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FLOOD RISK ASSESSMENT

ON

LAND AT
STATION ROAD, SKELMANTHORPE
WEST YORKSHIRE

FOR

YORKSHIRE COUNTRY PROPERTIES LTD.

E19/7366/FR01
Revision A

July 2021

T. Haigh. B.Sc., C.Eng., M.I.C.E.

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1.0 INTRODUCTION

1.1 This report is commissioned to investigate and report on the Flood Risk for this site in accordance Planning Practise Guidance- Flood Risk and Coastal Change April 2015 and the proposals for drainage of this site when redeveloped as residential land. The report is based on information supplied by the client and from relevant authorities in both written and verbal format. Some of this information is in verbal form only. No liability can be accepted for information supplied by third parties which is subsequently found to be inaccurate or incorrect.

2.0 THE SITE

2.1 The area to be developed is located in the north of the town of Skelmanthorpe, and approximately 8 miles south east of Huddersfield town centre in West Yorkshire. It comprises of a grassed field, currently surrounded by metal site fencing along the north western and north eastern boundaries and wire fencing with wooden posts along the south eastern and south western boundaries. It is situated around Ordnance Survey grid reference 423248, 411115. A site location plan is included in Appendix A.

2.2 The site is roughly rectangular, with a small extension to encompass the area of field behind the properties adjacent to the north east corner of the site. There are residential properties to the north, and to the west of the site beyond Station Road, and fields to the south and east. The Site area is approximately 0.8Ha

2.3 At the time of the site investigation, the northern half of the site was overgrown with brambles, with the remainder of the site covered by moderately long grass. Tree growth and shrubs were noted to the site boundaries, in particular the southern corner of the site, where three mature oak trees were noted. A path through the brambles has been cleared to enable easy access to the south of the site.

2.4 The site is accessible from station road when the site fencing is opened, since the previously existing stone wall has been removed.

2.5 The site slopes from south to north at an average grade of approximately 1 in 15. A high point of 148.84m AOD is located in the southern corner of the site and a low point of approximately 140.85m AOD located in the northern corner, close to Station Road.

3.0 PROPOSED DEVELOPMENT AND CONSTRAINTS

3.1 The BGS Digital Geological Map of Great Britain at 1:50,000 scale has been consulted and we would report as follows:-

3.2 An area of infilled ground is shown to encroach on the site from the north east. An area of voided worked ground is shown adjacent to the south of the site, associated with the railway cuttings. A large area of artificial ground is shown close to the northern site boundary. Which is associated with historical coal extraction.

3.3 The majority of the site is underlain by the Pennine Lower Coal Measures Formation consisting of Sandstone, Mudstone and Siltstone. Encroaching on the southern boundary is the Pennine Lower Coal Measure Formation consisting only of Sandstone. Sandstone is normally considered as permeable strata due to the presence of cracks and joints, indicating that infiltration techniques may be suitable for this site. However, since the majority of the site is underlain by a combination of permeable and impermeable strata, and due to the steep nature of the site, we would deem it unlikely that soak-a-ways would be an appropriate method of surface water disposal.

3.4 It is understood that the proposed development is for a series of detached, semi-detached and terraced houses, totalling 30 units, with associated car parking and access roads. A preliminary site layout is attached in the appendices.

3.5 A public combined sewer runs along Station Road to the north of the site. Yorkshire Water report that foul water should discharge to this public combined sewer at a point to the west of the site. A gravity connection to the sewer should be achievable.

3.6 Yorkshire Water have confirmed that if sustainable drainage is unsuitable for the site, then an outfall to the combined sewer in Station Road to the west of the site would be an acceptable last resort option, at an agreed rate of 3.5l/s. This report is written under the knowledge that infiltration methods are not suitable for this site, as proven by previous site investigation, and that the surface water from the site will be channeled to the combined sewer to the west of the site. The above would represent a conservative scenario, as we would anticipate a greenfield agricultural flow of 6.4 lit/s for the annual storm rising to 15.5 lit/s for the 100 year storm. The final discharge would have to be formally agreed with Kirklees MDC Land Drainage council who have indicated a reduced run off from the site of 3.5 lit/s for the area of the site that would be acceptable discharge rate to the combined sewer in station road to the west of the site. This should be acceptable to them which is equivalent to an agricultural run-off from the site which is currently the case due to the steep nature of the site.

4.0 FLOOD RISK

4.1 On reviewing the Environment Agency websites flood risk maps, the site currently falls outside of designated flood zones.
The hierarchy of flood zones are described as:

Flood Zone 1: Low Probability. Land assessed as having a less than 1 in 1000 chance of river and sea flooding in any year (<0.1%).

Flood Zone 2: Medium Probability. Land assessed as having between a 1 in 100 and 1 in 1000 chance of river flooding (1% 0.1%) and between a 1 in 200 and 1 in 1000 chance of sea flooding (0.5% 0.1%) in any year.

Flood Zone 3: High Probability. Land assessed as having a 1 in 100 or greater chance of river flooding (>1%) and 1 in 200 or greater chance of sea flooding (>0.5%) in any year.

The site is therefore considered not to be at risk from fluvial flooding from rivers or sea for the 1 in 100 or 1 in 1000 year flood event. The proposed use of the site would be classified as More Vulnerable in Table 2: Flood Risk Vulnerability Classification in the Planning Practise

Guidance- Flood Risk and Coastal Change April 2015. In accordance with that table the proposed development would be considered to be appropriate for the site.

4.2 The site falls within an area at very low risk of surface water flooding according to the EA maps.

4.2.1 High risk means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

4.2.2 Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

4.2.3 Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

4.2.4 Very low risk means that each year this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

4.2.5 Run off from the developments to the south appear to be routed along the railway tracks just to the south of the site, and diverted to the north east. Floor levels adjacent the access road will need to be raised slightly to facilitate a flood route through the site. New on-site drainage will attenuate any high flow events, allowing controlled release into the combined sewer to the west. The EA Flood Risk map for Planning for flooding from fluvial sources does not show flood waters encroaching onto the site.

4.3 The site does not appear to fall within an area subject to flooding from reservoirs according to the EA maps. We consider the risk of such a source of flooding would be low. The site does not fall within a flood warning zone.

4.4 Due to the size of the development being under 1Ha, it will not be necessary to prepare a site Specific Flood Risk Assessment for the site.

4.5 There are a number of potential flooding mechanisms that the Planning Practise Guidance- Flood Risk and Coastal Change April 2015 now requires to be evaluated for each proposed development site. Each method of flooding requires an assessment to be made on its probability relative to the site development. The normal requirement of the document is for no flooding of properties for storms up to a 1% probability or a once in a 100 years storm. The risk assessment also includes for flooding both on site and off site, and the effects of the development on the downstream catchment or the flow regime of the watercourse. NPPG also requires that the effects of severe storms above the normal 1% probability are reviewed together with the effects of climatic change relating to the design life of the development.

4.6 It also requires that the effects of climate change are taken into account together with the impacts of extreme events and flood defence failures. Prior to this the Sequential Test, and where necessary, the exception test as outlined in Planning Practise Guidance- Flood Risk and Coastal Change April 2015, must also be applied to each development site. These aspects are not covered in this report but the proposed site being in Flood Zone 1, would mean these requirements are already met and do not apply.

4.7 The Planning Practise Guidance- Flood Risk and Coastal Change April 2015 requires that each flooding mechanism is addressed and levels of risk evaluated. We consider there are four main risks of flooding to the site. The alternative mechanisms are not applicable to this site.

- Inundation from floodwaters leaving watercourses or rivers entering the site. This can include the effects on culverted watercourses and where the risk of blockage can occur and from breach scenarios.
- Rainwater falling on the site and not being able to leave the site at sufficient rate to prevent flooding on the site.
- Overland flows from adjacent land sites due to surcharging of sewerage systems or other watercourses.
- The impact of the developed site on the existing drainage systems and off-site surface water systems must also be assessed as part of this flood risk assessment.

5.0 DISCUSSION OF FLOOD RISKS

5.1 Flood Risk from Watercourses, River & Tidal

5.1.1 The proposed development area does not fall within the 0.1% or the 1% probability Flood Risk Maps (Zone 2 and 3) as published by the Environment Agency. The site is therefore considered not to be at risk from fluvial flooding for the once in 100 year flood event. We therefore consider the risk of flooding of the site from River and Sea is acceptable for this type of development on this site.

5.1.2 A watercourse is noted some 300m north of the site, however this is approximately 15m downhill of the site, meaning that it may be ruled out as a potential source of flooding.

5.2 Risk of Flooding from overland flows from adjacent land.

5.2.1 The site lies on an area of sloping land, with residential developments on the North West side of Station Road, as well as on the south side of the Kirklees Light Railway to the south of the site. A row of houses are located adjacent to the north eastern site boundary. Anecdotal evidence from one of the adjacent residents indicates that these properties receive run-off from the site during prolonged rainfall periods, both overland, and through weep-holes in the retaining wall forming the site boundary. It is likely that the proposed development will reduce the runoff to the existing properties, due to the proposed measures of surface water flow attenuation. There are open fields to the north east and east, sloping down towards a river some 300m to the north east of the site. These will tend to convey any low level overland flows away from the site. The residential areas to the south and west, both uphill from the site, are served by existing public drainage systems and as such the level of risk of flooding from surcharged sewers or drains is considered to be less than 3%. In extreme events any flood waters leaving this system would be channelled along the highways, or down railway tracks to the south, by the natural topography, away from the site.

5.2.2 The area to the south east is separated from the site by the railway running to the south of the site, intercepting any overland flow caused by runoff. Any overland flows are therefore not considered to be a flood risk to the site.

5.2.3 We would however, still recommend that an overland flood route is provided through the site to cater for extreme events, as is normal under the sewers for adoption criteria, and floor levels are to be based a minimum of 300mm above existing ground levels. The current layout accounts for this through piping beneath the proposed roads.

5.3 **Risk of Flooding from Rainwater Falling on Site**

5.3.1 The risk of flooding from water falling on site and not being able to leave the site is relatively high. The impermeable area of the site will increase significantly due to the development and thus would increase the run off from the site. This would increase the flood risk to downstream properties unless attenuation measures and restriction of flows took place.

5.3.2 The normal hierarchy for surface water discharge in accordance with current planning and SUDS policies is as follows:

1. The use of infiltration systems such as Soakaways.
2. Discharge to nearby rivers or watercourses with the use of attenuation.
3. Discharge to existing public sewer network with the use of attenuation.

5.3.3 Previous site investigation has shown that infiltration systems of surface water disposal will not be appropriate for this site, due to the underlying clays and mudstones. Therefore, we will consider the flood risks on the basis that the site is un-suitable for the use of infiltration systems. Trial pit logs from the site investigation have been included within appendix E.

5.3.4 As infiltration systems are considered unfeasible for the site, storm water attenuation systems should be utilised to ensure the flows from the site to the combined sewer, are reduced to 3.5l/s, as agreed with Yorkshire Water.

5.3.5 There are no significant existing buildings or paved areas on site but the various agricultural run-off estimations show that the site would generate an agricultural run-off of between 6.4 and 15.5 lit/s for the various storms between the 1 in 1 year and the 1 in 100 year storm conditions. For this site, a discharge of 3.5 lit/s/ha has been agreed with Yorkshire Water. This

will allow the systems to become adopted by Yorkshire Water and reduce the risk of failure in the long term. The discharge would be limited to this agreed rate to satisfy the Land Drainage Authority. Therefore this has been utilised for the discharge of surface water from the site and the storage volumes for this scenario calculated. Any run off from the site post development would have to be limited to 3.5 lit/s which is the rate specified.

5.3.6 With attenuation of flows there would have to be a storm-water storage facility. The use of above storage systems such as swales, detention basins or ponds, would provide the most sustainable urban drainage system and possibly the most economic but this would entails significant land up take due to the topography of the site and possibly large commuted sums for their adoption if an authority can be found that is prepared to adopt these. For the onsite sewerage system to be adopted there would still be a need for underground tanks to provide sufficient attenuation storage for the whole site so that sewers do not surcharge for the 1 in 30 year event. Based on this criteria, detailed calculations have been carried out to determine the volumes of storage required are shown in the attached calculation sheets. For this run off the storage volumes require 200cu.m for a 1 in 100 year storm, when 30% extra for climatic change allowance is made. The 1 in 30 year storage would have to be provided in underground tanks and not basins to satisfy Yorkshire water requirements. **Sufficient attenuation for the 100 year +30% storm will be provided by the pipework under the proposed highways (see HHA drawing E18/7366_004B).**

5.3.7 The use of below ground storage facilities on their own, may not provide a suitable level of treatment of the run off from the site, and biological systems, at source, may be needed to ensure contaminants are dealt with prior to discharge off site. The use of open swales and ponds would allow the use of reed beds and other organic systems to be employed, so should still be considered in the final designs if possible. Primary treatment for the roads would be the use of trapped gullies for all hard standings. The use of filter drains adjacent to private drives would also provide a first stage treatment of run off from drives and allow a discharge into the top soils on site. Rain water butts may also be provided to enable some recycling of run off from the roofs and paved areas. The use of green roofs is not considered appropriate in this development due to the type of building construction.

5.3.8 The size of the storm water storage facilities would need to be determined accurately in the final detailed designs. These should be all in accordance with the current PPG. The volumes of storage can include flooding to roads and designated areas such as carpark areas or public open space for the 100 year storm with due allowance for climate change and urban creep, but must ensure that no buildings are flooded.

5.3.9 The estimated volumes of storage required for each of the storm profiles are based on not exceeding the allowable discharge rates for the whole site as agreed.

5.3.10 The proposed discharge point and discharge rates from the site has been formally agreed with Yorkshire Water, and the Local Land Drainage Authority, prior to detailed design being undertaken.

5.4 **Impact on existing drainage systems.**

5.4.1 If the site is developed with attenuation systems and an agreed discharge rate reduced to agricultural rates of discharge, there should be no increase in the flood risk to properties off site or in the drainage networks downstream of the site. In real terms there would be slight reduction in flood risk to adjacent land due to the attenuation provided on site for the 1 in 100 year storms with the discharge rate cut to below the current estimated 1 in 1 year storm agricultural discharge rate.

5.4.2 The maintenance of the onsite storage tanks would be carried out by Yorkshire Water as part of the Section 104 Agreement and they would adopt the underground on site tanks. This may mean commuted sums being paid for such an agreement.

6.0 CONCLUSIONS

6.1 The area of the site to be developed currently falls within Flood Zone 1 as defined by the EA Flood maps. The area of the site to be developed is not at risk of flooding from river or tidal water up to a 1% return period. The flood risk is considered to be acceptable for residential development.

6.2 The risk of overland flows entering the site is considered to be low due to the topography of the area around the site, and the drainage systems to the previously developed areas to the south and West, as well as the railway track to the south of the site. The risk can be further minimised by providing a flood water route through the site to ensure flood water flows are directed away from the existing and proposed housing. The floor levels of the proposed houses should be a minimum of 300mm above the adjacent road levels or existing ground level.

6.3 The proposed surface water attenuation measures for the development will reduce the runoff from the site to below the agricultural rate, effectively lowering the current risk of flooding to adjacent properties.

Trevor Haigh B.Sc., C.Eng., M.I.C.E.

APPENDIX A

LOCATION PLAN

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Firth Building
99-101 Leeds Road
Dewsbury
WF12 7BU

Client :	Yorkshire Country Properties
Job Title:	Station Road, Skelmanthorpe
Job Number :	E18/7366

LOCATION PLAN

OS Grid Reference : SE 423225 411131
Easting : 423225
Northing : 411131

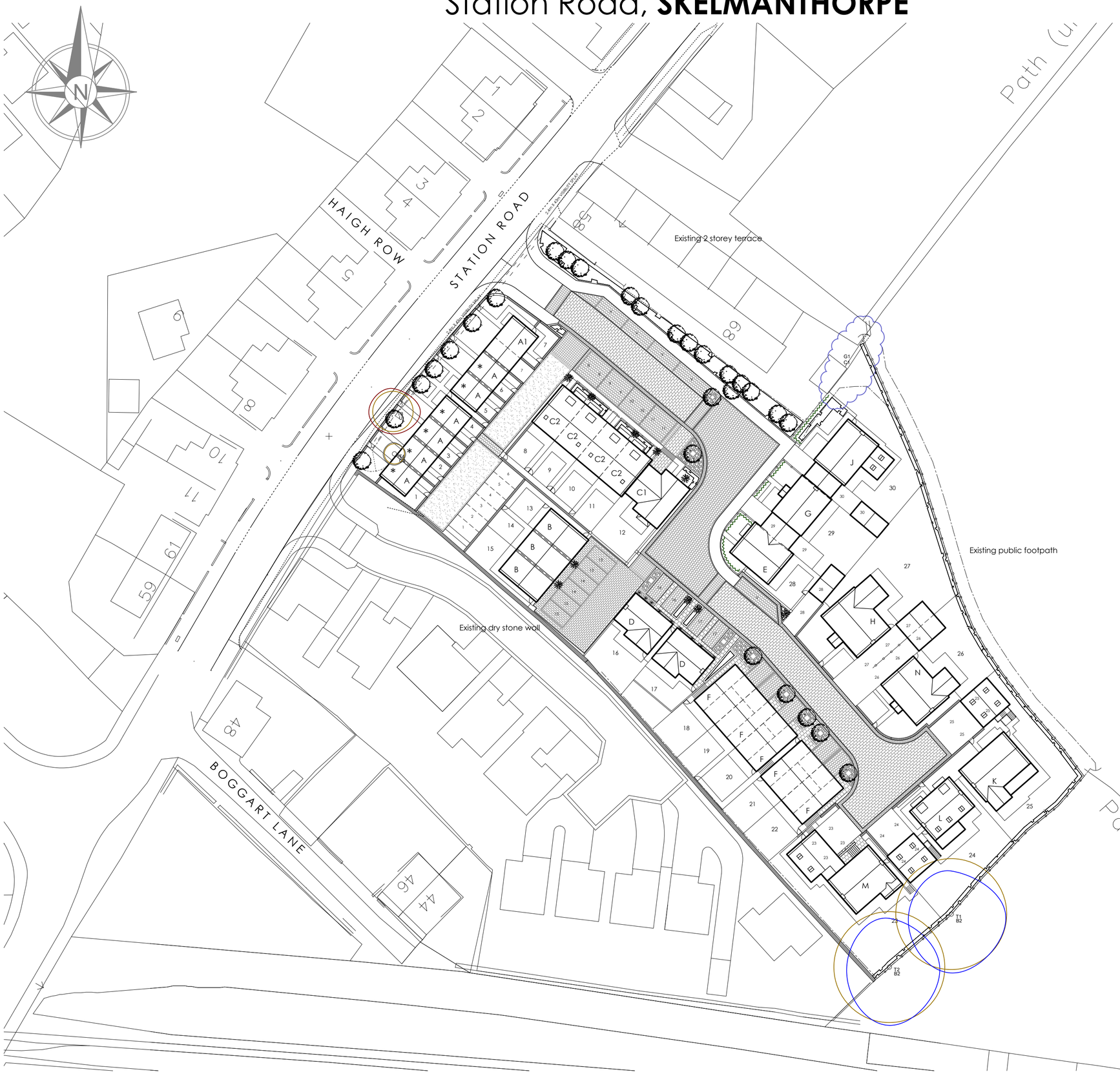
Topographical Survey carried out using GPS.

