
Development at Thurnscoe Bridge Lane Barnsley

Flood Risk Assessment and Drainage Strategy

Client:

Avant Homes Yorkshire Ltd
Unit 2
Mariner Court
Peel Avenue
Durkar
Wakefield
WF4 3FL

Prepared by:

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

REVISION HISTORY

Revision	Date	Details
00	19 th December 2023	First issue
01	5 th November 2024	Updated site layout added Drainage strategy plans by Eastwood Consulting Engineers added
02	8 th November 2024	Further update to site layout plan and drainage strategy plans

APENDICES

- A: Figure 1: Location Plan
- B: Topographical survey plan
- C: Yorkshire Water pre-development advice
- D: Site layout plan
- E: Flood Map for Planning
- F: LLFA correspondence
- G: Danvm Drainage Commissioners correspondence
- H: Surface water flood maps
- I: Reservoirs flood map
- J: REFH2.3 estimates of surface water runoff rates and volumes
- K: Drainage strategy plans and calculations by Eastwood Consulting Engineers

ABBREVIATIONS

AEP:	Annual exceedance probability
AOD:	Above Ordnance Datum
BGS:	British Geological Survey
CCA:	Climate change allowance
CDA:	Critical drainage area
FFL:	Finished floor level
LLFA:	Lead Local Flood Authority
NPPF:	National Planning Policy Framework
NGR:	National Grid Reference
OS:	Ordnance Survey
OWC:	Ordinary watercourse
SFRA:	Strategic flood risk assessment

1.0 SITE	Land off Thurnscoe Bridge Lane, Barnsley.
2.0 PURPOSE OF THIS REPORT	This site-specific flood risk assessment is required in connection with a planning application to Barnsley Council for a housing development.
3.0 PLANNING APPLICATION NUMBER	Not yet issued.
4.0 SITE LOCATION AND DESCRIPTION	
4.1 National Grid Coordinates	445380, 404900
4.2 Location	<p>The location of the site is shown in Figure 1 in Appendix A.</p> <p>The gross site area amounts to approximately 10.0ha.</p> <p>The site is bounded by the rear gardens of Derry Grove to the north; Thurnscoe Bridge Lane to the east; a disused railway (now footpath) to the south and an unnamed watercourse to the west.</p>
4.3 Watercourses	<p>Thurnscoe Dike flows west, approximately 115m to the south of the southern boundary of the site. This watercourse flows into Carr Dike which in turn flows into the River Dearne.</p> <p>An unnamed open drain watercourse flows past the western corner of the site and under to railway, to its confluence with Thurnscoe Dike.</p> <p>The River Dearne, which has Main River designation, is approximately 3.0km to the south-west of the site.</p> <p>The site is not within 20m of a Main River.</p>
4.4 Topography	<p>The topographical survey plan is provided in Appendix B.</p> <p>Ground levels fall to the south and west from around 47.0m to 32.03m AOD.</p> <p>The site has been in agricultural use and has a pervious ground surface.</p>

4.5 Existing drainage infrastructure	There are several Yorkshire Water assets within the site, as shown in Appendix C.
4.6 Geology	Superficial: No data Bedrock: Ackworth Rock – Sandstone.
4.7 Reservoirs and Canals	There are no impounding reservoirs in the vicinity of the site. There are no canals in the vicinity of the site. There are wetland waterbodies at Bolton Ings and Old Moor, approximately 2.6km to the south-west of the site and at an elevation between 35m and 40m AOD.
4.8 Flood warning area	The site is not within a flood warning area.
5.0 THE DEVELOPMENT	A development of 296 houses is proposed, as shown on the site layout plan in Appendix D. The site includes approximately 0.94ha of public open space at the west end of the site. The site is allocated for housing in the Local Plan under reference HS52.
6.0 VULNERABILITY CLASSIFICATION	As the development is for residential use it is classified as 'More Vulnerable' , in accordance with Annex 3 of the NPPF.
7.0 FLOOD ZONE	The Flood Map for Planning in Appendix E shows the site to be in Flood zone 1.
8.0 REQUIREMENT FOR THE SEQUENTIAL TEST	As the development is in Flood Zone 1, the sequential test is not required.
9.0 REQUIREMENT FOR THE EXCEPTION TEST	The exception test is not required for more vulnerable development in flood zone 1.
10.0 CONSULTATIONS	
10.1 The Environment Agency	As the development is in Flood Zone 1, the Environment Agency was not consulted for this FRA.
10.2 The Lead Local Flood Authority	The LLFA was consulted on 8 th December 2023 and its responses are provided in Appendix F.

10.3 The Danvm Drainage Commissioners	The Danvm Drainage Commissioners Internal Drainage Board was consulted on 8 th December 2023 and its response is provided in Appendix G.
10.4 Yorkshire Water	Pre-development advice was requested from Yorkshire water on 22 nd November 2023 and was received on 15 th December 2023. The advice is provided in Appendix C.
11.0 HISTORY OF FLOODING	There is no available evidence of historic flooding at the site. The topography suggests that surface water will run off towards the south and west.
12.0 FLUVIAL FLOODING	The annual probability of fluvial flooding is indicated to be less than 0.1%.
13.0 SURFACE WATER FLOODING	
13.1 Risk of surface water flooding	<p>The surface water flood maps are provided in Appendix H. These show the following risk bands:</p> <ul style="list-style-type: none">• High risk: occurring on average more than once in 30 years (3.3% AEP or more);• Medium risk: occurring on average between once in 30 years and once in 100 years (1% AEP to 3.3% AEP);• Low risk: occurring on average between once in 100 years and once in 1000 years (0.1% AEP to 1% AEP); and• Very low risk: occurring on average less than once in 1000 years (0.1% AEP or less). <p>There is generally a 'Very Low' risk of surface water flooding at the site, but there is an indication of some 'High Risk' flooding adjacent to the southern boundary. The depth is indicated to be less than 300mm.</p> <p>There is also an indication of Low risk flooding at the western extremity of the site. This will occur when the channel capacity of the watercourse is exceeded.</p>

In Medium risk events, there is evidence of a flow path crossing the site from north to south, leading to but not reaching a drainage ditch. This occurs in the slight depression in the land which is evident on the topographical survey plan at the same location.

In Low risk events, the overland flow path crossing the site from the north reaches the drainage ditch at the southern boundary. The flow in the ditch is westward and flood map indicates overland flow across the southern boundary into the neighbouring land.

13.2 Critical Drainage Areas

The site is not in a critical drainage area.

14.0 GROUNDWATER FLOODING

Groundwater flooding occurs when the water table rises above the ground surface or enters basements. It is typically associated with highly permeable rock such as chalk and highly fissured limestone.

This type of geology is not present at the site and the risk of groundwater emergence is therefore assessed to be low.

15.0 SEWER AND DRAIN FLOODING

Sewer and drain flooding can occur when the capacity of the sewerage system is exceeded by exceptional rainfall or if obstructions occur within the system.

The risk of flooding from sewers is assessed to be low.

16.0 FLOODING FROM RESERVOIRS AND CANALS

The Environment Agency reservoirs flood map in Appendix I shows the site is not within an area at risk from the uncontrolled release of water from reservoirs.

There are no canals in the vicinity of the site that could be a source of flooding.

17.0 EFFECT OF THE DEVELOPMENT ON FLOOD RISK

17.1 Fluvial flood risk

No effect.

17.2 Surface water flood risk

It is assumed for the purposes of this FRA that approximately 50% of the developed land will have an impervious surface, amounting to approximately 4.49ha. It is further assumed that this will increase over the lifetime of the development to 4.94ha, which represents an increase of 10% due to 'urban creep'.

Estimates of surface water runoff rates and volumes have been prepared using FEH22 rainfall data and the REFH 2.3 model.

The results are provided in Appendix J and show that surface water runoff rates and volumes could increase by an average of approximately 204% and 194% respectively.

17.3 Groundwater flood risk

No effect

17.4 Sewer flooding risk

No effect

18.0 EFFECT OF CLIMATE CHANGE

18.1 Lifetime of the development

Paragraph 006 of the current Planning Practice Guidance for Flood Risk and Coastal Change (revised 25th August 2022) recommends a lifetime of 100 years for residential development. The effects of climate change are therefore considered up to 2123.

18.2 Current guidance

Current guidance on the application of climate change allowances was issued in February 2016 and updated on 27th May 2022.

The development is within the Don and Rother Management Catchment. The recommended CCAs are:

Fluvial: Central allowance: 28%

Peak rainfall: Upper end allowances:

3.3% AEP: 35%;

1.0% AEP: 40%.

18.3 Effect on fluvial flood risk

The effect of climate change on fluvial flood risk will increase the frequency of major flood events over the lifetime of the development, but this is not expected to have any effect on the Flood Zone 1 designation of the site.

18.4 Effect on surface water flood risk

Provided the peak rainfall intensity allowances in section 18.2 above are applied in the design of the surface water drainage system for the development, there should be no adverse effects arising from the effects of climate change on peak rainfall intensity.

19.0 FLOOD RISK MANAGEMENT

19.1 Fluvial flood risk

No recommendations.

19.2 Surface water flood risk

A drainage strategy has been prepared by Eastwood Consulting Engineers and is provided in Appendix K.

The overland surface water flow path which crosses the site from north to south will be routed through the drainage system for the development.

19.3 Groundwater flood risk

No recommendations.

19.4 Sewer flooding risk

No recommendations.

19.5 Reservoir flood risk

No recommendations.

20.0 DRANAGE STRATEGY

20.1 Foul water disposal

The Yorkshire Water pre-development advice in Appendix C states that domestic wastewater may be discharged to the 450mm diameter combined public sewer which crosses the west side of the site. The foul drainage system is shown on the drainage strategy plan in Appendix K.

20.2 SuDS options for surface water disposal

Infiltration drainage

A geotechnical and geo-environmental investigation report¹ was prepared for the site in September 2024 by Eastwood Consulting Engineers. The report identified the ground conditions to be:

- topsoil, overlying;
- firm to stiff clay in the southern third of the site and sand or interbedded sand and clay in the remainder of the site;
- mudstone or siltstone generally encountered below the southern third of the site and sandstone in the remainder of the site.

The solid geology beneath the site comprises the Pennine Middle Coal Measures in the south and north-west of the site and the Pennine Upper Coal Measures in the north and east of the site.

Infiltration tests verified that soakaways will not be a feasible option for the disposal of surface water from the development.

Disposal to a watercourse

The disposal of surface water to Thurnscoe Dike is not be feasible owing to third party landowner restrictions. A pumped discharge to the 150mm surface water sewer in Thurnscoe Bridge Lane is therefore proposed.

20.3 Peak discharge rate

A pumped discharge rate of 3.5 l/s is proposed.

20.4 Attenuation storage

The drainage strategy proposes an attenuation basin, providing 5,230m³ of storage capacity, as shown on the drainage strategy plan in Appendix K.

20.5 Drainage layout

The proposed drainage layout is shown on the Drainage Strategy plan in Appendix K.

20.6 Water quality

The proposed attenuation basin is an on-line basin which will also act as a settlement basin for settleable solids on the surface water.

The planting of aquatic plants such as reeds in the margins of the basin would contribute to improved water quality and habitat.

¹ GeoEnvironmental Limited report reference 5262-G-R001

21.0 RESIDUAL RISKS

The residual risks are:

- flood events which exceed the design event;
- blockage of entry points to the drainage system; and
- failure of the surface water pumping station.

21.1 Events which exceed the design event

It is recommended that the detailed drainage design considers the effect of a 0.1% AEP rainfall event and identify any exceedance flows from the system.

The drainage plans should identify safe exceedance flow routes which ensure that there is no flooding of buildings.

21.2 Blockage of entry points

This residual risk can be mitigated by routine maintenance of the highways and the drainage system.

It is anticipated that a management company will be appointed to maintain the drainage system, pending its adoption by the sewerage undertaker.

21.3 Failure of the surface water pumping station

This risk can be minimised by routine maintenance and by having twin pumps operating on a 'duty assist' regime. A telemetry alarm system should also be installed to provide remote notification of any malfunction.

22. CONCLUSIONS

1. The development is classified as 'More Vulnerable' and is in flood zone 1. The annual probability of fluvial flooding is therefore less than 0.1%.
2. The site is not within 20m of a Main River.
3. The Sequential Test and Exception Test are not required for more vulnerable development in flood zone 1.
4. There is a generally very low risk of surface water flooding at the site, but a high risk is indicated at the southern boundary of where there is a drainage ditch. There is a low risk of surface water flooding at the west end the site next to the un-named watercourse.
5. The risks of groundwater and sewer flooding are assessed to be low.
6. The site is not within an area at risk from the uncontrolled release of water from reservoirs and there are no canals in the vicinity of the site that could be a source of flooding.
7. Climate change effects are predicted in current guidance to increase peak fluvial flow rates by 28% and peak rainfall intensity by up to 40% over the lifetime of the development. The effect on fluvial flow rates is not expected to have any effect on the Flood Zone 1 designation of the site.
8. The development could increase peak surface water run off rates and volumes by factors of approximately 2.0 and 1.9 respectively.
9. The effect of the development on surface water runoff will be mitigated by the proposed drainage strategy which provides attenuation storage and a controlled discharge rate limited to 3.5 l/s.

23.0 RECOMMENDATIONS

1. The flood risk management recommendations in sections 19 and 20 of this report should be implemented in the design and construction of the development.

USE OF REPORT

This report is prepared specifically for the client named on the cover of this report, for the purpose of the aforementioned planning application and the report may not be used for any other purpose and it may not be assigned to any third party without our written permission.

DISCLAIMER

In the preparation of this FRA report, JOC Consultants Ltd has relied on published information and on information provided by the Client and accepts no liability for the accuracy or adequacy of that information or for the consequences of any changes to or re-assessment of that information in the future.

APPENDIX A

Figure 1 Location Plan

Land off Thurnscoe Bridge Lane, Barnsley, S63 0TT

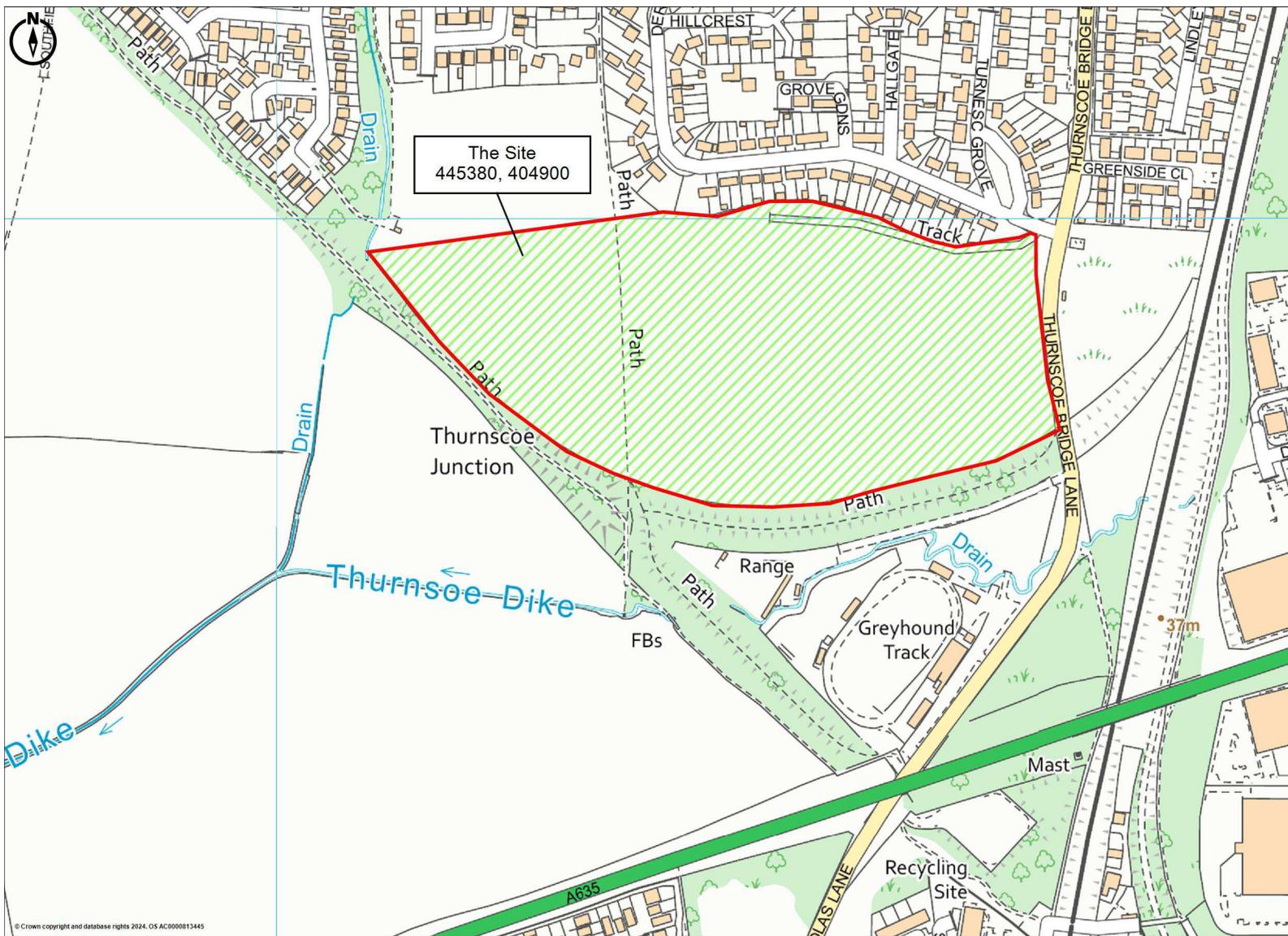


Figure 1: Location Plan

APPENDIX B

Topographical survey plan

APPENDIX C

Yorkshire Water pre-development advice

Mr J O'Conner
JOC Consultants Ltd
Park Farm House
Leathley
Otley
Leeds
LS21 2JU
john@jocconsultants.co.uk

Yorkshire Water Services
Developer Services
Pre-Development Team
PO BOX 52
Bradford
BD3 7AY

Tel: 0345 120 8482

Fax:

Email:

technical.sewerage@yorkshirewater.co.uk

Your Ref:
Our Ref: Z005848

For telephone enquiries ring:
Chris Roberts on 0345 120 8482

13th December 2023

Dear Mr J O'Conner,

Thurnscoe Bridge Lane, Barnsley, S63 0TT - Pre-planning Enquiry V322796

Thank you for your recent enquiry and remittance. Our official VAT receipt has been sent to you under separate cover. Please find enclosed a complimentary extract from the Statutory Sewer Map which indicates the recorded position of the public sewers. Please note that as of October 2011 and the private to public sewer transfer, there are many uncharted Yorkshire Water assets currently not shown on our records.

