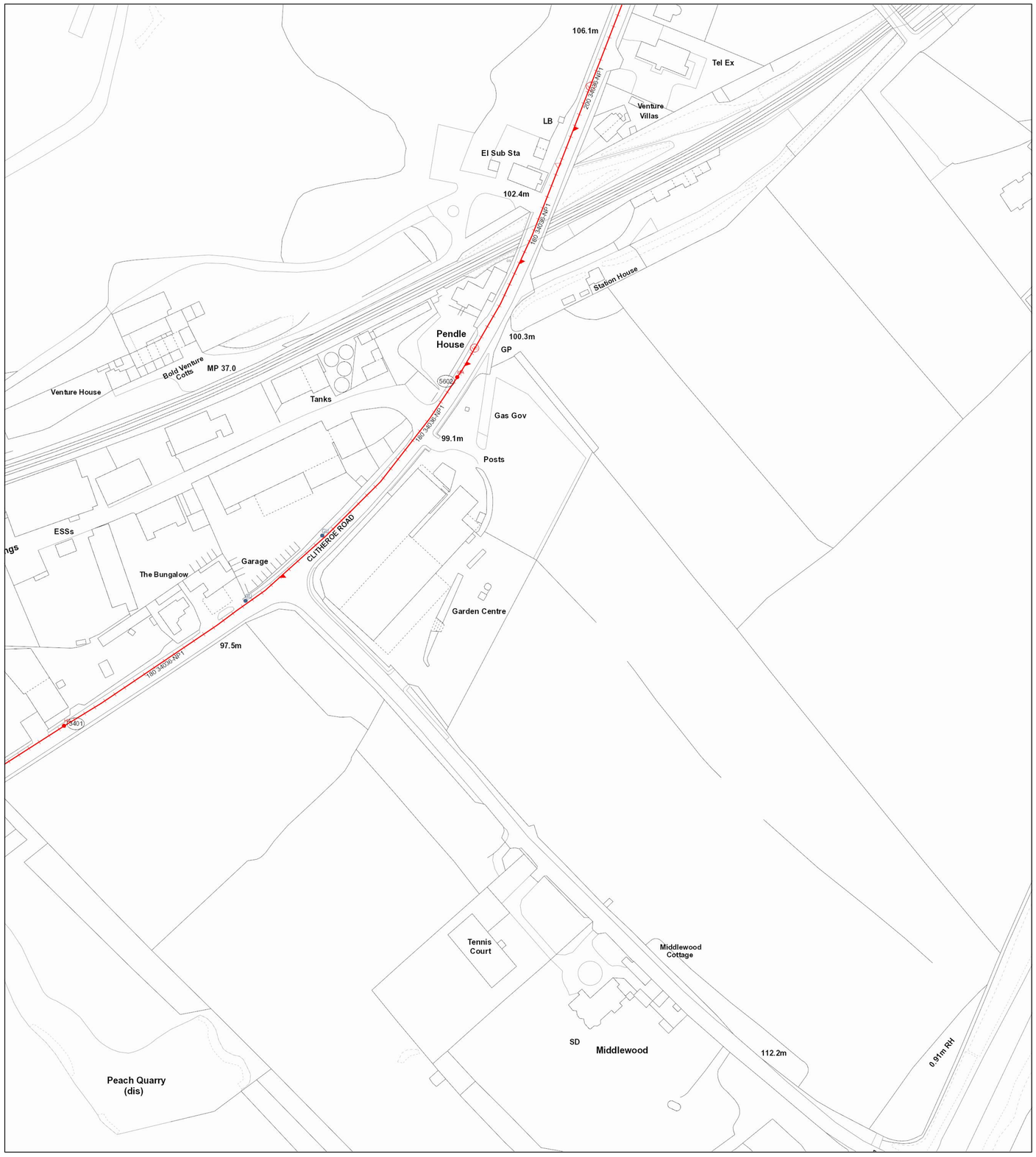
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP



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.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforecd Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

SHACKLETONS GARDEN CENTRE CLITHEROE ROAD,
CHATBURN,
CLITHEROE,
BB7 4JY

Scale: 1:1250 **Date:** 13/02/2020

Sheet: 1 of 1

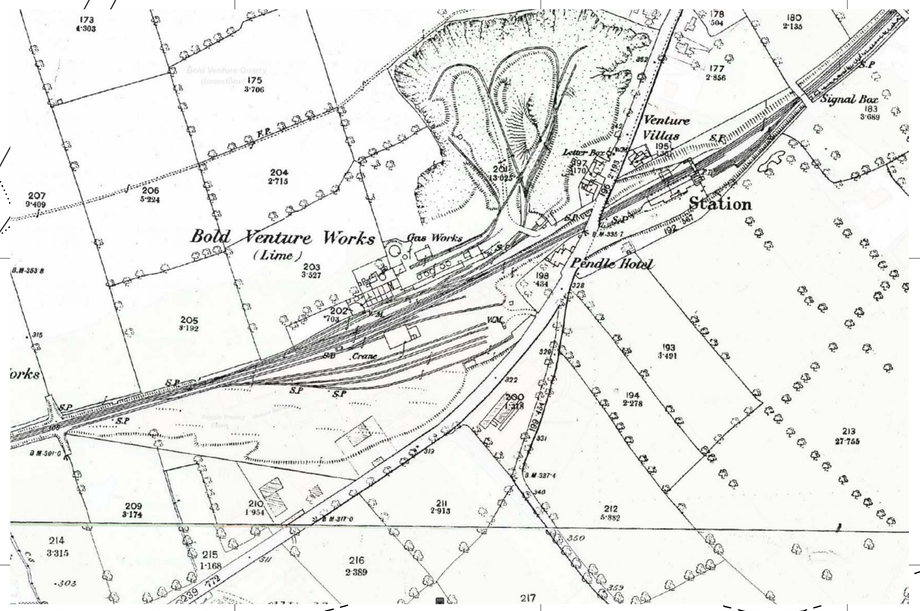
Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly

APPENDIX D

revision	date	note
-	Nov 21	issued for information



Excerpt from 1888 survey showing railway sidings and original road arrangement

Open ditch/drain confirmed as outfall to sough by dye test Nov 2021

Issues

MP 36.75

Drain

CS

CCS

Sinks

Pendle Trading Estate

Assumed route based on historic arrangement

Venture Buildings

Unit 3 & 4

ESSs

The Bungalow

Garage

CLITHEROE ROAD

225/450 dia sough route as advised

Venture House

Bold Venture Cotts

MP 37.0

Tanks

Assumed route based on histroric arrangement

Pendle House

100.3m

OP

450 sq stone culvert/sough route as confirmed by camera and excavation Nov 2021

Station House

Gas Gov

99.1m

Posts

Garden Centre

97.5m

Pond

El Sub Sta

Issues

95.1m

Drain

Pond

Bellman Farm

Rydal Place

94.5m

94.8m

94.5m

Peach Quarry (dis)

Tennis Court

Middlewood Cottage

37

36

35

34

33

stanton andrews
architects
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t. 01200 444490 e. mail@stantonandrews.co.uk w. stantonandrews.co.uk
Chartered Practice

project	project number	drawing number
shackletons home & garden	18.59	SK.05

name			
Sough drainage			
scale	date	status	revision
1 to 1000 @ A1	11.21	planning	-

APPENDIX E

PRELIMINARY DRAWING.
NOT FOR CONSTRUCTION.

N

CLITHEROE ROAD

ORSTON ROAD

FOR DETAILS OF OFF-SITE DRAINAGE SYSTEM AS SHOWN ON STANTON ANDREWS DRAWING No. SK05

225ø "SUFF"

EX MH 1200ø PCC
CL 98.600
IL 96.806
DISCHARGED AT A CONTROLLED RATE OF 6L/S
IL OF DISCHARGE MH TO BE CHECKED BEFORE FINAL DESIGN. ASSUMED TO BE 96.700

PETROL INTERCEPTOR KINGSPAN BYPASS SEPERATOR (NSBD006 OR SIMILAR APPROVED)

MH S9
2100ø PCC
CL 98.220
IL 96.900

PN 1.009 375ø 1:320

MH S10
2100ø PCC
CL 98.400
IL 96.834

PN 1.010 375ø 1:323

MH FC1 2100ø PCC CATCHPIT CHAMBER WITH 300MM SUMP AND HYDOBRAKE, FLOW LIMITED TO 6.0 L/S
CTL-SHE-0115-6000-1000-6000
CL 98.540
IL 96.786

PN 1.011 150ø 1:93

MH S8
2100ø PCC
CL 98.510
IL 97.000

PN 1.008 375ø 1:123

EXISTING BUILDING

900m²

1000m²

1400m²

800m²

600m²

MH S7
1800ø PCC
CL 99.650
IL 97.200

PN 1.007 375ø 1:57

CARRIER PIPE DRAIN START OF RUN
CL-99.650
IL-98.500

PN 1.006 375ø 1:26

RWP

RAINWATER DOWNPIPES TO BE PROVIDED TO ALL GUTTERS. DOWNPIPES TO BE CONNECTED INTO GULLY POTS FOLLOWING ONTO CARRIER DRAIN AND CONVEYED TO THE INTENDED MANHOLE. EXISTING CHUTES DISCHARGING ROOF DRAINAGE ONTO VERGE TO BE REMOVED

PN 7.000 300ø 1:227

300ø CARRIER PIPE DRAIN CONVEYING SURFACE WATER RUN OFF FROM 600M², 400M², 700M² AND 500M² ROOF AREAS TO S5 ATT MH.
IL AT CONNECTION INTO S5 ATT – 98.350

MH S6
1500ø PCC
CL 101.410
IL 98.219

PN 1.005 375ø 1:180

ex.101.56

COVERED EXTERNAL RETAIL

ex.101.00

MH S5 ATT 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP AND HYDOBRAKE.
FLOW LIMITED TO 4.8 L/S
CTL-SHE-0103-4800-1000-4800
CL 102.150
IL 98.275
TOP OF TANK LEVEL- 99.275

PN 6.000 225ø

25x22x1.0m DEEP OFFLINE ATTENUATION CRATES

MH B5
1200ø PCC
CL 102.150
IL 101.00

PN 4.000 300ø 1:22

ex.102.15

728m²

102.80
(ex.103.22)

103.15
(ex.103.59)

102.65
(ex.103.66)

SU28 SU27 SU26 SU25

S5 ATT S4 S3 S2 S1

104.45 104.45 104.45

PN 5.000 150ø

PN 4.000 150ø

MH B4
1200ø PCC
CL 104.450
IL 103.400

MH B3
1200ø PCC
CL 104.450
IL 103.300

MH S4 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP
CL 104.450
IL 102.000

PN 1.003 300ø 1:22

286m²

589m²

178m²

COVERED WALKWAY

357m²

MH S1
1200ø PCC
CL 105.200
IL 104.075

ex.105.57

MH N2 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP
CL 102.927
HYDRO-BRAKE MH
FLOW LIMITED TO 4.5L/S
CTL-SHE-0100-4500-1000-4500

