Haigh Huddleston & Associates
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FLOOD RISK ASSESSMENT

ON

LAND TO THE SOUTH OF CONISTON AVENUE, DARTON, BARNSLEY

FOR

CONROY BROOK DEVELOPMENTS Ltd

E24/8080/FR01

July 2024

M.Huddleston MEng.

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 2022 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 site is located on land to the south of Coniston Avenue, Darton and lies around OS Grid Reference 432179, 410860. A site location plan is attached in Appendix A at the rear of the report.

2.2 The site is approximately square in shape, with the northern, southern and eastern boundaries formed by the rear gardens to residential properties. To the west and southwest there are further agricultural fields. The current, and future proposed, access to the site is provided off Coniston Avenue to the north of the site. The site access is a separate smaller field to the main body of the development, and elevated above the remainder of the site. Adopted surface and foul sewers cross from north to south across this field, with a second foul connection crossing from east to west.

2.3 The main body of the site consists of a field used for crop farming. A second adjacent field proposed for proposed surface attenuation is located to the southwest and is separated from the main field by a hedge. Yorkshire Water adopted Foul and Surface water sewers run from north to south along the western boundary of the site. The surface water sewer outfalls to a culverted watercourse midway along the western boundary of the site adjacent to the hedgerow.

2.4 The site is open to further fields on the western boundary. There is a hedge separating the field from the adjacent residential properties to the north, south and east. Occasional mature trees are noted to the corners of the site.

2.5 The site generally falls from a high point of 142.0m AOD in the northeast to a low point of 130.5m AOD in the southwest at an average grade of 1 in 13.

3.0 PROPOSED DEVELOPMENT AND DRAINAGE CONSTRAINTS

3.1 It is understood that the proposed development is for a series of detached, semi-detached, terraced town houses (totalling 39 units) with associated car parking and access roads. A preliminary site layout is attached in the appendices.

3.2 The site investigation report confirms the ground consists of topsoils / clays, re-engineered clays overlying a weathered mudstone strata. Occasional thin bands of immature coal were also noted to outcrop across the site. Coal has previously been extracted from a large portion of the site in the form of open cast mining to a depth of up to 8m below current site. The backfill strata consists primarily of re-engineered clays and mudstone gravels. Infiltration testing has been undertaken on site in the form of two soakaway tests within the weathered mudstone strata. In both instances the water level remained stationary indicting that zero infiltration had occurred. We would therefore conclude that soakaways would not be a suitable method of surface water drainage for the development.

3.3 There are existing public foul and surface water sewers crossing the development land located along the western boundary. The surface water adopted sewer terminates in a culverted watercourse which is assumed to run in a south westerly direction near the field boundary hedge line. The exact alignment and condition of this watercourse is unknown, and would need further investigation to confirm its suitability, with agreements from the LLFA, third party land owners and Yorkshire Water to allow a discharge. The foul sewer leaves the site along the southern boundary and travels via the rear gardens of no. 23 & 25 Pennine View onto the road. A copy of the Yorkshire Water records for the site are in the appendices at the rear of the report.

3.4 The OS plans indicate a surface water feature leaving the development midway on the western boundary to the north of the existing hedge line. Its possible that this maybe culverted, however no evidence of this system was found on site. In addition, the current landowner is

not aware of any drainage system in this location. Even if a culverted system was discovered on this line it is unlikely to be able to accept a gravity discharge to serve the whole of the development site area.

4.0 FLOOD RISK

4.1 On reviewing the Environment Agency websites flood risk maps, the site currently falls within flood zone 1: which is designated as low probability of flooding from sea or rivers less than 0.1% (ie 1 in 1000 year) probability of flooding.
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 2022. In accordance with that table the proposed development would be considered to be appropriate for the site.

4.2 The available EA plans indicate that the site is not affected by overland surface water flood water. The surface water flooding maps do not show any ingress into the site from land to the north including Coniston Ave. There are low level risk of surface water ingress on land slightly to the west of the site, note this is consistent with the on site topography.

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 in excess of 1Ha, it would 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 2022 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 2022, 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 2022 requires that each flooding mechanism is addressed and levels of risk evaluated. We consider there are three 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.

5.2 Risk of Flooding from overland flows from adjacent land.

5.2.1 The site lies on an area of sloping land, with residential development to the northern, eastern and southern boundaries. Open agricultural land is located directly to the west of the proposed development site. The open agricultural land falls away from the site and is generally situated at a lower level. The residential properties to the north and east of the site are at a slightly higher level, these properties 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 or failure of the existing system would generate low level flood waters potentially entering the site along the northern and eastern site boundaries, plot levels should be slightly elevated above the rear garden areas and proposed road to create a flood route through to the new highway layout and subsequently channel any flood waters along the new highway system. Please note the catchment to the north is relatively small and the risk and flooding is considered low.

5.2.2 We would however, still recommend that an overland flood route is provided through the site to cater for extreme events and in addition to any blockage failure of new drainage systems on

site. As is normal under the sewers for adoption criteria and floor levels are to be based a minimum of 300mm above existing ground levels.

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 this 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 Infiltration testing was undertaken in two trial pits as part of the site investigation report. In addition, a large proportion of the site consists of re-engineered clays due to former open cast mining. The soakaway testing confirmed that soakaways will not be a viable method of dealing with surface water discharge from the site.