The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site and are valid for a maximum period of twelve months:

Existing Infrastructure

There is a 1350 mm diameter public combined water sewer recorded crossing the site. No buildings, or other obstructions, are to be erected within 6.5 (six point five) metres is required at each side of the sewer centre-line, no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer.

There is a 450 mm diameter public combined water sewer recorded crossing the site. No buildings, or other obstructions, are to be erected within 6 (six) metres is required at each side of the sewer centre-line, no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer.

There is a 1350 mm diameter Yorkshire Water Maintained overflow recorded crossing the site. No buildings, or other obstructions, are to be erected within 6.5 (six point five) metres is required at each side of the sewer centre-line, no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer.

There is a 150 mm diameter foul public sewer recorded crossing the site. No buildings, or other obstructions, are to be erected within 6.5 (six point five) metres is required at each side of the sewer centre-line, no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer.

If you wish to have this sewer diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0345 120 84 82.

There is a combined sewer overflow (CSO) and Detention Tank, under the control of Yorkshire Water, located near to the site. Vehicular access, including with large tankers, could be required at any time.

The proximity of the existing combined sewer overflow (CSO) and Detention Tank to the site may mean a loss of amenity for future residents. In order to minimise the risk of odour, noise and nuisance, industry standards recommend that habitable buildings should not be located within 15 (fifteen) metres of the existing CSO/DTK compound. To reduce the visible impact of the installation, the erection (by the developer) of suitable screening is advised.

Foul Water

Development of the site should take place with separate systems for foul and surface water drainage. The separate systems should extend to the points of discharge to be agreed.

Foul water domestic waste can discharge to the 450 mm diameter public combined sewer recorded on the site.

Surface Water

The developer's attention is drawn to Requirement H3 of the Building Regulations 2010. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SuDS), for example the use of soakaways and/or permeable hardstanding etc, may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SuDS in this instance from the appropriate authorities.

It is understood that all surface water will drain to watercourse to the southwest of the site.

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regard to surface water disposal from the site.

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may apply on line or obtain an application form from our website - <https://www.yorkshirewater.com/developers/sewerage/sewerage-connections/>

Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the Code for Adoption 2023/24, pursuant to an agreement under Section 104 of the Water Industry Act 1991. We are happy to offer pre-development technical advice on any prospective sites that you would like to put forward for adoption, prior to submission of your adoption application.

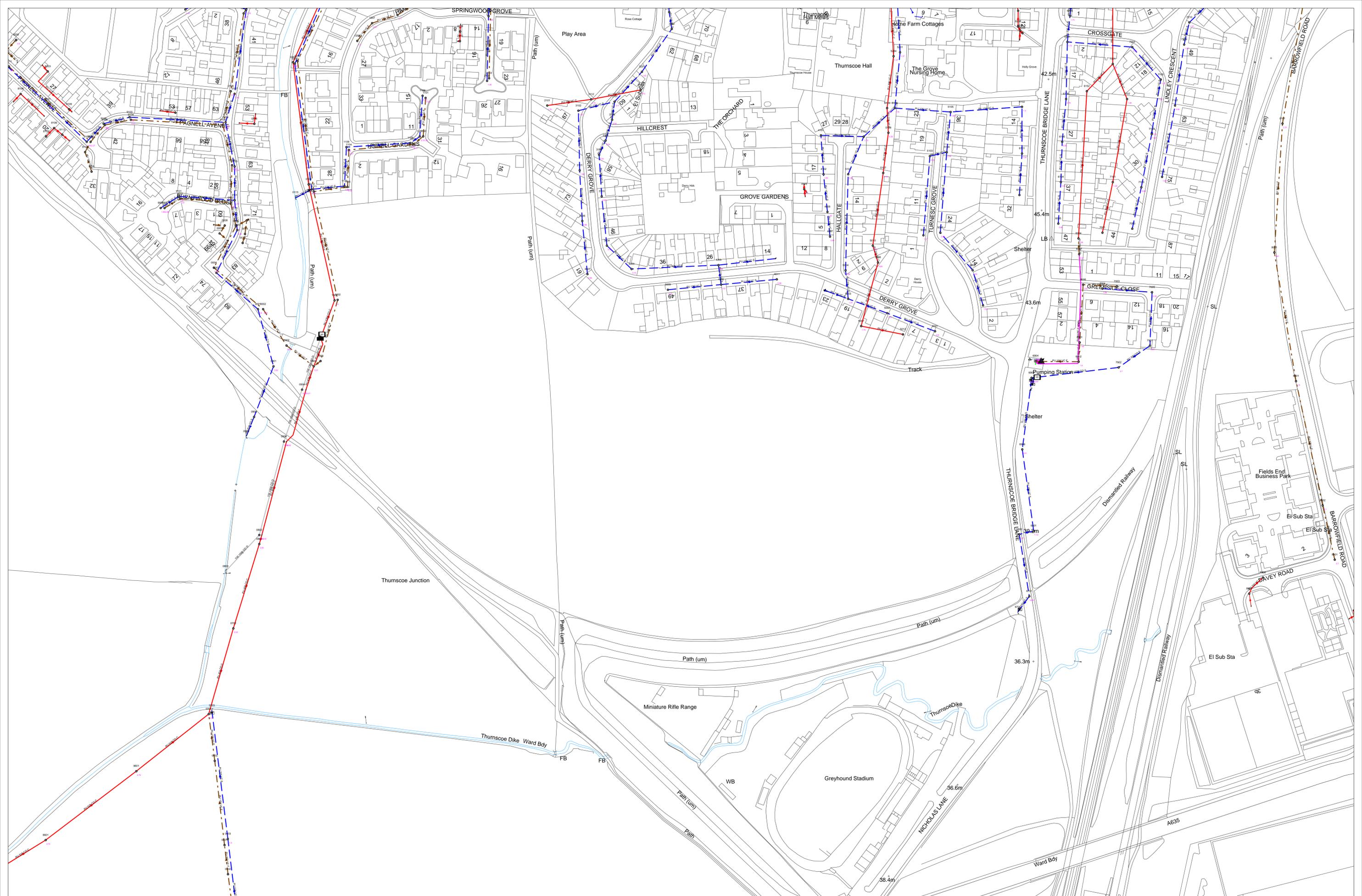
An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Sewer Adoption, Diversion and Requisition (telephone 0345 120 84 82) or email technical.sewerage@yorkshirewater.co.uk or visit - <https://www.yorkshirewater.com/developers/sewerage/sewer-adoptions/> for further information.

The site is within an area that may be affected by river, coastal or estuarine flooding. We would advise you to contact the Environment Agency for details.

All the above comments are based upon the information and records available at the present time and is subject to formal planning approval agreement. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours sincerely

Chris Roberts
Development Services Technician



445283 : 404844

Map Name : SE4404NE

Title



Yorkshire Water,
PO Box 500,
Hallifax Road,
Bradford BD6 2LZ
Contact Name :
YorMap Advisor C ROBERTS
Contact Tel : 87 2582

Notes

(C) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HM Government 2014. All rights reserved. Ordnance Survey Licence number 100022452

Partial Key

- Foul Sewer = F
- Combined Sewer = C
- Surface Water Sewer = SW
- Trade Sewer = TD
- Partially Separate = PS

Date Req : 15/12/2023, 14:52:12

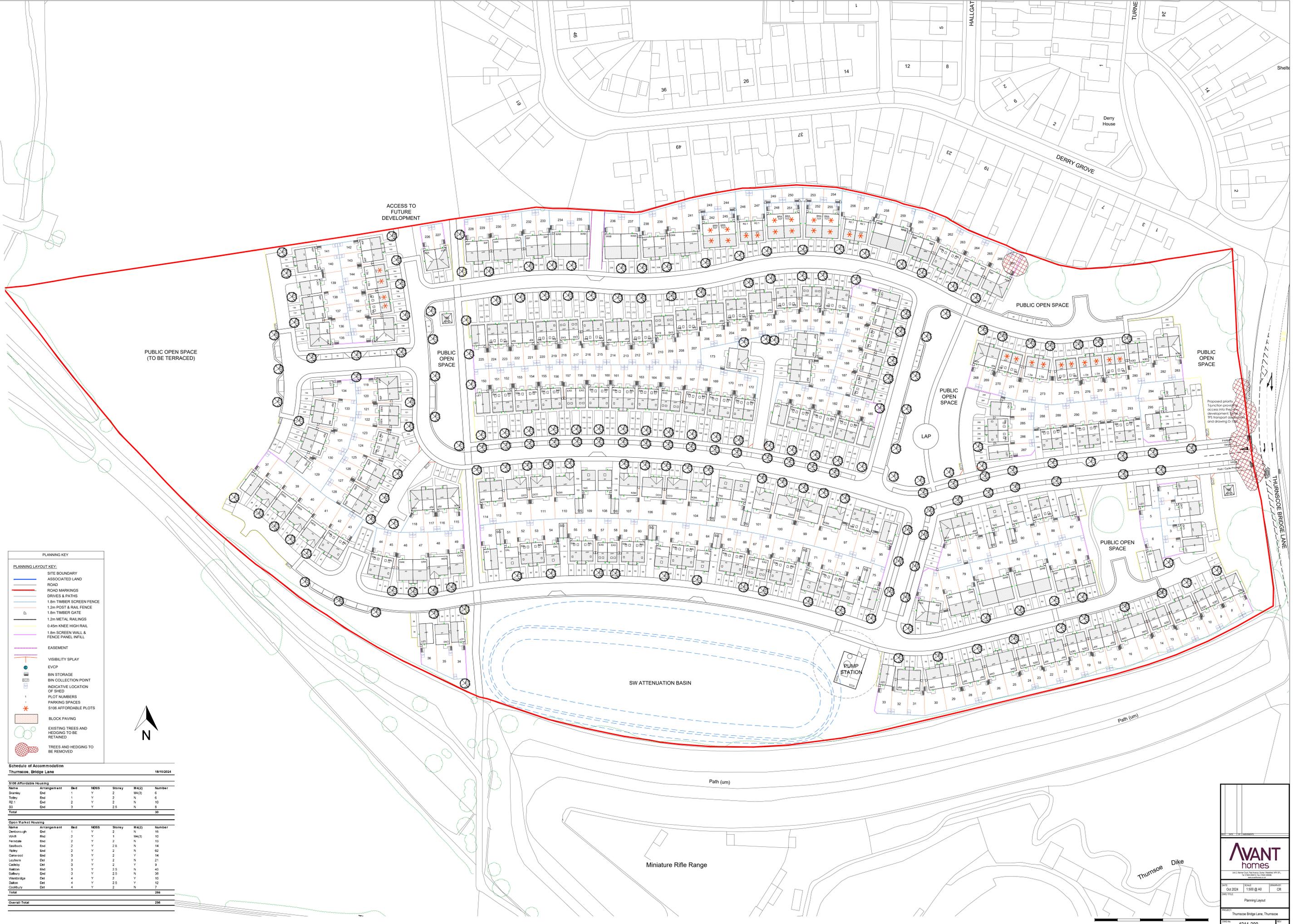
Date Gen : 15/12/2023, 14:55:48

Source : Sewer Network Enquiry

This plan is furnished as a general guide only and no warranty as to its contents is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

APPENDIX D

Site layout plan



PLANNING KEY

PLANNING LAYOUT KEY:

- SITE BOUNDARY
- ASSOCIATED LAND
- ROAD
- ROAD MARKINGS
- DRIVES & PATHS
- 1.8m TIMBER SCREEN FENCE
- 1.2m POST & RAIL FENCE
- 1.8m TIMBER GATE
- 1.2m METAL RAILINGS
- 0.45m KNEE HIGH RAIL
- 1.8m SCREEN WALL & FENCE PANEL INFILL
- EASEMENT
- VISIBILITY SPLAY
- EVCP
- BIN STORAGE
- BIN COLLECTION POINT
- INDICATIVE LOCATION OF SHED
- PLOT NUMBERS
- PARKING SPACES
- S105 AFFORDABLE PLOTS
- BLOCK PAVING
- EXISTING TREES AND HEDGING TO BE RETAINED
- TREES AND HEDGING TO BE REMOVED

Schedule of Accommodation
Thurnscoe, Bridge Lane
18/10/2024

S105 Affordable Housing						
Name	Arrangement	Bed	NESS	Storey	M4(2)	Number
Scarey	Det	1	Y	2	M(3)	6
Tolly	Det	1	Y	2	N	6
K2.1	Det	2	Y	2	N	10
S3	Det	3	Y	2.5	N	8
Total						30
Open Market Housing						
Name	Arrangement	Bed	NESS	Storey	M4(2)	Number
Dunborough	Det	1	Y	2	N	10
Wish	Det	2	Y	1	M4(3)	10
Ferndale	Det	2	Y	2	N	13
Saltbuck	Det	2	Y	2.5	N	14
Ruby	Det	2	Y	2	N	62
Oakwood	Det	3	Y	2	Y	14
Leyburn	Det	3	Y	2	Y	21
Cadby	Det	3	Y	2	Y	9
Salton	Det	3	Y	2.5	N	40
Gulbury	Det	3	Y	2.5	N	38
Westcliffe	Det	4	Y	2	Y	10
Dalton	Det	4	Y	2.5	Y	12
Croftby	Det	4	Y	2	N	7
Total						268
Overall Total						298

AVANT
homes

18/10/2024
Oct 2024
SCALE: 1:500 @ A0
DRAWN BY: CR
REV: -

Thurnscoe Bridge Lane, Thurnscoe

4211-200

T:\S04\4211_Thurnscoe\06_Architectural\01_Site Drawings\A4\24\Thurnscoe Proposed Site Layout - S105\Thurnscoe Proposed Site Layout

APPENDIX E

Flood Map for Planning

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
445358/404890

Created
8 Dec 2023 9:41

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>

Flood map for planning

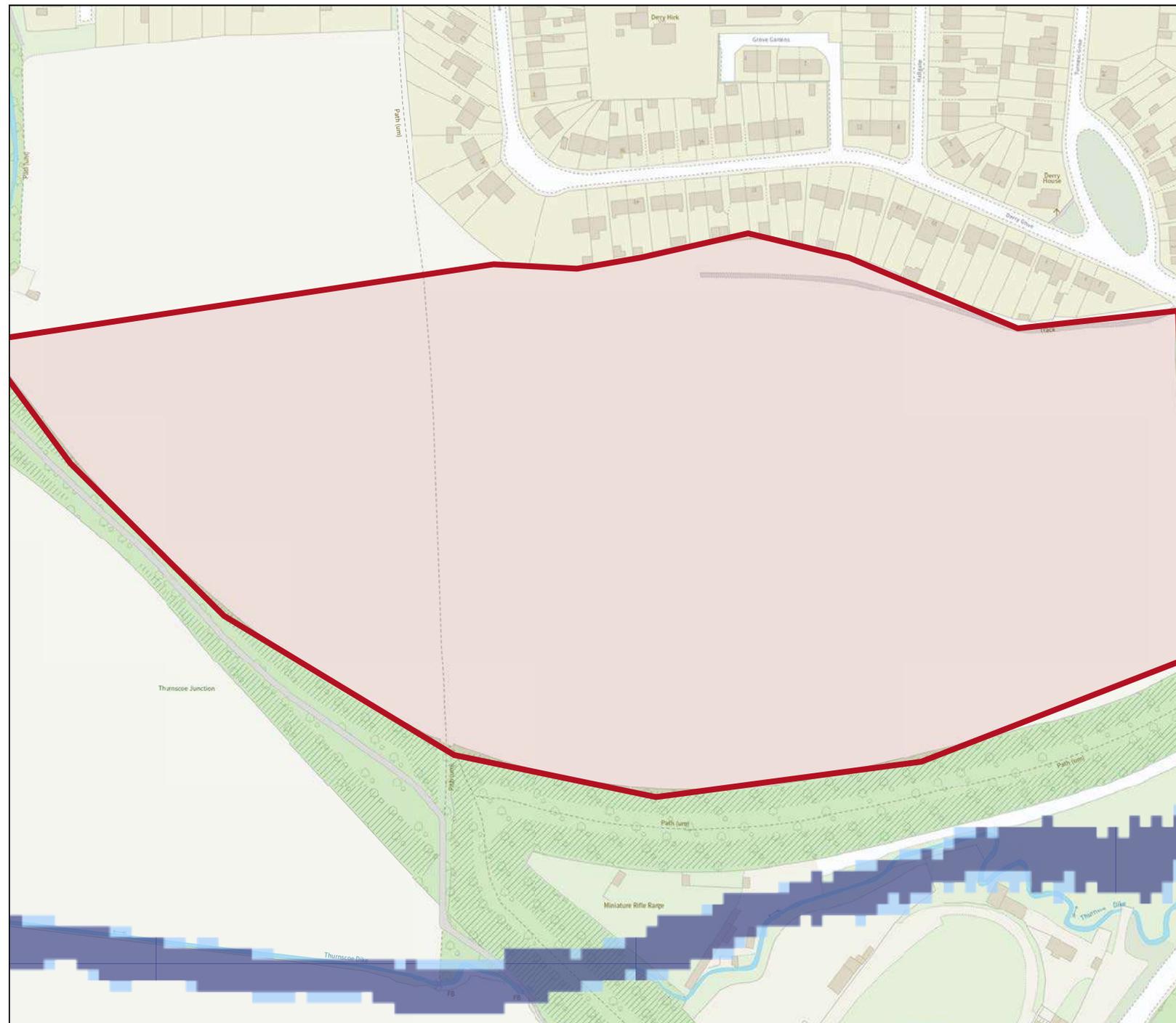
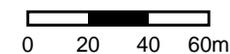
Your reference
<Unspecified>

Location (easting/northing)
445358/404890

Scale
1:2500

Created
8 Dec 2023 9:41

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



APPENDIX F

LLFA correspondence

John O'Connor

From: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Sent: 08 December 2023 09:31
To: John O'Connor
Subject: RE: Development of land off Thurnscoe Bridge Lane, Barnsley
Attachments: Figure 1 Location Plan.pdf

Hi

I will ask colleagues in my team if they know of any flooding, the watercourse you are intending to connect to is maintained by the IDB
Danum Drainage Commissioners based in Doncaster

Regards

Eddy

From: John O'Connor <john@jocconsultants.co.uk>
Sent: 08 December 2023 09:22
To: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Subject: Development of land off Thurnscoe Bridge Lane, Barnsley

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good morning Eddy,

We are preparing a flood risk assessment and drainage strategy for a development of 340 houses on the site shown outlined in red on the attached location plan. The site is allocated for housing under reference HS52 and the houses are proposed in the larger parcel of land shown on the location plan

The ground investigation report states that soakaways will not be feasible, so it is proposed to discharge surface water to Thurnscoe Dike at a rate limited to Q_{bar} for the site. I shall consult you again when we have an estimate of Q_{bar} but in the meantime, I shall be grateful if you will let me know of any surface water flooding problems at or in the vicinity of the site.