N

APPENDIX B

PROPOSED SITE PLAN

Station Road, **SKELMANTHORPE**



SITE LAYOUT PLAN - Scale 1:500@A2

NOTES:

- GATE
- LOCKABLE GATE (SERVING REAR GARDEN ACCESS PATHS - KEY TO ALL THOSE PLOTS WHICH IT SERVES)
- REFUSE COLLECTION POINTS (600x750mm paving slab) 3 wheelie bins to be provided to each dwelling to Kirklees CC recycling/ collection policy.
- * AFFORDABLE HOUSING

TREE SURVEY LEGEND

GROUP

TREE CANOPY GRADES

- CATEGORY A
- CATEGORY B
- CATEGORY C
- CATEGORY U
- ROOT PROTECTION AREA
- TREE SHADE (24 hr)

FOR FURTHER DETAILS OF TREES REFER TO ARBORICULTURAL REPORT BY IAIN TAVENDALE.

ACCOMMODATION SCHEDULE

HOUSE TYPE	DESCRIPTION	NO
AFFORDABLE 20% = 6 UNITS		
TYPE A	1 BEDROOM TERRACE HOUSE	6
PRIVATE UNITS		
TYPE A1	1 BEDROOM SEMI DETACHED HOUSE	1
TYPE B	2 BEDROOM SEMI DETACHED HOUSE	3
TYPE C1	3 BEDROOM LINK DETACHED HOUSE	1
TYPE C2	3 BEDROOM SEMI DETACHED HOUSE RIR	4
TYPE D	3 BEDROOM DETACHED HOUSE	2
TYPE E	3 BEDROOM LINK DETACHED HOUSE	1
TYPE F	3 BEDROOM TOWNHOUSE (Split level)	5
TYPE G	4 BEDROOM LINK DETACHED HOUSE	1
TYPE H	4 BEDROOM DETACHED HOUSE	1
TYPE J	4 BEDROOM LINK DETACHED HOUSE	1
TYPE K	4 BEDROOM DETACHED HOUSE	1
TYPE L	4 BEDROOM DETACHED HOUSE RIR	1
TYPE M	4 BEDROOM DETACHED HOUSE	1
TYPE N	4 BEDROOM DETACHED HOUSE	1
TOTAL		**30**

YORKSHIRE COUNTRY PROPERTIES

REV	DESCRIPTION	DATE
-	-	--/--/--

PARKER PEEL ARCHITECTURAL

E jp@parkerpeel.co.uk w www.parkerpeel.co.uk t 01924 921860

Client
YORKSHIRE COUNTRY PROPERTIES

Project
PROPOSED RESIDENTIAL DEVELOPMENT AT
STATION ROAD,
SKELMANTHORPE

Title
SITE LAYOUT PLAN

Drw. No.	Scale	Drawn	Checked	Date	Rev.
1902-SI-04	1:500@A2	RP	-	04/19	-

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Civil Structural Engineering Consultants

APPENDIX C

FLOOD RISK MAPS

Learn more about flood risk

Select the type of flood risk information you're interested in. The map will then update.

You can learn more about the ways we describe flood risk. Alternatively select a legend item or feature from the map for an explanation of that flood risk.

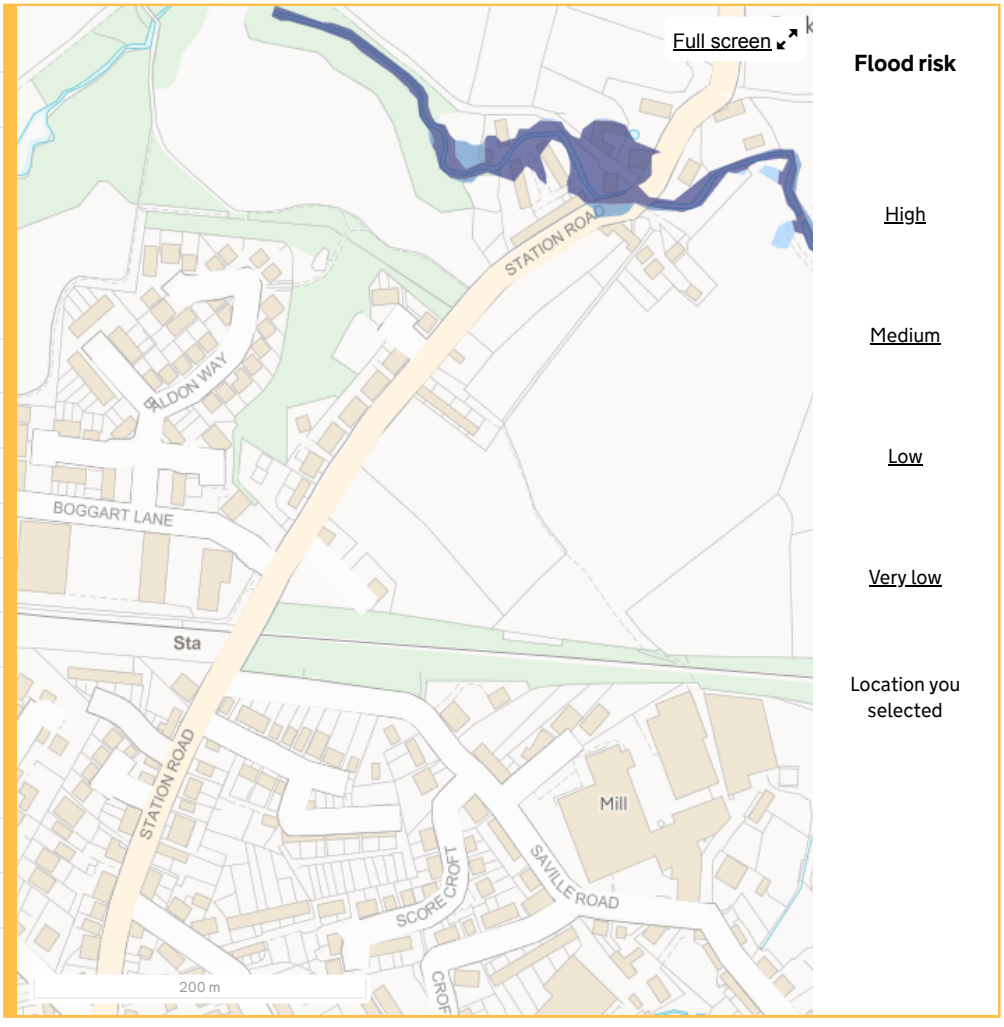
'Detailed view' shows more technical information.

> All information, particularly the likelihood of surface water flooding, is a general indicator of an area's flood risk. As such it is not suitable for identifying whether an individual property will flood. This service uses computer models to assess an area's long term flood risk from rivers, the sea, surface water and some groundwater. It does not include flood risk from sources such as blocked drains and burst pipes.

Basic view  Detailed view

Location skelmanthorpe

- Flood risk from rivers or the sea
  - Extent of flooding
  - Depth and flow estimates at monitoring stations
- Flood risk from surface water
  - Extent of flooding
  - High risk: depth
  - High risk: velocity
  - Medium risk: depth
  - Medium risk: velocity
  - Low risk: depth
  - Low risk: velocity
- Flood risk from reservoirs
  - Extent of flooding
  - Flood depth
  - Flood speed



▶ Accuracy of surface water flood risk information

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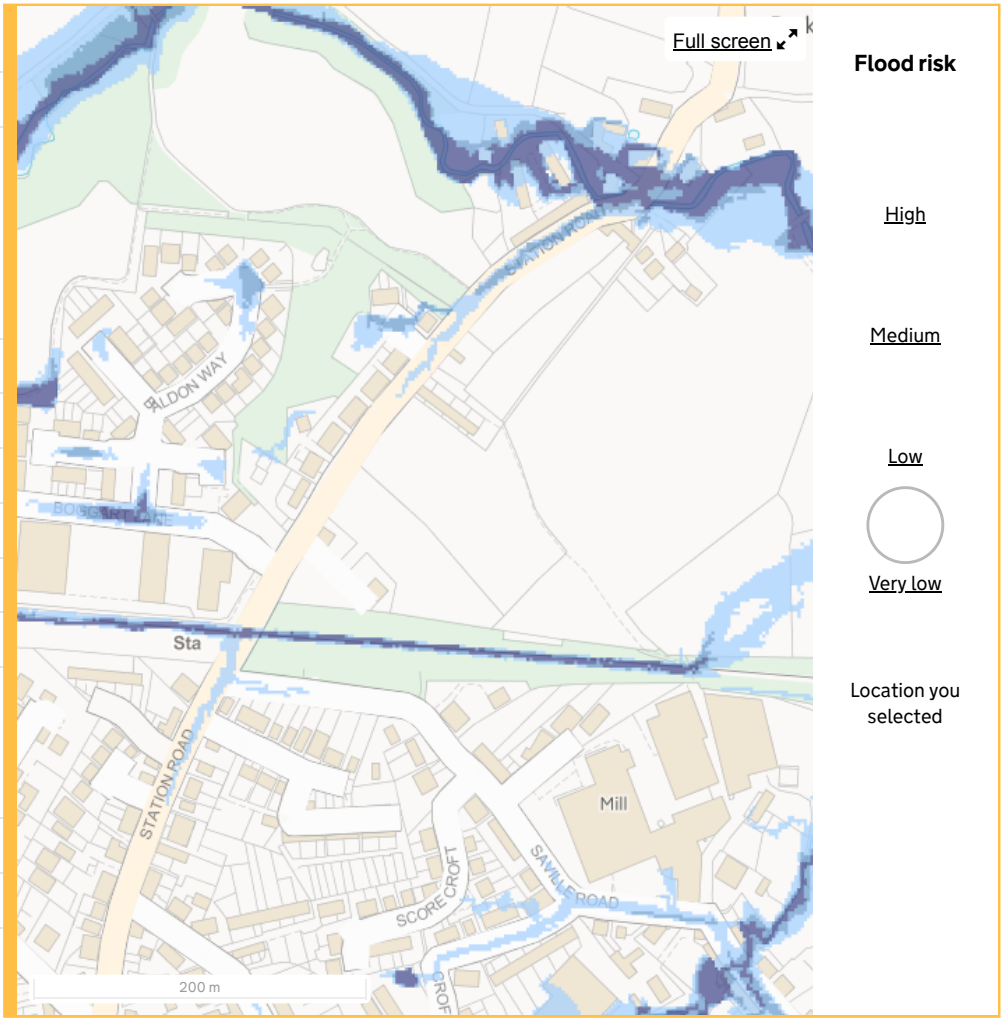

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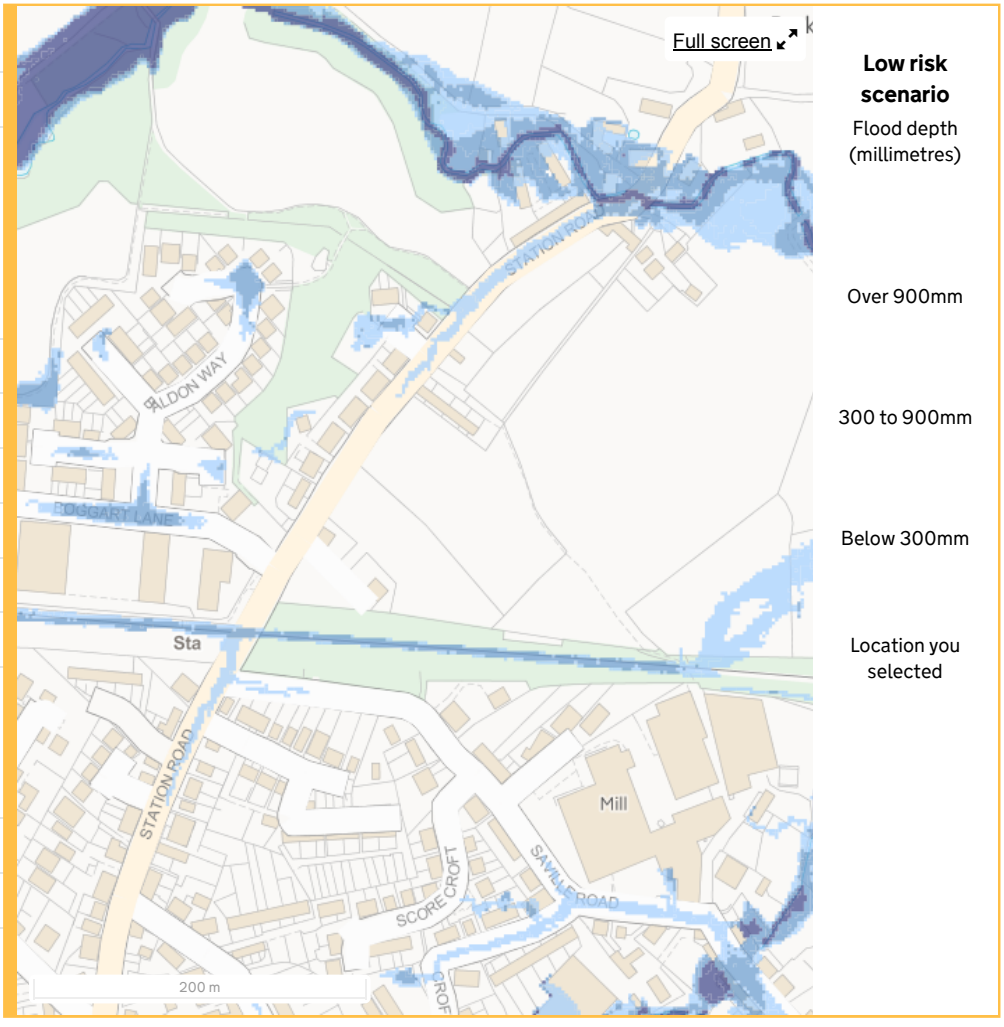

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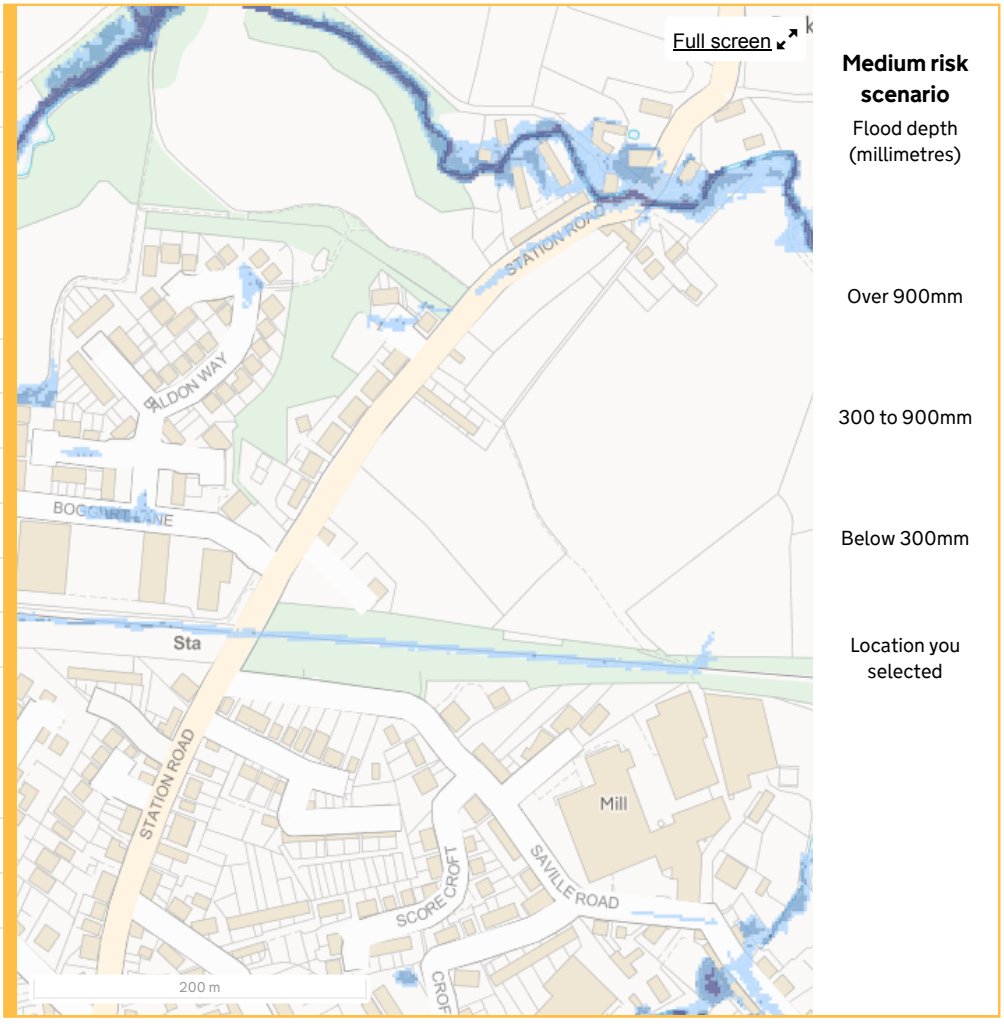