MH N1 1200ø PPIC
CL 106.000
IL 104.518

PN 1.000 225ø 1:18

107m²

545m²

SU1 SU3 SU7 SU8

ex.105.06

B2 PN 3.000 150ø S3 PN 1.002 225ø 1:38 S2 PN 1.001 225ø 1:170 S1

MH B2
1200ø PCC
CL 105.060
IL 104.010

MH S2 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP
CL 105.500
IL 103.945

25x15x0.8m DEEP OFFLINE ATTENUATION

10x11x0.8m DEEP OFFLINE ATTENUATION CRATES

SU6

180m²

PN 2.000 150ø

ex.105.20

750m²

B1

MH B1 1200ø PCC
CL 106.500
IL 105.450

ex.106.99

310m²

104m²

SU12

MH B15 1200ø PPIC
CL 98.700
IL 97.806

B15 PN 9.000 225ø 1:170 N7

PN 1.006 225ø 1:30

EXISTING FOUL TREATMENT PLANTS TO BE REMOVED AND REPLACED

FFL 98.70

MH B14 1200ø PPIC
CL 100.370
IL 99.137

SU20

PN 8.001 225ø 1:170

MH B13 1200ø PPIC CATCHPIT CHAMBER WITH 300MM SUMP
CL 100.350
IL 99.183

B13 B14 PN 8.002 225ø 1:170 N5

332m²

5x5x0.8m DEEP ATTENUATION CRATES

PN 8.000 225ø 1:170

ex.100.40

B12

DISABLED PARKING

MH B12 1200ø PPIC
CL 100.380
IL 99.255

419m²

391m²

441m²

440m²

RWP1 RWP2 RWP3 RWP5 RWP6

MH N4 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP
CL 102.510
IL 100.973
HYDRO-BRAKE MH
FLOW LIMITED TO 6.5L/S
CTL-SHE-0119-6500-1000-6500

MH N3 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP
CL 103.700
IL 101.965
HYDRO-BRAKE MH
FLOW LIMITED TO 5.5L/S
CTL-SHE-0110-5500-1000-5500

GREASE TRAP

MH N7 1200ø PCC
CL 99.350
IL 97.726

MH N6 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP
CL 99.800
IL 97.453

COLLAPSED

ex.99.31

SU24

PN 1.007 450ø 1:405

N6

FC2

MH FC2 1500ø PCC
CL 98.700
IL 97.414
HYDRO-BRAKE MH
FLOW LIMITED TO 6.0L/S
CTL-SHE-0115-6000-1000-6000

FOR DETAILS OF OFF-SITE DRAINAGE SYSTEM AS SHOWN ON STANTON ANDREWS DRAWING No. SK05

DISCHARGE TO EXISTING
CL- 98.640
IL- 97.365
NETWORK LIMITED TO 6l/s
IL OF DISCHARGE MH TO BE CHECKED BEFORE FINAL DESIGN. ASSUMED TO BE 97.215

PN 1.008 150ø 1:100

PETROL INTERCEPTOR KINGSPAN BYPASS SEPERATOR (NSBD006 OR SIMILAR APPROVED)

15x10x0.8m DEEP OFFLINE ATTENUATION CRATES

PACKAGED WASTEWATER TREATMENT WORKS TO DISCHARGE INTO EXISTING FOUL NETWORK

SU23

150m²

ex.101.01

PN 1.005 225ø 1:15

248m²

SU21

38.5x16x0.8m DEEP ATTENUATION CRATES

SU22

MH N5 1200ø PCC CATCHPIT CHAMBER WITH 300MM SUMP
CL 101.300
IL 99.108
HYDRO-BRAKE MH
FLOW LIMITED TO 5.4L/S
CTL-SHE-0109-5400-1000-5400

520m²

PN 7.000 225ø 1:170

B16 B11

MH B11 1200ø PPIC
CL 101.300
IL 100.265

350m²

SU19

PN 1.004 225ø 1:11

101.40
(ex.101.83)

SU18

ex.102.51

40x5x0.8m DEEP ATTENUATION CRATES

480m²

B10

PN 6.000 225ø 1:170

MH B10 1200ø PPIC
CL 102.310
IL 101.185

SU17

323m²

SU16

480m²

CUSTOMER PARKING

PN 1.003 225ø 1:18

35x5x0.8m DEEP ATTENUATION CRATES

N3

PN 5.000 225ø 1:30

B9

MH B9 1200ø PPIC
CL 103.305
IL 102.180

SU14

PN 1.002 225ø 1:17

40x6x0.8m DEEP ATTENUATION CRATES

530m²

ex.104.57

B8 PN 6.000 225ø 1:170

MH B8 1200ø PPIC
CL 104.570
IL 103.160

SU13

235m²

PN 1.001 225ø 1:12

PN 3.000 225ø 1:55 B7

260m²

MH B7 1200ø PPIC
CL 105.850
IL 104.725

323m²

PN 1.000 225ø 1:18

SU11

SU10

B6

LEGEND

- EXISTING SURFACE WATER DRAIN
- PROPOSED SURFACE WATER DRAIN
- PPIC PROPOSED POLYPROPYLENE INSPECTION CHAMBER
- PCC PROPOSED PRE-CAST CONCRETE MANHOLE
- PROPOSED GEO-CELLULAR ATTENUATION TANK
- PROPOSED FOUL WATER DRAIN

FOR GENERAL NOTES PLEASE REFER TO DRAWING NO. 10301-102

Rev	Details	Drawn By	Ckd/App By	Date
P5	TREE AND GAS INSTALLATION ADDED DRAINAGE RUN AMMENDED TO SUIT	SHR	SJR	05.03.24
P4	DRAINAGE AMENDED TO INCLUDE RUNOFF FROM EXISTING BUILDING.	SHR	SJR	20.02.24
P3	DRAINAGE AMENDED TO INCLUDE RESULTS OF FURTHER SURVEY WORK.	SD	SJR	23.11.21
P2	DRAWING SCALE AMENDED. PROPOSED DRAINAGE NETWORK REFERENCES ADDED. EXISTING DRAINAGE AND KEY ADDED.	SD	SJR	29.10.21
P1	ISSUED FOR INFORMATION	SD	SJR	18.03.20

Client:
SHACKLETONS GARDEN CENTRE LIMITED

Project:
PROPOSED DEVELOPMENT AT SHACKLETONS GARDEN CENTRE, CHATBURN

Title:
PROPOSED DRAINAGE GENERAL ARRANGEMENT SHEET 1 OF 2

Issued For:
INFORMATION

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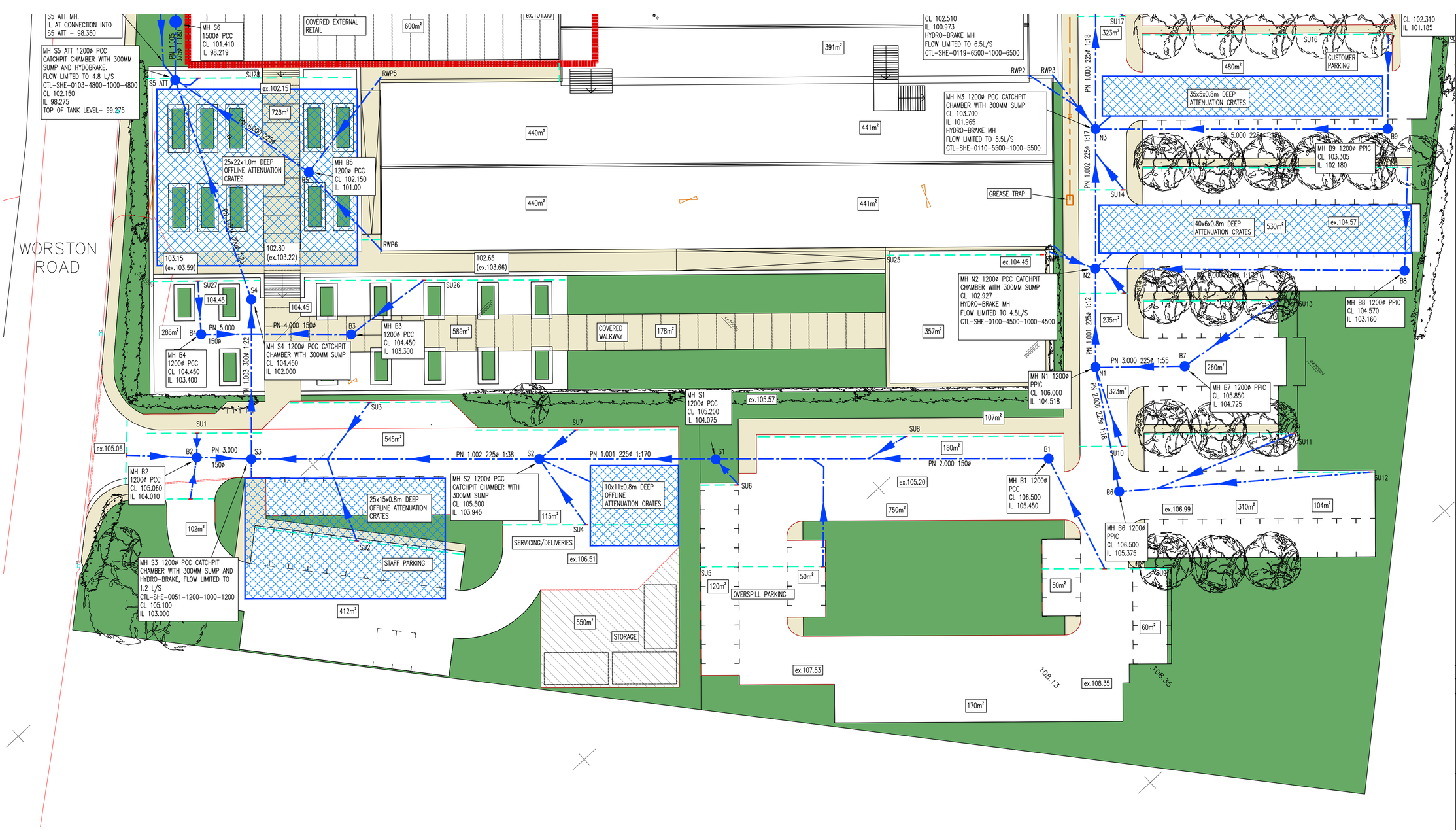
Scale: 1:250 @ (A1)

Project No:	Drawing No:	Issue:
10301	101	P5



LEGEND

- EXISTING SURFACE WATER DRAIN
- PROPOSED SURFACE WATER DRAIN
- PPIC — PROPOSED POLYPROPYLENE INSPECTION CHAMBER
- PCC — PROPOSED PRE–CAST CONCRETE MANHOLE
- PROPOSED GEO–CELLULAR ATTENUATION TANK
- PROPOSED FOUL WATER DRAIN

GENERAL NOTES

1. UN–ADOPTED FW & SW DRAINAGE IS TO BE CONSTRUCTED IN ACCORDANCE WITH CURRENT BUILDING REGULATIONS. INCLUDING APPROVED DOCUMENT H (UPDATED 2015): BS EN 752:2008 AND OTHER RELEVANT STANDARDS AND CERTIFICATES.