Kind regards,

John O'Connor
Director

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

Tel: 0113 284 2838

*** Barnsley Council Disclaimer: This email and any files attached are confidential for the use of the intended recipient. If you have received this email in error please notify the sender as soon as possible and delete the communication from your system without copying, disseminating or distributing the same in any way by any means. Any views or opinions expressed belong solely to the author and do not necessarily represent those of the council. In particular, the council will not accept liability for any defamatory statements made by email communications. Recipients are responsible for ensuring that all emails and files sent are checked for viruses. The council will not accept liability for damage caused by any virus transmitted by this email. No guarantees are offered on the security, content and accuracy of any emails and files received. Be aware that this email communication may be intercepted for regulatory, quality control, or crime detection purposes unless otherwise prohibited. The content of this email and any attachment may be stored for future reference. Link to privacy statement - <https://www.barnsley.gov.uk/services/information-and-privacy/your-privacy/>

John O'Connor

From: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Sent: 08 December 2023 09:50
To: John O'Connor
Subject: RE: Development of land off Thurnscoe Bridge Lane, Barnsley
Attachments: Screenshot (58).png

Hi

This is the IDB map

Regards

Eddy

From: John O'Connor <john@jocconsultants.co.uk>
Sent: 08 December 2023 09:22
To: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Subject: Development of land off Thurnscoe Bridge Lane, Barnsley

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good morning Eddy,

We are preparing a flood risk assessment and drainage strategy for a development of 340 houses on the site shown outlined in red on the attached location plan. The site is allocated for housing under reference HS52 and the houses are proposed in the larger parcel of land shown on the location plan

The ground investigation report states that soakaways will not be feasible, so it is proposed to discharge surface water to Thurnscoe Dike at a rate limited to Q_{bar} for the site. I shall consult you again when we have an estimate of Q_{bar} but in the meantime, I shall be grateful if you will let me know of any surface water flooding problems at or in the vicinity of the site.

Kind regards,

John O'Connor
Director

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

Tel: 0113 284 2838
www.jocconsultants.co.uk

*** Barnsley Council Disclaimer: This email and any files attached are confidential for the use of the intended recipient. If you have received this email in error please notify the sender as soon as possible and delete the

communication from your system without copying, disseminating or distributing the same in any way by any means. Any views or opinions expressed belong solely to the author and do not necessarily represent those of the council. In particular, the council will not accept liability for any defamatory statements made by email communications. Recipients are responsible for ensuring that all emails and files sent are checked for viruses. The council will not accept liability for damage caused by any virus transmitted by this email. No guarantees are offered on the security, content and accuracy of any emails and files received. Be aware that this email communication may be intercepted for regulatory, quality control, or crime detection purposes unless otherwise prohibited. The content of this email and any attachment may be stored for future reference. Link to privacy statement - <https://www.barnsley.gov.uk/services/information-and-privacy/your-privacy/>

John O'Connor

From: John O'Connor <john@jocconsultants.co.uk>
Sent: 11 December 2023 11:31
To: 'Allen , Eddy (FLOOD RISK CO-ORDINATOR)'
Subject: RE: Development at Thurnscoe Bridge Lane, Barnsley, S60 0TT

Hi Eddy,

Yes I will let you know when I have the response from the IDB.

Kind regards,

John

From: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Sent: Monday, December 11, 2023 10:58 AM
To: John O'Connor <john@jocconsultants.co.uk>
Subject: RE: Development at Thurnscoe Bridge Lane, Barnsley, S60 0TT

Hi

Please can you confirm from the IDB that they are happy in an email also the location of the connection is on the riparian or IDB system

Thanks

Eddy

From: John O'Connor <john@jocconsultants.co.uk>
Sent: 11 December 2023 10:50
To: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Subject: Development at Thurnscoe Bridge Lane, Barnsley, S60 0TT

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good morning Eddy,

Further to my email of 8th December 2023, I attach the REFH2 estimates of peak surface water runoff rates and volumes. Qbar rural is estimated to be approximately 29.6 l/s. We have consulted the Danvm Drainage Commissioners as to the acceptability of a discharge to Thurnscoe Dike at a rate not exceeding Qbar, but we must also seek the approval of the LLFA. Are you able to confirm that a discharge rate not exceeding 29.6 l/s would be acceptable to the LLFA, subject to the approval of the Danvm Drainage Commissioners?

Kind regards,

John O'Connor
Director

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

Tel: 0113 284 2838

www.jocconsultants.co.uk

*** Barnsley Council Disclaimer: This email and any files attached are confidential for the use of the intended recipient. If you have received this email in error please notify the sender as soon as possible and delete the communication from your system without copying, disseminating or distributing the same in any way by any means. Any views or opinions expressed belong solely to the author and do not necessarily represent those of the council. In particular, the council will not accept liability for any defamatory statements made by email communications. Recipients are responsible for ensuring that all emails and files sent are checked for viruses. The council will not accept liability for damage caused by any virus transmitted by this email. No guarantees are offered on the security, content and accuracy of any emails and files received. Be aware that this email communication may be intercepted for regulatory, quality control, or crime detection purposes unless otherwise prohibited. The content of this email and any attachment may be stored for future reference. Link to privacy statement - <https://www.barnsley.gov.uk/services/information-and-privacy/your-privacy/>

John O'Connor

From: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Sent: 13 December 2023 08:22
To: John O'Connor
Subject: RE: Development at Thurnscoe Bridge Lane, Barnsley, S60 0TT

Morning John

I confirm BMBC accept the rate of 29.6l/s surface water discharge rate could you please forward a copy of the IDB consent approval when approved

Thanks

Eddy

From: John O'Connor <john@jocconsultants.co.uk>
Sent: 12 December 2023 15:49
To: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Subject: RE: Development at Thurnscoe Bridge Lane, Barnsley, S60 0TT

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good afternoon Eddy,

I attach the response I have received form the IDB which confirms its approval of the proposed discharge rate. I shall be grateful if you can confirm that the proposed discharge rate of 29.6 l/s is also acceptable to the LLFA.

The outfall will be to Thurnscoe Dike at the location shown on the attached Drainage Feasibility Plan. This in on the IDB system.

Kind regards,

John O'Connor
Director

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

Tel: 0113 284 2838
www.jocconsultants.co.uk

From: Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Sent: Monday, December 11, 2023 10:58 AM

To: John O'Connor <john@jocconsultants.co.uk>

Subject: RE: Development at Thurnscoe Bridge Lane, Barnsley, S60 0TT

Hi

Please can you confirm from the IDB that they are happy in an email also the location of the connection is on the riparian or IDB system

Thanks

Eddy

From: John O'Connor <john@jocconsultants.co.uk>

Sent: 11 December 2023 10:50

To: Allen, Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>

Subject: Development at Thurnscoe Bridge Lane, Barnsley, S60 0TT

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good morning Eddy,

Further to my email of 8th December 2023, I attach the REFH2 estimates of peak surface water runoff rates and volumes. Qbar rural is estimated to be approximately 29.6 l/s. We have consulted the Danvm Drainage Commissioners as to the acceptability of a discharge to Thurnscoe Dike at a rate not exceeding Qbar, but we must also seek the approval of the LLFA. Are you able to confirm that a discharge rate not exceeding 29.6 l/s would be acceptable to the LLFA, subject to the approval of the Danvm Drainage Commissioners?

Kind regards,

John O'Connor
Director

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

Tel: 0113 284 2838

www.jocconsultants.co.uk

*** Barnsley Council Disclaimer: This email and any files attached are confidential for the use of the intended recipient. If you have received this email in error please notify the sender as soon as possible and delete the communication from your system without copying, disseminating or distributing the same in any way by any means. Any views or opinions expressed belong solely to the author and do not necessarily represent those of the council. In particular, the council will not accept liability for any defamatory statements made by email communications. Recipients are responsible for ensuring that all emails and files sent are checked for viruses. The council will not accept liability for damage caused by any virus transmitted by this email. No guarantees are offered on the security, content and accuracy of any emails and files received. Be aware that this email communication may be intercepted for regulatory, quality control, or crime detection purposes unless otherwise prohibited. The content of this email and any attachment may be stored for future reference. Link to privacy statement - <https://www.barnsley.gov.uk/services/information-and-privacy/your-privacy/>

*** Barnsley Council Disclaimer: This email and any files attached are confidential for the use of the intended recipient. If you have received this email in error please notify the sender as soon as possible and delete the communication from your system without copying, disseminating or distributing the same in any way by any means. Any views or opinions expressed belong solely to the author and do not necessarily represent those of the council. In particular, the council will not accept liability for any defamatory statements made by email communications. Recipients are responsible for ensuring that all emails and files sent are checked for viruses. The council will not accept liability for damage caused by any virus transmitted by this email. No guarantees are offered on the security, content and accuracy of any emails and files received. Be aware that this email communication may be intercepted for regulatory, quality control, or crime detection purposes unless otherwise prohibited. The content of this email and any attachment may be stored for future reference. Link to privacy statement - <https://www.barnsley.gov.uk/services/information-and-privacy/your-privacy/>

APPENDIX G

Danvm Drainage Commissioners correspondence

John O'Connor

From: Development <Development@yorkshirehumberdrainage.gov.uk>
Sent: 12 December 2023 15:25
To: John O'Connor
Subject: RE: Development of Thurnscoe Bridge Lane, Barnsley, S63 0TT
Attachments: DN Land Drainage Guidance & Application Form.pdf; Technical Guidance for Developer and Standing Advice.pdf

Dear John,

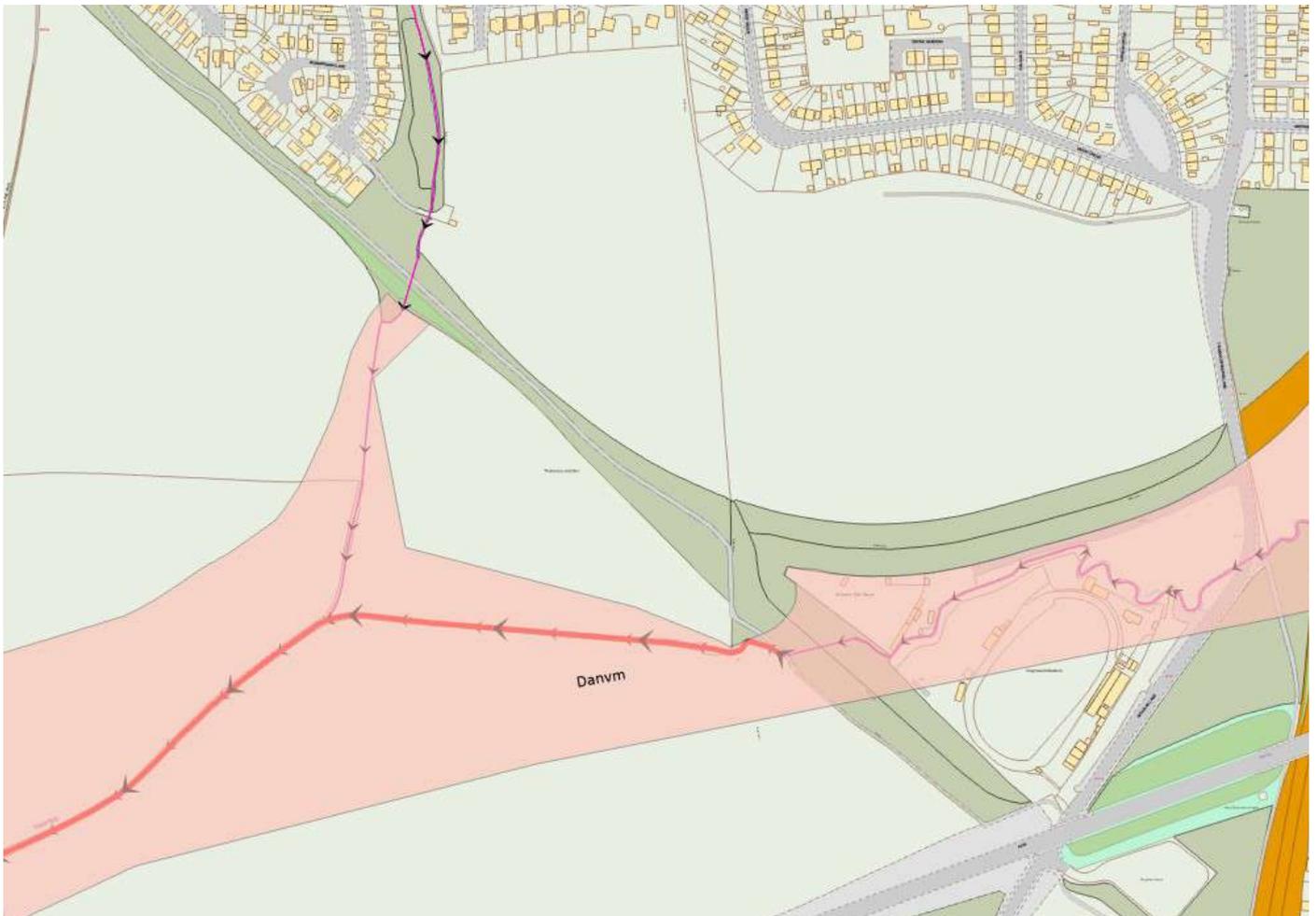
Thank you for your email and the information provided.

I can confirm that based on the information provided we will accept a maximum discharge rate of 29.6 l/s from the site. This will be subject to Land Drainage Consent prior to the start of the development.

The map below shows (in pink) the extend of the Internal Drainage Board district. The Board maintains the section of watercourse shown in red. It should be noted that Byelaws prevent any construction, including fences and planting, within 9 metres of any watercourse in the Board's district.

I can confirm that this catchment drains by gravity, with Thurnscoe Dike flowing into Ings Carr Dike and on to the River Dearne.

I have attached our development advice document and Consent application form and guidance for your reference. If you require any further information at this stage please let me know.



Kind regards,

Liam

Liam Plater
Senior Development Control Officer



Yorkshire & Humber Drainage Boards

Black Drain Drainage Board
Cowick & Snaith Internal Drainage Board
Danvm Drainage Commissioners
Dempster Internal Drainage Board
Ouse & Humber Drainage Board

24 Innovation Drive
Newport
East Riding of Yorkshire
HU15 2FW

01476 470077

From: John O'Connor <john@jocconsultants.co.uk>
Sent: Monday, December 11, 2023 10:58 AM
To: Development <Development@yorkshirehumberdrainage.gov.uk>
Subject: RE: Development of Thurnscoe Bridge Lane, Barnsley, S63 0TT

Dear Liam,

My apologies! Location plan now attached.

Kind regards,

John O'Connor
Director

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

Tel: 0113 284 2838
www.jocconsultants.co.uk

From: Development <Development@yorkshirehumberdrainage.gov.uk>
Sent: Monday, December 11, 2023 8:51 AM
To: John O'Connor <john@jocconsultants.co.uk>
Subject: RE: Development of Thurnscoe Bridge Lane, Barnsley, S63 OTT

Dear John,

Thank you for your email.

Unfortunately I have received the runoff calculations but not the location plan – please can you send this over to me?

Kind regards,

Liam

Liam Plater
Senior Development Control Officer



Yorkshire & Humber
Drainage Boards

Black Drain Drainage Board
Cowick & Snaith Internal Drainage Board
Danvm Drainage Commissioners
Dempster Internal Drainage Board
Ouse & Humber Drainage Board

24 Innovation Drive
Newport
East Riding of Yorkshire
HU15 2FW

01470 470077

From: John O'Connor <john@jocconsultants.co.uk>
Sent: Friday, December 8, 2023 2:03 PM
To: Development <Development@yorkshirehumberdrainage.gov.uk>
Subject: Development of Thurnscoe Bridge Lane, Barnsley, S63 OTT

FAO Liam Plater

Dear Liam,

Further to our telephone conversation this afternoon, I attach a location plan of the site which is outlined in red in two parts. The proposed development is in the larger parcel of land and a proposed attenuation basin will be in the smaller parcel.

The ground investigation report states that infiltration drainage will not be feasible so a surface water discharge to Thurnscoe Dike is proposed. Estimates of surface water runoff rates and volumes have been prepared using FEH22

rainfall data and the REFH2 model, from which Qbar is estimated to be approximately 29.6 l/s, as shown in the attached calculation sheet. I shall be grateful if you can confirm that a controlled discharge at a rate not exceeding 29.6 l/s will be acceptable to the Drainage Board.

Can you also let me know if Thurnscoe Dike is part of a pumped catchment or if it drains entirely by gravity?