5.3.4 Investigative works have been undertaken, in conjunction with Barnsley MBC LLFA, to locate and determine the condition of the existing culverted watercourse to the south of the proposed development on four separate occasions. The existing watercourse is in a dilapidated condition with numerous blockages. CCTV investigations to the existing watercourse using root cutters were unsuccessful due to deformation of the pipe and root intrusions. Dye testing was also undertaken, but no dye was observed further downstream.. The route of the watercourse crosses numerous third party land owners, a number of which are not readily identifiable, which has made negotiations to access for improvements impractical. It is therefore considered unsuitable to accept a further discharge from the proposed development. Correspondence from Barnsley MBC LLFA confirming this is attached to the rear of this report.

5.3.5 Due to the above, with infiltration methods and the existing watercourse proviing unsuitable, Yorkshire Water have confirmed that they will accept a discharge of 3.5 l/s into the existing 225mm diameter surface water sewer recorded in Pennine View to the south of the development. Due to the shallow nature of the existing surface water sewer, this will need to be re-laid at a deeper level under a Section 185 Agreement with Yorkshire Water. All existing connections will need to be reconstructed to suit the new invert levels of the diverted surface water sewer. Copy correspondence from Yorkshire Water confirming their acceptance of this proposals is attached to the rear of this report.

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 entail significant land up take and potentially large, commuted sums. With the recent implementation of the Codes for Adoption by Yorkshire Water there is greater scope for a regulatory body to adopt and maintain the above ground storage facilities than previously. However there is detailed criteria to be met to enable this to take place. Based on this criteria, the estimated volumes of storage required are shown in the attached calculation sheets. For this run off the storage volumes require 315 cu.m for the 30 year storm, 430cu.m. for the 100 year storm and 665 cu.m when 40% extra for climatic change allowance is made. The above storage volumes are based upon above ground attenuation provided in an attenuation basin to the west of the main development.

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 of 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. 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 or permeable paving on private drives would also provide a first stage treatment of run off from drives and allow a discharge into the top soils on site. Rainwater 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. We understand that open space to the south of the site has been designated as a possible area to locate surface water attenuation. Due to the

above requirements an off line basin is proposed which is unlikely to provide the same water quality benefits as an on line system. Please note Yorkshire Water will require an easement and access for future maintenance.

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 40% allowance for climate change, but must ensure that no buildings are flooded.

5.3.9 The requirement for surface water attenuation and the shallow nature of the existing adopted 225mm diameter surface water sewer in Pennine View will necessitate a length of offsite surface water sewer to be re-laid to enable a gravity connection to the existing system. The position and levels of the attenuation has been considered to ensure that any failure or blockage of the outfall will result in above ground flooding to the fields to the west of the site and not affect any of the new or existing properties. In the event of a failure of the proposed detention basin, the topology of the site and surrounding areas means any surface water will follow the route of the existing culverted watercourse.

5.4 **Impact on existing drainage systems.**

5.4.1 If the site is developed with attenuation systems and an agreed discharge rate of 3.5l/s 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.

5.4.2 In addition to the above, the existing Yorkshire Water sewer is to be diverted from the proposed back garden to Plot 39 in the north west of the development, before reconnecting to the sewer prior to discharging to the watercourse.. The existing watercourse is to remain untouched, with no increase in the discharge from the proposed development.

5.4.3 The maintenance of the onsite proposed SUDS basin would be carried out by Yorkshire Water as part of the Section 104 Agreement and they would adopt the underground pipework and manholes. The maintenance of any on or off site above ground storage systems will need to

be resolved satisfactorily in perpetuity either with Yorkshire Water, a management company or Barnsley MBC. This may mean commuted sums being paid for such an agreement.

5.4.4 The developer will be responsible to maintain the drainage systems on site until final adoption by Yorkshire Water ensuring that they are working effectively in the intervening period between construction and adoption.

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 development of the site utilising infiltration techniques is not considered suitable, and there are no watercourses available to accept a discharge form the site. An outfall to the 225mm surface water sewer in Pennine View to the south of the site has been agreed with Yorkshire Water. A surface water attenuation system should be designed to reduce the run-off from the site to an agricultural discharge rate of 3.5l/s, to ensure there is no increase in flood risk to the downstream catchment. The use of above ground surface water attenuation is proposed.

6.3 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 north. 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. We would recommend that the floor levels of the proposed houses should be a minimum of 300mm above the existing ground/road levels.

MARTIN HUDDLESTON. MEng
martin@haighhuddleston.co.uk

APPENDIX A

LOCATION PLAN

Haigh Huddleston & Associates
Civil Structural Engineering Consultants
t 01924 574074
e martin@haighhuddleston.co.uk

Unit 4, Midgley Business Park
Bar Lane
Midgley
WF4 4JJ

Client : Ben Bailey Homes

Job Title: Pennine View, Darton

Job Number : E24/8080

LOCATION PLAN

OS Grid Reference : SE 321108
Easting : 432172
Northing : 410861

Topographical Survey carried out using GPS.