2. THE LOCATION AND LEVELS OF EXISTING DRAINAGE PIPES AND CULVERTS MUST BE CHECKED ON–SITE PRIOR TO CONSTRUCTION.

3. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORKS.

4. DRAINS ARE TO BE CONSTRUCTED USING FLEXIBLY JOINTED VITRIFIED CLAY PIPES TO BS 65 (1991) AND BS EN 295 (2012 / 2013): OR UPVC BUILDING DRAINAGE SYSTEM PIPEWORK TO BS 4660 (2000), BS EN 13589–1 (2010) * BS EN 1401–1 (2009); BEDDED & BACKFILLED IN ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS.

5. BACKFILLING OF DRAIN TRENCHES ADJACENT TO DWELLINGS OR OTHER STRUCTURES TO BE IN ACCORDANCE WITH BS EN 1610 (1998) AND APPROVED DOCUMENT H.

6. ACCESS FITTINGS & INSPECTION CHAMBERS <1.2m DEEP ARE TO BE CLAYWARE OR PRE–FORMED POLYPROPYLENE AS APPROPRIATE TO THE NUMBER OF CONNECTIONS. POLYPROPYLENE CHAMBERS CAN BE USED UP TO 3m DEEP BUT REQUIRE A MAX 350mm DIAMETER RESTRICTOR RING TO PREVENT MAN ENTRY. INSPECTION CHAMBER SIZES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH BS EN 752 (2008).

7. MANHOLE CHAMBERS ARE TO BE OF PRECAST CONCRETE CONSTRUCTION WITH 150mm INSITU CONCRETE SURROUND WITH A MINIMUM CLEAR OPENING OF 600mm.

8. POLYPROPYLENE INSPECTION CHAMBERS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

9. COVER LEVELS INDICATED ON THE DRAWINGS ARE NOMINAL AND MAY BE ADJUSTED TO SUIT FINISHED LEVELS AS NECESSARY. INSPECTION CHAMBER COVERS SHOULD BE GRADE A15 FOR PEDESTRIAN AREAS ONLY, C250 FOR LIGHTLY TRAFFICKED ROADS AND SMALL PRIVATE CAR PARKS, AND D400 WITHIN THE ACCESS ROAD.

10. WHERE DRAINS PASS THROUGH FOUNDATIONS OR OTHER RIGID STRUCTURES, A LINTEL, OR SLEEVE IS TO BE USED & PROVISION FOR FLEXIBILITY IS TO MADE WITH ROCKER PIPES.

11. ANY EXISTING LAND DRAINS SEVERED BY SITE OPERATIONS SHOULD BE DIVERTED AROUND ANY PROPERTIES/BUILDINGS AND RECONNECTED TO THE EXISTING LAND DRAINAGE SYSTEM VIA A SILT TRAP.

12. CONCRETE PROTECTION REQUIRED TO PIPES WHERE DEPTH OF PIPE FROM GROUND LEVEL TO BARREL IS <0.6m WITHIN NON–TRAFFICKED AREAS; <0.9m WITHIN DOMESTIC DRIVEWAYS AND LIGHT ROADS; AND <1.2 m WITHIN THE PUBLIC HIGHWAY, OTHERWISE PIPES TO BE LAID IN CLASS S BEDDING (150mm GRANULAR BED & SURROUND).

13. WHERE PIPES RUN UNDER BUILDINGS AND WHERE COVER TO UNDERSIDE OF SLAB IS LESS THAN 300mm, PROVIDE A CONCRETE BED AND SURROUND.

14. UNLESS NOTED OTHERWISE, ALL FOUL DRAINS ARE 100mm DIA. AND SURFACE WATER DRAINS ARE 150mm DIA. SURFACE WATER CONNECTIONS FROM RWPs TO BE 100mm DIA.

15. MINIMUM GRADIENTS (UNLESS NOTED OTHERWISE):

FOUL
100 DIA FROM OUTLETS WITHIN BUILDING TO INSPECTION CHAMBER 1:40, THEREAFER 1:80

SURFACE WATER
100 DIA 1:100, 150 DIA 1:150, 225 DIA 1:225

16. ALL REDUNDANT DRAINS AND CHAMBERS TO BE REMOVED AS FAR AS PRACTICABLE OR ELSE GROUTED AND SEALED.

17. BEDDING AND BACKFILL TO CONFORM TO THE REQUIREMENT OF THE WATER INDUSTRY SPECIFICATION 4–08–02 (TABLE A2).

18. THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION MAY NEED TO BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTORS AND BENDS.

19. THE POSITIONS OF SVP'S, STUB–STACKS, WC OUTLETS AND RAINWATER DOWNPIPES ARE TO BE ACCURATELY LOCATED FROM THE ARCHITECT'S DRAWINGS.

PRELIMINARY DRAWING.
NOT FOR CONSTRUCTION.

Rev	Details	Drawn By	Ckd/App By	Date
P2	DRAINAGE AMENDED TO INCLUDE RUNOFF FROM EXISTING BUILDING.	SHR	SJR	20.02.24
P1	ISSUED FOR INFORMATION	SD	SJR	29.10.21

Client:
SHACKLETONS GARDEN CENTRE LIMITED

Project:
PROPOSED DEVELOPMENT AT SHACKLETONS GARDEN CENTRE, CHATBURN

Title:
PROPOSED DRAINAGE GENERAL ARRANGEMENT SHEET 2 OF 2

Issued For:
INFORMATION

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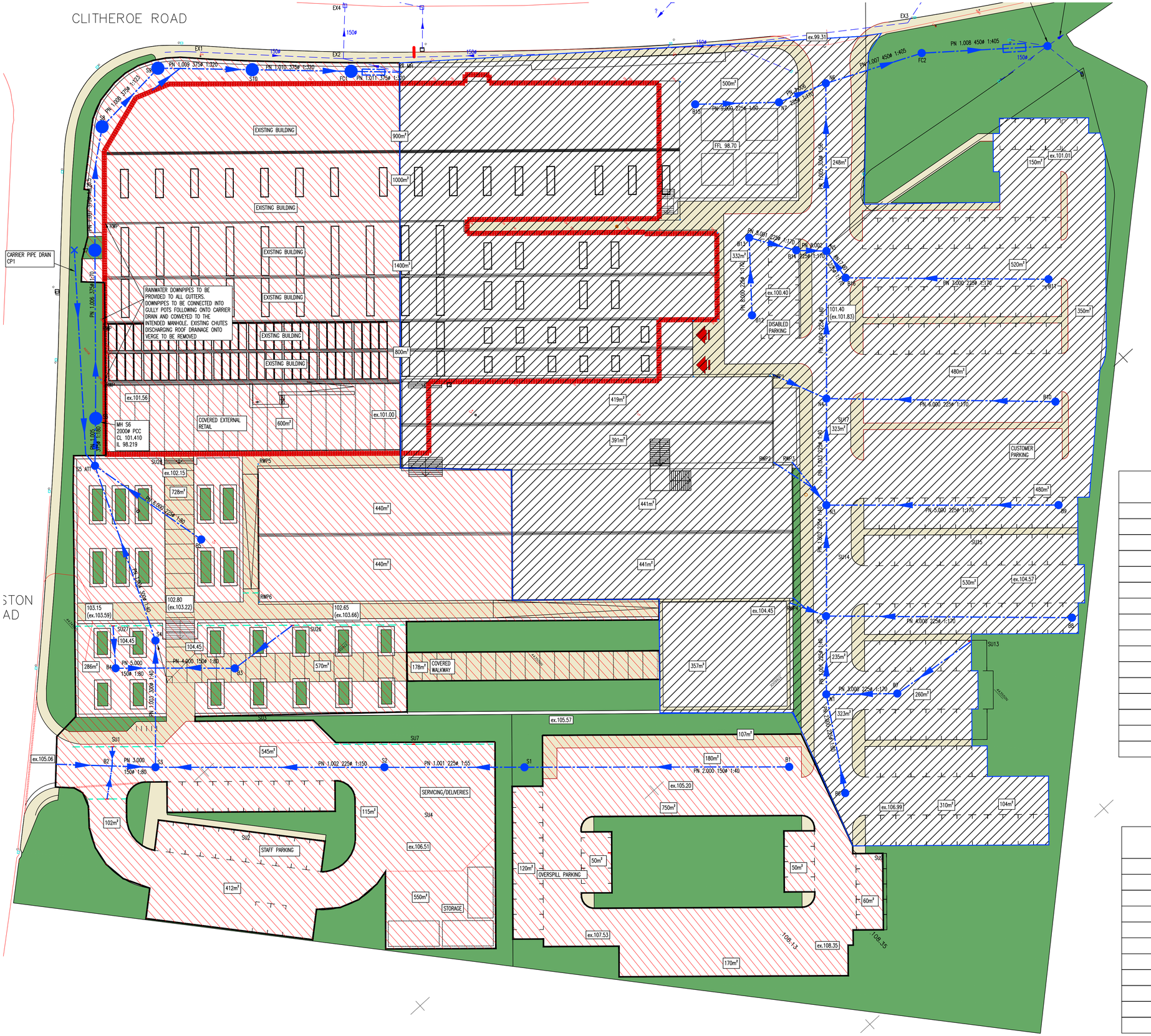
Scale: 1:250 @ (A1)

Project No:	Drawing No:	Issue:
10301	102	P2



LEGEND

AREA TAKEN BY NORTHERN NETWORK

AREA TAKEN BY SOUTHERN NETWORK

AREAS CONTRIBUTING TO NORTHERN NETWORK	
N1	323M²
N2	235M², 441M², 357M²
N3	441M², 391M²
N4	419M², 323M²
N6	248M²
N7	500M²
B6	310M², 104M²
B7	260M²
B8	530M²
B9	480M²
B10	480M², 175M²
B11	520M², 175M², 150M²
B12	400M², 350M²
B13	350M², 500M²
B14	332M²
B15	450M²

AREAS CONTRIBUTING TO SOUTHERN NETWORK	
S1	750M², 180M², 120M², 50M²
S2	550M², 115M², 206M²
S3	545M², 206M²
S5 ATT	728M²
S10	450M²
CP1	500M², 700M², 400M², 600M²
B1	60M², 50M², 170M²
B2	102M²
B3	570M²,178M²
B4	286M²
B5	440M², 440M²

PRELIMINARY DRAWING.
NOT FOR CONSTRUCTION.