Kind regards,

John O'Connor
Director

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

Tel: 0113 284 2838

www.jocconsultants.co.uk

APPENDIX H

Surface water flood maps

Flood risk

Location

Extent of flooding ▼

Enter a place or postcode 



Extent of flooding from surface water

-  High
-  Medium
-  Low
-  Very low
-  Location you selected

Flood risk

Location

High risk: depth

Enter a place or postcode



Surface water flood risk: water depth in a high risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm
- Location you selected

Flood risk

Location

Medium risk: depth

Enter a place or postcode



Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm
- Location you selected

Flood risk

Location

Low risk: depth

Enter a place or postcode



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm
- Location you selected

APPENDIX I

Reservoirs flood map

Flood risk

Location

Extent of flooding

Enter a place or postcode



Maximum extent of flooding from reservoirs:

- when river levels are normal
- when there is also flooding from rivers
- ⊕ Location you selected

APPENDIX J

REFH2.3 estimates of surface water runoff rates and volumes

23/031: Thurnscoe Bridge Lane, Barnsley

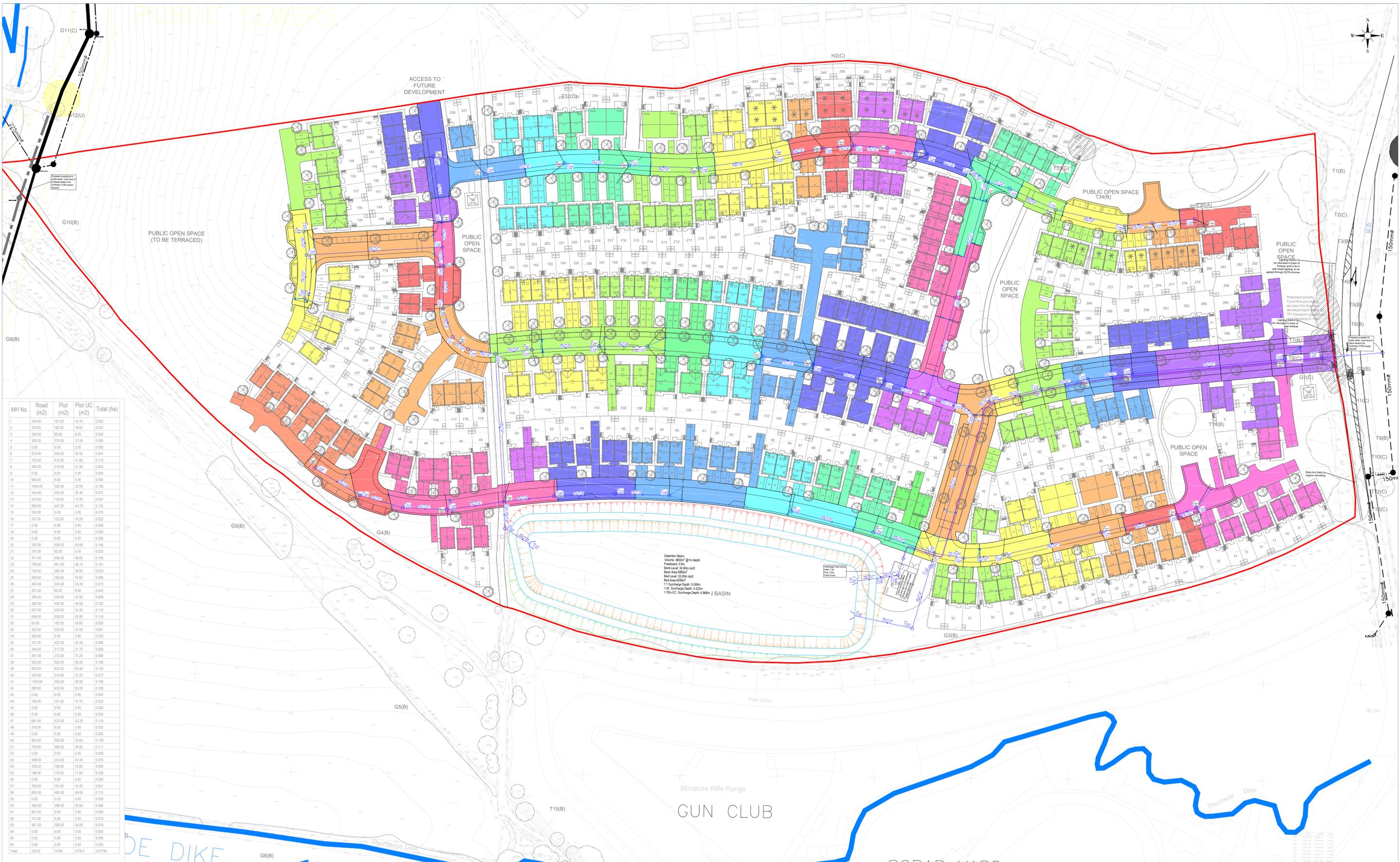
ReFH2 estimates of peak runoff rates and volumes: Post development

Developed area	8.980 ha					
Impervious area	4.939 ha					
	Urbanised peak flow (l/s)	Urbanised direct runoff (m ³)	As-rural peak flow (l/s)	As-rural direct runnof (m ³)	% increase in peak flow rate	% increase in volume
Return period (yrs)						
1 year	82.54	1001.47	24.04	288.97	243%	247%
2 year	94.60	1149.61	27.78	336.89	241%	241%
5 year	134.95	1647.35	40.92	507.18	230%	225%
10 year	163.50	2001.27	50.79	636.71	222%	214%
30 year	210.87	2591.58	68.18	867.71	209%	199%
30 year 1.35 CC	286.92	3547.13	98.70	1279.22	191%	177%
50 year	234.63	2889.08	77.38	990.98	203%	192%
75 year	254.75	3141.83	85.41	1099.19	198%	186%
100 year	269.93	3332.81	91.61	1183.03	195%	182%
100 year 1.40 CC	382.34	4758.98	141.32	1863.06	171%	155%
200 year	310.64	3847.04	108.85	1417.47	185%	171%
1000 year	438.35	5476.66	168.49	2239.12	160%	145%
				Average:	204%	194%
Q MED rural:	27.78 l/s					
Hydrological region	3					
Growth curve factor	0.94 FSSR 14					
Q bar	29.55 l/s					

APPENDIX K

Drainage strategy plans and calculations by Eastwood Consulting Engineers

PUBLIC SEWERS



MH No.	Road (m ²)	Plot (m ²)	Plot UC (m ²)	Total (ha)
1	244.00	151.00	15.10	0.042
2	218.00	158.00	15.80	0.057
3	334.00	80.00	8.00	0.042
4	300.00	270.00	27.00	0.090
5	0.00	0.00	0.00	0.000
6	572.00	305.00	30.50	0.091
7	733.00	416.00	41.60	0.119
8	590.00	210.00	21.00	0.063
9	0.00	0.00	0.00	0.000
10	545.00	0.00	0.00	0.095
11	1545.00	320.00	32.00	0.190
12	444.00	254.00	25.40	0.072
13	423.00	133.00	13.30	0.057
14	859.00	407.00	40.70	0.135
15	160.00	0.00	0.00	0.016
16	107.00	102.00	10.20	0.022
17	0.00	0.00	0.00	0.000
18	0.00	0.00	0.00	0.000
19	0.00	0.00	0.00	0.000
20	793.00	508.00	50.80	0.142
21	197.00	160.00	16.00	0.028
22	471.00	598.00	59.80	0.160
23	795.00	581.00	58.10	0.141
24	135.00	360.00	36.00	0.053
25	509.00	165.00	16.50	0.069
26	462.00	243.00	24.30	0.073
27	321.00	60.00	6.00	0.042
28	365.00	536.00	53.60	0.090
29	482.00	490.00	49.00	0.132
30	507.00	543.00	54.30	0.110
31	599.00	528.00	52.80	0.116
32	63.00	180.00	18.00	0.026
33	362.00	238.00	23.80	0.061
34	230.00	0.00	0.00	0.023
35	181.00	423.00	42.30	0.065
36	245.00	317.00	31.70	0.059
37	457.00	312.00	31.20	0.080
38	925.00	502.00	50.20	0.148
39	826.00	634.00	63.40	0.153
40	425.00	310.00	31.00	0.071
41	1162.00	305.00	30.50	0.150
42	385.00	630.00	63.00	0.108
43	0.00	0.00	0.00	0.000
44	100.00	107.00	10.70	0.022
45	0.00	0.00	0.00	0.000
46	0.00	0.00	0.00	0.000
47	661.00	433.00	43.30	0.114
48	316.00	0.00	0.00	0.032
49	0.00	0.00	0.00	0.000
50	803.00	528.00	52.80	0.138
51	709.00	368.00	36.80	0.111
52	0.00	0.00	0.00	0.000
53	488.00	243.00	24.30	0.076
54	439.00	198.00	19.80	0.066
55	196.00	170.00	17.00	0.038
56	0.00	0.00	0.00	0.000
57	230.00	164.00	16.40	0.041
58	605.00	480.00	48.00	0.113
59	0.00	0.00	0.00	0.000
60	492.00	296.00	29.60	0.082
61	601.00	0.00	0.00	0.060
62	151.00	0.00	0.00	0.015
63	367.00	358.00	35.80	0.076
64	0.00	0.00	0.00	0.000
65	0.00	0.00	0.00	0.000
66	0.00	0.00	0.00	0.000
Total	24512	14784	1478.4	4.07744

REV	DESCRIPTION	SG	CHK	DATE
P01	First Issue.	MA	CH	04/11/2024
P02	Updated to suit revised site layout received on 06/11/24. Basin geometry revised.	MA	CH	01/11/2024

AVANT HOMES
 LAND OFF THURNSCOE BRIDGE LANE, THURNSCOE, ROTHERHAM, S63 0TX

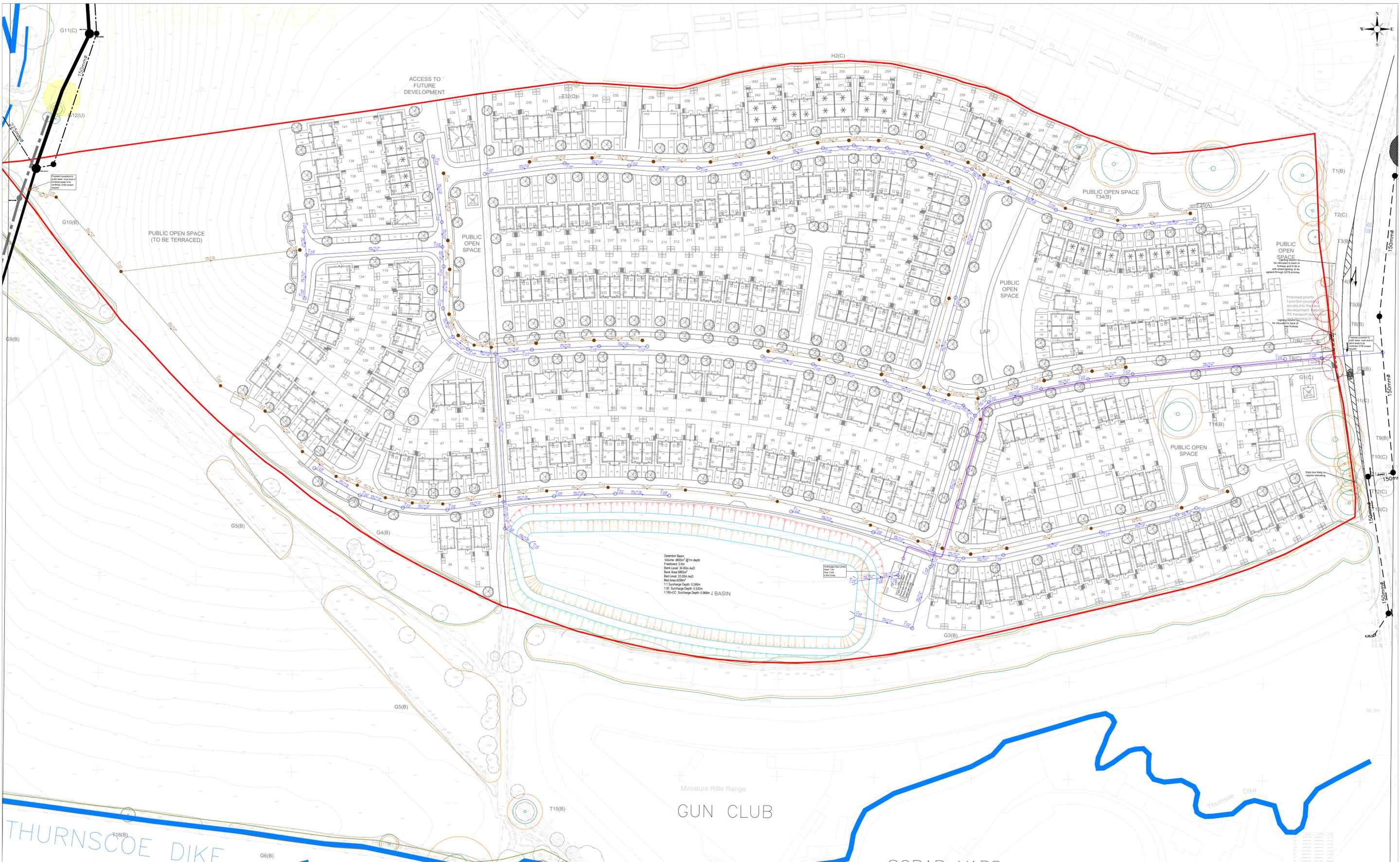
Eastwood
 CONSULTING ENGINEERS
 St Andrew's House
 23 Kingfield Road
 Sheffield, S11 9AS
 T: 0114 255 4554
 E: mail@eastwoodce.com
 eastwoodce.com

ECE PROJECT No.	SCALE AT A0	STATUS	SUITABLE FOR
48926	1:500	S3	Comment

DRAWING NUMBER	REV
48926 - ECE - XX - XX - DR - C - 0002	P02

This drawing should be read in conjunction with all other design drawings and reports.

PUBLIC SEWERS



Detention Basin
 Volume: 400m³ @ 1m depth
 Franchise: 5.0m
 Bank Level: 34.00m AOD
 Bank Area: 2880m²
 Bed Level: 33.00m AOD
 Bed Area: 2000m²
 1:25 Surcharge Depth: 0.245m
 1:25 Surcharge Depth: 0.330m
 1:100-CC Surcharge Depth: 0.960m J BASIN

THURNSCOE DIKE

GUN CLUB

- Site Boundary
- Unnamed Watercourse / Thurnscoe Dike
- Adoptable storm water manhole to ICOSA Water specification
- Adoptable storm water sewer to ICOSA Water specification
- Storm Water Rising Man
- Adoptable foul water manhole to ICOSA Water specification
- Adoptable foul water sewer to ICOSA Water specification
- Tree protection zone extents. Hand dig only construction where in close proximity to roots. Additional protection barriers may be required.
- ▨ Banking 1:3 Cut
- ▨ Banking 1:2 Cut. Slope reinforcement required.
- ▨ Banking 1:3 Fill.

REV	DESCRIPTION	SG	CHK	DATE
P01	First Issue.	MA	CH	04/11/2024
P02	Updated to suit revised site layout received on 06/11/24. Basin geometry revised.	MA	CH	01/11/2024

AVANT HOMES
 LAND OFF THURNSCOE BRIDGE
 LANE, THURNSCOE, ROTHERHAM,
 S63 0TX

DRAINAGE STRATEGY

Eastwood
 CONSULTING ENGINEERS

St Andrew's House
 23 Kingfield Road
 Sheffield, S11 9AS
 T: 0114 255 4554
 E: enquiries@eastwoodce.com
www.eastwoodce.com

ECE PROJECT No: **48926** SCALE AT A0: **1:500** STATUS: **S3** SUITABLE FOR: **Comment**

DRAWING NUMBER: **48926 - ECE - XX - XX - DR - C - 0001** REV: **P02**

Project	Originator	Zone	Level	Type	Role	Number
---------	------------	------	-------	------	------	--------

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.380	Preferred Cover Depth (m)	1.200
CV	1.000	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)	Easting (m)	Northing (m)	Depth (m)
S27	0.042	5.00	45.593	1350	445277.297	404966.851	1.776
S28	0.099	5.00	44.683	1350	445310.101	404971.522	1.776
S29	0.102	5.00	44.174	1350	445336.687	404970.863	1.650
S30	0.110	5.00	43.648	1350	445365.237	404970.156	1.650
S31	0.118	5.00	43.070	1350	445396.281	404974.650	1.658
S32	0.026	5.00	42.686	1350	445416.448	404978.819	1.660
S33	0.061	5.00	42.457	1350	445429.096	404980.051	1.656
S34	0.025	5.00	42.191	1500	445442.865	404979.160	1.810
S35	0.065	5.00	41.887	1500	445459.538	404976.747	2.005
S36	0.059	5.00	41.576	1500	445477.843	404970.792	2.491
S1	0.042	5.00	43.708	1350	445569.748	404951.094	1.425
S2	0.057	5.00	43.562	1350	445552.305	404949.242	1.454
S3	0.042	5.00	43.460	1350	445541.005	404948.043	1.466
S4	0.060	5.00	42.642	1350	445512.593	404954.326	1.524
S5			41.794	1350	445493.438	404962.983	1.524
S6	0.091	5.00	41.556	1500	445484.618	404965.386	2.500
S7	0.119	5.00	40.872	1500	445471.660	404917.826	1.880
S37	0.080	5.00	43.223	1350	445392.348	404892.841	1.650
S38	0.148	5.00	42.652	1350	445413.250	404889.767	1.650
S39	0.153	5.00	41.219	1350	445442.854	404883.250	1.694
S8	0.063	5.00	40.425	1500	445460.775	404877.873	2.500
S9			40.271	1500	445475.264	404873.526	3.082
S11	0.190	5.00	41.470	1350	445607.584	404893.769	1.650
S12	0.072	5.00	42.709	1350	445544.872	404887.110	3.266
S13	0.057	5.00	42.233	1350	445526.530	404884.856	2.901
S14	0.135	5.00	41.343	1350	445507.222	404880.666	2.094
S15	0.016	5.00	40.431	1350	445485.727	404874.970	2.782
S10	0.095	5.00	40.043	1500	445480.176	404869.303	3.169
S20	0.140	5.00	38.631	1350	445571.606	404832.127	2.388
S21	0.025	5.00	38.453	1350	445563.816	404829.356	2.377
S22	0.109	5.00	37.686	1350	445532.481	404821.772	2.915
S23	0.141	5.00	36.328	1350	445492.336	404812.056	1.832
S24	0.053	5.00	36.193	1350	445475.943	404810.566	1.807
S25	0.069	5.00	37.136	1350	445404.745	404829.139	1.500
S26	0.073	5.00	36.638	1350	445438.642	404820.877	1.600
S16	0.022	5.00	36.261	1800	445463.975	404812.550	2.256
S17			35.799	1800	445462.382	404806.972	1.903
S18			34.916	1800	445455.117	404781.523	1.516
S19			34.600	1000	445431.307	404786.459	1.600
S60	0.082	5.00	44.953	1350	445203.529	404914.932	1.500
S63	0.076	5.00	46.314	1200	445202.925	404942.470	1.910