▶ Accuracy of surface water flood risk information

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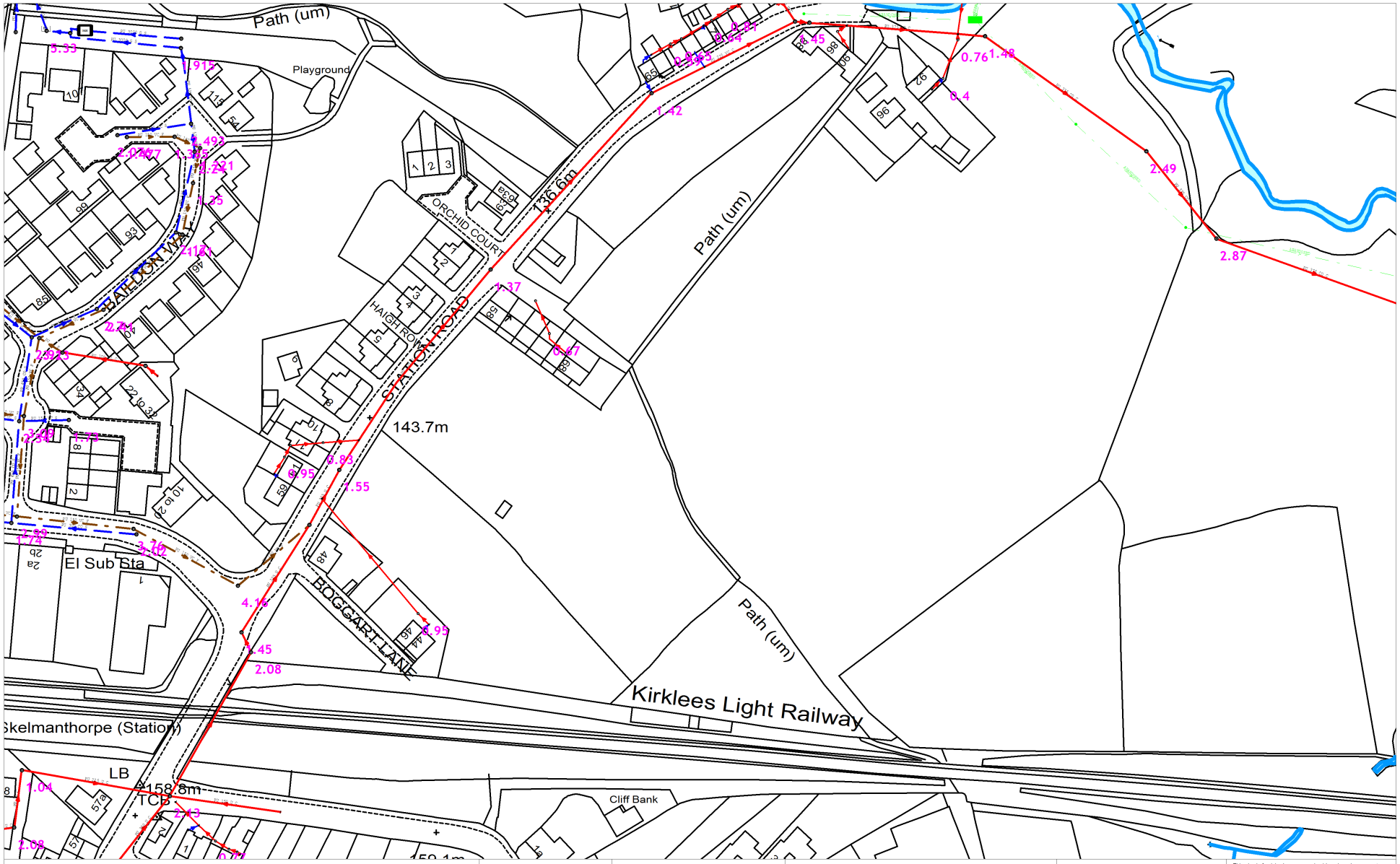
APPENDIX D

YORKSHIRE WATER RECORDS

YORKSHIRE WATER PRE-PLANNING CORRESPONDENCE



	423073 : 411010	Map Name : SE2310NW	Title	Partial Key
		Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : YorMap Advisor C ROBERTS Contact Tel : 87 2582	Notes	Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS
			(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432	Date Req : 29/10/2018, 14:24:28
				Source : Sewer Network Enquiry

This plan is furnished as a general guide only and no warranty as to its correctness 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.

Date Gen : 29/10/2018, 14:25:10

UPN: Undefined Originator: C ROBERTS, YorMap, 87 2582

YorkshireWater

Mr C MacDonald
Haigh Huddleston & Associates
Firth Buildings
99-101 Leeds Road
Dewsbury
WF12 7BU

Yorkshire Water Services
Developer Services
Sewerage Technical Team
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For telephone enquiries ring:
Chris Roberts on 0345 120 8482

Your Ref: 7366
Our Ref: U017699

29th October 2018

Dear Mr Macdonald,

Station Road, Skelmanthorpe, Huddersfield, HD8 9TT - Pre-Planning Sewerage Enquiry -

Thank you for your recent enquiry. Our charge of £158.93 (plus VAT) will be added to your account with us, reference MWA057. You will receive an invoice for your account in due course.

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:

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

Foul water domestic waste should discharge to the 225 mm diameter public combined sewer recorded in Station Road, at a point to the west of the site.

Surface Water

The developer's attention is drawn to Requirement H3 of the Building Regulations 2000. 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.

As a last resort and subject to providing satisfactory evidence as to why the other methods of surface water disposal have been discounted, curtilage surface water may discharge to the 225 mm diameter public combined sewer recorded in Station Road, at a point to the west of the site. The surface water discharge from the site to be restricted to not greater than 3.5 (three point five) litres/second.

YorkshireWater

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0345 120 84 82.

An off-site foul and surface water sewer may be required which may be provided by the developer and considered for adoption under Section 104 of the Water Industry Act 1991. Please telephone 0345 120 84 82 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0345 120 84 82.

All the above comments are based upon the information and records available at the present time. 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
Sewerage Technician
Developer Services

Haigh Huddleston & Associates

Civil Structural Engineering Consultants

APPENDIX E

STORMWATER STORAGE CALCULATIONS

GREENFIELD RUN-OFF

DRAINAGE FEASIBILITY PLAN

TRIAL PIT LOGS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.015	4.00	146.391	2100	423261.463	411081.574	7.385
9	0.055	4.00	145.292	2100	423273.513	411092.101	6.286
2	0.016	4.00	145.826	2100	423267.488	411086.838	6.860
3	0.046	4.00	144.749	450	423248.420	411108.988	5.929
4	0.075	4.00	143.581	2100	423226.980	411126.996	4.901
5	0.240	4.00	141.947	2100	423242.743	411145.762	3.390
6			140.958	2400	423209.123	411174.001	2.621
7			140.939	1200	423201.786	411174.227	2.786
8			140.927	1200	423199.420	411174.202	2.962

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	8.001	0.600	139.006	138.966	0.040	200.0	1350	4.05	67.6
2.000	9	2	8.000	0.600	139.006	138.966	0.040	200.0	1350	4.05	67.6
1.001	2	3	29.227	0.600	138.966	138.820	0.146	200.0	1350	4.22	66.6
1.002	3	4	27.999	0.600	138.820	138.680	0.140	200.0	1350	4.38	65.6
1.003	4	5	24.508	0.600	138.680	138.557	0.123	200.0	1350	4.53	64.8
1.004	5	6	43.906	0.600	138.557	138.337	0.220	200.0	1350	4.78	63.4
1.005	6	7	7.340	0.600	138.337	138.153	0.184	40.0	225	4.84	63.1
1.006	7	8	2.366	0.600	138.153	137.965	0.188	12.6	225	4.85	63.1

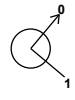
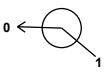
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.840	4064.7	2.7	6.035	5.510	0.015	0.0	26	0.419
2.000	2.840	4064.7	10.1	4.936	5.510	0.055	0.0	48	0.628
1.001	2.840	4064.7	15.5	5.510	4.579	0.086	0.0	58	0.714
1.002	2.840	4064.7	23.5	4.579	3.551	0.132	0.0	71	0.809
1.003	2.840	4064.7	36.4	3.551	2.040	0.207	0.0	87	0.923
1.004	2.840	4064.7	76.8	2.040	1.271	0.447	0.0	125	1.151
1.005	2.074	82.5	76.5	2.396	2.561	0.447	0.0	172	2.344
1.006	3.708	147.4	76.4	2.561	2.737	0.447	0.0	115	3.737

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	8.001	200.0	1350	Circular_Default Sewer Type	146.391	139.006	6.035	145.826	138.966	5.510
2.000	8.000	200.0	1350	Circular_Default Sewer Type	145.292	139.006	4.936	145.826	138.966	5.510
1.001	29.227	200.0	1350	Circular_Default Sewer Type	145.826	138.966	5.510	144.749	138.820	4.579
1.002	27.999	200.0	1350	Circular_Default Sewer Type	144.749	138.820	4.579	143.581	138.680	3.551
1.003	24.508	200.0	1350	Circular_Default Sewer Type	143.581	138.680	3.551	141.947	138.557	2.040
1.004	43.906	200.0	1350	Circular_Default Sewer Type	141.947	138.557	2.040	140.958	138.337	1.271
1.005	7.340	40.0	225	Circular_Default Sewer Type	140.958	138.337	2.396	140.939	138.153	2.561
1.006	2.366	12.6	225	Circular_Default Sewer Type	140.939	138.153	2.561	140.927	137.965	2.737

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	2100	Manhole	Adoptable	2	2100	Manhole	Adoptable
2.000	9	2100	Manhole	Adoptable	2	2100	Manhole	Adoptable
1.001	2	2100	Manhole	Adoptable	3	450	Manhole	Adoptable
1.002	3	450	Manhole	Adoptable	4	2100	Manhole	Adoptable
1.003	4	2100	Manhole	Adoptable	5	2100	Manhole	Adoptable
1.004	5	2100	Manhole	Adoptable	6	2400	Manhole	Adoptable
1.005	6	2400	Manhole	Adoptable	7	1200	Manhole	Adoptable
1.006	7	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	423261.463	411081.574	146.391	7.385	2100		0	1.000	139.006	1350
9	423273.513	411092.101	145.292	6.286	2100		0	2.000	139.006	1350
2	423267.488	411086.838	145.826	6.860	2100		1 2 0	2.000 1.000 1.001	138.966 138.966 138.966	1350 1350 1350
3	423248.420	411108.988	144.749	5.929	450		1 0	1.001 1.002	138.820 138.820	1350 1350
4	423226.980	411126.996	143.581	4.901	2100		1 0	1.002 1.003	138.680 138.680	1350 1350
5	423242.743	411145.762	141.947	3.390	2100		1 0	1.003 1.004	138.557 138.557	1350 1350
6	423209.123	411174.001	140.958	2.621	2400		1 0	1.004 1.005	138.337 138.337	1350 225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
7	423201.786	411174.227	140.939	2.786	1200	1	1.005	138.153	225
									
						0	1.006	138.153	225
8	423199.420	411174.202	140.927	2.962	1200	1	1.006	137.965	225
									

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.350	Check Discharge Rate(s)	✓
Winter CV	0.840	Check Discharge Volume	✓
Analysis Speed	Normal	100 year 360 minute (m³)	

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440	2160

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	0	0	0
100	30	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node 6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	138.337	Product Number	CTL-SHE-0076-3500-2000-3500
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Results for 2 year Critical Storm Duration. Lowest mass balance: 95.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	1	228	139.079	0.073	0.8	0.2568	0.0000	OK
240 minute winter	9	228	139.079	0.073	1.9	0.2664	0.0000	OK
240 minute winter	2	228	139.079	0.113	3.2	0.3980	0.0000	OK
240 minute winter	3	228	139.080	0.260	6.0	0.0817	0.0000	OK
240 minute winter	4	228	139.079	0.399	9.8	1.5036	0.0000	OK
240 minute winter	5	232	139.079	0.522	17.2	2.5462	0.0000	OK
240 minute winter	6	232	139.079	0.742	11.0	3.3588	0.0000	SURCHARGED
120 minute winter	7	48	138.176	0.023	2.7	0.0257	0.0000	OK
120 minute winter	8	48	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.000	2	0.6	0.125	0.000	0.3467	
240 minute winter	9	2.000	2	1.9	0.326	0.000	0.3465	
240 minute winter	2	1.001	3	3.0	0.370	0.001	3.6365	
240 minute winter	3	1.002	4	7.1	0.375	0.002	7.6131	
240 minute winter	4	1.003	5	8.8	0.314	0.002	10.5413	
240 minute winter	5	1.004	6	11.0	0.339	0.003	28.8094	
240 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
120 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	49.4

Results for 30 year Critical Storm Duration. Lowest mass balance: 95.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	352	139.441	0.435	1.5	1.5229	0.0000	OK
360 minute winter	9	352	139.441	0.435	2.6	1.5815	0.0000	OK
360 minute winter	2	352	139.441	0.475	4.1	1.6657	0.0000	OK
360 minute winter	3	352	139.440	0.620	5.3	0.1947	0.0000	OK
360 minute winter	4	344	139.440	0.760	5.8	2.8653	0.0000	OK
360 minute winter	5	344	139.440	0.883	12.8	4.3104	0.0000	OK
360 minute winter	6	344	139.440	1.103	8.9	4.9920	0.0000	SURCHARGED
360 minute winter	7	112	138.176	0.023	2.7	0.0257	0.0000	OK
360 minute winter	8	112	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	0.9	0.134	0.000	3.3750	
360 minute winter	9	2.000	2	2.4	0.341	0.001	3.3746	
360 minute winter	2	1.001	3	3.7	0.356	0.001	15.8767	
360 minute winter	3	1.002	4	3.7	0.344	0.001	20.5220	
360 minute winter	4	1.003	5	4.7	0.282	0.001	22.2548	
360 minute winter	5	1.004	6	8.9	0.263	0.002	49.1155	
360 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
360 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	87.2

Results for 100 year Critical Storm Duration. Lowest mass balance: 95.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	352	139.704	0.698	2.7	2.4464	0.0000	OK
360 minute winter	9	352	139.704	0.698	3.4	2.5407	0.0000	OK
360 minute winter	2	352	139.704	0.738	6.6	2.5910	0.0000	OK
360 minute winter	3	352	139.705	0.885	9.9	0.2778	0.0000	OK
360 minute winter	4	352	139.705	1.025	11.9	3.8650	0.0000	OK
360 minute winter	5	352	139.706	1.148	15.4	5.6045	0.0000	OK
360 minute winter	6	352	139.706	1.369	8.4	6.1915	0.0000	SURCHARGED
360 minute winter	7	352	138.177	0.024	2.9	0.0269	0.0000	OK
360 minute winter	8	352	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	-1.9	0.134	0.000	6.1701	
360 minute winter	9	2.000	2	3.4	0.345	0.001	6.1693	
360 minute winter	2	1.001	3	-4.5	0.344	-0.001	26.1408	
360 minute winter	3	1.002	4	-7.1	0.317	-0.002	30.1456	
360 minute winter	4	1.003	5	-5.9	0.308	-0.001	30.0941	
360 minute winter	5	1.004	6	8.4	0.261	0.002	59.6974	
360 minute winter	6	1.005	7	2.9	1.067	0.035	0.0201	
360 minute winter	7	1.006	8	2.9	1.388	0.020	0.0050	94.1

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 95.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	1	450	140.241	1.235	1.3	4.3272	0.0000	OK
600 minute winter	9	450	140.242	1.236	3.0	4.4961	0.0000	OK
720 minute winter	2	525	140.249	1.283	6.5	4.5020	0.0000	OK
600 minute winter	3	450	140.253	1.433	8.8	0.4501	0.0000	SURCHARGED
720 minute winter	4	525	140.252	1.572	6.1	5.9267	0.0000	SURCHARGED
360 minute winter	5	288	140.239	1.682	21.6	8.2067	0.0000	SURCHARGED
600 minute winter	6	450	140.238	1.901	7.0	8.6001	0.0000	SURCHARGED
360 minute winter	7	288	138.179	0.026	3.4	0.0291	0.0000	OK
360 minute winter	8	288	137.989	0.024	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 (m³)	Discharge Vol (m³)
600 minute winter	1	1.000	2	-1.3	0.125	0.000	11.0355	
600 minute winter	9	2.000	2	2.2	0.311	0.001	11.0347	
720 minute winter	2	1.001	3	5.9	0.308	0.001	41.2948	
600 minute winter	3	1.002	4	-7.3	0.299	-0.002	39.9263	
720 minute winter	4	1.003	5	9.0	0.277	0.002	34.9482	
360 minute winter	5	1.004	6	10.6	0.257	0.003	62.6096	
600 minute winter	6	1.005	7	3.4	1.112	0.041	0.0226	
360 minute winter	7	1.006	8	3.4	1.449	0.023	0.0056	103.4