N

APPENDIX B

PROPOSED SITE PLAN

Rev A Updated to suit latest planning layout 26.07.24 MD

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Client
BEN BAILEY HOMES

Project
CONISTON AVENUE, DARTON

Detail
ENGINEERING FEASIBILITY

Dwn	Chkd	Date	Scale	Dwg No.
MD		Jun'24	1:500@A1	E24/8080/01A

PRELIMINARY

APPENDIX C

TOPOGRAPHICAL SURVEY

P1	432082.491	410709.870	127.800
P2	432134.178	410880.109	133.294
P3	432043.363	410803.401	127.897
S1	432192.468	410960.485	139.722
S2	432171.515	410954.360	139.364
S3	432131.594	410938.890	137.257
S4	432156.458	410874.255	134.090
S5	432145.438	410808.381	132.006
S6	432142.829	410787.989	131.339

Sheet 1 of 1

Datum

GRID– Related to Ordnance Survey using One Point Localisation Station S2. Orientation OS Grid North.

LEVEL– Related to Ordnance Survey by connection to the OS Active Network by G.P.S

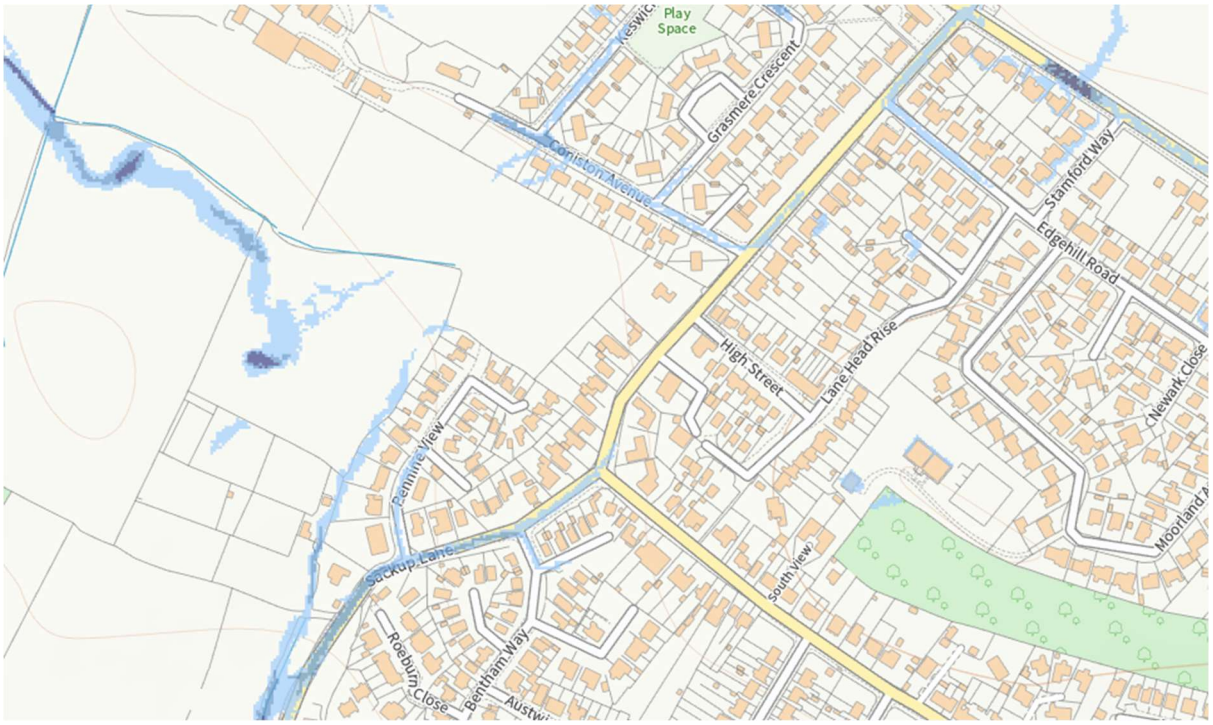
LEGEND

Manhole shown thus
Inspection Cover
Lamp post
Gully
Lampost
Telegraph Pole
Electricity Pole
Road Traffic Signs
Traffic Lights
British Telecom
Cable Television
Fire Hydrant
Safety Valve
Stop tap Water
Stopcock Gas
Unknown Stoptap

APPENDIX D

FLOOD RISK MAPS

FLOOD MAP FOR PLANNING



SURFACE WATER FLOODING AFFECTING THE SITE

APPENDIX E

YORKSHIRE WATER RECORDS AND PREPLANNING ENQUIRY

COPY CORRESPONDENCE FROM BARNSLEY MBC LLFA

COPY CORRESPONDENCE FROM YORKSHIRE WATER

YorkshireWater

Mr C MacDonald
Haigh Huddleston & Associates
99-103 Leeds Road
Dewsbury
WF12 7BU
c.macdonald@haighhuddleston.co.uk

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

Tel: 0345 120 8482
Fax:

Email:
technical.sewerage@yorkshirewater.co.uk

Your Ref:
Our Ref: W017899

For telephone enquiries ring:
Chris Roberts on 0345 120 8482

4th January 2021

Dear Mr MacDonald,

Pennine View, Darton, S75 5AT - Pre-Planning Sewerage Enquiry U076425 (RESIDENTIAL)

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

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

YorkshireWater

Existing Infrastructure

There is a 150 mm diameter public foul sewer recorded on the site. In this instance, building-over may take place under the control of Part H4 Building Regulations 2000.

There is a 225 mm diameter public surface water sewer recorded on the site. In this instance, building-over may take place under the control of Part H4 Building Regulations 2000.

No trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer. If you wish to have this sewer diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0345 120 84 82.

There is an outfall to watercourse, under the control of Yorkshire Water, located near to/within* the site. Vehicular access, including with large tankers, could be required at any time.