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S61	0.060	5.00	45.826	1200	445204.188	404932.760	2.551
S54	0.066	5.00	46.706	1350	445255.936	404973.820	1.428
S55	0.038	5.00	46.002	1200	445259.793	404946.886	1.964
S56			45.595	1350	445260.137	404936.652	2.806
S62	0.015	5.00	45.027	1350	445260.695	404928.625	2.272
S57	0.041	5.00	43.807	1350	445260.634	404911.328	1.655
S58	0.113	5.00	43.171	1350	445264.746	404899.632	1.654
S59			42.866	1350	445271.014	404894.638	1.739
S40	0.077	5.00	43.152	1350	445344.854	404896.454	1.501
S41	0.150	5.00	42.663	1350	445325.046	404896.374	1.622
S42	0.108	5.00	42.333	1350	445297.390	404894.703	1.621
S43			42.551	1350	445282.321	404892.906	2.250
S47	0.114	5.00	37.960	1350	445208.275	404845.069	1.537
S48	0.032	5.00	36.875	1350	445227.034	404834.099	1.778
S49			36.314	1500	445244.773	404829.153	1.833
S50	0.138	5.00	36.083	1500	445263.177	404828.490	1.725
S51	0.111	5.00	36.995	1350	445354.486	404835.190	1.500
S52			36.751	1350	445332.285	404835.760	1.549
S53	0.076	5.00	36.468	1350	445307.034	404834.471	1.653
S44	0.022	5.00	36.232	1500	445286.252	404832.028	1.952
S45			35.320	1500	445286.964	404821.007	1.651
S46			34.600	1000	445297.288	404814.702	1.600
S64		5.00	34.600	1000	445432.402	404800.754	1.600
S65			34.600	1800	445442.243	404802.236	1.633
S66			35.905	1200	445448.982	404803.331	3.006

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	S27	S28	33.135	0.600	43.817	42.907	0.910	36.4	450	5.16	50.0
1.001	S28	S29	26.594	0.600	42.907	42.524	0.383	69.4	450	5.35	50.0
1.002	S29	S30	28.558	0.600	42.524	41.998	0.526	54.3	450	5.52	50.0
1.003	S30	S31	31.368	0.600	41.998	41.412	0.586	53.5	450	5.71	50.0
1.004	S31	S32	20.594	0.600	41.412	41.026	0.386	53.4	450	5.83	50.0
1.005	S32	S33	12.709	0.600	41.026	40.801	0.225	56.5	450	5.91	50.0
1.006	S33	S34	13.797	0.600	40.801	40.531	0.270	51.1	450	5.99	50.0
1.007	S34	S35	16.847	0.600	40.381	39.882	0.499	33.8	600	6.05	50.0
1.008	S35	S36	19.249	0.600	39.882	39.085	0.797	24.2	600	6.12	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.377	537.1	7.6	1.326	1.326	0.042	0.0	36	1.227
1.001	2.442	388.4	25.5	1.326	1.200	0.141	0.0	77	1.401
1.002	2.763	439.5	43.9	1.200	1.200	0.243	0.0	95	1.796
1.003	2.783	442.6	63.8	1.200	1.208	0.353	0.0	115	2.005
1.004	2.788	443.4	85.1	1.208	1.210	0.471	0.0	132	2.169
1.005	2.709	430.8	89.8	1.210	1.206	0.497	0.0	138	2.158
1.006	2.849	453.1	100.8	1.206	1.210	0.558	0.0	144	2.314
1.007	4.200	1187.5	105.3	1.210	1.405	0.583	0.0	119	2.644
1.008	4.968	1404.7	117.1	1.405	1.891	0.648	0.0	116	3.075

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)
1.009	S36	S6	8.668	0.600	39.085	39.056	0.029	298.9	600	6.22	50.0
2.000	S1	S2	17.541	0.600	42.283	42.108	0.175	100.2	225	5.22	50.0
2.001	S2	S3	11.363	0.600	42.108	41.994	0.114	99.7	225	5.37	50.0
2.002	S3	S4	29.099	0.600	41.994	41.193	0.801	36.3	225	5.59	50.0
2.003	S4	S5	21.020	0.600	41.118	40.270	0.848	24.8	300	5.70	50.0
2.004	S5	S6	9.141	0.600	40.270	39.356	0.914	10.0	300	5.73	50.0
1.010	S6	S7	49.293	0.600	39.056	38.992	0.064	770.2	600	7.17	50.0
1.011	S7	S8	41.409	0.600	38.992	37.925	1.067	38.8	600	7.34	50.0
3.000	S37	S38	21.127	0.600	41.573	41.002	0.571	37.0	450	5.11	50.0
3.001	S38	S39	30.312	0.600	41.002	39.525	1.477	20.5	450	5.22	50.0
3.002	S39	S8	18.710	0.600	39.525	38.075	1.450	12.9	450	5.27	50.0
1.012	S8	S9	15.127	0.600	37.925	37.189	0.736	20.6	600	7.39	50.0
1.013	S9	S10	6.477	0.600	37.189	36.874	0.315	20.6	600	7.41	50.0
4.000	S11	S12	63.065	0.600	39.820	39.443	0.377	167.3	450	5.67	50.0
4.001	S12	S13	18.480	0.600	39.443	39.332	0.111	166.5	450	5.87	50.0
4.002	S13	S14	19.757	0.600	39.332	39.249	0.083	238.0	450	6.12	50.0
4.003	S14	S15	22.237	0.600	39.249	37.649	1.600	13.9	450	6.18	50.0
4.004	S15	S10	7.933	0.600	37.649	37.024	0.625	12.7	450	6.21	50.0
1.014	S10	S16	59.020	0.600	36.874	34.155	2.719	21.7	600	7.60	50.0
5.000	S20	S21	8.269	0.600	36.243	36.076	0.167	49.5	450	5.05	50.0
5.001	S21	S22	32.239	0.600	36.076	34.771	1.305	24.7	450	5.18	50.0
5.002	S22	S23	41.305	0.600	34.771	34.496	0.275	150.2	450	5.59	50.0
5.003	S23	S24	16.460	0.600	34.496	34.386	0.110	149.6	450	5.76	50.0
5.004	S24	S16	12.132	0.600	34.386	34.305	0.081	149.8	450	5.88	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.009	1.403	396.7	127.8	1.891	1.900	0.707	0.0	233	1.257
2.000	1.306	51.9	7.6	1.200	1.229	0.042	0.0	58	0.935
2.001	1.309	52.1	17.9	1.229	1.241	0.099	0.0	91	1.191
2.002	2.177	86.6	25.5	1.241	1.224	0.141	0.0	83	1.896
2.003	3.170	224.1	36.3	1.224	1.224	0.201	0.0	81	2.352
2.004	4.999	353.3	36.3	1.224	1.900	0.201	0.0	64	3.254
1.010	0.869	245.8	180.5	1.900	1.280	0.999	0.0	383	0.946
1.011	3.916	1107.3	202.0	1.280	1.900	1.118	0.0	172	3.013
3.000	3.350	532.8	14.5	1.200	1.200	0.080	0.0	51	1.493
3.001	4.503	716.1	41.2	1.200	1.244	0.228	0.0	73	2.500
3.002	5.682	903.7	68.8	1.244	1.900	0.381	0.0	83	3.417
1.012	5.387	1523.0	282.3	1.900	2.482	1.562	0.0	174	4.168
1.013	5.385	1522.7	282.3	2.482	2.569	1.562	0.0	174	4.167
4.000	1.569	249.5	34.3	1.200	2.816	0.190	0.0	112	1.115
4.001	1.573	250.1	47.3	2.816	2.451	0.262	0.0	131	1.218
4.002	1.313	208.8	57.6	2.451	1.644	0.319	0.0	161	1.129
4.003	5.475	870.7	82.0	1.644	2.332	0.454	0.0	92	3.488
4.004	5.729	911.2	84.9	2.332	2.569	0.470	0.0	92	3.650
1.014	5.241	1481.9	384.3	2.569	1.506	2.127	0.0	207	4.435
5.000	2.894	460.3	25.3	1.938	1.927	0.140	0.0	71	1.582
5.001	4.103	652.5	29.8	1.927	2.465	0.165	0.0	65	2.126
5.002	1.656	263.4	49.5	2.465	1.382	0.274	0.0	131	1.283
5.003	1.659	263.9	75.0	1.382	1.357	0.415	0.0	163	1.435
5.004	1.659	263.8	84.6	1.357	1.506	0.468	0.0	174	1.482

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)
6.000	S25	S26	34.889	0.600	35.636	35.038	0.598	58.3	300	5.28	50.0
6.001	S26	S16	26.666	0.600	35.038	34.455	0.583	45.7	300	5.47	50.0
1.015	S16	S17	5.801	0.600	34.005	33.896	0.109	53.2	750	7.62	50.0
1.016	S17	S18	26.466	0.600	33.896	33.400	0.496	53.4	750	7.74	50.0
1.017	S18	S19	24.316	0.600	33.400	33.000	0.400	60.8	750	7.85	50.0
7.000	S60	S61	17.841	0.600	43.453	43.275	0.178	100.2	300	5.19	50.0
8.000	S63	S61	9.792	0.600	44.404	43.425	0.979	10.0	150	5.05	50.0
7.001	S61	S56	56.084	0.600	43.275	42.939	0.336	166.9	300	5.96	50.0
9.000	S54	S55	27.209	0.600	45.278	44.038	1.240	21.9	225	5.16	50.0
9.001	S55	S56	10.239	0.600	44.038	43.014	1.024	10.0	225	5.20	50.0
7.002	S56	S62	8.047	0.600	42.789	42.755	0.034	236.7	450	6.06	50.0
7.003	S62	S57	17.297	0.600	42.755	42.152	0.603	28.7	450	6.14	50.0
7.004	S57	S58	12.397	0.600	42.152	41.517	0.635	19.5	450	6.18	50.0
7.005	S58	S59	8.015	0.600	41.517	41.127	0.390	20.6	450	6.21	50.0
7.006	S59	S43	11.439	0.600	41.127	40.301	0.826	13.8	450	6.25	50.0
10.000	S40	S41	19.808	0.600	41.651	41.041	0.610	32.5	300	5.12	50.0
10.001	S41	S42	27.706	0.600	41.041	40.712	0.329	84.2	300	5.39	50.0
10.002	S42	S43	15.176	0.600	40.712	40.451	0.261	58.1	300	5.51	50.0
7.007	S43	S44	61.005	0.600	40.301	34.355	5.946	10.3	450	6.41	50.0
11.000	S47	S48	21.731	0.600	36.423	35.247	1.176	18.5	300	5.10	50.0
11.001	S48	S49	18.416	0.600	35.097	34.556	0.541	34.0	450	5.19	50.0
11.002	S49	S50	18.416	0.600	34.481	34.358	0.123	149.7	525	5.35	50.0
11.003	S50	S44	23.345	0.600	34.358	34.280	0.078	299.3	525	5.66	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
6.000	2.062	145.8	12.5	1.200	1.300	0.069	0.0	59	1.275
6.001	2.330	164.7	25.7	1.300	1.506	0.142	0.0	79	1.707
1.015	3.840	1696.7	498.6	1.506	1.153	2.759	0.0	277	3.362
1.016	3.835	1694.4	498.6	1.153	0.766	2.759	0.0	277	3.357
1.017	3.593	1587.1	498.6	0.766	0.850	2.759	0.0	287	3.199
7.000	1.570	111.0	14.8	1.200	2.251	0.082	0.0	74	1.101
8.000	3.204	56.6	13.7	1.760	2.251	0.076	0.0	50	2.646
7.001	1.214	85.8	39.4	2.251	2.356	0.218	0.0	143	1.189
9.000	2.805	111.5	11.9	1.203	1.739	0.066	0.0	50	1.850
9.001	4.162	165.5	18.8	1.739	2.356	0.104	0.0	51	2.775
7.002	1.317	209.4	58.2	2.356	1.822	0.322	0.0	161	1.132
7.003	3.807	605.4	60.9	1.822	1.205	0.337	0.0	95	2.476
7.004	4.617	734.3	68.3	1.205	1.204	0.378	0.0	92	2.941
7.005	4.500	715.6	88.7	1.204	1.289	0.491	0.0	106	3.105
7.006	5.484	872.2	88.7	1.289	1.800	0.491	0.0	96	3.588
10.000	2.768	195.7	13.9	1.201	1.322	0.077	0.0	54	1.621
10.001	1.714	121.2	41.0	1.322	1.321	0.227	0.0	120	1.552
10.002	2.065	146.0	60.5	1.321	1.800	0.335	0.0	134	1.972
7.007	6.374	1013.7	149.3	1.800	1.427	0.826	0.0	116	4.616
11.000	3.674	259.7	20.6	1.237	1.328	0.114	0.0	57	2.221
11.001	3.493	555.6	26.4	1.328	1.308	0.146	0.0	65	1.824
11.002	1.828	395.7	26.4	1.308	1.200	0.146	0.0	90	1.055
11.003	1.289	279.1	51.3	1.200	1.427	0.284	0.0	152	0.993

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)
12.000	S51	S52	22.208	0.600	35.495	35.202	0.293	75.8	300	5.20	50.0
12.001	S52	S53	25.283	0.600	35.202	34.815	0.387	65.3	300	5.42	50.0
12.002	S53	S44	20.925	0.600	34.815	34.505	0.310	67.5	300	5.60	50.0
7.008	S44	S45	11.044	0.600	34.280	33.669	0.611	18.1	525	6.44	50.0
7.009	S45	S46	12.096	0.600	33.669	33.000	0.669	18.1	525	6.48	50.0
1.019	S64	S65	9.953	0.600	33.000	32.967	0.033	301.6	825	5.10	50.0
1.020	S65	S66	6.827	0.600	32.967	32.899	0.068	100.4	150	5.21	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
12.000	1.807	127.8	20.1	1.200	1.249	0.111	0.0	80	1.329
12.001	1.948	137.7	20.1	1.249	1.353	0.111	0.0	77	1.403
12.002	1.916	135.4	33.8	1.353	1.427	0.187	0.0	102	1.600
7.008	5.285	1144.2	238.3	1.427	1.126	1.319	0.0	161	4.213
7.009	5.285	1144.0	238.3	1.126	1.075	1.319	0.0	161	4.212
1.019	1.704	910.9	0.0	0.775	0.808	0.000	0.0	0	0.000
1.020	1.003	17.7	0.0	1.483	2.856	0.000	0.0	0	0.000

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)
1.000	33.135	36.4	450	Circular	45.593	43.817	1.326	44.683	42.907	1.326
1.001	26.594	69.4	450	Circular	44.683	42.907	1.326	44.174	42.524	1.200
1.002	28.558	54.3	450	Circular	44.174	42.524	1.200	43.648	41.998	1.200
1.003	31.368	53.5	450	Circular	43.648	41.998	1.200	43.070	41.412	1.208
1.004	20.594	53.4	450	Circular	43.070	41.412	1.208	42.686	41.026	1.210
1.005	12.709	56.5	450	Circular	42.686	41.026	1.210	42.457	40.801	1.206
1.006	13.797	51.1	450	Circular	42.457	40.801	1.206	42.191	40.531	1.210
1.007	16.847	33.8	600	Circular	42.191	40.381	1.210	41.887	39.882	1.405
1.008	19.249	24.2	600	Circular	41.887	39.882	1.405	41.576	39.085	1.891
1.009	8.668	298.9	600	Circular	41.576	39.085	1.891	41.556	39.056	1.900
2.000	17.541	100.2	225	Circular	43.708	42.283	1.200	43.562	42.108	1.229
2.001	11.363	99.7	225	Circular	43.562	42.108	1.229	43.460	41.994	1.241

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S27	1350	Manhole	Adoptable	S28	1350	Manhole	Adoptable
1.001	S28	1350	Manhole	Adoptable	S29	1350	Manhole	Adoptable
1.002	S29	1350	Manhole	Adoptable	S30	1350	Manhole	Adoptable
1.003	S30	1350	Manhole	Adoptable	S31	1350	Manhole	Adoptable
1.004	S31	1350	Manhole	Adoptable	S32	1350	Manhole	Adoptable
1.005	S32	1350	Manhole	Adoptable	S33	1350	Manhole	Adoptable
1.006	S33	1350	Manhole	Adoptable	S34	1500	Manhole	Adoptable
1.007	S34	1500	Manhole	Adoptable	S35	1500	Manhole	Adoptable
1.008	S35	1500	Manhole	Adoptable	S36	1500	Manhole	Adoptable
1.009	S36	1500	Manhole	Adoptable	S6	1500	Manhole	Adoptable
2.000	S1	1350	Manhole	Adoptable	S2	1350	Manhole	Adoptable
2.001	S2	1350	Manhole	Adoptable	S3	1350	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)
2.002	29.099	36.3	225	Circular	43.460	41.994	1.241	42.642	41.193	1.224
2.003	21.020	24.8	300	Circular	42.642	41.118	1.224	41.794	40.270	1.224
2.004	9.141	10.0	300	Circular	41.794	40.270	1.224	41.556	39.356	1.900
1.010	49.293	770.2	600	Circular	41.556	39.056	1.900	40.872	38.992	1.280
1.011	41.409	38.8	600	Circular	40.872	38.992	1.280	40.425	37.925	1.900
3.000	21.127	37.0	450	Circular	43.223	41.573	1.200	42.652	41.002	1.200
3.001	30.312	20.5	450	Circular	42.652	41.002	1.200	41.219	39.525	1.244
3.002	18.710	12.9	450	Circular	41.219	39.525	1.244	40.425	38.075	1.900
1.012	15.127	20.6	600	Circular	40.425	37.925	1.900	40.271	37.189	2.482
1.013	6.477	20.6	600	Circular	40.271	37.189	2.482	40.043	36.874	2.569
4.000	63.065	167.3	450	Circular	41.470	39.820	1.200	42.709	39.443	2.816
4.001	18.480	166.5	450	Circular	42.709	39.443	2.816	42.233	39.332	2.451
4.002	19.757	238.0	450	Circular	42.233	39.332	2.451	41.343	39.249	1.644
4.003	22.237	13.9	450	Circular	41.343	39.249	1.644	40.431	37.649	2.332
4.004	7.933	12.7	450	Circular	40.431	37.649	2.332	40.043	37.024	2.569
1.014	59.020	21.7	600	Circular	40.043	36.874	2.569	36.261	34.155	1.506
5.000	8.269	49.5	450	Circular	38.631	36.243	1.938	38.453	36.076	1.927
5.001	32.239	24.7	450	Circular	38.453	36.076	1.927	37.686	34.771	2.465
5.002	41.305	150.2	450	Circular	37.686	34.771	2.465	36.328	34.496	1.382
5.003	16.460	149.6	450	Circular	36.328	34.496	1.382	36.193	34.386	1.357
5.004	12.132	149.8	450	Circular	36.193	34.386	1.357	36.261	34.305	1.506
6.000	34.889	58.3	300	Circular	37.136	35.636	1.200	36.638	35.038	1.300
6.001	26.666	45.7	300	Circular	36.638	35.038	1.300	36.261	34.455	1.506
1.015	5.801	53.2	750	Circular	36.261	34.005	1.506	35.799	33.896	1.153
1.016	26.466	53.4	750	Circular	35.799	33.896	1.153	34.916	33.400	0.766