Rev	Details	Drawn By	Chkd/App By	Date
P1	ISSUED FOR INFORMATION	SHR	SJR	22.02.24

Client:
SHACKLETONS GARDEN CENTRE LIMITED

Project:
PROPOSED DEVELOPMENT AT SHACKLETONS GARDEN CENTRE, CHATBURN

Title:
AREAS DISCHARGED TO PROPOSED SURFACE WATER DRAINAGE

Issued For:
INFORMATION

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Scale: 1:300 @ (A1)

Project No: 10301 | Drawing No: 104 | Issue: P1

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)	20.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.200	Preferred Cover Depth (m)	0.900
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)
S1	0.110	5.00	105.200	1200	1.125
S2	0.087	5.00	105.500	1200	1.555
S3	0.075	5.00	105.100	1200	2.100
S4			104.450	1200	2.450
S5 ATT	0.073	5.00	102.150	1200	3.875
S6			101.410	1500	3.191
S7			99.650	1800	2.450
S8			98.510	2100	1.510
S9			98.220	2100	1.320
S10	0.045	5.00	98.400	2100	1.566
FC1			98.540	2100	1.754
EX MH			98.600	1200	1.900
CP1	0.220	2.00	99.650	1	1.150
B1	0.028	2.00	106.500	1200	1.050
B2	0.010	2.00	105.060	1200	1.050
B3	0.077	2.00	104.450	1200	1.150
B4	0.029	2.00	104.450	1200	1.050
B5	0.088	2.00	102.150	1200	1.150

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)
1.001	S1	S2	22.000	0.600	104.075	103.945	0.130	169.2	225	5.37	48.0
1.002	S2	S3	36.000	0.600	103.945	103.075	0.870	41.4	225	5.66	47.2
1.003	S3	S4	21.500	0.600	103.000	102.000	1.000	21.5	300	5.77	46.9
1.004	S4	S5 ATT	25.500	0.600	102.000	100.875	1.125	22.7	300	5.89	46.5
1.005	S5 ATT	S6	10.000	0.600	98.275	98.219	0.056	180.0	375	6.02	46.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.001	1.002	39.8	18.0	0.900	1.330	0.138	0.0
1.002	2.039	81.1	28.8	1.330	1.800	0.225	0.0
1.003	3.405	240.7	39.4	1.800	2.150	0.310	0.0
1.004	3.316	234.4	52.5	2.150	0.975	0.416	0.0
1.005	1.347	148.8	99.8	3.500	2.816	0.797	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)
1.006	S6	S7	26.400	0.600	98.219	97.200	1.019	25.9	375	6.14	45.9
1.007	S7	S8	12.550	0.600	97.200	97.000	0.200	62.8	375	6.23	45.6
1.008	S8	S9	12.300	0.600	97.000	96.900	0.100	123.0	375	6.36	45.3
1.009	S9	S10	21.100	0.600	96.900	96.834	0.066	319.7	375	6.71	44.5
1.010	S10	FC1	15.500	0.600	96.834	96.786	0.048	322.9	375	6.96	43.9
1.011	FC1	EX MH	8.000	0.600	96.786	96.700	0.086	93.0	150	7.09	43.6
7.000	CP1	S5 ATT	34.000	0.600	98.500	98.350	0.150	226.7	300	2.54	59.1
2.000	B1	S1	42.000	0.600	105.450	104.150	1.300	32.3	150	2.39	59.9
3.000	B2	S3	6.800	0.600	104.010	103.925	0.085	80.0	150	2.10	61.6
4.000	B3	S4	12.400	0.600	103.300	103.145	0.155	80.0	150	2.18	61.1
5.000	B4	S4	6.300	0.600	103.400	103.321	0.079	80.0	150	2.09	61.6
6.000	B5	S5 ATT	9.200	0.600	101.000	100.885	0.115	80.0	225	2.10	61.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.006	3.572	394.5	99.1	2.816	2.075	0.797	0.0
1.007	2.290	253.0	98.6	2.075	1.135	0.797	0.0
1.008	1.632	180.3	97.9	1.135	0.945	0.797	0.0
1.009	1.008	111.3	96.1	0.945	1.191	0.797	0.0
1.010	1.003	110.7	100.1	1.191	1.379	0.842	0.0
1.011	1.042	18.4	99.4	1.604	1.750	0.842	0.0
7.000	1.040	73.5	35.2	0.850	3.500	0.220	0.0
2.000	1.777	31.4	4.5	0.900	0.900	0.028	0.0
3.000	1.125	19.9	1.7	0.900	1.025	0.010	0.0
4.000	1.125	19.9	12.7	1.000	1.155	0.077	0.0
5.000	1.125	19.9	4.8	0.900	0.979	0.029	0.0
6.000	1.463	58.2	14.7	0.925	1.040	0.088	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.001	22.000	169.2	225	Circular	105.200	104.075	0.900	105.500	103.945	1.330
1.002	36.000	41.4	225	Circular	105.500	103.945	1.330	105.100	103.075	1.800
1.003	21.500	21.5	300	Circular	105.100	103.000	1.800	104.450	102.000	2.150
1.004	25.500	22.7	300	Circular	104.450	102.000	2.150	102.150	100.875	0.975
1.005	10.000	180.0	375	Circular	102.150	98.275	3.500	101.410	98.219	2.816

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.002	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.003	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.004	S4	1200	Manhole	Adoptable	S5 ATT	1200	Manhole	Adoptable
1.005	S5 ATT	1200	Manhole	Adoptable	S6	1500	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.006	26.400	25.9	375	Circular	101.410	98.219	2.816	99.650	97.200	2.075
1.007	12.550	62.8	375	Circular	99.650	97.200	2.075	98.510	97.000	1.135
1.008	12.300	123.0	375	Circular	98.510	97.000	1.135	98.220	96.900	0.945
1.009	21.100	319.7	375	Circular	98.220	96.900	0.945	98.400	96.834	1.191
1.010	15.500	322.9	375	Circular	98.400	96.834	1.191	98.540	96.786	1.379
1.011	8.000	93.0	150	Circular	98.540	96.786	1.604	98.600	96.700	1.750
7.000	34.000	226.7	300	Circular	99.650	98.500	0.850	102.150	98.350	3.500
2.000	42.000	32.3	150	Circular	106.500	105.450	0.900	105.200	104.150	0.900
3.000	6.800	80.0	150	Circular	105.060	104.010	0.900	105.100	103.925	1.025
4.000	12.400	80.0	150	Circular	104.450	103.300	1.000	104.450	103.145	1.155
5.000	6.300	80.0	150	Circular	104.450	103.400	0.900	104.450	103.321	0.979
6.000	9.200	80.0	225	Circular	102.150	101.000	0.925	102.150	100.885	1.040

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.006	S6	1500	Manhole	Adoptable	S7	1800	Manhole	Adoptable
1.007	S7	1800	Manhole	Adoptable	S8	2100	Manhole	Adoptable
1.008	S8	2100	Manhole	Adoptable	S9	2100	Manhole	Adoptable
1.009	S9	2100	Manhole	Adoptable	S10	2100	Manhole	Adoptable
1.010	S10	2100	Manhole	Adoptable	FC1	2100	Manhole	Adoptable
1.011	FC1	2100	Manhole	Adoptable	EX MH	1200	Manhole	Adoptable
7.000	CP1	1	Manhole	Adoptable	S5 ATT	1200	Manhole	Adoptable
2.000	B1	1200	Manhole	Adoptable	S1	1200	Manhole	Adoptable
3.000	B2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
4.000	B3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
5.000	B4	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
6.000	B5	1200	Manhole	Adoptable	S5 ATT	1200	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	105.200	1.125	1200	1	2.000	104.150	150
				0	1.001	104.075	225
S2	105.500	1.555	1200	1	1.001	103.945	225
				0	1.002	103.945	225
S3	105.100	2.100	1200	1	3.000	103.925	150
				2	1.002	103.075	225
				0	1.003	103.000	300
S4	104.450	2.450	1200	1	5.000	103.321	150
				2	4.000	103.145	150
				3	1.003	102.000	300
				0	1.004	102.000	300

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S5 ATT	102.150	3.875	1200		1	6.000	100.885	225
					2	7.000	98.350	300
				◯	3	1.004	100.875	300
					0	1.005	98.275	375
S6	101.410	3.191	1500		1	1.005	98.219	375
				◯				
					0	1.006	98.219	375
S7	99.650	2.450	1800		1	1.006	97.200	375
				◯				
					0	1.007	97.200	375
S8	98.510	1.510	2100		1	1.007	97.000	375
				◯				
					0	1.008	97.000	375
S9	98.220	1.320	2100		1	1.008	96.900	375
				◯				
					0	1.009	96.900	375
S10	98.400	1.566	2100		1	1.009	96.834	375
				◯				
					0	1.010	96.834	375
FC1	98.540	1.754	2100		1	1.010	96.786	375
				◯				
					0	1.011	96.786	150
EX MH	98.600	1.900	1200		1	1.011	96.700	150
				◯				
CP1	99.650	1.150	1					
				◯				
					0	7.000	98.500	300
B1	106.500	1.050	1200					
				◯				
					0	2.000	105.450	150
B2	105.060	1.050	1200					
				◯				
					0	3.000	104.010	150
B3	104.450	1.150	1200					
				◯				
					0	4.000	103.300	150
B4	104.450	1.050	1200					
				◯				
					0	5.000	103.400	150

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
B5	102.150	1.150	1200				
				0	6.000	101.000	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.200	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	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 %)
1	0	0	0
2	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node FC1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	96.786	Product Number	CTL-SHE-0109-6000-1430-6000
Design Depth (m)	1.430	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.0	Min Node Diameter (mm)	1200

Node S5 ATT Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	98.275	Product Number	CTL-SHE-0103-4800-1000-4800
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.8	Min Node Diameter (mm)	1200

Node S3 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	103.000	Product Number	CTL-SHE-0051-1200-1000-1200
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.2	Min Node Diameter (mm)	1200

Node S5 ATT Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.275
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	550.0	0.0	1.000	550.0	0.0	1.001	0.0	0.0

Node S3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	103.000
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	375.0	0.0	0.800	375.0	0.0	0.801	0.0	0.0