Results for 2 year 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 99.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	139.033	0.027	2.6	0.0941	0.0000	OK
15 minute winter	9	10	139.057	0.051	9.6	0.1841	0.0000	OK
15 minute winter	2	10	139.024	0.058	15.0	0.2049	0.0000	OK
15 minute winter	3	17	138.905	0.085	22.9	0.0268	0.0000	OK
15 minute winter	4	16	138.910	0.230	50.5	0.8677	0.0000	OK
15 minute winter	5	18	138.911	0.354	76.0	1.7253	0.0000	OK
15 minute winter	6	20	138.912	0.575	48.5	2.5990	0.0000	SURCHARGED
15 minute winter	7	148	138.176	0.023	2.7	0.0257	0.0000	OK
15 minute winter	8	147	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	2.6	0.202	0.001	0.1077	
15 minute winter	9	2.000	2	9.6	0.518	0.002	0.1497	
15 minute winter	2	1.001	3	14.8	0.603	0.004	0.7175	
15 minute winter	3	1.002	4	22.3	0.678	0.005	2.6721	
15 minute winter	4	1.003	5	34.0	0.621	0.008	5.4402	
15 minute winter	5	1.004	6	48.5	0.617	0.012	18.8513	
15 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
15 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	33.9

Results for 2 year 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	17	139.030	0.024	2.0	0.0824	0.0000	OK
30 minute winter	9	17	139.050	0.044	7.3	0.1598	0.0000	OK
30 minute winter	2	18	139.018	0.051	11.3	0.1807	0.0000	OK
30 minute winter	3	30	138.973	0.153	17.3	0.0481	0.0000	OK
30 minute winter	4	35	138.977	0.297	45.0	1.1208	0.0000	OK
30 minute winter	5	31	138.976	0.419	60.0	2.0424	0.0000	OK
30 minute winter	6	34	138.974	0.637	38.6	2.8823	0.0000	SURCHARGED
30 minute winter	7	222	138.176	0.023	2.7	0.0257	0.0000	OK
30 minute winter	8	222	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	2	2.0	0.187	0.000	0.0889	
30 minute winter	9	2.000	2	7.3	0.478	0.002	0.1216	
30 minute winter	2	1.001	3	11.3	0.564	0.003	1.3764	
30 minute winter	3	1.002	4	17.2	0.610	0.004	4.4295	
30 minute winter	4	1.003	5	32.3	0.500	0.008	7.2717	
30 minute winter	5	1.004	6	38.6	0.542	0.009	22.5123	
30 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
30 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	40.6

Results for 2 year 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	62	139.028	0.022	1.3	0.0763	0.0000	OK
60 minute winter	9	32	139.042	0.036	4.9	0.1311	0.0000	OK
60 minute winter	2	60	139.027	0.061	7.6	0.2124	0.0000	OK
60 minute winter	3	62	139.027	0.207	14.1	0.0650	0.0000	OK
60 minute winter	4	60	139.031	0.351	33.8	1.3242	0.0000	OK
60 minute winter	5	60	139.025	0.468	41.8	2.2830	0.0000	OK
60 minute winter	6	62	139.029	0.692	26.1	3.1325	0.0000	SURCHARGED
60 minute winter	7	26	138.176	0.023	2.7	0.0257	0.0000	OK
60 minute winter	8	26	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	1	1.000	2	1.3	0.169	0.000	0.1008	
60 minute winter	9	2.000	2	4.9	0.428	0.001	0.1005	
60 minute winter	2	1.001	3	7.6	0.498	0.002	2.3165	
60 minute winter	3	1.002	4	14.1	0.513	0.003	5.9738	
60 minute winter	4	1.003	5	21.3	0.405	0.005	8.9834	
60 minute winter	5	1.004	6	26.1	0.470	0.006	25.7001	
60 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
60 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	43.2

Results for 2 year 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	118	139.068	0.062	1.0	0.2156	0.0000	OK
120 minute winter	9	118	139.067	0.061	3.1	0.2233	0.0000	OK
120 minute winter	2	118	139.066	0.100	4.8	0.3499	0.0000	OK
120 minute winter	3	120	139.066	0.246	12.6	0.0772	0.0000	OK
120 minute winter	4	122	139.065	0.385	15.0	1.4507	0.0000	OK
120 minute winter	5	118	139.067	0.510	22.6	2.4872	0.0000	OK
120 minute winter	6	120	139.067	0.730	21.6	3.3004	0.0000	SURCHARGED
120 minute winter	7	48	138.176	0.023	2.7	0.0257	0.0000	OK
120 minute winter	8	48	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	1	1.000	2	1.2	0.145	0.000	0.2786	
120 minute winter	9	2.000	2	3.1	0.378	0.001	0.2781	
120 minute winter	2	1.001	3	4.8	0.431	0.001	3.2702	
120 minute winter	3	1.002	4	9.2	0.437	0.002	7.1483	
120 minute winter	4	1.003	5	9.1	0.340	0.002	10.1383	
120 minute winter	5	1.004	6	21.6	0.391	0.005	28.0521	
120 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
120 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	49.4

Results for 2 year 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 99.46%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	172	139.075	0.069	1.5	0.2421	0.0000	OK
180 minute winter	9	172	139.075	0.069	2.4	0.2521	0.0000	OK
180 minute winter	2	176	139.076	0.110	3.7	0.3846	0.0000	OK
180 minute winter	3	176	139.076	0.256	5.7	0.0803	0.0000	OK
180 minute winter	4	172	139.076	0.396	8.5	1.4930	0.0000	OK
180 minute winter	5	172	139.076	0.519	22.6	2.5307	0.0000	OK
180 minute winter	6	176	139.076	0.739	14.1	3.3423	0.0000	SURCHARGED
180 minute winter	7	72	138.176	0.023	2.7	0.0257	0.0000	OK
180 minute winter	8	72	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1	1.000	2	-1.2	0.130	0.000	0.3252	
180 minute winter	9	2.000	2	2.4	0.352	0.001	0.3253	
180 minute winter	2	1.001	3	3.7	0.396	0.001	3.5298	
180 minute winter	3	1.002	4	5.4	0.394	0.001	7.4896	
180 minute winter	4	1.003	5	12.6	0.324	0.003	10.4506	
180 minute winter	5	1.004	6	14.1	0.369	0.003	28.5985	
180 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
180 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	56.9

Results for 2 year 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 99.52%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	1	228	139.079	0.073	0.8	0.2568	0.0000	OK
240 minute winter	9	228	139.079	0.073	1.9	0.2664	0.0000	OK
240 minute winter	2	228	139.079	0.113	3.2	0.3980	0.0000	OK
240 minute winter	3	228	139.080	0.260	6.0	0.0817	0.0000	OK
240 minute winter	4	228	139.079	0.399	9.8	1.5036	0.0000	OK
240 minute winter	5	232	139.079	0.522	17.2	2.5462	0.0000	OK
240 minute winter	6	232	139.079	0.742	11.0	3.3588	0.0000	SURCHARGED
240 minute winter	7	96	138.176	0.023	2.7	0.0257	0.0000	OK
240 minute winter	8	96	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.000	2	0.6	0.125	0.000	0.3467	
240 minute winter	9	2.000	2	1.9	0.326	0.000	0.3465	
240 minute winter	2	1.001	3	3.0	0.370	0.001	3.6365	
240 minute winter	3	1.002	4	7.1	0.375	0.002	7.6131	
240 minute winter	4	1.003	5	8.8	0.314	0.002	10.5413	
240 minute winter	5	1.004	6	11.0	0.339	0.003	28.8094	
240 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
240 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	64.5

Results for 2 year 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 99.49%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	304	139.066	0.060	0.7	0.2095	0.0000	OK
360 minute winter	9	304	139.066	0.060	1.5	0.2179	0.0000	OK
360 minute winter	2	304	139.066	0.100	2.3	0.3514	0.0000	OK
360 minute winter	3	296	139.065	0.245	4.1	0.0770	0.0000	OK
360 minute winter	4	296	139.066	0.386	5.8	1.4554	0.0000	OK
360 minute winter	5	296	139.066	0.509	11.5	2.4828	0.0000	OK
360 minute winter	6	304	139.066	0.729	9.7	3.2958	0.0000	SURCHARGED
360 minute winter	7	152	138.176	0.023	2.7	0.0257	0.0000	OK
360 minute winter	8	152	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	-0.5	0.117	0.000	0.2755	
360 minute winter	9	2.000	2	1.5	0.302	0.000	0.2757	
360 minute winter	2	1.001	3	2.3	0.340	0.001	3.2672	
360 minute winter	3	1.002	4	3.4	0.347	0.001	7.1747	
360 minute winter	4	1.003	5	5.3	0.304	0.001	10.1426	
360 minute winter	5	1.004	6	9.7	0.273	0.002	28.0222	
360 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
360 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	79.4

Results for 2 year 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	376	139.053	0.047	0.6	0.1659	0.0000	OK
480 minute winter	9	376	139.054	0.048	1.2	0.1729	0.0000	OK
480 minute winter	2	368	139.054	0.088	1.8	0.3075	0.0000	OK
480 minute winter	3	368	139.054	0.234	2.8	0.0733	0.0000	OK
480 minute winter	4	376	139.053	0.373	5.5	1.4076	0.0000	OK
480 minute winter	5	376	139.054	0.497	7.9	2.4234	0.0000	OK
480 minute winter	6	376	139.054	0.717	8.9	3.2417	0.0000	SURCHARGED
480 minute winter	7	200	138.176	0.023	2.7	0.0257	0.0000	OK
480 minute winter	8	200	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1	1.000	2	0.5	0.106	0.000	0.2140	
480 minute winter	9	2.000	2	1.2	0.283	0.000	0.2143	
480 minute winter	2	1.001	3	1.8	0.313	0.000	2.9645	
480 minute winter	3	1.002	4	2.7	0.337	0.001	6.7928	
480 minute winter	4	1.003	5	3.5	0.300	0.001	9.7621	
480 minute winter	5	1.004	6	8.9	0.241	0.002	27.3262	
480 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
480 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	94.4

Results for 2 year 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	1	450	139.043	0.037	0.4	0.1302	0.0000	OK
600 minute winter	9	450	139.043	0.037	1.0	0.1352	0.0000	OK
600 minute winter	2	465	139.043	0.077	1.6	0.2693	0.0000	OK
600 minute winter	3	450	139.043	0.223	2.4	0.0700	0.0000	OK
600 minute winter	4	450	139.043	0.363	6.4	1.3684	0.0000	OK
600 minute winter	5	450	139.043	0.486	8.5	2.3710	0.0000	OK
600 minute winter	6	450	139.043	0.706	6.6	3.1937	0.0000	SURCHARGED
600 minute winter	7	825	138.176	0.023	2.7	0.0257	0.0000	OK
600 minute winter	8	825	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	1	1.000	2	0.5	0.106	0.000	0.1687	
600 minute winter	9	2.000	2	1.0	0.261	0.000	0.1687	
600 minute winter	2	1.001	3	1.6	0.311	0.000	2.7138	
600 minute winter	3	1.002	4	3.0	0.322	0.001	6.4713	
600 minute winter	4	1.003	5	4.4	0.279	0.001	9.4385	
600 minute winter	5	1.004	6	6.6	0.149	0.002	26.7080	
600 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
600 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	108.5

Results for 2 year 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	525	139.018	0.012	0.2	0.0432	0.0000	OK
720 minute winter	9	375	139.022	0.016	0.9	0.0587	0.0000	OK
720 minute winter	2	525	139.018	0.052	1.4	0.1840	0.0000	OK
720 minute winter	3	540	139.018	0.198	2.1	0.0622	0.0000	OK
720 minute winter	4	525	139.019	0.338	6.0	1.2761	0.0000	OK
720 minute winter	5	525	139.019	0.462	8.0	2.2522	0.0000	OK
720 minute winter	6	540	139.018	0.681	6.7	3.0824	0.0000	SURCHARGED
720 minute winter	7	315	138.176	0.023	2.7	0.0257	0.0000	OK
720 minute winter	8	315	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	1	1.000	2	0.2	0.093	0.000	0.0790	
720 minute winter	9	2.000	2	0.9	0.254	0.000	0.0790	
720 minute winter	2	1.001	3	1.4	0.296	0.000	2.1486	
720 minute winter	3	1.002	4	3.0	0.314	0.001	5.7245	
720 minute winter	4	1.003	5	4.1	0.284	0.001	8.7013	
720 minute winter	5	1.004	6	6.7	0.161	0.002	25.2827	
720 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
720 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	121.3

Results for 2 year 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	435	139.013	0.007	0.2	0.0259	0.0000	OK
960 minute winter	9	465	139.020	0.014	0.7	0.0518	0.0000	OK
960 minute winter	2	465	138.984	0.018	1.1	0.0625	0.0000	OK
960 minute winter	3	660	138.976	0.156	1.7	0.0489	0.0000	OK
960 minute winter	4	660	138.975	0.295	2.8	1.1127	0.0000	OK
960 minute winter	5	660	138.975	0.418	6.3	2.0415	0.0000	OK
960 minute winter	6	660	138.975	0.638	5.2	2.8854	0.0000	SURCHARGED
960 minute winter	7	435	138.176	0.023	2.7	0.0257	0.0000	OK
960 minute winter	8	435	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	1	1.000	2	0.2	0.095	0.000	0.0184	
960 minute winter	9	2.000	2	0.7	0.233	0.000	0.0242	
960 minute winter	2	1.001	3	1.1	0.272	0.000	1.3590	
960 minute winter	3	1.002	4	2.2	0.302	0.001	4.4925	
960 minute winter	4	1.003	5	3.1	0.272	0.001	7.4242	
960 minute winter	5	1.004	6	5.2	0.142	0.001	22.8068	
960 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
960 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	133.0

Results for 2 year 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1	480	139.011	0.005	0.1	0.0178	0.0000	OK
1440 minute winter	9	690	139.018	0.012	0.5	0.0436	0.0000	OK
1440 minute winter	2	720	138.981	0.015	0.8	0.0534	0.0000	OK
1440 minute winter	3	930	138.865	0.045	1.3	0.0140	0.0000	OK
1440 minute winter	4	930	138.865	0.185	2.0	0.6980	0.0000	OK
1440 minute winter	5	930	138.864	0.307	4.2	1.5000	0.0000	OK
1440 minute winter	6	930	138.865	0.528	4.5	2.3892	0.0000	SURCHARGED
1440 minute winter	7	1170	138.176	0.023	2.7	0.0257	0.0000	OK
1440 minute winter	8	1170	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	1	1.000	2	0.1	0.082	0.000	0.0142	
1440 minute winter	9	2.000	2	0.5	0.216	0.000	0.0195	
1440 minute winter	2	1.001	3	0.8	0.247	0.000	0.2328	
1440 minute winter	3	1.002	4	1.3	0.277	0.000	1.8355	
1440 minute winter	4	1.003	5	1.9	0.264	0.000	4.4250	
1440 minute winter	5	1.004	6	4.5	0.098	0.001	16.6988	
1440 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
1440 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	147.1

Results for 2 year 2160 minute winter. 2400 minute analysis at 60 minute timestep. Mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	1	840	139.011	0.005	0.1	0.0178	0.0000	OK
2160 minute winter	9	1080	139.017	0.011	0.4	0.0389	0.0000	OK
2160 minute winter	2	1080	138.979	0.013	0.6	0.0462	0.0000	OK
2160 minute winter	3	1080	138.836	0.016	0.9	0.0051	0.0000	OK
2160 minute winter	4	1080	138.700	0.020	1.4	0.0755	0.0000	OK
2160 minute winter	5	1260	138.694	0.137	3.2	0.6668	0.0000	OK
2160 minute winter	6	1260	138.694	0.357	3.5	1.6132	0.0000	SURCHARGED
2160 minute winter	7	1260	138.176	0.023	2.7	0.0257	0.0000	OK
2160 minute winter	8	1260	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	1	1.000	2	0.1	0.081	0.000	0.0122	
2160 minute winter	9	2.000	2	0.4	0.195	0.000	0.0164	
2160 minute winter	2	1.001	3	0.6	0.225	0.000	0.0783	
2160 minute winter	3	1.002	4	0.9	0.254	0.000	0.0996	
2160 minute winter	4	1.003	5	1.4	0.260	0.000	0.9681	
2160 minute winter	5	1.004	6	3.5	0.081	0.001	8.2506	
2160 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
2160 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	168.0

Results for 30 year 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	22	139.105	0.099	5.8	0.3467	0.0000	OK
15 minute winter	9	22	139.106	0.100	18.2	0.3638	0.0000	OK
15 minute winter	2	19	139.101	0.135	28.5	0.4746	0.0000	OK
15 minute winter	3	16	139.103	0.283	50.8	0.0888	0.0000	OK
15 minute winter	4	23	139.110	0.430	78.0	1.6197	0.0000	OK
15 minute winter	5	17	139.114	0.557	112.0	2.7172	0.0000	OK
15 minute winter	6	20	139.105	0.768	101.6	3.4761	0.0000	SURCHARGED
15 minute winter	7	8	138.176	0.023	2.7	0.0256	0.0000	OK
15 minute winter	8	8	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	5.0	0.241	0.001	0.4797	
15 minute winter	9	2.000	2	18.2	0.599	0.004	0.4827	
15 minute winter	2	1.001	3	28.0	0.730	0.007	4.1396	
15 minute winter	3	1.002	4	42.6	0.712	0.010	8.1759	
15 minute winter	4	1.003	5	62.5	0.630	0.015	11.1567	
15 minute winter	5	1.004	6	101.6	0.704	0.025	30.0991	
15 minute winter	6	1.005	7	2.7	1.042	0.032	0.0188	
15 minute winter	7	1.006	8	2.7	1.354	0.018	0.0046	34.8