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.002	S3	1350	Manhole	Adoptable	S4	1350	Manhole	Adoptable
2.003	S4	1350	Manhole	Adoptable	S5	1350	Manhole	Adoptable
2.004	S5	1350	Manhole	Adoptable	S6	1500	Manhole	Adoptable
1.010	S6	1500	Manhole	Adoptable	S7	1500	Manhole	Adoptable
1.011	S7	1500	Manhole	Adoptable	S8	1500	Manhole	Adoptable
3.000	S37	1350	Manhole	Adoptable	S38	1350	Manhole	Adoptable
3.001	S38	1350	Manhole	Adoptable	S39	1350	Manhole	Adoptable
3.002	S39	1350	Manhole	Adoptable	S8	1500	Manhole	Adoptable
1.012	S8	1500	Manhole	Adoptable	S9	1500	Manhole	Adoptable
1.013	S9	1500	Manhole	Adoptable	S10	1500	Manhole	Adoptable
4.000	S11	1350	Manhole	Adoptable	S12	1350	Manhole	Adoptable
4.001	S12	1350	Manhole	Adoptable	S13	1350	Manhole	Adoptable
4.002	S13	1350	Manhole	Adoptable	S14	1350	Manhole	Adoptable
4.003	S14	1350	Manhole	Adoptable	S15	1350	Manhole	Adoptable
4.004	S15	1350	Manhole	Adoptable	S10	1500	Manhole	Adoptable
1.014	S10	1500	Manhole	Adoptable	S16	1800	Manhole	Adoptable
5.000	S20	1350	Manhole	Adoptable	S21	1350	Manhole	Adoptable
5.001	S21	1350	Manhole	Adoptable	S22	1350	Manhole	Adoptable
5.002	S22	1350	Manhole	Adoptable	S23	1350	Manhole	Adoptable
5.003	S23	1350	Manhole	Adoptable	S24	1350	Manhole	Adoptable
5.004	S24	1350	Manhole	Adoptable	S16	1800	Manhole	Adoptable
6.000	S25	1350	Manhole	Adoptable	S26	1350	Manhole	Adoptable
6.001	S26	1350	Manhole	Adoptable	S16	1800	Manhole	Adoptable
1.015	S16	1800	Manhole	Adoptable	S17	1800	Manhole	Adoptable
1.016	S17	1800	Manhole	Adoptable	S18	1800	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)
1.017	24.316	60.8	750	Circular	34.916	33.400	0.766	34.600	33.000	0.850
7.000	17.841	100.2	300	Circular	44.953	43.453	1.200	45.826	43.275	2.251
8.000	9.792	10.0	150	Circular	46.314	44.404	1.760	45.826	43.425	2.251
7.001	56.084	166.9	300	Circular	45.826	43.275	2.251	45.595	42.939	2.356
9.000	27.209	21.9	225	Circular	46.706	45.278	1.203	46.002	44.038	1.739
9.001	10.239	10.0	225	Circular	46.002	44.038	1.739	45.595	43.014	2.356
7.002	8.047	236.7	450	Circular	45.595	42.789	2.356	45.027	42.755	1.822
7.003	17.297	28.7	450	Circular	45.027	42.755	1.822	43.807	42.152	1.205
7.004	12.397	19.5	450	Circular	43.807	42.152	1.205	43.171	41.517	1.204
7.005	8.015	20.6	450	Circular	43.171	41.517	1.204	42.866	41.127	1.289
7.006	11.439	13.8	450	Circular	42.866	41.127	1.289	42.551	40.301	1.800
10.000	19.808	32.5	300	Circular	43.152	41.651	1.201	42.663	41.041	1.322
10.001	27.706	84.2	300	Circular	42.663	41.041	1.322	42.333	40.712	1.321
10.002	15.176	58.1	300	Circular	42.333	40.712	1.321	42.551	40.451	1.800
7.007	61.005	10.3	450	Circular	42.551	40.301	1.800	36.232	34.355	1.427
11.000	21.731	18.5	300	Circular	37.960	36.423	1.237	36.875	35.247	1.328
11.001	18.416	34.0	450	Circular	36.875	35.097	1.328	36.314	34.556	1.308
11.002	18.416	149.7	525	Circular	36.314	34.481	1.308	36.083	34.358	1.200
11.003	23.345	299.3	525	Circular	36.083	34.358	1.200	36.232	34.280	1.427
12.000	22.208	75.8	300	Circular	36.995	35.495	1.200	36.751	35.202	1.249
12.001	25.283	65.3	300	Circular	36.751	35.202	1.249	36.468	34.815	1.353
12.002	20.925	67.5	300	Circular	36.468	34.815	1.353	36.232	34.505	1.427
7.008	11.044	18.1	525	Circular	36.232	34.280	1.427	35.320	33.669	1.126
7.009	12.096	18.1	525	Circular	35.320	33.669	1.126	34.600	33.000	1.075

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.017	S18	1800	Manhole	Adoptable	S19	1000	Manhole	Adoptable
7.000	S60	1350	Manhole	Adoptable	S61	1200	Manhole	Adoptable
8.000	S63	1200	Manhole	Adoptable	S61	1200	Manhole	Adoptable
7.001	S61	1200	Manhole	Adoptable	S56	1350	Manhole	Adoptable
9.000	S54	1350	Manhole	Adoptable	S55	1200	Manhole	Adoptable
9.001	S55	1200	Manhole	Adoptable	S56	1350	Manhole	Adoptable
7.002	S56	1350	Manhole	Adoptable	S62	1350	Manhole	Adoptable
7.003	S62	1350	Manhole	Adoptable	S57	1350	Manhole	Adoptable
7.004	S57	1350	Manhole	Adoptable	S58	1350	Manhole	Adoptable
7.005	S58	1350	Manhole	Adoptable	S59	1350	Manhole	Adoptable
7.006	S59	1350	Manhole	Adoptable	S43	1350	Manhole	Adoptable
10.000	S40	1350	Manhole	Adoptable	S41	1350	Manhole	Adoptable
10.001	S41	1350	Manhole	Adoptable	S42	1350	Manhole	Adoptable
10.002	S42	1350	Manhole	Adoptable	S43	1350	Manhole	Adoptable
7.007	S43	1350	Manhole	Adoptable	S44	1500	Manhole	Adoptable
11.000	S47	1350	Manhole	Adoptable	S48	1350	Manhole	Adoptable
11.001	S48	1350	Manhole	Adoptable	S49	1500	Manhole	Adoptable
11.002	S49	1500	Manhole	Adoptable	S50	1500	Manhole	Adoptable
11.003	S50	1500	Manhole	Adoptable	S44	1500	Manhole	Adoptable
12.000	S51	1350	Manhole	Adoptable	S52	1350	Manhole	Adoptable
12.001	S52	1350	Manhole	Adoptable	S53	1350	Manhole	Adoptable
12.002	S53	1350	Manhole	Adoptable	S44	1500	Manhole	Adoptable
7.008	S44	1500	Manhole	Adoptable	S45	1500	Manhole	Adoptable
7.009	S45	1500	Manhole	Adoptable	S46	1000	Manhole	Adoptable

Pipeline Schedule

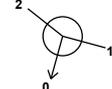
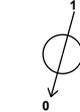
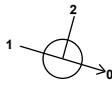
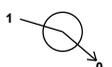
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.019	9.953	301.6	825	Circular	34.600	33.000	0.775	34.600	32.967	0.808
1.020	6.827	100.4	150	Circular	34.600	32.967	1.483	35.905	32.899	2.856

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.019	S64	1000	Manhole	Adoptable	S65	1800	Manhole	Adoptable
1.020	S65	1800	Manhole	Adoptable	S66	1200	Manhole	Adoptable

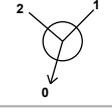
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S27	445277.297	404966.851	45.593	1.776	1350				
						0	1.000	43.817	450
S28	445310.101	404971.522	44.683	1.776	1350				
						0	1.001	42.907	450
S29	445336.687	404970.863	44.174	1.650	1350				
						0	1.002	42.524	450
S30	445365.237	404970.156	43.648	1.650	1350				
						0	1.003	41.998	450
S31	445396.281	404974.650	43.070	1.658	1350				
						0	1.004	41.412	450
S32	445416.448	404978.819	42.686	1.660	1350				
						0	1.005	41.026	450
S33	445429.096	404980.051	42.457	1.656	1350				
						0	1.006	40.801	450
S34	445442.865	404979.160	42.191	1.810	1500				
						0	1.007	40.381	600
S35	445459.538	404976.747	41.887	2.005	1500				
						0	1.008	39.882	600

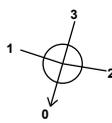
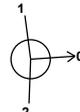
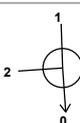
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S36	445477.843	404970.792	41.576	2.491	1500		1	1.008	39.085	600
							0	1.009	39.085	600
S1	445569.748	404951.094	43.708	1.425	1350		0	2.000	42.283	225
S2	445552.305	404949.242	43.562	1.454	1350		1	2.000	42.108	225
							0	2.001	42.108	225
S3	445541.005	404948.043	43.460	1.466	1350		1	2.001	41.994	225
							0	2.002	41.994	225
S4	445512.593	404954.326	42.642	1.524	1350		1	2.002	41.193	225
							0	2.003	41.118	300
S5	445493.438	404962.983	41.794	1.524	1350		1	2.003	40.270	300
							0	2.004	40.270	300
S6	445484.618	404965.386	41.556	2.500	1500		1	2.004	39.356	300
							2	1.009	39.056	600
							0	1.010	39.056	600
S7	445471.660	404917.826	40.872	1.880	1500		1	1.010	38.992	600
							0	1.011	38.992	600
S37	445392.348	404892.841	43.223	1.650	1350		0	3.000	41.573	450
S38	445413.250	404889.767	42.652	1.650	1350		1	3.000	41.002	450
							0	3.001	41.002	450
S39	445442.854	404883.250	41.219	1.694	1350		1	3.001	39.525	450
							0	3.002	39.525	450
S8	445460.775	404877.873	40.425	2.500	1500		1	3.002	38.075	450
							2	1.011	37.925	600
							0	1.012	37.925	600
S9	445475.264	404873.526	40.271	3.082	1500		1	1.012	37.189	600
							0	1.013	37.189	600

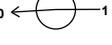
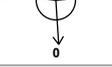
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S11	445607.584	404893.769	41.470	1.650	1350		0	4.000	39.820	450
S12	445544.872	404887.110	42.709	3.266	1350		1	4.000	39.443	450
S13	445526.530	404884.856	42.233	2.901	1350		0	4.001	39.443	450
S14	445507.222	404880.666	41.343	2.094	1350		1	4.001	39.332	450
S15	445485.727	404874.970	40.431	2.782	1350		0	4.002	39.332	450
S10	445480.176	404869.303	40.043	3.169	1500		1	4.002	39.249	450
S20	445571.606	404832.127	38.631	2.388	1350		0	4.003	39.249	450
S21	445563.816	404829.356	38.453	2.377	1350		1	4.003	37.649	450
S22	445532.481	404821.772	37.686	2.915	1350		0	4.004	37.649	450
S23	445492.336	404812.056	36.328	1.832	1350		1	4.004	37.024	450
S24	445475.943	404810.566	36.193	1.807	1350		2	1.013	36.874	600
S25	445404.745	404829.139	37.136	1.500	1350		0	1.014	36.874	600
S26	445438.642	404820.877	36.638	1.600	1350		1	5.000	36.243	450
							0	5.000	36.076	450
							0	5.001	36.076	450
							1	5.001	34.771	450
							0	5.002	34.771	450
							1	5.002	34.496	450
							0	5.003	34.496	450
							1	5.003	34.386	450
							0	5.004	34.386	450
							0	6.000	35.636	300
							1	6.000	35.038	300
							0	6.001	35.038	300

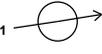
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S16	445463.975	404812.550	36.261	2.256	1800		1 2 3 0	6.001 5.004 1.014 1.015	34.455 34.305 34.155 34.005	300 450 600 750
S17	445462.382	404806.972	35.799	1.903	1800		1 0	1.015 1.016	33.896 33.896	750 750
S18	445455.117	404781.523	34.916	1.516	1800		1 0	1.016 1.017	33.400 33.400	750 750
S19	445431.307	404786.459	34.600	1.600	1000		1	1.017	33.000	750
S60	445203.529	404914.932	44.953	1.500	1350		0	7.000	43.453	300
S63	445202.925	404942.470	46.314	1.910	1200		0	8.000	44.404	150
S61	445204.188	404932.760	45.826	2.551	1200		1 2 0	8.000 7.000 7.001	43.425 43.275 43.275	150 300 300
S54	445255.936	404973.820	46.706	1.428	1350		0	9.000	45.278	225
S55	445259.793	404946.886	46.002	1.964	1200		1 0	9.000 9.001	44.038 44.038	225 225
S56	445260.137	404936.652	45.595	2.806	1350		1 2 0	9.001 7.001 7.002	43.014 42.939 42.789	225 300 450
S62	445260.695	404928.625	45.027	2.272	1350		1 0	7.002 7.003	42.755 42.755	450 450
S57	445260.634	404911.328	43.807	1.655	1350		1 0	7.003 7.004	42.152 42.152	450 450
S58	445264.746	404899.632	43.171	1.654	1350		1 0	7.004 7.005	41.517 41.517	450 450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S59	445271.014	404894.638	42.866	1.739	1350		1	7.005	41.127	450
							0	7.006	41.127	450
S40	445344.854	404896.454	43.152	1.501	1350					
							0	10.000	41.651	300
S41	445325.046	404896.374	42.663	1.622	1350		1	10.000	41.041	300
							0	10.001	41.041	300
S42	445297.390	404894.703	42.333	1.621	1350		1	10.001	40.712	300
							0	10.002	40.712	300
S43	445282.321	404892.906	42.551	2.250	1350		1	10.002	40.451	300
							2	7.006	40.301	450
							0	7.007	40.301	450
S47	445208.275	404845.069	37.960	1.537	1350					
							0	11.000	36.423	300
S48	445227.034	404834.099	36.875	1.778	1350		1	11.000	35.247	300
							0	11.001	35.097	450
S49	445244.773	404829.153	36.314	1.833	1500		1	11.001	34.556	450
							0	11.002	34.481	525
S50	445263.177	404828.490	36.083	1.725	1500		1	11.002	34.358	525
							0	11.003	34.358	525
S51	445354.486	404835.190	36.995	1.500	1350					
							0	12.000	35.495	300
S52	445332.285	404835.760	36.751	1.549	1350		1	12.000	35.202	300
							0	12.001	35.202	300
S53	445307.034	404834.471	36.468	1.653	1350		1	12.001	34.815	300
							0	12.002	34.815	300
S44	445286.252	404832.028	36.232	1.952	1500		1	12.002	34.505	300
							2	11.003	34.280	525
							3	7.007	34.355	450
							0	7.008	34.280	525

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S45	445286.964	404821.007	35.320	1.651	1500	 1	7.008	33.669	525	
							0	7.009	33.669	525
S46	445297.288	404814.702	34.600	1.600	1000	 1	7.009	33.000	525	
S64	445432.402	404800.754	34.600	1.600	1000	 0				
							0	1.019	33.000	825
S65	445442.243	404802.236	34.600	1.633	1800	 1	1.019	32.967	825	
							0	1.020	32.967	150
S66	445448.982	404803.331	35.905	3.006	1200	 1	1.020	32.899	150	

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m ³ /ha)	20.0
Ratio-R	0.380	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node S65 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	32.967	Product Number	CTL-SHE-0089-3500-1000-3500
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node S64 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	140.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	33.000	Main Channel Slope (1:X)	10000.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.025