Foul Water

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

Foul water domestic waste can discharge to the 150 mm diameter public foul sewer recorded crossing 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 the proposed site is currently undeveloped no surface water is known to have previously discharged to the public sewer network

As such, the local public sewer network does not have capacity to accept any surface water from the proposed site. If SuDS are not viable, the developer is advised to contact the Environment Agency/local Land Drainage Authority/Internal Drainage Board with a view to establishing a suitable watercourse for discharge.

It is understood that the site is to drain to the culverted watercourse located close to the site. This appears to be the obvious place for surface water disposal (if SuDS are not viable). Please note Yorkshire Water cannot provide plans of culverted watercourses or highway drains. To obtain plans please contact the Lead Local Flood Authority for more details.

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

Other Observations

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

YorkshireWater

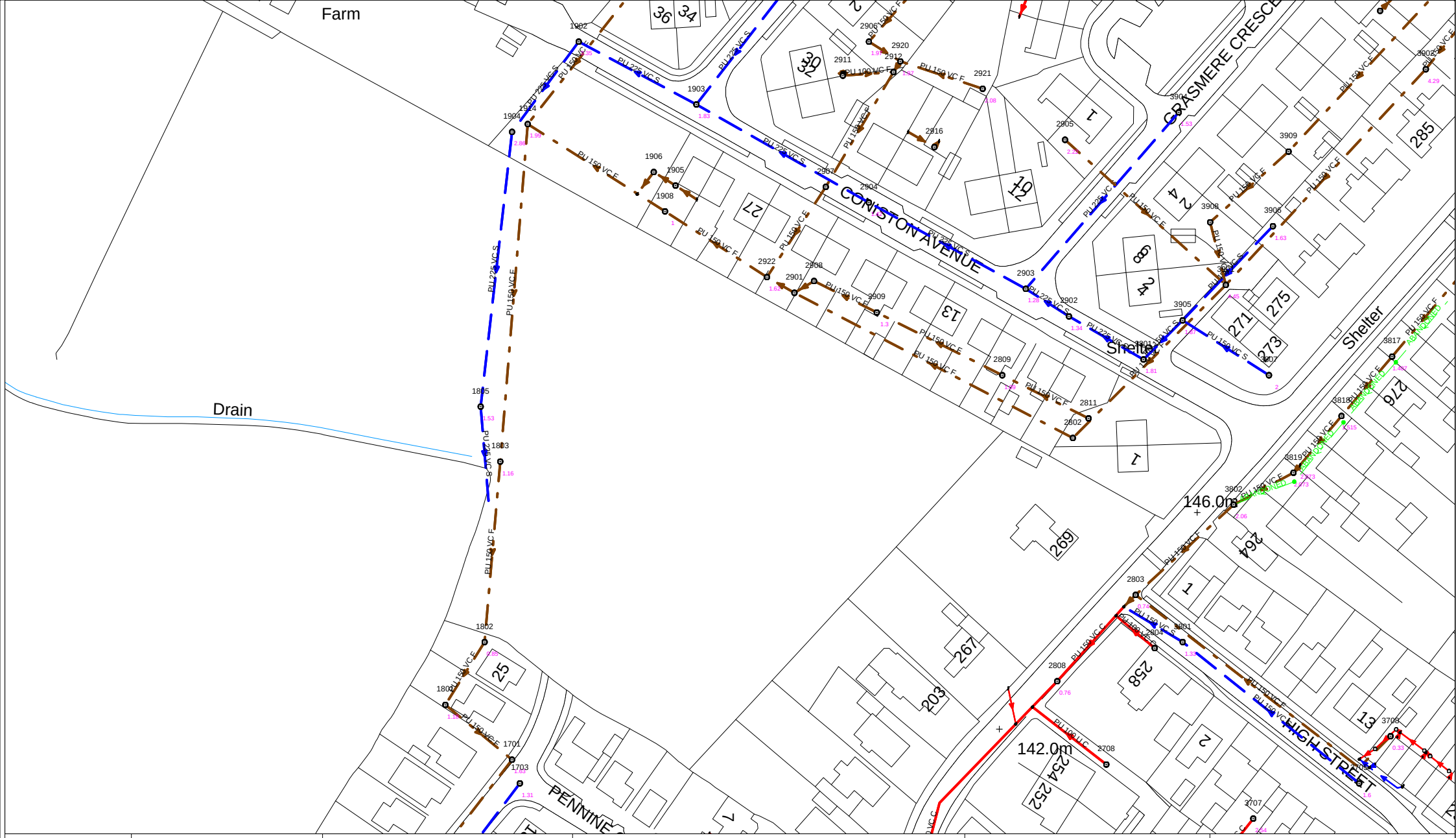
Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the WRc publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition as supplemented by Yorkshire Water's requirements, pursuant to an agreement under Section 104 of the Water Industry Act 1991. An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Developer Services Team (telephone 0345 120 84 82) for further information.

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

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

Yours sincerely

Chris Roberts
Development Services Technician



432020 : 410778	Map Name : SE3210NW	Title	Partial Key Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS
Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : YorMap Advisor C ROBERTS Contact Tel : 87 2582		Notes	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 Req : 04/01/2021, 10:51:26 Source : Sewer Network Enquiry
			Date Gen : 04/01/2021, 10:51:45

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

Michael Dean

From: Atkins , Wayne (SENIOR ENGINEER) <WayneAtkins@barnsley.gov.uk>
Sent: 06 September 2023 08:43
To: Martin Huddleston
Cc: Michael Dean; Jason Lock; Elenya McCue; Grayson , Ian (SENIOR ENGINEER - ASSETS)
Subject: RE: Field North of Pennine View, Darton (REQ149986)

Good Morning Martin,

Confirmation of our conversation on site yesterday (5/9/2023).