Results for 30 year 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	33	139.203	0.197	7.8	0.6908	0.0000	OK
30 minute winter	9	33	139.206	0.200	14.0	0.7272	0.0000	OK
30 minute winter	2	33	139.203	0.237	33.4	0.8330	0.0000	OK
30 minute winter	3	39	139.197	0.377	48.8	0.1184	0.0000	OK
30 minute winter	4	32	139.205	0.525	57.7	1.9791	0.0000	OK
30 minute winter	5	34	139.201	0.644	100.4	3.1423	0.0000	OK
30 minute winter	6	38	139.200	0.863	44.1	3.9026	0.0000	SURCHARGED
30 minute winter	7	12	138.176	0.023	2.7	0.0257	0.0000	OK
30 minute winter	8	12	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	2	-6.6	0.228	-0.002	1.1868	
30 minute winter	9	2.000	2	13.9	0.564	0.003	1.1973	
30 minute winter	2	1.001	3	21.5	0.660	0.005	7.1247	
30 minute winter	3	1.002	4	43.6	0.626	0.011	11.5812	
30 minute winter	4	1.003	5	52.4	0.500	0.013	14.4572	
30 minute winter	5	1.004	6	44.1	0.626	0.011	35.7143	
30 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
30 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	35.8

Results for 30 year 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	62	139.295	0.289	6.0	1.0139	0.0000	OK
60 minute winter	9	62	139.295	0.289	9.3	1.0532	0.0000	OK
60 minute winter	2	62	139.295	0.329	17.6	1.1552	0.0000	OK
60 minute winter	3	62	139.292	0.472	35.9	0.1483	0.0000	OK
60 minute winter	4	61	139.295	0.615	44.3	2.3174	0.0000	OK
60 minute winter	5	63	139.295	0.738	63.2	3.6023	0.0000	OK
60 minute winter	6	63	139.294	0.957	35.9	4.3304	0.0000	SURCHARGED
60 minute winter	7	20	138.176	0.023	2.7	0.0257	0.0000	OK
60 minute winter	8	20	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	1	1.000	2	5.4	0.199	0.001	1.9687	
60 minute winter	9	2.000	2	9.5	0.509	0.002	1.9689	
60 minute winter	2	1.001	3	15.2	0.562	0.004	10.4168	
60 minute winter	3	1.002	4	25.1	0.505	0.006	15.0521	
60 minute winter	4	1.003	5	23.0	0.417	0.006	17.4856	
60 minute winter	5	1.004	6	35.9	0.545	0.009	41.2669	
60 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
60 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	41.7

Results for 30 year 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	118	139.379	0.373	6.1	1.3082	0.0000	OK
120 minute winter	9	118	139.379	0.373	5.8	1.3586	0.0000	OK
120 minute winter	2	118	139.379	0.413	11.6	1.4504	0.0000	OK
120 minute winter	3	120	139.380	0.560	17.9	0.1758	0.0000	OK
120 minute winter	4	120	139.380	0.700	27.6	2.6378	0.0000	OK
120 minute winter	5	120	139.379	0.822	35.2	4.0101	0.0000	OK
120 minute winter	6	122	139.380	1.043	21.4	4.7171	0.0000	SURCHARGED
120 minute winter	7	36	138.176	0.023	2.7	0.0257	0.0000	OK
120 minute winter	8	36	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	1	1.000	2	-4.5	0.174	-0.001	2.7620	
120 minute winter	9	2.000	2	6.5	0.438	0.002	2.7616	
120 minute winter	2	1.001	3	8.0	0.462	0.002	13.5558	
120 minute winter	3	1.002	4	11.1	0.412	0.003	18.2699	
120 minute winter	4	1.003	5	-17.7	0.355	-0.004	20.2853	
120 minute winter	5	1.004	6	21.4	0.452	0.005	45.9150	
120 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
120 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	51.8

Results for 30 year 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	176	139.416	0.410	3.5	1.4353	0.0000	OK
180 minute winter	9	176	139.416	0.410	4.4	1.4905	0.0000	OK
180 minute winter	2	176	139.416	0.450	6.3	1.5782	0.0000	OK
180 minute winter	3	176	139.416	0.596	8.8	0.1872	0.0000	OK
180 minute winter	4	176	139.416	0.736	19.3	2.7751	0.0000	OK
180 minute winter	5	176	139.416	0.859	27.3	4.1921	0.0000	OK
180 minute winter	6	176	139.416	1.079	13.4	4.8818	0.0000	SURCHARGED
180 minute winter	7	52	138.176	0.023	2.7	0.0257	0.0000	OK
180 minute winter	8	52	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1	1.000	2	-2.3	0.155	-0.001	3.1222	
180 minute winter	9	2.000	2	4.0	0.397	0.001	3.1218	
180 minute winter	2	1.001	3	5.7	0.408	0.001	14.9430	
180 minute winter	3	1.002	4	6.0	0.371	0.001	19.6331	
180 minute winter	4	1.003	5	-13.3	0.327	-0.003	21.4809	
180 minute winter	5	1.004	6	13.4	0.417	0.003	47.8633	
180 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
180 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	61.1

Results for 30 year 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	1	236	139.435	0.428	1.5	1.5014	0.0000	OK
240 minute winter	9	236	139.435	0.428	3.5	1.5592	0.0000	OK
240 minute winter	2	236	139.434	0.468	6.3	1.6442	0.0000	OK
240 minute winter	3	236	139.434	0.614	14.2	0.1927	0.0000	OK
240 minute winter	4	232	139.434	0.754	11.4	2.8416	0.0000	OK
240 minute winter	5	232	139.434	0.877	20.1	4.2789	0.0000	OK
240 minute winter	6	236	139.434	1.097	14.7	4.9619	0.0000	SURCHARGED
240 minute winter	7	68	138.176	0.023	2.7	0.0257	0.0000	OK
240 minute winter	8	68	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.000	2	1.0	0.144	0.000	3.3127	
240 minute winter	9	2.000	2	3.6	0.378	0.001	3.3123	
240 minute winter	2	1.001	3	4.7	0.384	0.001	15.6362	
240 minute winter	3	1.002	4	-10.6	0.360	-0.003	20.2853	
240 minute winter	4	1.003	5	7.8	0.311	0.002	22.0508	
240 minute winter	5	1.004	6	14.7	0.384	0.004	48.7778	
240 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
240 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	70.2

Results for 30 year 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	352	139.441	0.435	1.5	1.5229	0.0000	OK
360 minute winter	9	352	139.441	0.435	2.6	1.5815	0.0000	OK
360 minute winter	2	352	139.441	0.475	4.1	1.6657	0.0000	OK
360 minute winter	3	352	139.440	0.620	5.3	0.1947	0.0000	OK
360 minute winter	4	344	139.440	0.760	5.8	2.8653	0.0000	OK
360 minute winter	5	344	139.440	0.883	12.8	4.3104	0.0000	OK
360 minute winter	6	344	139.440	1.103	8.9	4.9920	0.0000	SURCHARGED
360 minute winter	7	112	138.176	0.023	2.7	0.0257	0.0000	OK
360 minute winter	8	112	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	0.9	0.134	0.000	3.3750	
360 minute winter	9	2.000	2	2.4	0.341	0.001	3.3746	
360 minute winter	2	1.001	3	3.7	0.356	0.001	15.8767	
360 minute winter	3	1.002	4	3.7	0.344	0.001	20.5220	
360 minute winter	4	1.003	5	4.7	0.282	0.001	22.2548	
360 minute winter	5	1.004	6	8.9	0.263	0.002	49.1155	
360 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
360 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	87.2

Results for 30 year 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	456	139.430	0.424	1.1	1.4855	0.0000	OK
480 minute winter	9	456	139.430	0.424	2.1	1.5428	0.0000	OK
480 minute winter	2	456	139.430	0.464	3.8	1.6284	0.0000	OK
480 minute winter	3	456	139.430	0.610	5.5	0.1914	0.0000	OK
480 minute winter	4	448	139.430	0.749	7.1	2.8256	0.0000	OK
480 minute winter	5	448	139.430	0.873	11.3	4.2586	0.0000	OK
480 minute winter	6	448	139.430	1.093	6.6	4.9438	0.0000	SURCHARGED
480 minute winter	7	160	138.176	0.023	2.7	0.0257	0.0000	OK
480 minute winter	8	160	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1	1.000	2	0.7	0.124	0.000	3.2669	
480 minute winter	9	2.000	2	2.0	0.326	0.001	3.2665	
480 minute winter	2	1.001	3	2.9	0.335	0.001	15.4749	
480 minute winter	3	1.002	4	-3.7	0.333	-0.001	20.1354	
480 minute winter	4	1.003	5	-4.3	0.266	-0.001	21.9154	
480 minute winter	5	1.004	6	6.6	0.254	0.002	48.5707	
480 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
480 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	104.0

Results for 30 year 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	1	495	139.413	0.407	0.6	1.4251	0.0000	OK
600 minute winter	9	495	139.413	0.407	1.8	1.4800	0.0000	OK
600 minute winter	2	495	139.413	0.447	2.6	1.5679	0.0000	OK
600 minute winter	3	495	139.413	0.593	3.8	0.1861	0.0000	OK
600 minute winter	4	495	139.413	0.733	5.5	2.7625	0.0000	OK
600 minute winter	5	495	139.413	0.856	10.2	4.1761	0.0000	OK
600 minute winter	6	495	139.413	1.076	10.2	4.8668	0.0000	SURCHARGED
600 minute winter	7	210	138.176	0.023	2.7	0.0257	0.0000	OK
600 minute winter	8	210	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	1	1.000	2	0.4	0.115	0.000	3.0929	
600 minute winter	9	2.000	2	1.9	0.302	0.000	3.0925	
600 minute winter	2	1.001	3	2.3	0.325	0.001	14.8216	
600 minute winter	3	1.002	4	2.8	0.319	0.001	19.5064	
600 minute winter	4	1.003	5	4.9	0.279	0.001	21.3736	
600 minute winter	5	1.004	6	10.2	0.162	0.003	47.6920	
600 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
600 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	119.6

Results for 30 year 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	570	139.402	0.396	1.4	1.3874	0.0000	OK
720 minute winter	9	570	139.402	0.396	1.6	1.4408	0.0000	OK
720 minute winter	2	570	139.402	0.436	2.4	1.5301	0.0000	OK
720 minute winter	3	570	139.402	0.582	3.6	0.1826	0.0000	OK
720 minute winter	4	570	139.401	0.721	4.9	2.7195	0.0000	OK
720 minute winter	5	570	139.401	0.844	9.2	4.1198	0.0000	OK
720 minute winter	6	585	139.401	1.064	7.4	4.8142	0.0000	SURCHARGED
720 minute winter	7	255	138.176	0.023	2.7	0.0257	0.0000	OK
720 minute winter	8	255	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	1	1.000	2	-1.0	0.117	0.000	2.9856	
720 minute winter	9	2.000	2	1.5	0.293	0.000	2.9852	
720 minute winter	2	1.001	3	2.2	0.306	0.001	14.4066	
720 minute winter	3	1.002	4	2.7	0.322	0.001	19.0853	
720 minute winter	4	1.003	5	4.1	0.280	0.001	21.0025	
720 minute winter	5	1.004	6	7.4	0.163	0.002	47.0850	
720 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
720 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	134.6

Results for 30 year 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	735	139.367	0.361	0.4	1.2660	0.0000	OK
960 minute winter	9	735	139.367	0.361	1.3	1.3148	0.0000	OK
960 minute winter	2	735	139.367	0.401	1.8	1.4086	0.0000	OK
960 minute winter	3	735	139.367	0.547	2.8	0.1718	0.0000	OK
960 minute winter	4	735	139.367	0.687	4.5	2.5904	0.0000	OK
960 minute winter	5	735	139.367	0.810	8.1	3.9531	0.0000	OK
960 minute winter	6	735	139.367	1.030	6.0	4.6598	0.0000	SURCHARGED
960 minute winter	7	360	138.176	0.023	2.7	0.0257	0.0000	OK
960 minute winter	8	360	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	1	1.000	2	0.3	0.105	0.000	2.6454	
960 minute winter	9	2.000	2	1.2	0.283	0.000	2.6451	
960 minute winter	2	1.001	3	1.8	0.309	0.000	13.1081	
960 minute winter	3	1.002	4	2.4	0.314	0.001	17.8005	
960 minute winter	4	1.003	5	3.8	0.272	0.001	19.8893	
960 minute winter	5	1.004	6	6.0	0.161	0.001	45.2615	
960 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
960 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	161.9

Results for 30 year 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1	1050	139.300	0.294	0.3	1.0302	0.0000	OK
1440 minute winter	9	1050	139.300	0.294	0.9	1.0699	0.0000	OK
1440 minute winter	2	1050	139.300	0.334	1.5	1.1723	0.0000	OK
1440 minute winter	3	1050	139.300	0.480	2.1	0.1507	0.0000	OK
1440 minute winter	4	1050	139.300	0.620	3.5	2.3361	0.0000	OK
1440 minute winter	5	1050	139.300	0.743	6.1	3.6238	0.0000	OK
1440 minute winter	6	1050	139.300	0.963	5.0	4.3544	0.0000	SURCHARGED
1440 minute winter	7	570	138.176	0.023	2.7	0.0257	0.0000	OK
1440 minute winter	8	570	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	1	1.000	2	0.3	0.094	0.000	2.0122	
1440 minute winter	9	2.000	2	0.9	0.254	0.000	2.0120	
1440 minute winter	2	1.001	3	1.4	0.283	0.000	10.6428	
1440 minute winter	3	1.002	4	2.2	0.296	0.001	15.2975	
1440 minute winter	4	1.003	5	2.6	0.262	0.001	17.6772	
1440 minute winter	5	1.004	6	5.0	0.109	0.001	41.5369	
1440 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
1440 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	208.5

Results for 30 year 2160 minute winter. 2400 minute analysis at 60 minute timestep. Mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	1	1500	139.208	0.202	0.2	0.7069	0.0000	OK
2160 minute winter	9	1500	139.208	0.202	0.7	0.7342	0.0000	OK
2160 minute winter	2	1500	139.208	0.242	1.1	0.8485	0.0000	OK
2160 minute winter	3	1500	139.208	0.388	1.7	0.1217	0.0000	OK
2160 minute winter	4	1500	139.208	0.528	2.3	1.9894	0.0000	OK
2160 minute winter	5	1500	139.208	0.651	5.0	3.1753	0.0000	OK
2160 minute winter	6	1500	139.208	0.871	3.8	3.9389	0.0000	SURCHARGED
2160 minute winter	7	2340	138.176	0.023	2.7	0.0257	0.0000	OK
2160 minute winter	8	2340	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	1	1.000	2	0.2	0.095	0.000	1.2229	
2160 minute winter	9	2.000	2	0.7	0.233	0.000	1.2227	
2160 minute winter	2	1.001	3	1.1	0.266	0.000	7.4663	
2160 minute winter	3	1.002	4	1.5	0.266	0.000	11.9631	
2160 minute winter	4	1.003	5	2.2	0.263	0.001	14.6640	
2160 minute winter	5	1.004	6	3.8	0.085	0.001	36.2892	
2160 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
2160 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	279.4

Results for 100 year 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 99.66%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	19	139.201	0.195	12.5	0.6833	0.0000	OK
15 minute winter	9	17	139.203	0.197	23.6	0.7151	0.0000	OK
15 minute winter	2	19	139.200	0.234	44.5	0.8224	0.0000	OK
15 minute winter	3	25	139.205	0.385	77.4	0.1208	0.0000	OK
15 minute winter	4	17	139.204	0.523	81.5	1.9735	0.0000	OK
15 minute winter	5	20	139.204	0.647	183.2	3.1593	0.0000	OK
15 minute winter	6	18	139.203	0.866	62.4	3.9170	0.0000	SURCHARGED
15 minute winter	7	7	138.176	0.023	2.7	0.0257	0.0000	OK
15 minute winter	8	7	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	9.3	0.232	0.002	1.1662	
15 minute winter	9	2.000	2	23.6	0.635	0.006	1.1568	
15 minute winter	2	1.001	3	44.8	0.755	0.011	7.1974	
15 minute winter	3	1.002	4	49.5	0.750	0.012	11.6031	
15 minute winter	4	1.003	5	69.6	0.662	0.017	14.4266	
15 minute winter	5	1.004	6	62.4	0.740	0.015	35.8830	
15 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
15 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	33.8

Results for 100 year 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	35	139.330	0.324	13.0	1.1367	0.0000	OK
30 minute winter	9	35	139.331	0.324	18.3	1.1807	0.0000	OK
30 minute winter	2	35	139.330	0.364	54.0	1.2774	0.0000	OK
30 minute winter	3	32	139.328	0.508	66.1	0.1595	0.0000	OK
30 minute winter	4	34	139.329	0.649	95.3	2.4460	0.0000	OK
30 minute winter	5	36	139.329	0.772	146.3	3.7677	0.0000	OK
30 minute winter	6	31	139.328	0.991	68.1	4.4852	0.0000	SURCHARGED
30 minute winter	7	11	138.176	0.023	2.7	0.0257	0.0000	OK
30 minute winter	8	11	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	2	-10.5	0.240	-0.003	2.2911	
30 minute winter	9	2.000	2	18.2	0.603	0.004	2.2910	
30 minute winter	2	1.001	3	-31.8	0.663	-0.008	11.6169	
30 minute winter	3	1.002	4	52.0	0.630	0.013	16.2257	
30 minute winter	4	1.003	5	66.7	0.520	0.016	18.6264	
30 minute winter	5	1.004	6	68.1	0.649	0.017	43.0274	
30 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
30 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	38.2

Results for 100 year 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	62	139.459	0.453	10.0	1.5883	0.0000	OK
60 minute winter	9	62	139.459	0.453	12.2	1.6495	0.0000	OK
60 minute winter	2	62	139.459	0.493	28.3	1.7318	0.0000	OK
60 minute winter	3	62	139.460	0.640	31.0	0.2009	0.0000	OK
60 minute winter	4	63	139.460	0.780	53.8	2.9423	0.0000	OK
60 minute winter	5	63	139.460	0.903	75.3	4.4088	0.0000	OK
60 minute winter	6	61	139.461	1.124	51.3	5.0860	0.0000	SURCHARGED
60 minute winter	7	17	138.176	0.023	2.7	0.0257	0.0000	OK
60 minute winter	8	17	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	1	1.000	2	-6.8	0.210	-0.002	3.5673	
60 minute winter	9	2.000	2	11.9	0.530	0.003	3.5667	
60 minute winter	2	1.001	3	-21.1	0.556	-0.005	16.6216	
60 minute winter	3	1.002	4	-24.3	0.491	-0.006	21.2378	
60 minute winter	4	1.003	5	-38.6	0.446	-0.009	22.9049	
60 minute winter	5	1.004	6	51.3	0.563	0.013	50.0526	
60 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
60 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	44.8