Node S2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	103.945
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	110.0	0.0	0.800	110.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	9	104.183	0.108	15.3	0.1226	0.0000	OK
60 minute summer	S2	36	104.013	0.068	20.5	7.1585	0.0000	OK
1440 minute winter	S3	1140	103.275	0.275	4.5	98.1477	0.0000	OK
15 minute summer	S4	9	102.054	0.054	15.8	0.0609	0.0000	OK
1440 minute winter	S5 ATT	960	98.478	0.203	8.1	106.1372	0.0000	OK
1440 minute winter	S6	960	98.248	0.029	4.7	0.0506	0.0000	OK
1440 minute winter	S7	960	97.235	0.035	4.7	0.0895	0.0000	OK
1440 minute winter	S8	960	97.042	0.042	4.7	0.1453	0.0000	OK
720 minute summer	S9	420	96.965	0.065	4.6	0.2235	0.0000	OK
720 minute summer	S10	420	96.962	0.128	5.6	0.4439	0.0000	OK
720 minute summer	FC1	420	96.962	0.176	5.3	0.6081	0.0000	SURCHARGED
15 minute summer	EX MH	1	96.700	0.000	3.7	0.0000	0.0000	OK
15 minute summer	CP1	9	98.646	0.146	32.7	0.0000	0.0000	OK
15 minute summer	B1	9	105.487	0.037	4.2	0.0419	0.0000	OK
15 minute summer	B2	9	104.039	0.029	1.5	0.0326	0.0000	OK
15 minute summer	B3	9	103.387	0.087	11.5	0.0989	0.0000	OK
15 minute summer	B4	9	103.451	0.051	4.3	0.0571	0.0000	OK
15 minute summer	B5	9	101.078	0.078	13.1	0.0882	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 summer	S1	1.001	S2	15.4	1.443	0.385	0.2545	
60 minute summer	S2	1.002	S3	15.5	1.562	0.191	0.3564	
1440 minute winter	S3	Hydro-Brake®	S4	1.0				
15 minute summer	S4	1.004	S5 ATT	15.8	1.883	0.068	0.2143	
1440 minute winter	S5 ATT	Hydro-Brake®	S6	4.7				
1440 minute winter	S6	1.006	S7	4.7	1.046	0.012	0.1187	
1440 minute winter	S7	1.007	S8	4.7	0.788	0.018	0.0746	
1440 minute winter	S8	1.008	S9	4.7	0.592	0.026	0.0994	
720 minute summer	S9	1.009	S10	4.6	0.439	0.042	0.4835	
720 minute summer	S10	1.010	FC1	5.3	0.248	0.048	0.6496	
720 minute summer	FC1	Hydro-Brake®	EX MH	5.3				175.3
15 minute summer	CP1	7.000	S5 ATT	32.7	0.998	0.445	1.1160	
15 minute summer	B1	2.000	S1	4.1	1.224	0.131	0.1407	
15 minute summer	B2	3.000	S3	1.5	0.649	0.075	0.0157	
15 minute summer	B3	4.000	S4	11.5	1.125	0.579	0.1268	
15 minute summer	B4	5.000	S4	4.3	0.864	0.216	0.0314	
15 minute summer	B5	6.000	S5 ATT	13.1	1.131	0.225	0.1066	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	9	104.198	0.123	19.9	0.1388	0.0000	OK
30 minute winter	S2	21	104.025	0.080	27.9	8.4010	0.0000	OK
1440 minute winter	S3	1170	103.324	0.324	5.3	115.6182	0.0000	SURCHARGED
15 minute summer	S4	9	102.061	0.061	20.5	0.0694	0.0000	OK
1440 minute winter	S5 ATT	990	98.518	0.243	9.2	127.0160	0.0000	OK
1440 minute winter	S6	990	98.248	0.029	4.8	0.0510	0.0000	OK
960 minute winter	S7	675	97.236	0.036	4.8	0.0905	0.0000	OK
1440 minute winter	S8	990	97.042	0.042	4.8	0.1466	0.0000	OK
480 minute winter	S9	304	96.999	0.099	4.7	0.3441	0.0000	OK
480 minute winter	S10	304	96.999	0.165	5.7	0.5699	0.0000	OK
480 minute winter	FC1	304	96.998	0.212	5.6	0.7349	0.0000	SURCHARGED
15 minute summer	EX MH	1	96.700	0.000	4.4	0.0000	0.0000	OK
15 minute summer	CP1	9	98.671	0.171	42.5	0.0000	0.0000	OK
15 minute summer	B1	9	105.492	0.042	5.4	0.0476	0.0000	OK
15 minute summer	B2	9	104.043	0.033	1.9	0.0368	0.0000	OK
15 minute summer	B3	9	103.405	0.105	14.9	0.1187	0.0000	OK
15 minute summer	B4	9	103.459	0.059	5.6	0.0663	0.0000	OK
15 minute summer	B5	9	101.091	0.090	17.0	0.1024	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 summer	S1	1.001	S2	19.7	1.501	0.495	0.3111	
30 minute winter	S2	1.002	S3	20.9	1.695	0.257	0.4432	
1440 minute winter	S3	Hydro-Brake®	S4	1.0				
15 minute summer	S4	1.004	S5 ATT	20.5	2.029	0.088	0.2580	
1440 minute winter	S5 ATT	Hydro-Brake®	S6	4.8				
1440 minute winter	S6	1.006	S7	4.8	1.052	0.012	0.1204	
960 minute winter	S7	1.007	S8	4.8	0.801	0.019	0.0755	
1440 minute winter	S8	1.008	S9	4.8	0.595	0.026	0.1279	
480 minute winter	S9	1.009	S10	4.8	0.399	0.043	0.7364	
480 minute winter	S10	1.010	FC1	5.6	0.251	0.050	0.8584	
480 minute winter	FC1	Hydro-Brake®	EX MH	5.5				161.9
15 minute summer	CP1	7.000	S5 ATT	42.5	1.069	0.579	1.3524	
15 minute summer	B1	2.000	S1	5.4	1.232	0.172	0.1860	
15 minute summer	B2	3.000	S3	1.9	0.694	0.095	0.0186	
15 minute summer	B3	4.000	S4	14.9	1.185	0.750	0.1559	
15 minute summer	B4	5.000	S4	5.6	0.924	0.282	0.0382	
15 minute summer	B5	6.000	S5 ATT	17.0	1.208	0.292	0.1295	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	104.253	0.178	37.7	0.2008	0.0000	OK
30 minute summer	S2	20	104.068	0.123	58.9	12.9743	0.0000	OK
1440 minute winter	S3	1410	103.584	0.584	8.1	208.7095	0.0000	SURCHARGED
15 minute summer	S4	9	102.084	0.084	38.1	0.0955	0.0000	OK
960 minute winter	S5 ATT	735	98.724	0.449	17.5	235.0746	0.0000	SURCHARGED
120 minute winter	S6	116	98.248	0.029	4.8	0.0511	0.0000	OK
180 minute winter	S7	256	97.236	0.036	4.8	0.0908	0.0000	OK
240 minute winter	S8	176	97.187	0.187	4.8	0.6490	0.0000	OK
240 minute winter	S9	176	97.187	0.287	5.2	0.9958	0.0000	OK
240 minute winter	S10	176	97.187	0.353	7.7	1.2237	0.0000	OK
240 minute winter	FC1	176	97.187	0.401	6.7	1.3891	0.0000	SURCHARGED
15 minute summer	EX MH	1	96.700	0.000	5.4	0.0000	0.0000	OK
15 minute summer	CP1	9	98.784	0.284	79.9	0.0000	0.0000	OK
15 minute summer	B1	9	105.509	0.059	10.2	0.0665	0.0000	OK
15 minute summer	B2	9	104.056	0.046	3.6	0.0517	0.0000	OK
15 minute summer	B3	9	103.653	0.353	27.9	0.3996	0.0000	SURCHARGED
15 minute summer	B4	9	103.486	0.086	10.6	0.0976	0.0000	OK
15 minute summer	B5	9	101.133	0.133	31.9	0.1509	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	S1	1.001	S2	37.8	1.608	0.950	0.5592	
30 minute summer	S2	1.002	S3	44.1	2.045	0.544	0.7759	
1440 minute winter	S3	Hydro-Brake®	S4	1.0				
15 minute summer	S4	1.004	S5 ATT	37.8	2.398	0.161	0.4019	
960 minute winter	S5 ATT	Hydro-Brake®	S6	4.8				
120 minute winter	S6	1.006	S7	4.8	1.054	0.012	0.1209	
180 minute winter	S7	1.007	S8	4.8	0.802	0.019	0.3525	
240 minute winter	S8	1.008	S9	5.2	0.596	0.029	0.8960	
240 minute winter	S9	1.009	S10	5.4	0.358	0.048	2.0928	
240 minute winter	S10	1.010	FC1	6.7	0.291	0.061	1.6895	
240 minute winter	FC1	Hydro-Brake®	EX MH	6.0				132.9
15 minute summer	CP1	7.000	S5 ATT	79.0	1.251	1.075	2.1124	
15 minute summer	B1	2.000	S1	10.2	1.263	0.325	0.4017	
15 minute summer	B2	3.000	S3	3.6	0.826	0.181	0.0297	
15 minute summer	B3	4.000	S4	27.4	1.556	1.378	0.2158	
15 minute summer	B4	5.000	S4	10.6	1.077	0.533	0.0620	
15 minute summer	B5	6.000	S5 ATT	32.0	1.403	0.550	0.2098	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	104.333	0.258	48.4	0.2921	0.0000	SURCHARGED
30 minute summer	S2	20	104.094	0.149	75.3	15.7603	0.0000	OK
1440 minute winter	S3	1410	103.735	0.735	9.7	262.7059	0.0000	SURCHARGED
15 minute summer	S4	9	102.096	0.096	48.7	0.1091	0.0000	OK
960 minute winter	S5 ATT	900	98.873	0.598	21.0	313.0464	0.0000	SURCHARGED
60 minute winter	S6	56	98.248	0.029	4.8	0.0511	0.0000	OK
240 minute winter	S7	184	97.358	0.158	4.8	0.4011	0.0000	OK
240 minute winter	S8	180	97.359	0.359	5.1	1.2420	0.0000	OK
240 minute winter	S9	184	97.358	0.458	5.5	1.5878	0.0000	SURCHARGED
240 minute winter	S10	184	97.357	0.523	8.2	1.8134	0.0000	SURCHARGED
240 minute winter	FC1	184	97.357	0.571	6.9	1.9774	0.0000	SURCHARGED
15 minute summer	EX MH	1	96.700	0.000	5.7	0.0000	0.0000	OK
15 minute summer	CP1	9	98.935	0.435	102.9	0.0000	0.0000	SURCHARGED
15 minute summer	B1	9	105.518	0.068	13.1	0.0764	0.0000	OK
15 minute summer	B2	9	104.063	0.053	4.7	0.0598	0.0000	OK
15 minute summer	B3	9	103.884	0.583	36.0	0.6599	0.0000	SURCHARGED
15 minute summer	B4	9	103.502	0.102	13.6	0.1157	0.0000	OK
15 minute summer	B5	9	101.159	0.159	41.1	0.1801	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	S1	1.001	S2	46.9	1.624	1.176	0.7069	
30 minute summer	S2	1.002	S3	58.8	2.173	0.725	0.9740	
1440 minute winter	S3	Hydro-Brake®	S4	1.0				
15 minute summer	S4	1.004	S5 ATT	48.3	2.560	0.206	0.4813	
960 minute winter	S5 ATT	Hydro-Brake®	S6	4.8				
60 minute winter	S6	1.006	S7	4.8	1.054	0.012	0.1208	
240 minute winter	S7	1.007	S8	5.1	0.798	0.020	0.9568	
240 minute winter	S8	1.008	S9	5.5	0.594	0.030	1.3460	
240 minute winter	S9	1.009	S10	5.9	0.361	0.053	2.3273	
240 minute winter	S10	1.010	FC1	6.9	0.277	0.063	1.7096	
240 minute winter	FC1	Hydro-Brake®	EX MH	6.0				139.4
15 minute summer	CP1	7.000	S5 ATT	103.2	1.481	1.404	2.2585	
15 minute summer	B1	2.000	S1	13.1	1.240	0.417	0.5263	
15 minute summer	B2	3.000	S3	4.7	0.885	0.236	0.0361	
15 minute summer	B3	4.000	S4	34.9	1.985	1.758	0.2161	
15 minute summer	B4	5.000	S4	13.6	1.136	0.684	0.0754	
15 minute summer	B5	6.000	S5 ATT	41.2	1.478	0.708	0.2561	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	S1	1410	104.971	0.896	6.0	1.0131	0.0000	FLOOD RISK
1440 minute winter	S2	1410	104.971	1.026	11.2	84.8123	0.0000	SURCHARGED
1440 minute winter	S3	1410	104.971	1.970	13.5	287.4067	0.0000	FLOOD RISK
15 minute summer	S4	9	102.115	0.115	66.6	0.1298	0.0000	OK
1440 minute winter	S5 ATT	1380	99.241	0.966	22.4	505.6797	0.0000	SURCHARGED
30 minute winter	S6	29	98.248	0.029	4.8	0.0511	0.0000	OK
480 minute winter	S7	368	97.865	0.665	4.8	1.6922	0.0000	SURCHARGED
480 minute winter	S8	368	97.865	0.865	4.9	2.9958	0.0000	SURCHARGED
480 minute winter	S9	368	97.865	0.965	5.3	3.3418	0.0000	SURCHARGED
480 minute winter	S10	368	97.865	1.031	7.7	3.5700	0.0000	SURCHARGED
480 minute winter	FC1	368	97.864	1.078	6.9	3.7357	0.0000	SURCHARGED
15 minute summer	EX MH	1	96.700	0.000	5.9	0.0000	0.0000	OK
15 minute summer	CP1	9	99.308	0.808	144.3	0.0000	0.0000	SURCHARGED
15 minute summer	B1	9	105.533	0.082	18.4	0.0933	0.0000	OK
1440 minute winter	B2	1410	104.971	0.960	0.4	1.0863	0.0000	FLOOD RISK
15 minute summer	B3	9	104.384	1.084	50.5	1.2263	0.0000	FLOOD RISK
15 minute summer	B4	9	103.538	0.138	19.0	0.1565	0.0000	OK
15 minute summer	B5	9	101.248	0.248	57.7	0.2803	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)
1440 minute winter	S1	1.001	S2	6.0	0.768	0.151	0.8750	
1440 minute winter	S2	1.002	S3	9.8	0.891	0.121	1.4318	
1440 minute winter	S3	Hydro-Brake®	S4	1.6				
15 minute summer	S4	1.004	S5 ATT	66.0	2.774	0.281	0.6066	
1440 minute winter	S5 ATT	Hydro-Brake®	S6	4.8				
30 minute winter	S6	1.006	S7	4.8	1.054	0.012	0.3513	
480 minute winter	S7	1.007	S8	4.9	0.795	0.019	1.3842	
480 minute winter	S8	1.008	S9	5.3	0.575	0.029	1.3567	
480 minute winter	S9	1.009	S10	5.6	0.375	0.050	2.3273	
480 minute winter	S10	1.010	FC1	6.9	0.275	0.062	1.7096	
480 minute winter	FC1	Hydro-Brake®	EX MH	6.0				202.3
15 minute summer	CP1	7.000	S5 ATT	144.3	2.049	1.963	2.3575	
15 minute summer	B1	2.000	S1	18.4	1.184	0.586	0.5781	
1440 minute winter	B2	3.000	S3	0.5	0.443	0.024	0.1197	
15 minute summer	B3	4.000	S4	47.4	2.691	2.384	0.2161	
15 minute summer	B4	5.000	S4	19.0	1.189	0.954	0.0998	
15 minute summer	B5	6.000	S5 ATT	57.8	1.519	0.994	0.3523	