Inlets

S46 | S19

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	4299.0	0.0	1.000	5272.0	0.0	1.600	5883.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	102.083	28.886	30 year 360 minute summer	30.435	7.832
1 year 15 minute winter	71.637	28.886	30 year 360 minute winter	19.784	7.832
1 year 30 minute summer	66.886	18.927	30 year 480 minute summer	23.798	6.289
1 year 30 minute winter	46.938	18.927	30 year 480 minute winter	15.811	6.289
1 year 60 minute summer	45.726	12.084	30 year 600 minute summer	19.383	5.302
1 year 60 minute winter	30.379	12.084	30 year 600 minute winter	13.243	5.302
1 year 120 minute summer	28.629	7.566	30 year 720 minute summer	17.199	4.609
1 year 120 minute winter	19.021	7.566	30 year 720 minute winter	11.559	4.609
1 year 180 minute summer	22.256	5.727	30 year 960 minute summer	14.028	3.694
1 year 180 minute winter	14.467	5.727	30 year 960 minute winter	9.293	3.694
1 year 240 minute summer	17.770	4.696	30 year 1440 minute summer	10.077	2.701
1 year 240 minute winter	11.806	4.696	30 year 1440 minute winter	6.772	2.701
1 year 360 minute summer	13.744	3.537	100 year +45% CC 15 minute summer	469.509	132.855
1 year 360 minute winter	8.934	3.537	100 year +45% CC 15 minute winter	329.480	132.855
1 year 480 minute summer	10.893	2.879	100 year +45% CC 30 minute summer	311.257	88.075
1 year 480 minute winter	7.237	2.879	100 year +45% CC 30 minute winter	218.426	88.075
1 year 600 minute summer	8.971	2.454	100 year +45% CC 60 minute summer	210.766	55.699
1 year 600 minute winter	6.130	2.454	100 year +45% CC 60 minute winter	140.028	55.699
1 year 720 minute summer	8.036	2.154	100 year +45% CC 120 minute summer	128.858	34.053
1 year 720 minute winter	5.400	2.154	100 year +45% CC 120 minute winter	85.610	34.053
1 year 960 minute summer	6.658	1.753	100 year +45% CC 180 minute summer	97.908	25.195
1 year 960 minute winter	4.410	1.753	100 year +45% CC 180 minute winter	63.643	25.195
1 year 1440 minute summer	4.897	1.312	100 year +45% CC 240 minute summer	76.520	20.222
1 year 1440 minute winter	3.291	1.312	100 year +45% CC 240 minute winter	50.838	20.222
30 year 15 minute summer	250.125	70.777	100 year +45% CC 360 minute summer	57.309	14.748
30 year 15 minute winter	175.526	70.777	100 year +45% CC 360 minute winter	37.253	14.748
30 year 30 minute summer	164.299	46.491	100 year +45% CC 480 minute summer	44.627	11.794
30 year 30 minute winter	115.298	46.491	100 year +45% CC 480 minute winter	29.649	11.794
30 year 60 minute summer	110.635	29.238	100 year +45% CC 600 minute summer	36.225	9.908
30 year 60 minute winter	73.503	29.238	100 year +45% CC 600 minute winter	24.751	9.908
30 year 120 minute summer	67.583	17.860	100 year +45% CC 720 minute summer	32.051	8.590
30 year 120 minute winter	44.901	17.860	100 year +45% CC 720 minute winter	21.541	8.590
30 year 180 minute summer	51.478	13.247	100 year +45% CC 960 minute summer	26.020	6.852
30 year 180 minute winter	33.462	13.247	100 year +45% CC 960 minute winter	17.236	6.852
30 year 240 minute summer	40.374	10.670	100 year +45% CC 1440 minute summer	18.558	4.974
30 year 240 minute winter	26.823	10.670	100 year +45% CC 1440 minute winter	12.472	4.974