Results for 100 year 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	120	139.587	0.581	5.5	2.0350	0.0000	OK
120 minute winter	9	120	139.587	0.581	7.7	2.1134	0.0000	OK
120 minute winter	2	120	139.587	0.621	11.4	2.1788	0.0000	OK
120 minute winter	3	122	139.587	0.767	21.7	0.2407	0.0000	OK
120 minute winter	4	120	139.587	0.907	36.3	3.4196	0.0000	OK
120 minute winter	5	120	139.587	1.030	42.0	5.0279	0.0000	OK
120 minute winter	6	120	139.587	1.250	25.7	5.6554	0.0000	SURCHARGED
120 minute winter	7	120	138.176	0.023	2.8	0.0263	0.0000	OK
120 minute winter	8	120	137.987	0.022	2.8	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	1	1.000	2	-3.4	0.181	-0.001	4.9078	
120 minute winter	9	2.000	2	8.0	0.455	0.002	4.9072	
120 minute winter	2	1.001	3	9.2	0.451	0.002	21.5687	
120 minute winter	3	1.002	4	-14.6	0.402	-0.004	25.9701	
120 minute winter	4	1.003	5	22.0	0.388	0.005	26.8075	
120 minute winter	5	1.004	6	25.7	0.480	0.006	55.9240	
120 minute winter	6	1.005	7	2.8	1.055	0.034	0.0195	
120 minute winter	7	1.006	8	2.8	1.372	0.019	0.0048	55.9

Results for 100 year 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	180	139.649	0.643	2.5	2.2522	0.0000	OK
180 minute winter	9	180	139.649	0.643	5.7	2.3390	0.0000	OK
180 minute winter	2	180	139.649	0.683	8.5	2.3964	0.0000	OK
180 minute winter	3	180	139.648	0.828	14.1	0.2601	0.0000	OK
180 minute winter	4	180	139.648	0.968	19.3	3.6508	0.0000	OK
180 minute winter	5	180	139.649	1.092	29.3	5.3270	0.0000	OK
180 minute winter	6	180	139.649	1.312	14.2	5.9349	0.0000	SURCHARGED
180 minute winter	7	180	138.177	0.024	2.9	0.0266	0.0000	OK
180 minute winter	8	180	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1	1.000	2	1.6	0.162	0.000	5.5735	
180 minute winter	9	2.000	2	4.7	0.403	0.001	5.5728	
180 minute winter	2	1.001	3	-6.9	0.402	-0.002	23.9853	
180 minute winter	3	1.002	4	-9.7	0.371	-0.002	28.1824	
180 minute winter	4	1.003	5	10.0	0.351	0.002	28.5669	
180 minute winter	5	1.004	6	14.2	0.442	0.003	58.1934	
180 minute winter	6	1.005	7	2.9	1.061	0.035	0.0199	
180 minute winter	7	1.006	8	2.9	1.380	0.019	0.0049	65.9

Results for 100 year 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	1	232	139.681	0.675	1.7	2.3643	0.0000	OK
240 minute winter	9	232	139.681	0.675	4.6	2.4553	0.0000	OK
240 minute winter	2	232	139.681	0.715	7.3	2.5086	0.0000	OK
240 minute winter	3	236	139.681	0.861	12.3	0.2703	0.0000	OK
240 minute winter	4	236	139.682	1.002	14.2	3.7761	0.0000	OK
240 minute winter	5	236	139.682	1.125	20.9	5.4902	0.0000	OK
240 minute winter	6	236	139.682	1.345	13.8	6.0860	0.0000	SURCHARGED
240 minute winter	7	236	138.177	0.024	2.9	0.0268	0.0000	OK
240 minute winter	8	236	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.000	2	1.0	0.152	0.000	5.9177	
240 minute winter	9	2.000	2	4.1	0.381	0.001	5.9170	
240 minute winter	2	1.001	3	4.9	0.379	0.001	25.2240	
240 minute winter	3	1.002	4	-8.7	0.344	-0.002	29.3327	
240 minute winter	4	1.003	5	-8.1	0.326	-0.002	29.4778	
240 minute winter	5	1.004	6	13.8	0.399	0.003	59.1657	
240 minute winter	6	1.005	7	2.9	1.065	0.035	0.0200	
240 minute winter	7	1.006	8	2.9	1.385	0.020	0.0049	75.7

Results for 100 year 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 99.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	352	139.704	0.698	2.7	2.4464	0.0000	OK
360 minute winter	9	352	139.704	0.698	3.4	2.5407	0.0000	OK
360 minute winter	2	352	139.704	0.738	6.6	2.5910	0.0000	OK
360 minute winter	3	352	139.705	0.885	9.9	0.2778	0.0000	OK
360 minute winter	4	352	139.705	1.025	11.9	3.8650	0.0000	OK
360 minute winter	5	352	139.706	1.148	15.4	5.6045	0.0000	OK
360 minute winter	6	352	139.706	1.369	8.4	6.1915	0.0000	SURCHARGED
360 minute winter	7	352	138.177	0.024	2.9	0.0269	0.0000	OK
360 minute winter	8	352	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	-1.9	0.134	0.000	6.1701	
360 minute winter	9	2.000	2	3.4	0.345	0.001	6.1693	
360 minute winter	2	1.001	3	-4.5	0.344	-0.001	26.1408	
360 minute winter	3	1.002	4	-7.1	0.317	-0.002	30.1456	
360 minute winter	4	1.003	5	-5.9	0.308	-0.001	30.0941	
360 minute winter	5	1.004	6	8.4	0.261	0.002	59.6974	
360 minute winter	6	1.005	7	2.9	1.067	0.035	0.0201	
360 minute winter	7	1.006	8	2.9	1.388	0.020	0.0050	94.1

Results for 100 year 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	464	139.699	0.693	1.0	2.4284	0.0000	OK
480 minute winter	9	464	139.699	0.693	2.7	2.5220	0.0000	OK
480 minute winter	2	464	139.699	0.733	4.2	2.5729	0.0000	OK
480 minute winter	3	464	139.699	0.879	6.2	0.2759	0.0000	OK
480 minute winter	4	464	139.698	1.018	7.1	3.8394	0.0000	OK
480 minute winter	5	464	139.698	1.141	13.5	5.5692	0.0000	OK
480 minute winter	6	456	139.698	1.361	7.7	6.1580	0.0000	SURCHARGED
480 minute winter	7	464	138.177	0.024	2.9	0.0268	0.0000	OK
480 minute winter	8	464	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1	1.000	2	1.3	0.125	0.000	6.1147	
480 minute winter	9	2.000	2	2.3	0.326	0.001	6.1139	
480 minute winter	2	1.001	3	2.9	0.341	0.001	25.9267	
480 minute winter	3	1.002	4	-4.1	0.308	-0.001	29.9275	
480 minute winter	4	1.003	5	5.1	0.283	0.001	29.9124	
480 minute winter	5	1.004	6	7.7	0.266	0.002	59.5366	
480 minute winter	6	1.005	7	2.9	1.066	0.035	0.0201	
480 minute winter	7	1.006	8	2.9	1.387	0.020	0.0050	112.3

Results for 100 year 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	1	570	139.681	0.675	1.0	2.3652	0.0000	OK
600 minute winter	9	570	139.681	0.675	2.3	2.4563	0.0000	OK
600 minute winter	2	570	139.681	0.715	3.8	2.5097	0.0000	OK
600 minute winter	3	570	139.681	0.861	4.6	0.2703	0.0000	OK
600 minute winter	4	570	139.681	1.001	4.8	3.7736	0.0000	OK
600 minute winter	5	570	139.681	1.124	11.1	5.4848	0.0000	OK
600 minute winter	6	570	139.681	1.344	6.6	6.0799	0.0000	SURCHARGED
600 minute winter	7	570	138.177	0.024	2.9	0.0268	0.0000	OK
600 minute winter	8	570	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	1	1.000	2	1.0	0.117	0.000	5.9209	
600 minute winter	9	2.000	2	2.2	0.306	0.001	5.9201	
600 minute winter	2	1.001	3	2.5	0.314	0.001	25.2405	
600 minute winter	3	1.002	4	2.6	0.316	0.001	29.3226	
600 minute winter	4	1.003	5	4.1	0.264	0.001	29.4541	
600 minute winter	5	1.004	6	6.6	0.160	0.002	59.1389	
600 minute winter	6	1.005	7	2.9	1.065	0.035	0.0200	
600 minute winter	7	1.006	8	2.9	1.385	0.020	0.0049	129.3

Results for 100 year 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	675	139.655	0.649	0.6	2.2747	0.0000	OK
720 minute winter	9	675	139.655	0.649	2.0	2.3624	0.0000	OK
720 minute winter	2	675	139.655	0.689	2.8	2.4190	0.0000	OK
720 minute winter	3	600	139.655	0.835	4.3	0.2623	0.0000	OK
720 minute winter	4	600	139.656	0.976	5.6	3.6779	0.0000	OK
720 minute winter	5	600	139.656	1.099	10.7	5.3616	0.0000	OK
720 minute winter	6	600	139.656	1.319	5.8	5.9661	0.0000	SURCHARGED
720 minute winter	7	600	138.177	0.024	2.9	0.0266	0.0000	OK
720 minute winter	8	600	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	1	1.000	2	0.4	0.117	0.000	5.6426	
720 minute winter	9	2.000	2	1.8	0.302	0.000	5.6419	
720 minute winter	2	1.001	3	2.3	0.309	0.001	24.2445	
720 minute winter	3	1.002	4	-2.8	0.309	-0.001	28.4325	
720 minute winter	4	1.003	5	-3.1	0.264	-0.001	28.7667	
720 minute winter	5	1.004	6	5.8	0.162	0.001	58.4162	
720 minute winter	6	1.005	7	2.9	1.062	0.035	0.0199	
720 minute winter	7	1.006	8	2.9	1.381	0.019	0.0049	146.7

Results for 100 year 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	735	139.616	0.610	0.7	2.1369	0.0000	OK
960 minute winter	9	735	139.616	0.610	1.6	2.2192	0.0000	OK
960 minute winter	2	735	139.616	0.650	2.8	2.2809	0.0000	OK
960 minute winter	3	750	139.616	0.796	3.2	0.2498	0.0000	OK
960 minute winter	4	750	139.616	0.936	4.3	3.5273	0.0000	OK
960 minute winter	5	750	139.616	1.059	9.2	5.1661	0.0000	OK
960 minute winter	6	750	139.616	1.279	5.8	5.7846	0.0000	SURCHARGED
960 minute winter	7	750	138.176	0.023	2.8	0.0264	0.0000	OK
960 minute winter	8	750	137.987	0.022	2.8	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	1	1.000	2	0.4	0.105	0.000	5.2195	
960 minute winter	9	2.000	2	1.3	0.283	0.000	5.2188	
960 minute winter	2	1.001	3	1.9	0.309	0.000	22.7057	
960 minute winter	3	1.002	4	2.4	0.314	0.001	27.0150	
960 minute winter	4	1.003	5	3.3	0.271	0.001	27.6372	
960 minute winter	5	1.004	6	5.8	0.149	0.001	57.0356	
960 minute winter	6	1.005	7	2.8	1.058	0.034	0.0197	
960 minute winter	7	1.006	8	2.8	1.376	0.019	0.0049	178.0

Results for 100 year 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 99.70%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1	1080	139.540	0.534	0.6	1.8718	0.0000	OK
1440 minute winter	9	1080	139.540	0.534	1.2	1.9439	0.0000	OK
1440 minute winter	2	1080	139.540	0.574	1.7	2.0154	0.0000	OK
1440 minute winter	3	1080	139.540	0.720	2.6	0.2262	0.0000	OK
1440 minute winter	4	1080	139.540	0.860	3.0	3.2435	0.0000	OK
1440 minute winter	5	1080	139.540	0.983	6.0	4.7989	0.0000	OK
1440 minute winter	6	1080	139.540	1.203	4.9	5.4443	0.0000	SURCHARGED
1440 minute winter	7	1080	138.176	0.023	2.7	0.0260	0.0000	OK
1440 minute winter	8	1080	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	1	1.000	2	-0.3	0.106	0.000	4.4117	
1440 minute winter	9	2.000	2	1.1	0.261	0.000	4.4112	
1440 minute winter	2	1.001	3	1.6	0.277	0.000	19.7568	
1440 minute winter	3	1.002	4	1.9	0.300	0.000	24.2676	
1440 minute winter	4	1.003	5	2.6	0.270	0.001	25.4011	
1440 minute winter	5	1.004	6	4.9	0.102	0.001	53.9216	
1440 minute winter	6	1.005	7	2.7	1.051	0.033	0.0193	
1440 minute winter	7	1.006	8	2.7	1.366	0.019	0.0048	233.0

Results for 100 year 2160 minute winter. 2400 minute analysis at 60 minute timestep. Mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	1	1560	139.420	0.414	0.2	1.4494	0.0000	OK
2160 minute winter	9	1560	139.420	0.414	0.8	1.5052	0.0000	OK
2160 minute winter	2	1560	139.420	0.454	1.2	1.5923	0.0000	OK
2160 minute winter	3	1560	139.420	0.600	1.9	0.1883	0.0000	OK
2160 minute winter	4	1560	139.420	0.740	2.6	2.7885	0.0000	OK
2160 minute winter	5	1560	139.420	0.863	5.8	4.2098	0.0000	OK
2160 minute winter	6	1560	139.420	1.083	3.4	4.8980	0.0000	SURCHARGED
2160 minute winter	7	840	138.176	0.023	2.7	0.0257	0.0000	OK
2160 minute winter	8	840	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	1	1.000	2	0.2	0.094	0.000	3.1626	
2160 minute winter	9	2.000	2	0.8	0.247	0.000	3.1622	
2160 minute winter	2	1.001	3	1.2	0.266	0.000	15.0869	
2160 minute winter	3	1.002	4	1.5	0.277	0.000	19.7659	
2160 minute winter	4	1.003	5	2.3	0.259	0.001	21.5970	
2160 minute winter	5	1.004	6	3.4	0.081	0.001	48.0511	
2160 minute winter	6	1.005	7	2.7	1.043	0.032	0.0189	
2160 minute winter	7	1.006	8	2.7	1.355	0.018	0.0047	298.4

Results for 100 year +30% CC 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	18	139.326	0.320	14.2	1.1209	0.0000	OK
15 minute winter	9	18	139.322	0.316	30.6	1.1498	0.0000	OK
15 minute winter	2	18	139.323	0.357	57.4	1.2536	0.0000	OK
15 minute winter	3	20	139.335	0.515	103.2	0.1616	0.0000	OK
15 minute winter	4	21	139.328	0.648	223.8	2.4438	0.0000	OK
15 minute winter	5	19	139.316	0.759	135.3	3.7046	0.0000	OK
15 minute winter	6	18	139.334	0.997	134.9	4.5106	0.0000	SURCHARGED
15 minute winter	7	6	138.176	0.023	2.7	0.0256	0.0000	OK
15 minute winter	8	7	137.986	0.021	2.6	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	18.5	0.250	0.005	2.2378	
15 minute winter	9	2.000	2	30.6	0.675	0.008	2.2203	
15 minute winter	2	1.001	3	72.0	0.806	0.018	11.6429	
15 minute winter	3	1.002	4	60.7	0.740	0.015	16.1278	
15 minute winter	4	1.003	5	-126.9	0.659	-0.031	18.2938	
15 minute winter	5	1.004	6	134.9	0.775	0.033	42.9331	
15 minute winter	6	1.005	7	2.7	1.042	0.032	0.0188	
15 minute winter	7	1.006	8	2.6	1.353	0.018	0.0046	36.0

Results for 100 year +30% CC 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	32	139.493	0.487	16.7	1.7048	0.0000	OK
30 minute winter	9	32	139.493	0.487	23.8	1.7706	0.0000	OK
30 minute winter	2	32	139.492	0.526	50.7	1.8450	0.0000	OK
30 minute winter	3	34	139.491	0.671	103.0	0.2107	0.0000	OK
30 minute winter	4	37	139.489	0.809	109.9	3.0492	0.0000	OK
30 minute winter	5	37	139.491	0.934	124.2	4.5569	0.0000	OK
30 minute winter	6	35	139.496	1.159	78.5	5.2415	0.0000	SURCHARGED
30 minute winter	7	31	138.176	0.023	2.7	0.0258	0.0000	OK
30 minute winter	8	33	137.986	0.021	2.7	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	2	-11.8	0.238	-0.003	3.9064	
30 minute winter	9	2.000	2	24.3	0.629	0.006	3.9060	
30 minute winter	2	1.001	3	37.8	0.666	0.009	17.8105	
30 minute winter	3	1.002	4	-87.8	0.630	-0.022	22.2632	
30 minute winter	4	1.003	5	-78.5	0.551	-0.019	23.8316	
30 minute winter	5	1.004	6	78.5	0.692	0.019	51.5769	
30 minute winter	6	1.005	7	2.7	1.046	0.033	0.0190	
30 minute winter	7	1.006	8	2.7	1.359	0.018	0.0047	41.0