From the survey information you provided it is obvious there are a number of major issues with the condition of the watercourse which the connection of flows from the development site, even at a minimal rate, could cause major concerns regarding flooding of proposed and existing properties. Given this and existing known operational and flooding issues with the watercourse downstream BMBC as LLFA would unfortunately have to resist any connection of flows from the development site to the watercourse.

As you mentioned on site that the ground is not suitable for soakaways then I would recommend you contact Yorkshire Water to discuss appropriate flow rates and points of discharge into the Public Sewer System.

Should you wish to discuss this matter further please let me know.

Regards

Wayne Atkins F.I.H.E.
Senior Engineer, Highway Design
Strategic Transport
Growth and Sustainability
Barnsley Metropolitan Borough Council

E-mail: wayneatkins@barnsley.gov.uk
Mail : PO Box 601, Barnsley S70 9FA

From: Martin Huddleston <martin@haighhuddleston.co.uk>
Sent: 29 August 2023 11:51
To: Grayson , Ian (SENIOR ENGINEER - ASSETS) <iangrayson@barnsley.gov.uk>; Atkins , Wayne (SENIOR ENGINEER) <WayneAtkins@barnsley.gov.uk>
Cc: Michael Dean <m.dean@haighhuddleston.co.uk>; Jason Lock <JLock@conroybrook.co.uk>; Elenya McCue <EMcCue@conroybrook.co.uk>
Subject: FW: Field North of Pennine View, Darton (REQ149986)

Morning Ian, Wayne

We have recently undertaken further CCTV work to try and prove a connection between the existing Yorkshire Water outfall and the adopted system downstream of Sackup Lane.

Manhole Located at point (E) where YW outfalls – this takes the residential development to the north

Michael Dean

From: Reuben Thornton <Reuben.Thornton@yorkshirewater.co.uk>
Sent: 28 September 2023 10:31
To: Michael Dean
Subject: X022960 - Land to the south of Coniston Avenue, Darton, Barnsley - 2021/1661

Good Morning Michael

As per our recent meeting, it is accepted that the on-site culvert is terminally out of action, and I will therefore accept 3.5 litres per second to the public combined network in principle. Presumably this will be via the short section of surface water sewer on Pennine View.

If you send through the information shown at the meeting to the planning portal I can condition the application to discharge to public sewer at 3.5 litres per second.

As to the issues of flooding due to the broken culvert and diverting the surface water from the crescent to the North East, we will need to come to some sort of bespoke agreement with YW and the LLFA. As you can see from the sewer map extract below, we have at least the run-off from the highway draining to the broken culvert - Presumably a fair few of the houses too, unless there is an error in the records, and they are actually highway drains. Further investigation and modelling will be needed as you said.

If you need further mapping, sewer maps can be obtained from Safe-move.co.uk.

Please let me know if you need anything further.

Kind Regards

Reuben Thornton
Development Control Technician
Developer Services

0779 061 6373
yorkshirewater.com/developers

Want to know a bit more about Yorkshire Water? Our website is full of useful info, from how to apply for a water meter to planning your next walk at one of our beautiful reservoirs - it's all at yorkshirewater.com

Need to talk to us? For the best way to get in touch with us, go to yorkshirewater.com/contact

APPENDIX F

PRELIMINARY ATTENUATION CALCULATIONS AND GREENFIELD RUN OFF CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	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	0.067	4.00	137.587	1200	432142.047	410941.291	1.587
2	0.043	4.00	136.680	1200	432135.195	410929.267	1.603
3	0.074	4.00	135.290	1500	432137.465	410906.455	2.116
11	0.167	4.00	137.989	1200	432208.134	410867.503	1.489
4	0.075	4.00	136.392	1800	432173.153	410886.779	3.531
5	0.053	4.00	134.851	1200	432157.104	410857.917	2.934
12	0.117	4.00	134.707	1200	432182.123	410818.189	1.707
13	0.091	4.00	133.596	1200	432157.980	410831.604	2.050
6	0.048	4.00	133.241	1500	432149.735	410834.118	2.220
14	0.000	4.00	130.000	1500	432096.984	410840.762	1.200
7	0.000		132.518	1800	432146.450	410823.511	4.030
8	0.000		131.846	1200	432147.416	410804.618	3.484
9	0.000		130.953	1200	432135.961	410785.161	2.742
10	0.000		129.122	1200	432115.026	410756.090	1.150