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)	20.000	Minimum Backdrop Height (m)	2.000
Ratio-R	0.200	Preferred Cover Depth (m)	0.900
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)
N1	0.032	5.00	106.000	1200	1.482
N3	0.083	5.00	103.700	1200	1.735
N5			101.300	1200	2.192
N6	0.025	5.00	99.800	1500	2.347
FC2			98.700	1500	1.286
EX MH			98.640	1200	1.425
N7	0.050	5.00	98.700	1200	0.974
N4	0.075	5.00	102.510	1200	1.537
N2	0.103	2.00	104.570	1200	1.643
B6	0.041	2.00	106.500	1200	1.125
B7	0.026	2.00	105.850	1200	1.125
B8	0.053	2.00	104.540	1200	1.380
B9	0.048	2.00	103.390	1200	1.210
B10	0.065	2.00	102.640	1200	1.455
B11	0.085	2.00	101.390	1200	1.125
B12	0.075	2.00	100.380	1200	1.125
B13	0.085	2.00	100.350	1200	1.167
B14	0.033	2.00	100.370	1200	1.233
B15	0.045	2.00	98.700	1200	0.894
B16			101.400	1200	1.324

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)
1.001	N1	N2	19.000	0.600	104.518	102.927	1.591	11.9	225	5.08	48.9
1.002	N2	N3	16.700	0.600	102.927	101.965	0.962	17.4	225	5.17	48.6
1.003	N3	N4	17.600	0.600	101.965	100.973	0.992	17.7	225	5.27	48.3
1.004	N4	N5	20.300	0.600	100.973	99.108	1.865	10.9	225	5.35	48.1
1.005	N5	N6	24.450	0.600	99.108	97.453	1.655	14.8	225	5.47	47.7
1.006	N7	N6	8.100	0.600	97.726	97.453	0.273	29.7	225	5.06	49.0
1.007	N6	FC2	15.800	0.600	97.453	97.414	0.039	405.1	450	5.73	47.0
1.008	FC2	EX MH	19.800	0.600	97.414	97.215	0.199	99.5	150	6.06	46.1
2.000	B6	N1	15.800	0.600	105.375	104.518	0.857	18.4	225	2.09	61.7
3.000	B7	N1	11.200	0.600	104.725	104.518	0.207	54.1	225	2.10	61.5
4.000	B8	N2	39.500	0.600	103.160	102.927	0.233	169.5	225	2.66	58.5
5.000	B9	N3	36.500	0.600	102.180	101.965	0.215	169.8	225	2.61	58.8
6.000	B10	N4	36.000	0.600	101.185	100.973	0.212	169.8	225	2.60	58.8
7.000	B11	B16	32.000	0.600	100.265	100.076	0.189	169.3	225	2.53	59.2
7.001	B16	N5	5.000	0.600	100.076	99.108	0.968	5.2	225	2.55	59.1
8.000	B12	B13	12.200	0.600	99.255	99.183	0.072	169.4	225	2.20	61.0
8.001	B13	B14	7.700	0.600	99.183	99.137	0.046	167.4	225	2.33	60.3
8.002	B14	N5	4.800	0.600	99.137	99.108	0.029	165.5	225	2.41	59.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.001	3.807	151.4	13.1	1.257	1.418	0.099	0.0
1.002	3.155	125.5	33.6	1.418	1.510	0.255	0.0
1.003	3.121	124.1	50.6	1.510	1.312	0.386	0.0
1.004	3.988	158.6	68.6	1.312	1.967	0.526	0.0
1.005	3.421	136.0	104.0	1.967	2.122	0.804	0.0
1.006	2.410	95.8	12.6	0.749	2.122	0.095	0.0
1.007	1.004	159.6	117.7	1.897	0.836	0.924	0.0
1.008	1.007	17.8	115.4	1.136	1.275	0.924	0.0
2.000	3.061	121.7	6.9	0.900	1.257	0.041	0.0
3.000	1.782	70.8	4.3	0.900	1.257	0.026	0.0
4.000	1.001	39.8	8.4	1.155	1.418	0.053	0.0
5.000	1.000	39.8	7.6	0.985	1.510	0.048	0.0
6.000	1.000	39.8	10.4	1.230	1.312	0.065	0.0
7.000	1.002	39.8	13.6	0.900	1.099	0.085	0.0
7.001	5.795	230.4	13.6	1.099	1.967	0.085	0.0
8.000	1.001	39.8	12.4	0.900	0.942	0.075	0.0
8.001	1.008	40.1	26.1	0.942	1.008	0.160	0.0
8.002	1.013	40.3	31.3	1.008	1.967	0.193	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)
9.000	B15	N7	13.500	0.600	97.806	97.726	0.080	168.8	225	2.22	60.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
9.000	1.003	39.9	7.4	0.669	0.749	0.045	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.001	19.000	11.9	225	Circular	106.000	104.518	1.257	104.570	102.927	1.418
1.002	16.700	17.4	225	Circular	104.570	102.927	1.418	103.700	101.965	1.510
1.003	17.600	17.7	225	Circular	103.700	101.965	1.510	102.510	100.973	1.312
1.004	20.300	10.9	225	Circular	102.510	100.973	1.312	101.300	99.108	1.967
1.005	24.450	14.8	225	Circular	101.300	99.108	1.967	99.800	97.453	2.122
1.006	8.100	29.7	225	Circular	98.700	97.726	0.749	99.800	97.453	2.122
1.007	15.800	405.1	450	Circular	99.800	97.453	1.897	98.700	97.414	0.836
1.008	19.800	99.5	150	Circular	98.700	97.414	1.136	98.640	97.215	1.275
2.000	15.800	18.4	225	Circular	106.500	105.375	0.900	106.000	104.518	1.257
3.000	11.200	54.1	225	Circular	105.850	104.725	0.900	106.000	104.518	1.257
4.000	39.500	169.5	225	Circular	104.540	103.160	1.155	104.570	102.927	1.418
5.000	36.500	169.8	225	Circular	103.390	102.180	0.985	103.700	101.965	1.510
6.000	36.000	169.8	225	Circular	102.640	101.185	1.230	102.510	100.973	1.312
7.000	32.000	169.3	225	Circular	101.390	100.265	0.900	101.400	100.076	1.099

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	N1	1200	Manhole	Adoptable	N2	1200	Manhole	Adoptable
1.002	N2	1200	Manhole	Adoptable	N3	1200	Manhole	Adoptable
1.003	N3	1200	Manhole	Adoptable	N4	1200	Manhole	Adoptable
1.004	N4	1200	Manhole	Adoptable	N5	1200	Manhole	Adoptable
1.005	N5	1200	Manhole	Adoptable	N6	1500	Manhole	Adoptable
1.006	N7	1200	Manhole	Adoptable	N6	1500	Manhole	Adoptable
1.007	N6	1500	Manhole	Adoptable	FC2	1500	Manhole	Adoptable
1.008	FC2	1500	Manhole	Adoptable	EX MH	1200	Manhole	Adoptable
2.000	B6	1200	Manhole	Adoptable	N1	1200	Manhole	Adoptable
3.000	B7	1200	Manhole	Adoptable	N1	1200	Manhole	Adoptable
4.000	B8	1200	Manhole	Adoptable	N2	1200	Manhole	Adoptable
5.000	B9	1200	Manhole	Adoptable	N3	1200	Manhole	Adoptable
6.000	B10	1200	Manhole	Adoptable	N4	1200	Manhole	Adoptable
7.000	B11	1200	Manhole	Adoptable	B16	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
7.001	5.000	5.2	225	Circular	101.400	100.076	1.099	101.300	99.108	1.967
8.000	12.200	169.4	225	Circular	100.380	99.255	0.900	100.350	99.183	0.942
8.001	7.700	167.4	225	Circular	100.350	99.183	0.942	100.370	99.137	1.008
8.002	4.800	165.5	225	Circular	100.370	99.137	1.008	101.300	99.108	1.967
9.000	13.500	168.8	225	Circular	98.700	97.806	0.669	98.700	97.726	0.749