Results for 100 year +30% CC 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	64	139.683	0.677	10.2	2.3722	0.0000	OK
60 minute winter	9	64	139.683	0.677	15.9	2.4636	0.0000	OK
60 minute winter	2	64	139.683	0.717	35.2	2.5153	0.0000	OK
60 minute winter	3	61	139.681	0.861	46.8	0.2705	0.0000	OK
60 minute winter	4	62	139.680	1.000	78.9	3.7688	0.0000	OK
60 minute winter	5	63	139.681	1.124	88.3	5.4827	0.0000	OK
60 minute winter	6	63	139.682	1.345	53.3	6.0868	0.0000	SURCHARGED
60 minute winter	7	65	138.177	0.024	2.9	0.0268	0.0000	OK
60 minute winter	8	62	137.987	0.022	2.9	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	1	1.000	2	8.5	0.215	0.002	5.9403	
60 minute winter	9	2.000	2	14.5	0.543	0.004	5.9396	
60 minute winter	2	1.001	3	-25.3	0.541	-0.006	25.2197	
60 minute winter	3	1.002	4	-34.9	0.503	-0.009	29.2932	
60 minute winter	4	1.003	5	-60.2	0.482	-0.015	29.4115	
60 minute winter	5	1.004	6	53.3	0.608	0.013	59.1319	
60 minute winter	6	1.005	7	2.9	1.065	0.035	0.0200	
60 minute winter	7	1.006	8	2.9	1.385	0.020	0.0049	48.5

Results for 100 year +30% CC 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 99.67%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	120	139.920	0.914	5.3	3.2011	0.0000	OK
120 minute winter	9	120	139.920	0.914	10.0	3.3251	0.0000	OK
120 minute winter	2	120	139.920	0.953	20.1	3.3468	0.0000	OK
120 minute winter	3	120	139.920	1.100	32.8	0.3453	0.0000	OK
120 minute winter	4	120	139.920	1.240	35.7	4.6746	0.0000	OK
120 minute winter	5	120	139.920	1.363	46.0	6.6519	0.0000	SURCHARGED
120 minute winter	6	120	139.920	1.583	30.7	7.1625	0.0000	SURCHARGED
120 minute winter	7	120	138.178	0.025	3.1	0.0279	0.0000	OK
120 minute winter	8	120	137.988	0.023	3.1	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	1	1.000	2	-2.7	0.178	-0.001	8.4200	
120 minute winter	9	2.000	2	9.5	0.454	0.002	8.4204	
120 minute winter	2	1.001	3	-13.0	0.452	-0.003	33.9273	
120 minute winter	3	1.002	4	-19.7	0.416	-0.005	36.6241	
120 minute winter	4	1.003	5	-17.0	0.417	-0.004	34.2795	
120 minute winter	5	1.004	6	30.7	0.504	0.008	62.6051	
120 minute winter	6	1.005	7	3.1	1.086	0.038	0.0212	
120 minute winter	7	1.006	8	3.1	1.413	0.021	0.0052	61.0

Results for 100 year +30% CC 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 98.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	180	140.121	1.115	3.7	3.9073	0.0000	OK
180 minute winter	9	176	140.121	1.115	7.5	4.0581	0.0000	OK
180 minute winter	2	180	140.088	1.122	14.8	3.9379	0.0000	OK
180 minute winter	3	176	140.105	1.285	29.1	0.4035	0.0000	OK
180 minute winter	4	176	140.103	1.423	27.5	5.3637	0.0000	SURCHARGED
180 minute winter	5	176	140.106	1.549	32.6	7.5593	0.0000	SURCHARGED
180 minute winter	6	176	140.105	1.768	19.1	7.9992	0.0000	SURCHARGED
180 minute winter	7	176	138.178	0.025	3.3	0.0286	0.0000	OK
180 minute winter	8	176	137.988	0.023	3.3	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1	1.000	2	2.1	0.155	0.001	10.1109	
180 minute winter	9	2.000	2	6.4	0.401	0.002	10.1073	
180 minute winter	2	1.001	3	-9.2	0.392	-0.002	38.9576	
180 minute winter	3	1.002	4	-18.8	0.380	-0.005	39.5804	
180 minute winter	4	1.003	5	-13.4	0.377	-0.003	34.9482	
180 minute winter	5	1.004	6	19.1	0.457	0.005	62.6096	
180 minute winter	6	1.005	7	3.3	1.102	0.040	0.0220	
180 minute winter	7	1.006	8	3.3	1.435	0.022	0.0054	72.3

Results for 100 year +30% CC 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 98.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	1	224	140.228	1.222	3.3	4.2826	0.0000	OK
240 minute winter	9	224	140.227	1.221	6.0	4.4439	0.0000	OK
240 minute winter	2	228	140.244	1.278	16.1	4.4868	0.0000	OK
240 minute winter	3	224	140.229	1.409	14.9	0.4423	0.0000	SURCHARGED
240 minute winter	4	228	140.251	1.571	21.2	5.9236	0.0000	SURCHARGED
240 minute winter	5	228	140.229	1.672	26.4	8.1592	0.0000	SURCHARGED
240 minute winter	6	228	140.231	1.894	18.7	8.5673	0.0000	SURCHARGED
240 minute winter	7	228	138.179	0.026	3.4	0.0291	0.0000	OK
240 minute winter	8	228	137.989	0.024	3.4	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	1	1.000	2	6.1	0.148	0.001	11.0052	
240 minute winter	9	2.000	2	8.3	0.388	0.002	11.0058	
240 minute winter	2	1.001	3	-10.0	0.366	-0.002	41.2620	
240 minute winter	3	1.002	4	-10.5	0.362	-0.003	39.9263	
240 minute winter	4	1.003	5	-13.0	0.352	-0.003	34.9482	
240 minute winter	5	1.004	6	18.7	0.423	0.005	62.6096	
240 minute winter	6	1.005	7	3.4	1.111	0.041	0.0225	
240 minute winter	7	1.006	8	3.4	1.448	0.023	0.0056	83.5

Results for 100 year +30% CC 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 95.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	288	140.239	1.233	4.5	4.3217	0.0000	OK
360 minute winter	9	288	140.240	1.234	4.4	4.4920	0.0000	OK
360 minute winter	2	304	140.242	1.276	35.9	4.4772	0.0000	OK
360 minute winter	3	288	140.238	1.418	10.6	0.4452	0.0000	SURCHARGED
360 minute winter	4	304	140.248	1.568	17.4	5.9109	0.0000	SURCHARGED
360 minute winter	5	288	140.239	1.682	21.6	8.2067	0.0000	SURCHARGED
360 minute winter	6	288	140.238	1.900	10.6	8.5977	0.0000	SURCHARGED
360 minute winter	7	288	138.179	0.026	3.4	0.0291	0.0000	OK
360 minute winter	8	288	137.989	0.024	3.4	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	9.2	0.127	0.002	11.0474	
360 minute winter	9	2.000	2	20.5	0.346	0.005	11.0557	
360 minute winter	2	1.001	3	-5.9	0.340	-0.001	41.2386	
360 minute winter	3	1.002	4	-7.5	0.322	-0.002	39.9263	
360 minute winter	4	1.003	5	11.8	0.322	0.003	34.9482	
360 minute winter	5	1.004	6	10.6	0.257	0.003	62.6096	
360 minute winter	6	1.005	7	3.4	1.112	0.041	0.0226	
360 minute winter	7	1.006	8	3.4	1.449	0.023	0.0056	103.4

Results for 100 year +30% CC 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 95.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	464	140.232	1.226	15.4	4.2946	0.0000	OK
480 minute winter	9	464	140.232	1.226	3.5	4.4609	0.0000	OK
480 minute winter	2	376	140.241	1.275	9.4	4.4763	0.0000	OK
480 minute winter	3	464	140.231	1.411	9.0	0.4431	0.0000	SURCHARGED
480 minute winter	4	368	140.249	1.569	9.7	5.9160	0.0000	SURCHARGED
480 minute winter	5	368	140.230	1.673	15.8	8.1622	0.0000	SURCHARGED
480 minute winter	6	368	140.232	1.895	8.8	8.5718	0.0000	SURCHARGED
480 minute winter	7	368	138.179	0.026	3.4	0.0291	0.0000	OK
480 minute winter	8	368	137.989	0.024	3.4	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1	1.000	2	-15.1	0.123	-0.004	11.0058	
480 minute winter	9	2.000	2	5.1	0.330	0.001	11.0066	
480 minute winter	2	1.001	3	7.4	0.325	0.002	41.2359	
480 minute winter	3	1.002	4	-7.0	0.304	-0.002	39.9263	
480 minute winter	4	1.003	5	7.1	0.306	0.002	34.9482	
480 minute winter	5	1.004	6	8.8	0.265	0.002	62.6096	
480 minute winter	6	1.005	7	3.4	1.111	0.041	0.0225	
480 minute winter	7	1.006	8	3.4	1.448	0.023	0.0056	123.7

Results for 100 year +30% CC 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 95.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	1	450	140.241	1.235	1.3	4.3272	0.0000	OK
600 minute winter	9	450	140.242	1.236	3.0	4.4961	0.0000	OK
600 minute winter	2	465	140.240	1.274	5.1	4.4731	0.0000	OK
600 minute winter	3	450	140.253	1.433	8.8	0.4501	0.0000	SURCHARGED
600 minute winter	4	465	140.244	1.564	7.5	5.8975	0.0000	SURCHARGED
600 minute winter	5	450	140.238	1.681	12.9	8.2030	0.0000	SURCHARGED
600 minute winter	6	450	140.238	1.901	7.0	8.6001	0.0000	SURCHARGED
600 minute winter	7	450	138.179	0.026	3.4	0.0291	0.0000	OK
600 minute winter	8	450	137.989	0.024	3.4	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	1	1.000	2	-1.3	0.125	0.000	11.0355	
600 minute winter	9	2.000	2	2.2	0.311	0.001	11.0347	
600 minute winter	2	1.001	3	5.0	0.308	0.001	41.2272	
600 minute winter	3	1.002	4	-7.3	0.299	-0.002	39.9263	
600 minute winter	4	1.003	5	6.2	0.284	0.002	34.9482	
600 minute winter	5	1.004	6	7.0	0.159	0.002	62.6096	
600 minute winter	6	1.005	7	3.4	1.112	0.041	0.0226	
600 minute winter	7	1.006	8	3.4	1.449	0.023	0.0056	142.9

Results for 100 year +30% CC 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 96.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	600	140.237	1.231	1.1	4.3147	0.0000	OK
720 minute winter	9	600	140.238	1.232	2.6	4.4824	0.0000	OK
720 minute winter	2	525	140.249	1.283	6.5	4.5020	0.0000	OK
720 minute winter	3	600	140.246	1.426	6.3	0.4477	0.0000	SURCHARGED
720 minute winter	4	525	140.252	1.572	6.1	5.9267	0.0000	SURCHARGED
720 minute winter	5	660	140.232	1.675	11.4	8.1735	0.0000	SURCHARGED
720 minute winter	6	675	140.232	1.895	6.4	8.5742	0.0000	SURCHARGED
720 minute winter	7	525	138.179	0.026	3.4	0.0291	0.0000	OK
720 minute winter	8	525	137.989	0.024	3.4	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	1	1.000	2	1.3	0.118	0.000	11.0166	
720 minute winter	9	2.000	2	6.3	0.302	0.002	11.0158	
720 minute winter	2	1.001	3	5.9	0.308	0.001	41.2948	
720 minute winter	3	1.002	4	4.5	0.299	0.001	39.9263	
720 minute winter	4	1.003	5	9.0	0.277	0.002	34.9482	
720 minute winter	5	1.004	6	6.4	0.160	0.002	62.6096	
720 minute winter	6	1.005	7	3.4	1.112	0.041	0.0225	
720 minute winter	7	1.006	8	3.4	1.449	0.023	0.0056	162.9

Results for 100 year +30% CC 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 98.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	750	140.208	1.202	4.5	4.2131	0.0000	OK
960 minute winter	9	750	140.209	1.202	2.1	4.3757	0.0000	OK
960 minute winter	2	750	140.208	1.242	42.0	4.3581	0.0000	OK
960 minute winter	3	750	140.207	1.387	7.4	0.4354	0.0000	SURCHARGED
960 minute winter	4	750	140.209	1.529	5.9	5.7650	0.0000	SURCHARGED
960 minute winter	5	750	140.204	1.647	9.7	8.0383	0.0000	SURCHARGED
960 minute winter	6	750	140.208	1.871	6.4	8.4654	0.0000	SURCHARGED
960 minute winter	7	750	138.179	0.026	3.4	0.0290	0.0000	OK
960 minute winter	8	750	137.989	0.024	3.4	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	1	1.000	2	18.3	0.111	0.004	10.8626	
960 minute winter	9	2.000	2	23.6	0.285	0.006	10.8617	
960 minute winter	2	1.001	3	4.4	0.296	0.001	40.8880	
960 minute winter	3	1.002	4	-4.1	0.302	-0.001	39.9263	
960 minute winter	4	1.003	5	7.5	0.260	0.002	34.9482	
960 minute winter	5	1.004	6	6.4	0.163	0.002	62.6096	
960 minute winter	6	1.005	7	3.4	1.109	0.041	0.0224	
960 minute winter	7	1.006	8	3.4	1.446	0.023	0.0055	200.4

Results for 100 year +30% CC 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 99.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1	1080	140.032	1.026	0.4	3.5936	0.0000	OK
1440 minute winter	9	1080	140.032	1.026	1.5	3.7330	0.0000	OK
1440 minute winter	2	1080	140.032	1.066	2.9	3.7407	0.0000	OK
1440 minute winter	3	1080	140.032	1.212	2.9	0.3805	0.0000	OK
1440 minute winter	4	1080	140.031	1.351	4.6	5.0946	0.0000	SURCHARGED
1440 minute winter	5	1080	140.031	1.474	7.4	7.1950	0.0000	SURCHARGED
1440 minute winter	6	1080	140.032	1.695	6.4	7.6668	0.0000	SURCHARGED
1440 minute winter	7	1080	138.178	0.025	3.2	0.0283	0.0000	OK
1440 minute winter	8	1080	137.988	0.023	3.2	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	1	1.000	2	0.9	0.106	0.000	9.4871	
1440 minute winter	9	2.000	2	1.6	0.261	0.000	9.4857	
1440 minute winter	2	1.001	3	-2.7	0.283	-0.001	37.3767	
1440 minute winter	3	1.002	4	2.9	0.300	0.001	38.8472	
1440 minute winter	4	1.003	5	5.7	0.264	0.001	34.9358	
1440 minute winter	5	1.004	6	6.4	0.102	0.002	62.6096	
1440 minute winter	6	1.005	7	3.2	1.095	0.039	0.0217	
1440 minute winter	7	1.006	8	3.2	1.426	0.022	0.0053	264.9

Results for 100 year +30% CC 2160 minute winter. 2400 minute analysis at 60 minute timestep. Mass balance: 99.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	1	1560	139.822	0.816	0.3	2.8584	0.0000	OK
2160 minute winter	9	1560	139.822	0.816	1.1	2.9701	0.0000	OK
2160 minute winter	2	1560	139.822	0.856	1.6	3.0047	0.0000	OK
2160 minute winter	3	1560	139.822	1.002	1.9	0.3146	0.0000	OK
2160 minute winter	4	1560	139.822	1.142	2.6	4.3054	0.0000	OK
2160 minute winter	5	1560	139.822	1.265	6.5	6.1732	0.0000	OK
2160 minute winter	6	1560	139.822	1.485	4.4	6.7181	0.0000	SURCHARGED
2160 minute winter	7	1560	138.177	0.024	3.0	0.0274	0.0000	OK
2160 minute winter	8	1560	137.987	0.022	3.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	1	1.000	2	0.8	0.094	0.000	7.4208	
2160 minute winter	9	2.000	2	0.9	0.247	0.000	7.4219	
2160 minute winter	2	1.001	3	1.2	0.272	0.000	30.5345	
2160 minute winter	3	1.002	4	1.7	0.272	0.000	33.9155	
2160 minute winter	4	1.003	5	2.9	0.256	0.001	32.7925	
2160 minute winter	5	1.004	6	4.4	0.083	0.001	61.7968	
2160 minute winter	6	1.005	7	3.0	1.078	0.037	0.0207	
2160 minute winter	7	1.006	8	3.0	1.402	0.021	0.0051	346.0

IH 124 Mean Annual Flood

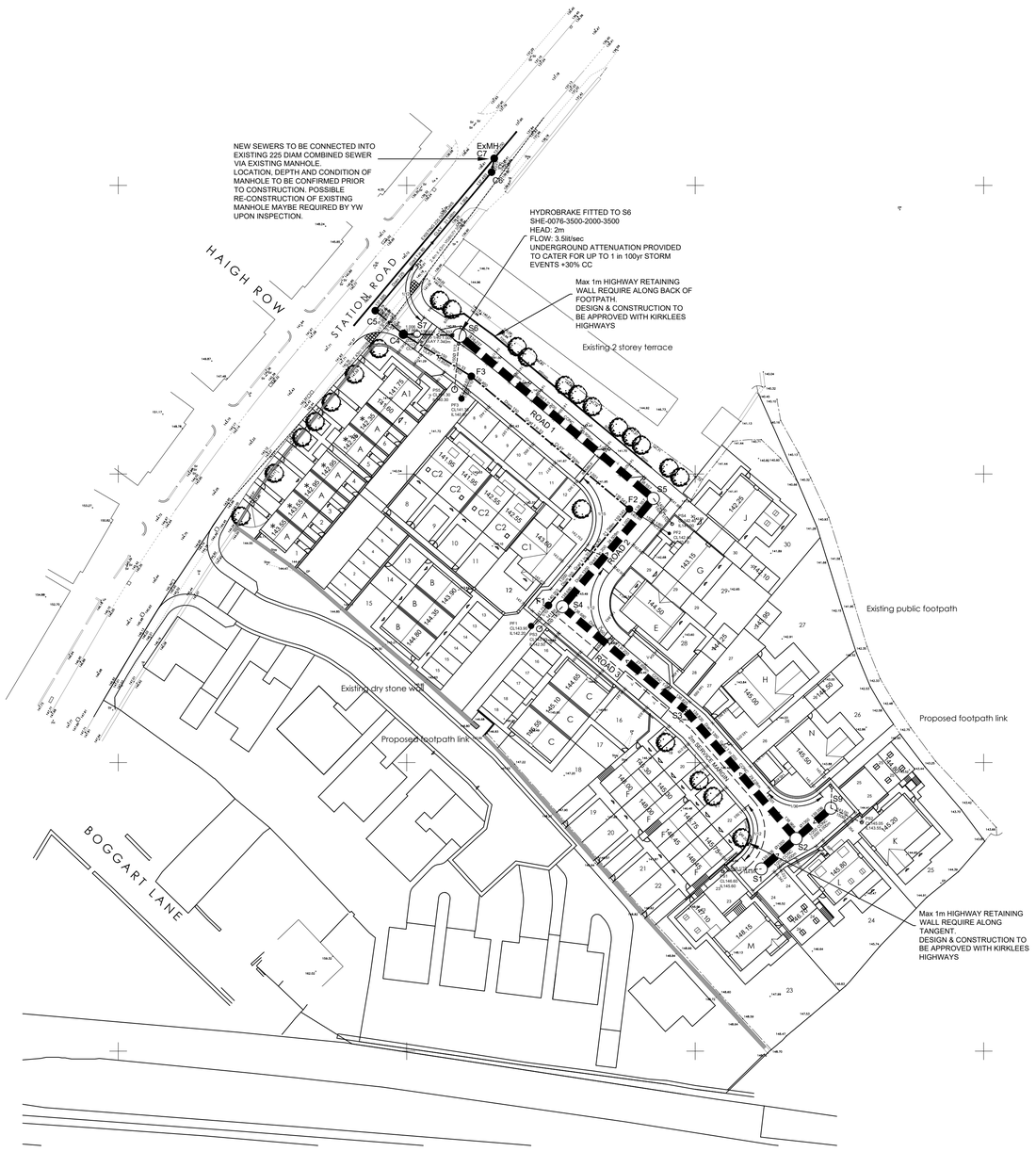
Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.800	Urban	0.000
SAAR (mm)	900	Region Number	Region 3

Results l/s

QBAR Rural	7.4
QBAR Urban	7.4
Q100 years	15.5
Q1 year	6.4
Q2 years	7.0
Q5 years	9.3
Q10 years	10.8
Q20 years	12.2
Q25 years	12.7
Q30 years	13.1
Q50 years	14.1
Q100 years	15.5
Q200 years	17.5
Q250 years	18.2
Q1000 years	22.6

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required area. The ICP SUDS tab will do this automatically.