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	13.839	0.600	136.000	135.077	0.923	15.0	225	4.07	50.0
1.001	2	3	22.925	0.600	135.077	133.549	1.528	15.0	225	4.18	50.0
1.002	3	4	40.753	0.600	133.174	132.861	0.313	130.0	600	4.50	50.0
2.000	11	4	39.940	0.600	136.500	133.236	3.264	12.2	225	4.18	50.0
1.003	4	5	33.024	0.600	132.861	131.917	0.944	35.0	300	4.71	50.0
1.004	5	6	24.914	0.600	131.917	131.021	0.896	27.8	300	4.84	50.0
3.000	12	13	27.620	0.600	133.000	131.546	1.454	19.0	225	4.15	50.0
3.001	13	6	8.620	0.600	131.546	131.096	0.450	19.2	225	4.20	50.0
1.005	6	7	11.104	0.600	131.021	129.911	1.110	10.0	300	4.88	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.395	135.0	9.1	1.362	1.378	0.067	0.0	39	1.947
1.001	3.395	135.0	14.9	1.378	1.516	0.110	0.0	51	2.263
1.002	2.134	603.4	24.9	1.516	2.931	0.184	0.0	82	1.074
2.000	3.761	149.5	22.6	1.264	2.931	0.167	0.0	58	2.721
1.003	2.666	188.4	57.7	3.231	2.634	0.426	0.0	113	2.351
1.004	2.993	211.5	64.9	2.634	1.920	0.479	0.0	114	2.646
3.000	3.015	119.9	15.9	1.482	1.825	0.117	0.0	55	2.107
3.001	3.003	119.4	28.2	1.825	1.920	0.208	0.0	74	2.471
1.005	4.999	353.4	99.6	1.920	2.307	0.735	0.0	109	4.320

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.000	14	7	52.388	0.600	128.800	128.538	0.262	200.0	600	4.51	50.0
1.006	7	8	18.918	0.600	128.488	128.362	0.126	150.0	225	5.18	50.0
1.007	8	9	22.579	0.600	128.362	128.211	0.151	150.0	225	5.53	50.0
1.008	9	10	35.825	0.600	128.211	127.972	0.239	150.0	225	6.09	50.0

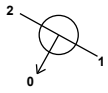
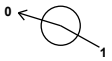
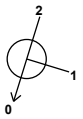
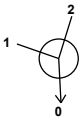
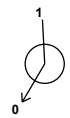
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
4.000	1.718	485.8	0.0	0.600	3.380	0.000	0.0	0	0.000
1.006	1.065	42.3	99.6	3.805	3.259	0.735	0.0	225	1.085
1.007	1.065	42.3	99.6	3.259	2.517	0.735	0.0	225	1.085
1.008	1.065	42.3	99.6	2.517	0.925	0.735	0.0	225	1.085

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	13.839	15.0	225	Circular_Default Sewer Type	137.587	136.000	1.362	136.680	135.077	1.378
1.001	22.925	15.0	225	Circular_Default Sewer Type	136.680	135.077	1.378	135.290	133.549	1.516
1.002	40.753	130.0	600	Circular_Default Sewer Type	135.290	133.174	1.516	136.392	132.861	2.931
2.000	39.940	12.2	225	Circular_Default Sewer Type	137.989	136.500	1.264	136.392	133.236	2.931
1.003	33.024	35.0	300	Circular_Default Sewer Type	136.392	132.861	3.231	134.851	131.917	2.634
1.004	24.914	27.8	300	Circular_Default Sewer Type	134.851	131.917	2.634	133.241	131.021	1.920
3.000	27.620	19.0	225	Circular_Default Sewer Type	134.707	133.000	1.482	133.596	131.546	1.825
3.001	8.620	19.2	225	Circular_Default Sewer Type	133.596	131.546	1.825	133.241	131.096	1.920
1.005	11.104	10.0	300	Circular_Default Sewer Type	133.241	131.021	1.920	132.518	129.911	2.307
4.000	52.388	200.0	600	Circular_Default Sewer Type	130.000	128.800	0.600	132.518	128.538	3.380
1.006	18.918	150.0	225	Circular_Default Sewer Type	132.518	128.488	3.805	131.846	128.362	3.259
1.007	22.579	150.0	225	Circular_Default Sewer Type	131.846	128.362	3.259	130.953	128.211	2.517
1.008	35.825	150.0	225	Circular_Default Sewer Type	130.953	128.211	2.517	129.122	127.972	0.925

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1500	Manhole	Adoptable
1.002	3	1500	Manhole	Adoptable	4	1800	Manhole	Adoptable
2.000	11	1200	Manhole	Adoptable	4	1800	Manhole	Adoptable
1.003	4	1800	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.004	5	1200	Manhole	Adoptable	6	1500	Manhole	Adoptable
3.000	12	1200	Manhole	Adoptable	13	1200	Manhole	Adoptable
3.001	13	1200	Manhole	Adoptable	6	1500	Manhole	Adoptable
1.005	6	1500	Manhole	Adoptable	7	1800	Manhole	Adoptable
4.000	14	1500	Manhole	Adoptable	7	1800	Manhole	Adoptable
1.006	7	1800	Manhole	Adoptable	8	1200	Manhole	Adoptable
1.007	8	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
1.008	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	432142.047	410941.291	137.587	1.587	1200		0 1.000	136.000	225
2	432135.195	410929.267	136.680	1.603	1200		1 1.000 0 1.001	135.077 135.077	225 225
3	432137.465	410906.455	135.290	2.116	1500		1 1.001 0 1.002	133.549 133.174	225 600
11	432208.134	410867.503	137.989	1.489	1200		0 2.000	136.500	225
4	432173.153	410886.779	136.392	3.531	1800		1 2.000 2 1.002 0 1.003	133.236 132.861 132.861	225 600 300
5	432157.104	410857.917	134.851	2.934	1200		1 1.003 0 1.004	131.917 131.917	300 300
12	432182.123	410818.189	134.707	1.707	1200		0 3.000	133.000	225
13	432157.980	410831.604	133.596	2.050	1200		1 3.000 0 3.001	131.546 131.546	225 225
6	432149.735	410834.118	133.241	2.220	1500		1 3.001 2 1.004 0 1.005	131.096 131.021 131.021	225 300 300
14	432096.984	410840.762	130.000	1.200	1500		0 4.000	128.800	600
7	432146.450	410823.511	132.518	4.030	1800		1 4.000 2 1.005 0 1.006	128.538 129.911 128.488	600 300 225
8	432147.416	410804.618	131.846	3.484	1200		1 1.006 0 1.007	128.362 128.362	225 225
9	432135.961	410785.161	130.953	2.742	1200		1 1.007 0 1.008	128.211 128.211	225 225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
10	432115.026	410756.090	129.122	1.150	1200	 1	1.008	127.972	225