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
7.001	B16	1200	Manhole	Adoptable	N5	1200	Manhole	Adoptable
8.000	B12	1200	Manhole	Adoptable	B13	1200	Manhole	Adoptable
8.001	B13	1200	Manhole	Adoptable	B14	1200	Manhole	Adoptable
8.002	B14	1200	Manhole	Adoptable	N5	1200	Manhole	Adoptable
9.000	B15	1200	Manhole	Adoptable	N7	1200	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
N1	106.000	1.482	1200	1	3.000	104.518	225
				2	2.000	104.518	225
				0	1.001	104.518	225
N3	103.700	1.735	1200	1	5.000	101.965	225
				2	1.002	101.965	225
				0	1.003	101.965	225
N5	101.300	2.192	1200	1	8.002	99.108	225
				2	7.001	99.108	225
				3	1.004	99.108	225
				0	1.005	99.108	225
N6	99.800	2.347	1500	1	1.006	97.453	225
				2	1.005	97.453	225
				0	1.007	97.453	450
FC2	98.700	1.286	1500	1	1.007	97.414	450
				0	1.008	97.414	150
EX MH	98.640	1.425	1200	1	1.008	97.215	150
N7	98.700	0.974	1200	1	9.000	97.726	225
				0	1.006	97.726	225
N4	102.510	1.537	1200	1	6.000	100.973	225
				2	1.003	100.973	225
				0	1.004	100.973	225

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
N2	104.570	1.643	1200	1	4.000	102.927	225
				2	1.001	102.927	225
				0	1.002	102.927	225
B6	106.500	1.125	1200	0	2.000	105.375	225
B7	105.850	1.125	1200	0	3.000	104.725	225
B8	104.540	1.380	1200	0	4.000	103.160	225
B9	103.390	1.210	1200	0	5.000	102.180	225
B10	102.640	1.455	1200	0	6.000	101.185	225
B11	101.390	1.125	1200	0	7.000	100.265	225
B12	100.380	1.125	1200	0	8.000	99.255	225
B13	100.350	1.167	1200	1	8.000	99.183	225
				0	8.001	99.183	225
B14	100.370	1.233	1200	1	8.001	99.137	225
				0	8.002	99.137	225
B15	98.700	0.894	1200	0	9.000	97.806	225
B16	101.400	1.324	1200	1	7.000	100.076	225
				0	7.001	100.076	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.200	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	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 %)
1	0	0	0
2	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node FC2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	97.414	Product Number	CTL-SHE-0115-6000-1000-6000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.0	Min Node Diameter (mm)	1200

Node N5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	99.108	Product Number	CTL-SHE-0109-5400-1000-5400
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.4	Min Node Diameter (mm)	1200

Node N4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	100.973	Product Number	CTL-SHE-0119-6500-1000-6500
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.5	Min Node Diameter (mm)	1200

Node N3 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	101.965	Product Number	CTL-SHE-0110-5500-1000-5500
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.5	Min Node Diameter (mm)	1200

Node N2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	102.927	Product Number	CTL-SHE-0100-4500-1000-4500
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.5	Min Node Diameter (mm)	1200

Node N3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	101.965
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	160.0	0.0	0.800	160.0	0.0	0.801	0.0	0.0

Node N5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	99.108
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	625.0	0.0	0.800	625.0	0.0	0.801	0.0	0.0

Node N6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.453
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	150.0	0.0	0.800	150.0	0.0	0.801	0.0	0.0

Node N4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	100.973
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	185.0	0.0	0.800	185.0	0.0	0.801	0.0	0.0

Node N2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	102.927
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	225.0	0.0	0.800	225.0	0.0	0.801	0.0	0.0