RISK ASSESSMENT: SIGNIFICANT RISKS THAT CANNOT BE DESIGNED OUT		
RISK	LEVEL OF RISK (H/M)	SUGGESTED ACTION
DEEP EXCAVATIONS ASSOCIATED WITH NEW DRAINAGE WORKS	HIGH	ENSURE ALL EXCAVATIONS HAVE ADEQUATE TRENCH SUPPORTS
HANDLING LARGE DIAMETER MANHOLE RINGS AND CIRCULAR PIPES	HIGH	USE CORRECT LIFTING EQUIPMENT AND ENSURE OPERATIVES WEAR APPROPRIATE PROTECTIVE CLOTHING/HARD HATS/CORRECT PPE.
CONTACT WITH SEWAGE	MED	OPERATIVES TO USE CORRECT BREATHING EQUIPMENT/CORRECT PPE
NOISE	MED	OPERATIVES TO USE CORRECT EAR PROTECTION/CORRECT PPE
DRAINAGE EXCAVATIONS ADJACENT EXISTING BOUNDARY STRUCTURES	HIGH	ENSURE CORRECT SUPPORTS ARE PROVIDED TO TRENCHES AND BUILDINGS WHERE REQUIRED
DRAINAGE EXCAVATION IN PUBLIC HIGHWAY	HIGH	ENSURE CORRECT USE OF TRENCH SUPPORTS IN EXCAVATION AND SCREEN BARRIERS TO PROTECT MEMBERS OF THE PUBLIC
MAINTAIN ACCESS TO ADJACENT PROPERTIES AND OCCUPIERS	HIGH	ENSURE WORKS ARE PROTECTED WITH BARRIERS AND SIGNS TO GUIDE THE PUBLIC AWAY FROM THE WORKS
DRAINAGE EXCAVATIONS NEAR TO EXISTING SERVICES	HIGH	ENSURE WORKS ARE PROTECTED WITH BARRIERS AND SIGNS TO GUIDE MEMBERS OF THE PUBLIC AWAY FROM THE AREA
WORKING IN CONFINED SPACES. WORKING IN DRAINS AND MANHOLES	HIGH	CONFINED SPACES WORKING TRAINED PERSONNEL ONLY TO CARRY OUT WORKS UNDER A PERMIT TO WORK SCHEME IMPLEMENTED BY CONTRACTOR. GAS TESTING TO TAKE PLACE BEFORE ALL ENTRIES TO CONFINED SPACES.
WORKING IN HIGHWAYS / RISKS FROM VEHICLE AND PLANT	HIGH	ALL WORKS TO BE SIGNED AND FENCED FROM NORMAL VEHICULAR TRAFFIC. ALL WORKERS TO WEAR HIGH VISIBILITY CLOTHING. ALL PLANT TO HAVE VISUAL AND AUDIBLE WARNING SYSTEMS
ROAD AND DRAINAGE CONSTRUCTION	HIGH	ALL EXCAVATIONS TO BE ADEQUATELY FENCED OFF AND SUPPORTED DURING CONSTRUCTION. ALL OPERATIVES TO BE TRAINED IN CORRECT METHODS OF LIFTING AND WORK IN ACCORDANCE WITH LOLER REGS
IT IS ASSUMED THAT WORKS ASSOCIATED WITH THIS DESIGN WILL BE UNDERTAKEN BY A PERSON OR PERSONS WHO ARE COMPETANT AND HAVE THE REQUIRED LEVEL OF EXPERIENCE AND EXPERTISE		

1. ALL ADOPTABLE SEWER WORKS AND MATERIAL TO BE IN ACCORDANCE WITH "CODES FOR ADOPTION",THE RELEVANT BRITISH/EUROPEAN AND YORKSHIRE WATER'S STANDARDS/REQUIREMENTS/ADDENDUM TO THE MECHANICAL AND ELECTRICAL SPECIFICATION AND KITEMARKED.
2. MANHOLE COVERS SHALL/MUST HAVE A CLEAR OPENING OF 600mm AND SHALL BE CLASS D400 TO BS EN 124 WITH 150mm DEEP FRAMES IN HIGHWAYS.
3. FILLED GROUND MUST BE FILLED AND CONSOLIDATED UNDER THE SUPERVISION AND TO THE SATISFACTION OF YORKSHIRE WATER BEFORE ANY SEWER WORKS ARE CARRIED OUT.
4. YORKSHIRE WATER IS **NOT** OBLIGED TO ACCEPT FILTER DRAIN/LAND DRAINAGE RUNOFF INTO THE PUBLIC SEWER NETWORK OR ADOPTABLE DRAINAGE SYSTEM (DIRECTLY OR INDIRECTLY). AN ALTERNATIVE METHOD OF DISPOSAL OF THE LAND DRAINAGE RUNOFF WILL THEREFORE BE REQUIRED AND YOU WILL HAVE TO LIAISE WITH THE LOCAL AUTHORITY, LAND DRAINAGE SECTION WITH REGARD TO THE DISPOSAL OF THE FILTER DRAIN/LAND DRAINAGE RUNOFF.
5. COVER SLABS MUST CARRY THE BSI KITEMARK OR WILL BE REJECTED BY YORKSHIRE WATER INSPECTOR. WHERE THE CLEAR OPENING OF THE KITEMARKED PRODUCT IS DIFFERENT TO THAT OF THE COVER AND FRAME, A LOADING BEARING SLAB SHOULD BE FITTED ABOVE THE COVER SLAB TO BRING THE SIZE DOWN TO 600x600mm FOR THE YORKSHIRE WATER SPECIFIED COVER SIZE. PLEASE REFER TO CONCRETE PIPE SYSTEMS ASSOCIATION (CPSA), 'TECHNICAL BULLETIN' ISSUED AUTUMN 2004 FOR KITEMARKED COVER SLAB OPENING SIZES.
6. SULPHATE RESISTANT CEMENT (C20-DC2) AND PRECAST CONCRETE PRODUCTS MUST BE USED OR A LABORATORY REPORT PROVIDED PROVING THAT SUCH PRECAUTIONS ARE NOT NECESSARY.
7. THE ADOPTABLE SEWERS SHOULD BE A MINIMUM OF 1m AND MANHOLES 0.5m FROM KERB FACES.
8. SEWERS MUST HAVE 5m CLEARANCE FROM TREES AND HEDGES
9. SEWERS TO BE LAID IN CLASS "S" BEDDING (150mm GRANULAR BED AND SURROUND), WHERE DEPTH OF COVER TO TOP OF THE SEWER IS LESS THAN 1.2m IN HIGHWAYS AND VERGES (OR LESS THAN 900mm IN NONE VEHICULAR ACCESS AREAS) THEN A 175mm CONCRETE SLAB OVER SEWER SHALL BE PROVIDED.
10. ALL PIPEWORK 300mm DIAM. OR LESS TO BE VITRIFIED CLAY CONFORMING WITH BS 65. MINIMUM CRUSHING STRENGTHS TO BE AS FOLLOWS: 100mm DIA. 40kN/m, 150mm DIA 40kN/m, 225mm DIA 45kN/m, 300mm DIA 72kN/m.
11. ALL PIPEWORK 375mm DIAM. OR GREATER TO BE CONCRETE CLASS 120 TO EN 1916/ BS 5911-1: 2002.
12. THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION IN THEM MAY NEED TO BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTIONS AND BENDS.
13.YORKSHIRE WATER POLICY IS NOT TO ACCEPT TYPE "C" BRICK MANHOLES AND 1050mm DIAM. MANHOLE RINGS. INSTEAD IT IS PREFERRED THAT YOU USE A TYPE "B" MANHOLE WITH 1200mm DIAM. OR 1500mm DIAM. RINGS, WITH THE OPENING SIGHTED OVER THE CHANNEL WHERE DEPTH OF COVER TO PIPE SOFFIT IS 1-1.5m.
14. ALL HIGHWAY WORKS AND MATERIAL TO CONFORM WITH KIRKLEES COUNCIL SPECIFICATION.
15. GULLY COVER AND FRAMES SHALL BE D400 DUCTILE IRON AND COMPLY WITH EUROPEAN STANDARD BS EN 124. THOSE SIGHTED IN ACCESSWAYS AND MEWS COURTS MUST BE SUITABLE FOR USE IN PEDESTRIAN AREAS.
16. BEDDING AND BACKFILL MATERIAL TO CONFORM TO THE REQUIREMENT OF WATER INDUSTRY SPECIFICATION 4-08–2 (TABLE A2).
17. PLASTIC CHANNEL SECTIONS IN MANHOLES ARE NOT ACCEPTABLE AND YORKSHIRE WATER WOULD PREFER CLAYWARE CHANNELS IN MANHOLES. YORKSHIRE WATER HAVE FOUND THAT PLASTIC CHANNELS ARE DIFFICULT TO SET IN CONCRETE AS THEY FLOAT AND A SATISFACTORY FINISH CANNOT BE OBTAINED ON BENCHING.
18. WHERE A B125 COVER AND FRAME HAS BEEN APPROVED, THIS **MUST NOT** BE COATED IN PLASTIC AND MUST HAVE LIFTING EYES SUITABLY SIZED TO ACCOMMODATE STANDARD LIFTING KEYS. SCREW DOWN COVERS ARE **NOT** ACCEPTABLE.
19. THERE SHOULD BE ENOUGH CLEARANCE TO ACCOMMODATE THE BEDDING FOR BOTH PIPES. APPROX 300mm : IF CROSSOVER IS NEAR THE ROCKER THEN THE CLEARANCE NEEDED MAY BE INCREASED.

ALL PIPEWORK 300mm DIAM OR LESS TO BE VITRIFIED CLAY CONFORMING WITH BS 65. MINIMUM CRUSHING STRENGTHS TO BE AS FOLLOWS: 100mm DIA 40kN/m, 150mm DIA 40kN/m, 225mm DIA 45kN/m and 300mm DIA 72kN/m.
ALL PIPEWORK 375mm DIAM OR GREATER TO BE CONCRETE CLASS 120, TO EN 1916 / BS 5911-1:2002.
ADOPTABLE SEWERS TO BE LAID IN CLASS 'S' GRANULAR BED & SURROUND.

Rev B. Road numbers added. 13.07.21 HH
Rev A. Gullies on road 1 amended to new position. 29.06.21 CM

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Client
YORKSHIRE COUNTRY PROPERTIES

Project
STATION ROAD, SKELMANTHORPE

Detail
MAIN ROAD & SEWER PLAN

Dwn	Chkd	Date	Scale	Dwg No.
HH		JUN-21	1:500@A1	E18/7366/004B

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FORM HHA 5

TRIAL HOLE NO. 1

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.25	Rough grass over dark brown loamy topsoil.
0.5		Stiff light brown clay.
1.0		
	1.4	Thin (<100mm) band of weathered coal at 1.4m.
1.5		Light grey firm/stiff mottled clay.
	1.9	
2.0		Light grey completely weathered mudstone containing coal fragments, excavated as angular gravels.
	2.4	Light grey weak weathered mudstone. End of trial pit.
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	YES @0.2 and 0.6m
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

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FORM HHA 5

TRIAL HOLE NO. 2

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.3	Rough grass over dark brown loamy topsoil.
0.5		Dark grey soft re-engineered ground consisting of firm clay, weathered mudstone and coal fragments.
1.0		
1.5		
2.0		
2.5		
3.0		
	3.1	
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	YES @0.2 and 1.0m
Sides of excavation remained stable	YES
Level	……..

NOTES:

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…….

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FORM HHA 5

TRIAL HOLE NO. 3

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.25	Rough grass over dark brown loamy topsoil.
0.5		Firm light brown/grey mottled clay.
1.0		
	1.2	
1.5	**1.5**	Weak/immature completely weathered coal.
2.0		Moderately weak light grey completely weathered mudstone containing occasional coal fragments. Water ingress at 1.3m from sides.
	2.3	
2.5		Moderately weak light grey highly weathered mudstone.
	2.9	
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	YES
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

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…….

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FORM HHA 5

TRIAL HOLE NO. 4

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.4	Rough grass over dark brown clayey topsoil containing coal fragments (possible made ground).
0.5		Firm/stiff light brown/grey clay with occasional coal fragments.
1.0		
1.5		
	1.7	
		Light grey weak highly weathered mudstone.
2.0		
	2.3	
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	YES @0.2m
Sides of excavation remained stable	YES
Level	……..

NOTES:

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FORM HHA 5

TRIAL HOLE NO. 5

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.3	Rough grass over dark brown clayey topsoil.
0.5		Light brown/grey firm/stiff clay.
1.0		
	1.3	Thin band of weathered coal at 1.3m.
1.5	**1.5**	Light grey completely weathered mudstone containing coal fragments.
2.0		Moderately weak light grey weathered mudstone.
	2.4	
2.5		Weathered coal.
3.0	**3.0**	
3.5		Light grey moderately weak weathered mudstone.
	3.6	
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

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FORM HHA 5

TRIAL HOLE NO. 6

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.3	Rough grass and brambles over dark brown loamy topsoil.
0.5		Firm light brown/grey clay. Clay land drain at 0.6m. (dry)
1.0	**1.1**	
	1.4	Completely weathered coal. Water ingress from sides at 1.3m.
1.5	**1.8**	Soft light grey mottled clay.
2.0		Completely weathered light grey mudstone.
2.5	**2.9**	
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	YES
Sample taken	YES @0.2m
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

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FORM HHA 5

TRIAL HOLE NO. 7

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.2	Overgrown brambles over dark brown loamy topsoil.
0.5		Firm light brown/grey clay.
1.0		
	1.2	
1.5		Weak light grey/brown very weathered mudstone.
	1.8	
2.0		Moderately strong light grey weathered mudstone containing coal fragments.
	2.3	
2.5		Strong light grey/brown mudstone.
	2.6	
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	YES @0.2m
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

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FORM HHA 5

TRIAL HOLE NO. 8

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.3	Overgrown brambles over dark brown clayey topsoil.
0.5		Firm light brown clay.
	0.8	Thin band of weathered coal at 0.8m.
1.0		Light grey completely weathered mudstone.
1.5		
2.0		
	2.3	
2.5		Moderately weak light grey weathered mudstone.
	2.8	
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

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FORM HHA 5

TRIAL HOLE NO. 9

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.3	Rough grass and brambles over dark brown clayey topsoil.
0.5		Firm/stiff light brown/grey clay.
1.0		
	1.3	
1.5		Light grey completed weathered mudstone.
	1.8	
2.0		Moderately strong light grey weathered mudstone.
	2.4	
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	NO
Sides of excavation remained stable	YES
Level	……..

NOTES:

…….

…….

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FORM HHA 5

TRIAL HOLE NO. 10

Client :	**YORKSHIRE COUNTRY PROPERTIES**	**Job No :**	**7366**
Site :	**SKELMANTHORPE**	**Date :**	**21/02/2019**

0.0		
	0.25	Overgrown brambles over dark brown loamy topsoil.
0.5	**0.8**	Firm/stiff light brown/grey clay.
1.0 / **1.5**	**1.5**	Light grey completely weathered mudstone.
2.0 / **2.3**	**2.3**	Moderately weak light grey weathered mudstone.
2.5 / **3.0** / **3.5** / **4.0**		

REMARKS:

Ground water encountered during excavation	NO
Sample taken	YES @ 0.2m
Sides of excavation remained stable	YES
Level	……..

NOTES:

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