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Normal		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	0	0	0
100	40	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 7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	128.488	Product Number	CTL-SHE-0078-3500-1800-3500
Design Depth (m)	1.800	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node 14 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	128.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	500.0	0.0	1.200	1008.0	0.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	136.045	0.045	11.8	0.0507	0.0000	OK
15 minute winter	2	10	135.136	0.059	19.3	0.0668	0.0000	OK
15 minute winter	3	10	133.267	0.092	32.3	0.1634	0.0000	OK
15 minute summer	11	10	136.569	0.069	29.3	0.0778	0.0000	OK
15 minute winter	4	10	132.997	0.136	74.7	0.3465	0.0000	OK
15 minute winter	5	10	132.054	0.137	83.9	0.1554	0.0000	OK
15 minute summer	12	10	133.063	0.063	20.5	0.0709	0.0000	OK
15 minute summer	13	10	131.641	0.095	36.5	0.1080	0.0000	OK
15 minute winter	6	10	131.165	0.144	128.5	0.2550	0.0000	OK
600 minute winter	14	510	129.023	0.223	12.3	122.2086	0.0000	OK
15 minute summer	7	10	129.703	1.215	128.0	3.0914	0.0000	SURCHARGED
15 minute summer	8	10	128.402	0.040	2.9	0.0454	0.0000	OK
15 minute summer	9	11	128.251	0.040	2.9	0.0450	0.0000	OK
15 minute summer	10	11	128.011	0.039	2.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	11.8	1.714	0.087	0.0961	
15 minute winter	2	1.001	3	19.3	2.379	0.143	0.1860	
15 minute winter	3	1.002	4	32.3	0.864	0.053	1.5355	
15 minute summer	11	2.000	4	29.3	2.902	0.196	0.4033	
15 minute winter	4	1.003	5	74.6	2.385	0.396	1.0323	
15 minute winter	5	1.004	6	83.6	2.575	0.395	0.8091	
15 minute summer	12	3.000	13	20.5	1.651	0.171	0.3458	
15 minute summer	13	3.001	6	36.5	2.457	0.306	0.1281	
15 minute winter	6	1.005	7	128.2	4.210	0.363	0.3384	
600 minute winter	14	4.000	7	-12.3	-0.127	-0.025	8.8791	
15 minute summer	7	Hydro-Brake®	8	2.9				
15 minute summer	8	1.007	9	2.9	0.731	0.068	0.1066	
15 minute summer	9	1.008	10	2.8	0.609	0.067	0.1675	40.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	136.062	0.061	22.2	0.0695	0.0000	OK
15 minute summer	2	10	135.160	0.083	36.5	0.0941	0.0000	OK
15 minute winter	3	10	133.300	0.126	61.1	0.2231	0.0000	OK
15 minute summer	11	10	136.598	0.097	55.4	0.1103	0.0000	OK
15 minute winter	4	10	133.068	0.207	141.4	0.5265	0.0000	OK
15 minute winter	5	10	132.127	0.210	158.7	0.2380	0.0000	OK
15 minute summer	12	10	133.088	0.088	38.8	0.0991	0.0000	OK
15 minute summer	13	10	131.687	0.141	69.0	0.1598	0.0000	OK
15 minute winter	6	10	131.253	0.232	243.2	0.4092	0.0000	OK
720 minute winter	14	705	129.274	0.474	20.7	285.1381	0.0000	OK
15 minute summer	7	9	129.993	1.504	242.5	3.8289	0.0000	SURCHARGED
15 minute winter	8	9	128.404	0.042	3.2	0.0480	0.0000	OK
15 minute summer	9	10	128.253	0.042	3.2	0.0473	0.0000	OK
15 minute summer	10	10	128.013	0.041	3.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	22.2	2.026	0.164	0.1529	
15 minute summer	2	1.001	3	36.5	2.823	0.270	0.2965	
15 minute winter	3	1.002	4	61.1	0.965	0.101	2.6304	
15 minute summer	11	2.000	4	55.4	3.437	0.370	0.6439	
15 minute winter	4	1.003	5	141.1	2.697	0.749	1.7274	
15 minute winter	5	1.004	6	158.3	2.866	0.748	1.3847	
15 minute summer	12	3.000	13	38.8	1.913	0.324	0.5598	
15 minute summer	13	3.001	6	69.1	2.636	0.578	0.2401	
15 minute winter	6	1.005	7	242.7	4.704	0.687	0.5700	
720 minute winter	14	4.000	7	-20.7	-0.128	-0.043	13.6289	
15 minute summer	7	Hydro-Brake®	8	3.2				
15 minute winter	8	1.007	9	3.2	0.715	0.076	0.1146	
15 minute summer	9	1.008	10	3.1	0.626	0.074	0.1798	41.9