Node B13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	99.183
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	25.0	0.0	0.800	25.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	N1	9	104.569	0.051	13.3	0.0576	0.0000	OK
600 minute winter	N3	420	102.135	0.170	6.9	25.9784	0.0000	OK
1440 minute winter	N5	1110	99.356	0.248	9.7	147.7862	0.0000	SURCHARGED
1440 minute winter	N6	1020	97.638	0.185	6.8	26.6429	0.0000	OK
1440 minute winter	FC2	1020	97.637	0.223	5.9	0.3947	0.0000	SURCHARGED
15 minute summer	EX MH	1	97.215	0.000	1.7	0.0000	0.0000	OK
15 minute summer	N7	9	97.799	0.073	11.8	0.0829	0.0000	OK
960 minute winter	N4	660	101.155	0.182	7.5	32.2301	0.0000	OK
360 minute winter	N2	240	103.066	0.139	7.8	29.8699	0.0000	OK
15 minute summer	B6	9	105.409	0.034	6.1	0.0387	0.0000	OK
15 minute summer	B7	9	104.761	0.036	3.9	0.0404	0.0000	OK
15 minute summer	B8	9	103.237	0.077	7.9	0.0872	0.0000	OK
15 minute summer	B9	9	102.258	0.078	7.2	0.0877	0.0000	OK
15 minute summer	B10	9	101.279	0.094	9.7	0.1059	0.0000	OK
15 minute summer	B11	9	100.353	0.088	12.7	0.0995	0.0000	OK
15 minute winter	B12	11	99.379	0.124	10.0	0.1400	0.0000	OK
15 minute winter	B13	11	99.379	0.196	21.0	4.8752	0.0000	OK
15 minute winter	B14	11	99.371	0.234	20.6	0.2645	0.0000	SURCHARGED
15 minute summer	B15	9	97.870	0.064	6.7	0.0729	0.0000	OK
15 minute summer	B16	9	100.180	0.104	12.9	0.1174	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 summer	N1	1.001	N2	13.5	3.064	0.089	0.0899	
600 minute winter	N3	Hydro-Brake®	N4	5.2				
1440 minute winter	N5	Hydro-Brake®	N6	5.4				
1440 minute winter	N6	1.007	FC2	5.9	0.226	0.037	1.1040	
1440 minute winter	FC2	Hydro-Brake®	EX MH	5.9				392.9
15 minute summer	N7	1.006	N6	12.0	2.204	0.126	0.0498	
960 minute winter	N4	Hydro-Brake®	N5	6.2				
360 minute winter	N2	Hydro-Brake®	N3	4.1				
15 minute summer	B6	2.000	N1	6.1	1.172	0.050	0.0830	
15 minute summer	B7	3.000	N1	3.9	0.730	0.055	0.0603	
15 minute summer	B8	4.000	N2	8.1	1.156	0.202	0.2912	
15 minute summer	B9	5.000	N3	7.3	1.240	0.185	0.2428	
15 minute summer	B10	6.000	N4	10.0	1.361	0.252	0.3010	
15 minute summer	B11	7.000	B16	12.9	0.906	0.323	0.5160	
15 minute winter	B12	8.000	B13	9.8	0.802	0.245	0.3605	
15 minute winter	B13	8.001	B14	19.5	0.701	0.487	0.2945	
15 minute winter	B14	8.002	N5	22.1	1.521	0.548	0.0967	
15 minute summer	B15	9.000	N7	6.7	0.650	0.168	0.1388	
15 minute summer	B16	7.001	N5	13.5	3.487	0.059	0.0450	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	N1	9	104.575	0.057	17.1	0.0641	0.0000	OK
600 minute winter	N3	435	102.172	0.206	7.7	31.6178	0.0000	OK
1440 minute winter	N5	1170	99.409	0.301	10.5	178.9520	0.0000	SURCHARGED
1440 minute winter	N6	1050	97.676	0.223	7.1	32.1239	0.0000	OK
1440 minute winter	FC2	1050	97.675	0.261	6.0	0.4620	0.0000	SURCHARGED
15 minute summer	EX MH	1	97.215	0.000	2.7	0.0000	0.0000	OK
15 minute summer	N7	9	97.808	0.082	15.3	0.0927	0.0000	OK
960 minute winter	N4	675	101.192	0.219	8.1	38.6630	0.0000	OK
360 minute winter	N2	248	103.099	0.172	9.2	37.0334	0.0000	OK
15 minute summer	B6	9	105.414	0.039	7.9	0.0439	0.0000	OK
15 minute summer	B7	9	104.765	0.040	5.0	0.0456	0.0000	OK
15 minute summer	B8	9	103.247	0.087	10.2	0.0982	0.0000	OK
15 minute summer	B9	9	102.267	0.087	9.3	0.0987	0.0000	OK
15 minute summer	B10	9	101.291	0.106	12.6	0.1198	0.0000	OK
15 minute summer	B11	9	100.367	0.102	16.4	0.1157	0.0000	OK
15 minute winter	B12	10	99.425	0.170	12.9	0.1918	0.0000	OK
15 minute winter	B13	10	99.420	0.237	26.6	5.8957	0.0000	SURCHARGED
1440 minute winter	B14	1170	99.409	0.272	3.1	0.3074	0.0000	SURCHARGED
15 minute summer	B15	9	97.881	0.075	8.7	0.0845	0.0000	OK
15 minute summer	B16	9	100.191	0.115	16.5	0.1299	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 summer	N1	1.001	N2	17.3	3.176	0.114	0.1128	
600 minute winter	N3	Hydro-Brake®	N4	5.4				
1440 minute winter	N5	Hydro-Brake®	N6	5.4				
1440 minute winter	N6	1.007	FC2	6.0	0.226	0.037	1.3723	
1440 minute winter	FC2	Hydro-Brake®	EX MH	6.0				412.8
15 minute summer	N7	1.006	N6	15.6	2.333	0.162	0.0595	
960 minute winter	N4	Hydro-Brake®	N5	6.4				
360 minute winter	N2	Hydro-Brake®	N3	4.3				
15 minute summer	B6	2.000	N1	7.9	1.289	0.065	0.0978	
15 minute summer	B7	3.000	N1	5.0	0.797	0.071	0.0708	
15 minute summer	B8	4.000	N2	10.4	1.196	0.262	0.3582	
15 minute summer	B9	5.000	N3	9.5	1.307	0.240	0.2923	
15 minute summer	B10	6.000	N4	13.0	1.444	0.328	0.3602	
15 minute summer	B11	7.000	B16	16.5	1.001	0.414	0.6067	
15 minute winter	B12	8.000	B13	12.1	0.850	0.303	0.4385	
15 minute winter	B13	8.001	B14	26.2	0.776	0.653	0.3062	
1440 minute winter	B14	8.002	N5	3.0	0.605	0.075	0.1909	
15 minute summer	B15	9.000	N7	8.7	0.707	0.218	0.1659	
15 minute summer	B16	7.001	N5	18.2	3.604	0.079	0.0515	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	N1	8	104.593	0.075	32.3	0.0846	0.0000	OK
960 minute winter	N3	750	102.368	0.403	8.8	61.6702	0.0000	SURCHARGED
1440 minute winter	N5	1560	99.641	0.533	13.3	317.3423	0.0000	SURCHARGED
1440 minute winter	N6	1140	97.884	0.431	8.5	62.2288	0.0000	OK
1440 minute winter	FC2	1140	97.884	0.470	6.1	0.8310	0.0000	SURCHARGED
15 minute summer	EX MH	1	97.215	0.000	4.6	0.0000	0.0000	OK
1440 minute winter	N7	1140	97.884	0.158	2.5	0.1791	0.0000	OK
960 minute winter	N4	750	101.373	0.400	10.1	70.7175	0.0000	SURCHARGED
360 minute winter	N2	272	103.286	0.359	16.0	77.1121	0.0000	SURCHARGED
15 minute summer	B6	9	105.428	0.053	14.9	0.0599	0.0000	OK
15 minute summer	B7	9	104.781	0.056	9.5	0.0637	0.0000	OK
360 minute winter	B8	272	103.286	0.126	3.3	0.1424	0.0000	OK
960 minute winter	B9	750	102.368	0.188	1.6	0.2123	0.0000	OK
960 minute winter	B10	750	101.373	0.188	2.2	0.2124	0.0000	OK
15 minute summer	B11	9	100.421	0.155	31.0	0.1759	0.0000	OK
1440 minute winter	B12	1560	99.641	0.386	1.9	0.4371	0.0000	SURCHARGED
1440 minute winter	B13	1560	99.641	0.458	4.1	11.4069	0.0000	SURCHARGED
1440 minute winter	B14	1560	99.641	0.504	4.6	0.5705	0.0000	SURCHARGED
15 minute summer	B15	9	97.914	0.108	16.4	0.1223	0.0000	OK
15 minute summer	B16	8	100.213	0.137	31.3	0.1547	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 summer	N1	1.001	N2	32.6	3.384	0.216	0.2299	
960 minute winter	N3	Hydro-Brake®	N4	5.5				
1440 minute winter	N5	Hydro-Brake®	N6	5.4				
1440 minute winter	N6	1.007	FC2	6.1	0.225	0.038	2.4860	
1440 minute winter	FC2	Hydro-Brake®	EX MH	6.0				443.6
1440 minute winter	N7	1.006	N6	2.5	0.805	0.026	0.2820	
960 minute winter	N4	Hydro-Brake®	N5	6.5				
360 minute winter	N2	Hydro-Brake®	N3	4.5				
15 minute summer	B6	2.000	N1	14.9	1.611	0.122	0.1471	
15 minute summer	B7	3.000	N1	9.5	0.990	0.134	0.1078	
360 minute winter	B8	4.000	N2	3.3	0.518	0.083	1.2368	
960 minute winter	B9	5.000	N3	1.6	0.418	0.040	1.3720	
960 minute winter	B10	6.000	N4	2.2	0.482	0.055	1.3535	
15 minute summer	B11	7.000	B16	31.3	1.339	0.786	0.8523	
1440 minute winter	B12	8.000	B13	1.9	0.330	0.047	0.4852	
1440 minute winter	B13	8.001	B14	3.7	0.398	0.093	0.3062	
1440 minute winter	B14	8.002	N5	4.6	0.666	0.114	0.1909	
15 minute summer	B15	9.000	N7	16.4	0.862	0.411	0.2572	
15 minute summer	B16	7.001	N5	35.9	4.520	0.156	0.0639	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	N1	8	104.602	0.084	41.6	0.0955	0.0000	OK
960 minute winter	N3	945	102.529	0.564	9.8	86.4090	0.0000	SURCHARGED
1440 minute winter	N5	1680	99.757	0.649	14.8	385.8303	0.0000	SURCHARGED
1440 minute winter	N6	1410	98.106	0.653	9.2	94.2035	0.0000	SURCHARGED
1440 minute winter	FC2	1410	98.106	0.692	6.1	1.2226	0.0000	SURCHARGED
15 minute summer	EX MH	1	97.215	0.000	5.4	0.0000	0.0000	OK
1440 minute winter	N7	1410	98.106	0.380	3.0	0.4298	0.0000	SURCHARGED
960 minute winter	N4	810	101.489	0.516	11.2	91.3244	0.0000	SURCHARGED
480 minute winter	N2	360	103.427	0.500	16.5	107.3375	0.0000	SURCHARGED
15 minute summer	B6	9	105.435	0.060	19.2	0.0681	0.0000	OK
15 minute summer	B7	9	104.790	0.065	12.2	0.0733	0.0000	OK
480 minute winter	B8	360	103.427	0.267	3.5	0.3016	0.0000	SURCHARGED
960 minute winter	B9	945	102.529	0.349	2.0	0.3950	0.0000	SURCHARGED
960 minute winter	B10	810	101.489	0.304	2.7	0.3442	0.0000	SURCHARGED
15 minute summer	B11	9	100.456	0.191	39.7	0.2162	0.0000	OK
1440 minute winter	B12	1680	99.757	0.502	2.4	0.5673	0.0000	SURCHARGED
1440 minute winter	B13	1680	99.757	0.574	5.1	14.2713	0.0000	SURCHARGED
1440 minute winter	B14	1680	99.757	0.620	5.7	0.7007	0.0000	SURCHARGED
1440 minute winter	B15	1410	98.106	0.300	1.4	0.3393	0.0000	SURCHARGED
15 minute summer	B16	8	100.224	0.148	40.6	0.1672	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 summer	N1	1.001	N2	42.0	3.443	0.277	0.3061	
960 minute winter	N3	Hydro-Brake®	N4	5.5				
1440 minute winter	N5	Hydro-Brake®	N6	5.4				
1440 minute winter	N6	1.007	FC2	6.1	0.225	0.038	2.5034	
1440 minute winter	FC2	Hydro-Brake®	EX MH	6.0				423.6
1440 minute winter	N7	1.006	N6	3.0	0.851	0.031	0.3221	
960 minute winter	N4	Hydro-Brake®	N5	6.5				
480 minute winter	N2	Hydro-Brake®	N3	4.5				
15 minute summer	B6	2.000	N1	19.2	1.757	0.158	0.1735	
15 minute summer	B7	3.000	N1	12.2	1.068	0.172	0.1282	
480 minute winter	B8	4.000	N2	3.4	0.513	0.085	1.5710	
960 minute winter	B9	5.000	N3	1.9	0.459	0.048	1.4516	
960 minute winter	B10	6.000	N4	2.6	0.474	0.065	1.4318	
15 minute summer	B11	7.000	B16	40.6	1.463	1.019	0.9898	
1440 minute winter	B12	8.000	B13	2.4	0.322	0.059	0.4852	
1440 minute winter	B13	8.001	B14	4.7	0.397	0.116	0.3062	
1440 minute winter	B14	8.002	N5	5.6	0.698	0.140	0.1909	
1440 minute winter	B15	9.000	N7	1.4	0.490	0.035	0.5369	
15 minute summer	B16	7.001	N5	44.7	4.695	0.194	0.0704	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	N1	8	104.618	0.100	58.3	0.1129	0.0000	OK
600 minute winter	N3	555	103.016	1.051	14.7	122.8648	0.0000	SURCHARGED
1440 minute winter	N5	1470	100.314	1.206	17.9	476.6603	0.0000	SURCHARGED
1440 minute winter	N6	1020	98.590	1.137	10.5	116.0799	0.0000	SURCHARGED
1440 minute winter	FC2	1020	98.590	1.176	6.5	2.0773	0.0000	FLOOD RISK
15 minute summer	EX MH	1	97.215	0.000	5.8	0.0000	0.0000	OK
1440 minute winter	N7	1020	98.590	0.864	4.1	0.9770	0.0000	FLOOD RISK
1440 minute winter	N4	1080	102.106	1.133	11.5	141.9696	0.0000	SURCHARGED
600 minute winter	N2	465	104.176	1.249	20.1	172.5192	0.0000	SURCHARGED
15 minute summer	B6	9	105.447	0.072	26.9	0.0810	0.0000	OK
15 minute summer	B7	9	104.804	0.079	17.1	0.0891	0.0000	OK
600 minute winter	B8	465	104.176	1.016	4.2	1.1492	0.0000	SURCHARGED
600 minute winter	B9	555	103.016	0.836	3.8	0.9458	0.0000	SURCHARGED
1440 minute winter	B10	1080	102.106	0.921	2.9	1.0421	0.0000	SURCHARGED
15 minute summer	B11	9	100.673	0.408	55.8	0.4615	0.0000	SURCHARGED
1440 minute winter	B12	1470	100.314	1.059	3.3	1.1978	0.0000	FLOOD RISK
1440 minute winter	B13	1470	100.314	1.131	7.0	20.2912	0.0000	FLOOD RISK
1440 minute winter	B14	1470	100.314	1.177	7.9	1.3313	0.0000	FLOOD RISK
1440 minute winter	B15	1020	98.590	0.784	2.0	0.8866	0.0000	FLOOD RISK
1440 minute winter	B16	1470	100.314	0.238	3.7	0.2691	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 summer	N1	1.001	N2	58.8	3.496	0.388	0.4251	
600 minute winter	N3	Hydro-Brake®	N4	5.6				
1440 minute winter	N5	Hydro-Brake®	N6	5.9				
1440 minute winter	N6	1.007	FC2	6.5	0.225	0.041	2.5034	
1440 minute winter	FC2	Hydro-Brake®	EX MH	6.5				477.3
1440 minute winter	N7	1.006	N6	4.0	0.884	0.042	0.3221	
1440 minute winter	N4	Hydro-Brake®	N5	6.9				
600 minute winter	N2	Hydro-Brake®	N3	5.0				
15 minute summer	B6	2.000	N1	26.9	1.959	0.221	0.2186	
15 minute summer	B7	3.000	N1	17.1	1.177	0.241	0.1637	
600 minute winter	B8	4.000	N2	4.1	0.533	0.103	1.5710	
600 minute winter	B9	5.000	N3	3.7	0.519	0.094	1.4516	
1440 minute winter	B10	6.000	N4	2.9	0.481	0.072	1.4318	
15 minute summer	B11	7.000	B16	53.9	1.499	1.353	1.0948	
1440 minute winter	B12	8.000	B13	3.3	0.320	0.082	0.4852	
1440 minute winter	B13	8.001	B14	6.5	0.428	0.161	0.3062	
1440 minute winter	B14	8.002	N5	7.8	0.767	0.194	0.1909	
1440 minute winter	B15	9.000	N7	1.9	0.507	0.048	0.5369	
1440 minute winter	B16	7.001	N5	3.7	1.849	0.016	0.1989	