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S27	10	43.853	0.036	7.0	0.0677	0.0000	OK
15 minute summer	S28	10	42.981	0.074	23.4	0.1875	0.0000	OK
15 minute summer	S29	10	42.615	0.091	40.0	0.2429	0.0000	OK
15 minute summer	S30	10	42.107	0.109	57.8	0.3027	0.0000	OK
15 minute summer	S31	11	41.545	0.133	76.7	0.3795	0.0000	OK
15 minute summer	S32	11	41.173	0.147	81.0	0.2563	0.0000	OK
15 minute summer	S33	11	40.953	0.152	91.0	0.3302	0.0000	OK
15 minute summer	S34	11	40.505	0.124	95.3	0.2536	0.0000	OK
15 minute summer	S35	11	39.991	0.109	105.7	0.2642	0.0000	OK
15 minute summer	S36	11	39.381	0.296	115.2	0.6640	0.0000	OK
15 minute summer	S1	10	42.338	0.055	7.0	0.1115	0.0000	OK
15 minute summer	S2	10	42.200	0.092	16.4	0.2048	0.0000	OK
15 minute summer	S3	11	42.075	0.081	23.2	0.1632	0.0000	OK
15 minute summer	S4	10	41.201	0.083	32.8	0.1837	0.0000	OK
15 minute summer	S5	11	40.336	0.066	32.6	0.0950	0.0000	OK
15 minute summer	S6	11	39.356	0.300	162.4	0.7475	0.0000	OK
15 minute summer	S7	11	39.159	0.167	181.2	0.5068	0.0000	OK
15 minute summer	S37	10	41.621	0.048	13.3	0.1163	0.0000	OK
15 minute summer	S38	10	41.071	0.069	37.9	0.2233	0.0000	OK
15 minute summer	S39	10	39.609	0.084	63.1	0.2714	0.0000	OK
15 minute summer	S8	11	38.106	0.181	251.2	0.4109	0.0000	OK
15 minute summer	S9	11	37.400	0.211	250.5	0.3736	0.0000	OK
15 minute summer	S11	10	39.926	0.106	31.7	0.3946	0.0000	OK
15 minute summer	S12	11	39.579	0.136	43.1	0.2548	0.0000	OK
15 minute summer	S13	11	39.487	0.155	51.8	0.2828	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S27	1.000	S28	6.9	0.635	0.013	0.3753	
15 minute summer	S28	1.001	S29	23.0	1.163	0.059	0.5285	
15 minute summer	S29	1.002	S30	39.5	1.510	0.090	0.7515	
15 minute summer	S30	1.003	S31	57.5	1.675	0.130	1.0790	
15 minute summer	S31	1.004	S32	76.9	1.832	0.173	0.8647	
15 minute summer	S32	1.005	S33	81.3	1.767	0.189	0.5851	
15 minute summer	S33	1.006	S34	91.3	2.099	0.202	0.6008	
15 minute summer	S34	1.007	S35	95.4	2.481	0.080	0.6488	
15 minute summer	S35	1.008	S36	105.8	1.263	0.075	1.6715	
15 minute summer	S36	1.009	S6	115.1	0.824	0.290	1.2104	
15 minute summer	S1	2.000	S2	6.9	0.612	0.133	0.2008	
15 minute summer	S2	2.001	S3	16.2	1.147	0.311	0.1606	
15 minute summer	S3	2.002	S4	23.0	1.818	0.266	0.3683	
15 minute summer	S4	2.003	S5	32.6	2.398	0.146	0.2869	
15 minute summer	S5	2.004	S6	32.8	2.996	0.093	0.0999	
15 minute summer	S6	1.010	S7	162.3	1.605	0.660	5.0435	
15 minute summer	S7	1.011	S8	179.8	2.684	0.162	2.8059	
15 minute summer	S37	3.000	S38	13.2	1.087	0.025	0.2589	
15 minute summer	S38	3.001	S39	37.6	2.109	0.052	0.5414	
15 minute summer	S39	3.002	S8	62.6	3.205	0.069	0.3653	
15 minute summer	S8	1.012	S9	250.5	3.133	0.165	1.2113	
15 minute summer	S9	1.013	S10	250.0	2.933	0.164	0.5527	
15 minute summer	S11	4.000	S12	31.2	0.922	0.125	2.1572	
15 minute summer	S12	4.001	S13	42.7	0.963	0.171	0.8198	
15 minute summer	S13	4.002	S14	51.9	1.493	0.249	0.6981	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S14	11	39.339	0.090	73.4	0.2436	0.0000	OK
15 minute summer	S15	11	37.748	0.099	76.0	0.1537	0.0000	OK
15 minute summer	S10	11	37.074	0.200	341.1	0.4730	0.0000	OK
15 minute summer	S20	10	36.318	0.075	23.3	0.1952	0.0000	OK
15 minute summer	S21	10	36.138	0.062	27.4	0.1017	0.0000	OK
15 minute summer	S22	10	34.896	0.125	45.4	0.2724	0.0000	OK
15 minute summer	S23	11	34.670	0.174	68.2	0.5168	0.0000	OK
15 minute summer	S24	11	34.569	0.183	76.4	0.3697	0.0000	OK
15 minute summer	S25	10	35.692	0.056	11.5	0.1323	0.0000	OK
15 minute summer	S26	10	35.116	0.078	23.6	0.1828	0.0000	OK
15 minute summer	S16	11	34.360	0.355	443.8	0.9737	0.0000	OK
15 minute summer	S17	11	34.189	0.293	441.5	0.7445	0.0000	OK
15 minute summer	S18	11	33.752	0.352	440.4	0.8951	0.0000	OK
1440 minute summer	S19	1440	33.246	0.246	37.5	0.1935	0.0000	OK
15 minute summer	S60	10	43.523	0.070	13.7	0.1772	0.0000	OK
15 minute summer	S63	10	44.455	0.051	12.7	0.0981	0.0000	OK
15 minute summer	S61	11	43.412	0.137	36.2	0.2187	0.0000	OK
15 minute summer	S54	10	45.326	0.048	11.0	0.1121	0.0000	OK
15 minute summer	S55	10	44.089	0.051	17.2	0.0781	0.0000	OK
15 minute summer	S56	11	42.940	0.151	52.0	0.2166	0.0000	OK
15 minute summer	S62	11	42.851	0.096	54.5	0.1508	0.0000	OK
15 minute summer	S57	11	42.242	0.090	61.1	0.1732	0.0000	OK
15 minute summer	S58	11	41.634	0.117	79.2	0.3269	0.0000	OK
15 minute summer	S59	11	41.223	0.096	79.3	0.1378	0.0000	OK
15 minute summer	S40	10	41.703	0.052	12.8	0.1266	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S14	4.003	S15	73.5	3.045	0.084	0.5368	
15 minute summer	S15	4.004	S10	76.0	3.219	0.083	0.1876	
15 minute summer	S10	1.014	S16	340.5	4.090	0.230	4.9353	
15 minute summer	S20	5.000	S21	23.2	1.531	0.050	0.1257	
15 minute summer	S21	5.001	S22	27.2	1.145	0.042	0.7897	
15 minute summer	S22	5.002	S23	44.9	0.981	0.170	1.8986	
15 minute summer	S23	5.003	S24	68.0	1.162	0.258	0.9637	
15 minute summer	S24	5.004	S16	76.7	1.365	0.291	0.6819	
15 minute summer	S25	6.000	S26	11.4	0.967	0.078	0.4126	
15 minute summer	S26	6.001	S16	23.1	1.630	0.140	0.3777	
15 minute summer	S16	1.015	S17	441.5	2.432	0.260	1.0567	
15 minute summer	S17	1.016	S18	440.4	2.505	0.260	4.7850	
15 minute summer	S18	1.017	S19	444.2	3.904	0.280	2.9125	
1440 minute summer	S19	Flow through pond	S64	29.4	0.020	0.002	1056.6588	
15 minute summer	S60	7.000	S61	13.5	0.659	0.122	0.3876	
15 minute summer	S63	8.000	S61	12.6	2.490	0.223	0.0497	
15 minute summer	S61	7.001	S56	35.3	1.155	0.412	1.7160	
15 minute summer	S54	9.000	S55	10.9	1.692	0.098	0.1757	
15 minute summer	S55	9.001	S56	17.1	2.608	0.103	0.0671	
15 minute summer	S56	7.002	S62	52.1	1.471	0.249	0.2882	
15 minute summer	S62	7.003	S57	54.6	2.309	0.090	0.4091	
15 minute summer	S57	7.004	S58	61.2	2.231	0.083	0.3414	
15 minute summer	S58	7.005	S59	79.3	2.769	0.111	0.2301	
15 minute summer	S59	7.006	S43	79.3	2.861	0.091	0.3177	
15 minute summer	S40	10.000	S41	12.7	0.784	0.065	0.3318	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S41	10	41.158	0.117	37.7	0.3844	0.0000	OK
15 minute summer	S42	10	40.851	0.139	55.2	0.3848	0.0000	OK
15 minute summer	S43	11	40.413	0.112	133.9	0.1604	0.0000	OK
15 minute summer	S47	10	36.479	0.056	19.0	0.1634	0.0000	OK
15 minute summer	S48	10	35.163	0.066	24.1	0.1175	0.0000	OK
15 minute summer	S49	10	34.567	0.086	23.9	0.1514	0.0000	OK
15 minute summer	S50	11	34.512	0.154	46.7	0.5191	0.0000	OK
15 minute summer	S51	10	35.575	0.080	18.5	0.2327	0.0000	OK
15 minute summer	S52	10	35.275	0.073	18.3	0.1044	0.0000	OK
15 minute summer	S53	11	34.916	0.101	30.8	0.2385	0.0000	OK
15 minute summer	S44	11	34.455	0.175	214.5	0.3484	0.0000	OK
15 minute summer	S45	10	33.879	0.210	214.6	0.3711	0.0000	OK
1440 minute summer	S46	1440	33.246	0.246	17.8	0.1934	0.0000	OK
1440 minute summer	S64	1440	33.246	0.246	29.4	0.1933	0.0000	OK
1440 minute summer	S65	1440	33.246	0.279	3.6	0.7106	0.0000	SURCHARGED
15 minute summer	S66	1	32.899	0.000	3.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S41	10.001	S42	37.2	1.296	0.307	0.7959	
15 minute summer	S42	10.002	S43	54.6	1.824	0.374	0.4547	
15 minute summer	S43	7.007	S44	134.2	4.449	0.132	1.8401	
15 minute summer	S47	11.000	S48	18.8	2.120	0.072	0.1929	
15 minute summer	S48	11.001	S49	23.9	1.730	0.043	0.2548	
15 minute summer	S49	11.002	S50	23.7	0.643	0.060	0.6966	
15 minute summer	S50	11.003	S44	46.3	0.806	0.166	1.3496	
15 minute summer	S51	12.000	S52	18.3	1.299	0.144	0.3136	
15 minute summer	S52	12.001	S53	18.1	1.069	0.132	0.4315	
15 minute summer	S53	12.002	S44	30.6	1.515	0.226	0.4223	
15 minute summer	S44	7.008	S45	214.6	3.124	0.188	0.7784	
15 minute summer	S45	7.009	S46	216.0	4.500	0.189	0.6052	
1440 minute summer	S46	Flow through pond	S64	29.4	0.020	0.002	1056.6588	
1440 minute summer	S64	1.019	S65	3.6	0.143	0.004	1.4528	
1440 minute summer	S65	Hydro-Brake®	S66	3.5				262.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S27	10	43.871	0.054	17.2	0.1036	0.0000	OK
15 minute summer	S28	10	43.025	0.118	57.4	0.3012	0.0000	OK
15 minute summer	S29	10	42.672	0.148	98.5	0.3956	0.0000	OK
15 minute summer	S30	10	42.179	0.181	142.5	0.5015	0.0000	OK
15 minute summer	S31	10	41.641	0.229	189.5	0.6547	0.0000	OK
15 minute summer	S32	11	41.287	0.261	198.6	0.4547	0.0000	OK
15 minute summer	S33	11	41.066	0.265	223.4	0.5746	0.0000	OK
15 minute summer	S34	11	40.587	0.206	234.1	0.4204	0.0000	OK
15 minute summer	S35	11	40.053	0.171	259.7	0.4138	0.0000	OK
15 minute summer	S36	11	39.607	0.522	283.1	1.1689	0.0000	OK
15 minute summer	S1	10	42.371	0.088	17.2	0.1780	0.0000	OK
15 minute summer	S2	10	42.272	0.164	40.3	0.3630	0.0000	OK
15 minute summer	S3	10	42.134	0.140	57.0	0.2807	0.0000	OK
15 minute summer	S4	10	41.257	0.139	80.7	0.3090	0.0000	OK
15 minute summer	S5	10	40.367	0.097	80.2	0.1392	0.0000	OK
15 minute summer	S6	11	39.559	0.503	399.7	1.2542	0.0000	OK
15 minute summer	S7	11	39.272	0.280	447.9	0.8484	0.0000	OK
15 minute summer	S37	10	41.647	0.074	32.7	0.1788	0.0000	OK
15 minute summer	S38	10	41.111	0.109	93.0	0.3524	0.0000	OK
15 minute summer	S39	9	39.656	0.131	154.7	0.4244	0.0000	OK
15 minute summer	S8	11	38.251	0.326	622.4	0.7401	0.0000	OK
15 minute summer	S9	11	37.582	0.393	622.7	0.6940	0.0000	OK
15 minute summer	S11	10	39.989	0.169	77.6	0.6301	0.0000	OK
15 minute summer	S12	11	39.677	0.234	106.6	0.4377	0.0000	OK
15 minute summer	S13	11	39.582	0.250	127.2	0.4555	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S27	1.000	S28	17.1	0.804	0.032	0.7297	
15 minute summer	S28	1.001	S29	56.8	1.451	0.146	1.0461	
15 minute summer	S29	1.002	S30	97.6	1.864	0.222	1.5029	
15 minute summer	S30	1.003	S31	141.3	2.017	0.319	2.2105	
15 minute summer	S31	1.004	S32	188.5	2.143	0.425	1.8111	
15 minute summer	S32	1.005	S33	199.6	2.077	0.463	1.2216	
15 minute summer	S33	1.006	S34	224.4	2.579	0.495	1.1999	
15 minute summer	S34	1.007	S35	234.4	3.097	0.197	1.2775	
15 minute summer	S35	1.008	S36	260.1	1.543	0.185	3.1407	
15 minute summer	S36	1.009	S6	284.0	1.109	0.716	2.2201	
15 minute summer	S1	2.000	S2	17.1	0.746	0.328	0.3980	
15 minute summer	S2	2.001	S3	39.8	1.395	0.765	0.3236	
15 minute summer	S3	2.002	S4	56.3	2.257	0.651	0.7268	
15 minute summer	S4	2.003	S5	80.2	3.127	0.358	0.5442	
15 minute summer	S5	2.004	S6	80.2	3.311	0.227	0.3207	
15 minute summer	S6	1.010	S7	401.5	2.066	1.633	9.3875	
15 minute summer	S7	1.011	S8	447.8	3.176	0.404	5.9021	
15 minute summer	S37	3.000	S38	32.5	1.403	0.061	0.4944	
15 minute summer	S38	3.001	S39	92.2	2.770	0.129	1.0195	
15 minute summer	S39	3.002	S8	154.9	3.919	0.171	0.8708	
15 minute summer	S8	1.012	S9	622.7	3.536	0.409	2.6608	
15 minute summer	S9	1.013	S10	622.6	3.570	0.409	1.1280	
15 minute summer	S11	4.000	S12	77.3	1.128	0.310	4.3271	
15 minute summer	S12	4.001	S13	105.0	1.211	0.420	1.6030	
15 minute summer	S13	4.002	S14	128.0	1.915	0.613	1.3272	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S14	11	39.394	0.145	180.6	0.3943	0.0000	OK
15 minute summer	S15	11	37.813	0.164	187.3	0.2542	0.0000	OK
15 minute summer	S10	11	37.194	0.320	847.3	0.7576	0.0000	OK
15 minute summer	S20	10	36.365	0.122	57.2	0.3179	0.0000	OK
15 minute summer	S21	10	36.172	0.096	67.2	0.1575	0.0000	OK
15 minute summer	S22	10	34.975	0.204	111.3	0.4450	0.0000	OK
15 minute summer	S23	11	34.832	0.336	168.6	0.9992	0.0000	OK
15 minute summer	S24	11	34.763	0.377	185.2	0.7611	0.0000	OK
15 minute summer	S25	10	35.724	0.088	28.2	0.2076	0.0000	OK
15 minute summer	S26	10	35.161	0.122	57.7	0.2871	0.0000	OK
15 minute summer	S16	11	34.685	0.680	1097.9	1.8623	0.0000	OK
15 minute summer	S17	11	34.454	0.558	1098.0	1.4206	0.0000	OK
15 minute summer	S18	11	33.985	0.585	1098.5	1.4897	0.0000	OK
1440 minute winter	S19	1440	33.532	0.532	52.1	0.4180	0.0000	OK
15 minute summer	S60	10	43.564	0.111	33.5	0.2814	0.0000	OK
15 minute summer	S63	9	44.488	0.084	31.0	0.1619	0.0000	OK
15 minute summer	S61	11	43.536	0.261	88.8	0.4183	0.0000	OK
15 minute summer	S54	10	45.354	0.076	27.0	0.1782	0.0000	OK
15 minute summer	S55	10	44.123	0.085	42.3	0.1284	0.0000	OK
15 minute summer	S56	11	43.036	0.247	126.9	0.3537	0.0000	OK
15 minute summer	S62	11	42.912	0.157	132.8	0.2450	0.0000	OK
15 minute summer	S57	11	42.301	0.149	148.9	0.2868	0.0000	OK
15 minute summer	S58	11	41.716	0.199	193.1	0.5571	0.0000	OK
15 minute summer	S59	11	41.290	0.163	193.4	0.2326	0.0000	OK
15 minute summer	S40	10	41.732	0.081	31.5	0.1980	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S14	4.003	S15	181.1	3.757	0.208	1.0724	
15 minute summer	S15	4.004	S10	187.7	3.718	0.206	0.4253	
15 minute summer	S10	1.014	S16	847.9	4.143	0.572	12.2804	
15 minute summer	S20	5.000	S21	57.0	1.928	0.124	0.2455	
15 minute summer	S21	5.001	S22	66.8	1.452	0.102	1.5248	
15 minute summer	S22	5.002	S23	111.0	1.159	0.422	4.0135	
15 minute summer	S23	5.003	S24	164.5	1.344	0.623	2.2136	
15 minute summer	S24	5.004	S16	185.2	1.588	0.702	1.7261	
15 minute summer	S25	6.000	S26	27.9	1.266	0.192	0.7730	
15 minute summer	S26	6.001	S16	58.6	1.992	0.356	1.1207	
15 minute summer	S16	1.015	S17	1098.0	2.825	0.647	2.2362	
15 minute summer	S17	1.016	S18	1098.5	3.088	0.648	9.5304	
15 minute summer	S18	1.017	S19	1101.5	4.435	0.694	5.9785	
1440 minute winter	S19	Flow through pond	S64	40.1	0.028	0.002	2393.1614	
15 minute summer	S60	7.000	S61	33.3	0.801	0.300	0.7884	
15 minute summer	S63	8.000	S61	31.0	3.036	0.548	0.1144	
15 minute summer	S61	7.001	S56	85.9	1.397	1.002	3.4417	
15 minute summer	S54	9.000	S55	26.8	2.120	0.241	0.3445	
15 minute summer	S55	9.001	S56	42.1	3.286	0.254	0.1311	
15 minute summer	S56	7.002	S62	127.0	1.843	0.606	0.5562	
15 minute summer	S62	7.003	S57	132.9	2.805	0.220	0.8198	
15 minute summer	S57	7.004	S58	149.1	2.638	0.203	0.7026	
15 minute summer	S58	7.005	S59	193.4	3.249	0.270	0.4777	
15 minute summer	S59	7.006	S43	193.5	3.593	0.222	0.6163	
15 minute summer	S40	10.000	S41	31.3	0.913	0.160	0.6853	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S41	10	41.256	0.215	92.6	0.7048	0.0000	OK
15 minute summer	S42	11	40.984	0.272	135.7	0.7531	0.0000	OK
15 minute summer	S43	11	40.474	0.173	327.7	0.2478	0.0000	OK
15 minute summer	S47	10	36.513	0.090	46.6	0.2615	0.0000	OK
15 minute summer	S48	10	35.202	0.105	59.4	0.1880	0.0000	OK
15 minute summer	S49	11	34.639	0.158	59.0	0.2789	0.0000	OK
15 minute summer	S50	11	34.641	0.283	114.0	0.9514	0.0000	OK
15 minute summer	S51	10	35.626	0.131	45.3	0.3808	0.0000	OK
15 minute summer	S52	10	35.321	0.119	44.9	0.1706	0.0000	OK
15 minute summer	S53	10	34.988	0.173	75.6	0.4078	0.0000	OK
15 minute summer	S44	11	34.602	0.322	524.2	0.6419	0.0000	OK
15 minute summer	S45	10	34.016	0.347	525.5	0.6130	0.0000	OK
1440 minute winter	S46	1440	33.532	0.532	24.5	0.4179	0.0000	OK
1440 minute winter	S64	1440	33.532	0.532	40.1	0.4178	0.0000	OK
1440 minute winter	S65	1440	33.533	0.566	7.0	1.4394	0.0000	SURCHARGED
15 minute summer	S66	1	32.899	0.000	3.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S41	10.001	S42	91.6	1.499	0.756	1.6762	
15 minute summer	S42	10.002	S43	134.2	2.157	0.919	0.9360	
15 minute summer	S43	7.007	S44	328.2	4.724	0.324	4.4324	
15 minute summer	S47	11.000	S48	46.3	2.715	0.178	0.3703	
15 minute summer	S48	11.001	S49	59.0	2.213	0.106	0.4909	
15 minute summer	S49	11.002	S50	57.9	0.726	0.146	1.5926	
15 minute summer	S50	11.003	S44	112.6	0.885	0.403	3.0030	
15 minute summer	S51	12.000	S52	44.9	1.618	0.352	0.6169	
15 minute summer	S52	12.001	S53	44.6	1.307	0.324	0.8630	
15 minute summer	S53	12.002	S44	74.8	1.883	0.552	0.8318	
15 minute summer	S44	7.008	S45	525.5	3.718	0.459	1.5831	
15 minute summer	S45	7.009	S46	527.6	4.987	0.461	1.3200	
1440 minute winter	S46	Flow through pond	S64	40.1	0.028	0.002	2393.1614	
1440 minute winter	S64	1.019	S65	7.0	0.149	0.008	3.7479	
1440 minute winter	S65	Hydro-Brake®	S66	3.5				280.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S27	10	43.891	0.074	32.2	0.1401	0.0000	OK
15 minute summer	S28	10	43.077	0.170	107.9	0.4325	0.0000	OK
15 minute summer	S29	10	42.741	0.217	184.9	0.5791	0.0000	OK
15 minute summer	S30	10	42.277	0.279	267.8	0.7720	0.0000	OK
15 minute summer	S31	11	41.945	0.533	355.2	1.5228	0.0000	SURCHARGED
15 minute summer	S32	11	41.584	0.558	366.0	0.9735	0.0000	SURCHARGED
15 minute summer	S33	12	41.338	0.537	410.1	1.1632	0.0000	SURCHARGED
15 minute summer	S34	12	41.027	0.646	427.2	1.3207	0.0000	SURCHARGED
15 minute summer	S35	12	40.927	1.045	476.8	2.5235	0.0000	SURCHARGED
15 minute summer	S36	12	40.808	1.723	486.5	3.8620	0.0000	SURCHARGED
15 minute summer	S1	12	42.812	0.529	32.2	1.0695	0.0000	SURCHARGED
15 minute summer	S2	11	42.745	0.637	69.2	1.4120	0.0000	SURCHARGED
15 minute summer	S3	11	42.490	0.496	95.6	0.9941	0.0000	SURCHARGED
15 minute summer	S4	12	41.326	0.208	136.9	0.4612	0.0000	OK
15 minute summer	S5	12	40.893	0.623	138.0	0.8922	0.0000	SURCHARGED
15 minute summer	S6	12	40.709	1.653	674.4	4.1247	0.0000	SURCHARGED
15 minute summer	S7	12	40.179	1.187	749.2	3.6015	0.0000	SURCHARGED
15 minute summer	S37	10	41.674	0.101	61.3	0.2436	0.0000	OK
15 minute summer	S38	10	41.157	0.155	174.5	0.5012	0.0000	OK
15 minute summer	S39	12	39.785	0.260	292.3	0.8434	0.0000	OK
15 minute summer	S8	12	39.619	1.694	1001.7	3.8475	0.0000	SURCHARGED
15 minute summer	S9	12	39.035	1.846	957.0	3.2623	0.0000	SURCHARGED
15 minute summer	S11	10	40.061	0.241	145.7	0.8981	0.0000	OK
15 minute summer	S12	11	39.814	0.371	199.6	0.6950	0.0000	OK
15 minute summer	S13	11	39.701	0.369	238.2	0.6735	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S27	1.000	S28	32.0	0.925	0.060	1.1859	
15 minute summer	S28	1.001	S29	106.7	1.645	0.275	1.7340	
15 minute summer	S29	1.002	S30	183.5	2.080	0.418	2.5555	
15 minute summer	S30	1.003	S31	264.7	2.100	0.598	4.0591	
15 minute summer	S31	1.004	S32	347.0	2.225	0.783	3.2630	
15 minute summer	S32	1.005	S33	365.5	2.307	0.848	2.0137	
15 minute summer	S33	1.006	S34	408.9	2.800	0.903	2.1860	
15 minute summer	S34	1.007	S35	429.4	3.134	0.362	4.7454	
15 minute summer	S35	1.008	S36	441.3	1.688	0.314	5.4220	
15 minute summer	S36	1.009	S6	476.2	1.691	1.200	2.4416	
15 minute summer	S1	2.000	S2	28.3	0.796	0.545	0.6976	
15 minute summer	S2	2.001	S3	65.7	1.653	1.263	0.4519	
15 minute summer	S3	2.002	S4	93.3	2.393	1.078	1.1573	
15 minute summer	S4	2.003	S5	138.0	3.210	0.616	1.2875	
15 minute summer	S5	2.004	S6	130.0	3.402	0.368	0.6437	
15 minute summer	S6	1.010	S7	658.0	2.456	2.677	13.8847	
15 minute summer	S7	1.011	S8	787.0	3.323	0.711	11.6640	
15 minute summer	S37	3.000	S38	61.0	1.680	0.115	0.7945	
15 minute summer	S38	3.001	S39	175.0	3.215	0.244	2.0480	
15 minute summer	S39	3.002	S8	274.7	3.854	0.304	2.3717	
15 minute summer	S8	1.012	S9	957.0	3.581	0.628	4.2609	
15 minute summer	S9	1.013	S10	971.4	3.560	0.638	1.8244	
15 minute summer	S11	4.000	S12	144.4	1.266	0.579	7.1217	
15 minute summer	S12	4.001	S13	196.2	1.406	0.785	2.5788	
15 minute summer	S13	4.002	S14	238.3	2.271	1.141	2.1648	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S14	12	39.477	0.228	339.8	0.6190	0.0000	OK
15 minute summer	S15	12	38.795	1.146	353.7	1.7720	0.0000	SURCHARGED
15 minute summer	S10	12	38.617	1.743	1329.9	4.1260	0.0000	SURCHARGED
15 minute summer	S20	10	36.418	0.175	107.4	0.4567	0.0000	OK
15 minute summer	S21	12	36.368	0.292	126.2	0.4787	0.0000	OK
15 minute summer	S22	12	36.343	1.572	209.3	3.4264	0.0000	SURCHARGED
15 minute summer	S23	12	36.202	1.706	278.6	5.0682	0.0000	FLOOD RISK
15 minute summer	S24	12	36.036	1.650	303.3	3.3293	0.0000	FLOOD RISK
15 minute summer	S25	12	36.136	0.500	52.9	1.1748	0.0000	SURCHARGED
15 minute summer	S26	12	36.072	1.034	107.8	2.4241	0.0000	SURCHARGED
15 minute summer	S16	12	35.858	1.853	1716.6	5.0782	0.0000	SURCHARGED
15 minute summer	S17	12	35.362	1.466	1716.8	3.7301	0.0000	SURCHARGED
15 minute summer	S18	12	34.476	1.076	1716.9	2.7377	0.0000	SURCHARGED
1440 minute winter	S19	1440	33.969	0.969	162.9	0.7604	0.0000	OK
15 minute summer	S60	11	44.367	0.914	62.9	2.3081	0.0000	SURCHARGED
15 minute summer	S63	12	45.326	0.922	58.3	1.7768	0.0000	SURCHARGED
15 minute summer	S61	11	44.303	1.028	148.9	1.6451	0.0000	SURCHARGED
15 minute summer	S54	10	45.385	0.107	50.6	0.2532	0.0000	OK
15 minute summer	S55	10	44.163	0.125	79.4	0.1903	0.0000	OK
15 minute summer	S56	11	43.130	0.341	223.3	0.4879	0.0000	OK
15 minute summer	S62	11	42.975	0.220	234.1	0.3445	0.0000	OK
15 minute summer	S57	11	42.367	0.215	263.8	0.4150	0.0000	OK
15 minute summer	S58	11	41.814	0.297	346.2	0.8304	0.0000	OK
15 minute summer	S59	11	41.365	0.238	346.2	0.3409	0.0000	OK
15 minute summer	S40	11	42.428	0.777	59.0	1.9097	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S14	4.003	S15	341.4	4.093	0.392	2.6551	
15 minute summer	S15	4.004	S10	318.4	3.592	0.349	1.2569	
15 minute summer	S10	1.014	S16	1330.3	4.723	0.898	16.6246	
15 minute summer	S20	5.000	S21	107.0	2.241	0.233	0.6584	
15 minute summer	S21	5.001	S22	125.7	1.572	0.193	4.3054	
15 minute summer	S22	5.002	S23	174.9	1.201	0.664	6.5445	
15 minute summer	S23	5.003	S24	264.6	1.670	1.002	2.6080	
15 minute summer	S24	5.004	S16	299.7	1.892	1.136	1.9222	
15 minute summer	S25	6.000	S26	51.8	1.340	0.355	2.4569	
15 minute summer	S26	6.001	S16	89.0	1.899	0.540	1.8778	
15 minute summer	S16	1.015	S17	1716.8	3.901	1.012	2.5531	
15 minute summer	S17	1.016	S18	1716.9	3.901	1.013	11.6482	
15 minute summer	S18	1.017	S19	1717.1	4.464	1.082	8.3419	
1440 minute winter	S19	Flow through pond	S64	72.2	0.035	0.004	4582.7124	
15 minute summer	S60	7.000	S61	55.9	0.839	0.504	1.2564	
15 minute summer	S63	8.000	S61	50.5	2.982	0.891	0.1724	
15 minute summer	S61	7.001	S56	146.5	2.080	1.707	3.8919	
15 minute summer	S54	9.000	S55	50.3	2.436	0.451	0.5635	
15 minute summer	S55	9.001	S56	79.0	3.786	0.477	0.2166	
15 minute summer	S56	7.002	S62	223.1	2.146	1.065	0.8291	
15 minute summer	S62	7.003	S57	233.8	3.083	0.386	1.3152	
15 minute summer	S57	7.004	S58	263.5	2.867	0.359	1.1516	
15 minute summer	S58	7.005	S59	346.2	3.526	0.484	0.7858	
15 minute summer	S59	7.006	S43	346.3	4.063	0.397	0.9752	
15 minute summer	S40	10.000	S41	54.4	0.922	0.278	1.3949	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S41	11	42.369	1.328	161.1	4.3565	0.0000	FLOOD RISK
15 minute summer	S42	11	41.680	0.968	233.6	2.6761	0.0000	SURCHARGED
15 minute summer	S43	11	40.540	0.239	577.3	0.3414	0.0000	OK
15 minute summer	S47	10	36.551	0.128	87.4	0.3734	0.0000	OK
15 minute summer	S48	9	35.233	0.136	111.4	0.2437	0.0000	OK
15 minute summer	S49	11	35.213	0.732	111.3	1.2931	0.0000	SURCHARGED
15 minute summer	S50	11	35.195	0.837	199.3	2.8168	0.0000	SURCHARGED
15 minute summer	S51	12	35.703	0.208	85.1	0.6045	0.0000	OK
15 minute summer	S52	12	35.618	0.416	84.4	0.5954	0.0000	SURCHARGED
15 minute summer	S53	12	35.475	0.660	134.4	1.5526	0.0000	SURCHARGED
15 minute summer	S44	12	35.136	0.856	903.3	1.7053	0.0000	SURCHARGED
15 minute summer	S45	11	34.330	0.661	892.5	1.1672	0.0000	SURCHARGED
1440 minute winter	S46	1440	33.968	0.968	45.5	0.7601	0.0000	OK
1440 minute winter	S64	1440	33.968	0.968	72.2	0.7601	0.0000	SURCHARGED
1440 minute winter	S65	1440	33.968	1.001	3.6	2.5483	0.0000	SURCHARGED
15 minute summer	S66	1	32.899	0.000	3.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S41	10.001	S42	155.3	2.205	1.281	1.9510	
15 minute summer	S42	10.002	S43	231.1	3.281	1.583	1.0579	
15 minute summer	S43	7.007	S44	576.8	4.686	0.569	7.4353	
15 minute summer	S47	11.000	S48	86.9	3.186	0.334	0.5926	
15 minute summer	S48	11.001	S49	111.3	2.364	0.200	1.8162	
15 minute summer	S49	11.002	S50	104.0	0.723	0.263	3.9785	
15 minute summer	S50	11.003	S44	197.5	0.968	0.708	5.0433	
15 minute summer	S51	12.000	S52	84.4	1.800	0.661	1.3597	
15 minute summer	S52	12.001	S53	83.2	1.385	0.604	1.7804	
15 minute summer	S53	12.002	S44	130.2	1.978	0.962	1.4735	
15 minute summer	S44	7.008	S45	892.5	4.132	0.780	2.3859	
15 minute summer	S45	7.009	S46	895.7	5.029	0.783	2.1667	
1440 minute winter	S46	Flow through pond	S64	72.2	0.035	0.004	4582.7124	
1440 minute winter	S64	1.019	S65	3.6	0.136	0.004	5.3063	
1440 minute winter	S65	Hydro-Brake®	S66	3.5				301.1

End of Report