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	136.070	0.070	28.8	0.0795	0.0000	OK
15 minute winter	2	10	135.174	0.096	47.3	0.1091	0.0000	OK
15 minute winter	3	10	133.318	0.144	79.1	0.2539	0.0000	OK
15 minute winter	11	10	136.614	0.114	71.7	0.1284	0.0000	OK
15 minute winter	4	11	133.186	0.325	183.0	0.8274	0.0000	SURCHARGED
15 minute summer	5	10	132.383	0.466	188.4	0.5266	0.0000	SURCHARGED
15 minute winter	12	10	133.101	0.101	50.2	0.1142	0.0000	OK
15 minute winter	13	10	131.774	0.228	89.3	0.2582	0.0000	SURCHARGED
15 minute winter	6	10	131.454	0.433	291.2	0.7644	0.0000	SURCHARGED
960 minute winter	14	930	129.423	0.623	21.7	394.4293	0.0000	SURCHARGED
15 minute winter	7	8	130.079	1.591	287.9	4.0480	0.0000	SURCHARGED
15 minute summer	8	9	128.405	0.043	3.3	0.0487	0.0000	OK
15 minute winter	9	9	128.253	0.042	3.3	0.0479	0.0000	OK
15 minute winter	10	9	128.014	0.042	3.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	28.8	2.161	0.213	0.1855	
15 minute winter	2	1.001	3	47.3	3.015	0.350	0.3598	
15 minute winter	3	1.002	4	79.1	0.983	0.131	4.1518	
15 minute winter	11	2.000	4	71.7	3.663	0.480	0.7819	
15 minute winter	4	1.003	5	171.1	2.719	0.908	2.3255	
15 minute summer	5	1.004	6	197.0	3.088	0.931	1.7544	
15 minute winter	12	3.000	13	50.2	1.972	0.419	0.7875	
15 minute winter	13	3.001	6	86.7	2.635	0.726	0.3428	
15 minute winter	6	1.005	7	287.9	4.642	0.815	0.6729	
960 minute winter	14	4.000	7	-21.7	-0.108	-0.045	14.7565	
15 minute winter	7	Hydro-Brake®	8	3.3				
15 minute summer	8	1.007	9	3.3	0.742	0.077	0.1160	
15 minute winter	9	1.008	10	3.2	0.632	0.076	0.1834	41.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.44%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	136.085	0.085	40.3	0.0957	0.0000	OK
15 minute winter	2	10	135.195	0.118	66.2	0.1337	0.0000	OK
15 minute winter	3	12	134.209	1.035	110.7	1.8289	0.0000	SURCHARGED
15 minute summer	11	9	136.639	0.139	100.3	0.1576	0.0000	OK
15 minute winter	4	12	134.141	1.280	247.8	3.2575	0.0000	SURCHARGED
15 minute winter	5	11	133.007	1.090	207.2	1.2324	0.0000	SURCHARGED
15 minute winter	12	10	133.158	0.158	70.3	0.1786	0.0000	OK
15 minute winter	13	11	132.523	0.977	123.7	1.1049	0.0000	SURCHARGED
15 minute winter	6	11	131.909	0.888	341.1	1.5698	0.0000	SURCHARGED
1440 minute winter	14	1410	129.692	0.891	22.5	615.5229	0.0000	SURCHARGED
15 minute winter	7	8	130.166	1.678	339.6	4.2715	0.0000	SURCHARGED
15 minute winter	8	8	128.406	0.044	3.4	0.0497	0.0000	OK
15 minute winter	9	8	128.254	0.043	3.5	0.0485	0.0000	OK
15 minute winter	10	8	128.014	0.042	3.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	40.3	2.327	0.299	0.2402	
15 minute winter	2	1.001	3	66.2	3.267	0.490	0.6563	
15 minute winter	3	1.002	4	102.3	0.983	0.170	11.4792	
15 minute summer	11	2.000	4	100.4	3.910	0.671	1.2864	
15 minute winter	4	1.003	5	186.2	2.657	0.988	2.3255	
15 minute winter	5	1.004	6	211.6	3.114	1.000	1.7544	
15 minute winter	12	3.000	13	69.0	1.931	0.576	0.9603	
15 minute winter	13	3.001	6	118.0	2.968	0.989	0.3428	
15 minute winter	6	1.005	7	339.6	4.952	0.961	0.7457	
1440 minute winter	14	4.000	7	-22.5	-0.082	-0.046	14.7565	
15 minute winter	7	Hydro-Brake®	8	3.4				
15 minute winter	8	1.007	9	3.5	0.776	0.082	0.1209	
15 minute winter	9	1.008	10	3.3	0.638	0.078	0.1863	39.1

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Martin Huddleston
Site name:	Pennine View
Site location:	Darton

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.59334° N
Longitude:	1.51519° W
Reference:	788047646
Date:	Jul 14 2021 12:11

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1.2

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	671	671
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	2.08	3.28
1 in 1 year (l/s):	1.79	2.82
1 in 30 years (l/s):	3.64	5.74
1 in 100 year (l/s):	4.33	6.82
1 in 200 years (l/s):	4.93	7.78