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ADVANCE

Frank Shaw Associates
Deighton SEMH School
Huddersfield
Sustainable Drainage Statement

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Sustainable Drainage Statement

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1. INTRODUCTION

1.1 A Sustainable Drainage Statement (SDS) sets out the principles of drainage design for a development and summarises the reasoning behind the chosen design. This includes consideration of national and local guidance, justification of specific flow rates, volumes of attenuated storage, as well as the appropriate level of treatment to be provided to surface water runoff.

1.2 This SDS has been produced by BWB Consulting on behalf of Kirklees Council in respect of a site located at Joseph Norton SEMH School Land off Deighton Road, Huddersfield. This SDS is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

1.3 The location of the site is illustrated within **Figure 1.1**, with contextual information provided within **Table 1.1**. A proposed site layout plan is included as **Appendix 1**.

Figure 1.1: Site Location

Table 1.1: Site Details

Site Name	Future Joseph Norton Academy site on Deighton Road, Ashbrow
Location	Land off Deighton Road Deighton Huddersfield HD2 1JP
NGR (approx.)	415904, 419561
Application Site Area (ha)	2.07ha (approx.)
Development Type	Educational building
Lead Local Flood Authority	Kirklees Council
Local Planning Authority	Kirklees Council
Environment Agency Area	Yorkshire
Sewerage Undertaker	Yorkshire Water

2. EXISTING CONDITIONS AND WIDER SITE CONTEXT

2.1 The site is located off Deighton Road in Deighton, a neighbourhood located in the northeast of Huddersfield. The site was formerly occupied by the Deighton Centre which was demolished in 2013. A site location plan is shown in **Figure 1.1**. Although the building footprints have been removed, the former access road and parking areas have been retained and are in a good operational condition. The area that was once occupied by the school is now covered by overgrown green space and scrubland. This former school area is traversed by informal paths that are utilised by the local community. Additionally, there is a public right of way footpath situated adjacent to the southwestern/western boundary of the site.

2.2 A Topographical Survey for the site was undertaken by HSP Consulting Engineers Ltd in May 2023 and is included as **Appendix 1**. The site is located on a higher plateau and levels fall from west to east and south to north. The highest elevation on the site is found in the southwest corner of the site at approximately 138m Above Ordnance Datum (AOD). The site slopes downward towards the north, with the lowest recorded point at around 128.8mAOD. The site also slopes eastward towards the playing fields, with the lowest point at around 129.5mAOD in the southeast corner of the site.

2.3 The site is bound by the adjoining Christ Church CE Academy along the west elevation. Along the north elevation, an embankment slopes down to a woodland area that descends towards the residential properties along Tenter Hill. Another embankment is located along the east elevation and slopes down towards playing fields. Finally, the site is bordered by greenspace area along the south elevation.

2.4 The proposed project currently consists of a new school including associated access road, parking and drop-off areas and various outdoor facilities such as, an outdoor learning area, forest school, habitat zone, and a Multi-Use Games Area (MUGA). The proposed development plan is included as **Appendix 2**.

2.5 A Flood Risk Assessment (FRA) by HSP Consulting Ltd, reference HSP2022-C4164-C&S-FRAS1-1069, was submitted during the Pre-Planning application. The report has been reviewed and a summary of the implications on the current site are outlined below:

- The application site is located within Flood Zone 1. The land is shown to be within Flood Zone 1 and considered having less than 1 in 1000 annual probability of river and sea flooding.
- The potential flood risk area closest to the site, which falls within the conjectural Flood Zone 2 or Zone 3, is situated roughly 550 meters to the south of the application site.
- The application site is at a "very low" risk of flooding from surface water flooding and reservoir sources. However, a conjectural flood risk envelope is located approximately 550m to the south.

2.6 In addition, a response from Kirklees Council was received regarding the proposed development location. Their feedback is summarised as follow:

- The land is shown to be within Flood Zone 1 for river and sea flooding.

- The LLFA deem this development as "More Vulnerable" for Flood Vulnerability Classification and subject to no sequential test.
- There is off-site surface water flood risk area located at the Southeast of the site on Deighton Road, there is vulnerability to a 1 in 30 flooding with 0mm-150mm of surface water. This may affect access/egress to the site. Also, there is vulnerability to a 1 in 100 flooding with 0mm-150mm of surface water flowing at the Southeast of the site on Deighton Road.
- There were no flood incidents recorded near or on the site.
- During intense rainfall events drainage systems can often become blocked or overwhelmed. We expect developers to understand where the flow of water will be in these circumstances and avoid unnecessary risk.
- The site is classified as Brownfield.

2.7 Advice on the surface water drainage strategy was provided by the LLFA as part of the Pre-Planning consultation. Their recommendations have been reviewed and a summary of the implications on the site is outlined below:

- The first option in the surface water drainage hierarchy is a soakaway. The entire site has a BGS score of 2, indicating that the site is probably compatible for infiltration SuDS. The subsurface is probably suitable for infiltration SuDs although the design may be influenced by the ground conditions. The LLFA recommends that the quantify infiltration rate be determined through an infiltration/soakaway test.
- The second option is discharge to a watercourse. The officer from LLFA commented that there is no watercourse nearby to connect to.
- The third and final option in the hierarchy is a sewer connection. The LLFA officer noted that a 150mm public sewer runs directly through the middle of the site. Additionally, a 150mm public sewer is situated to the North of the site, while a 300mm public sewer is located to the South-East of the site.
- The require attenuation must be capable of containing the significant 1 in 30-year storm event. Moreover, the capacity to accommodate volumes generated by storms up to and including the 1 in 100 + 30% climate change critical storm is also mandated to be stored on-site. While the possibility of utilising safe surface areas to store the additional volume can be explored, it's important to acknowledge that many sites in Kirklees might be inclined, necessitating the storage of this volume within an underground system.
- Brownfield sites are obligated to improve the current discharge rate by 30%.
- In case the extent of the attenuation surpasses 1500mm and it is positioned under a highway, the circumstance is likely to preclude adoption by Kirklees Council. However, storage within landscaped areas or non-adaptable highways remains unaffected by these considerations.

3. SURFACE WATER DRAINAGE STRATEGY

3.1 The illustrative masterplan (included in **Appendix 2**) identifies the proposed development.

3.2 The surface water drainage design is shown in a Proposed Drainage Layout (**Appendix 3**); this layout shows the drainage network including SuDS, proposed attenuation within soakaway tanks and design infiltration rates.

3.3 The proposed Surface Water Drainage network has been simulated using MicroDrainage, to show the network complies with 1 in 1 year, 30 year, 100 year and 100 year + 40% CC requirements (included in **Appendix 4**).

Drainage Hierarchy

3.4 The Planning Policy Guidance[1], the SuDS Manual[2] identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

i. into the ground (infiltration);

ii. to a surface water body;

iii. to a surface water sewer, highway drain, or another drainage system;

iv. to a combined sewer.

3.5 The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

Discharge via infiltration

3.6 As part of the Pre-Planning consultation, the LLFA recommend infiltration at the site.

3.7 The site investigation report produced by HSP in May 23 suggests surface water infiltration into the ground is possible.

3.8 Soakaway tests in line with BRE Digest 365 have been carried out and infiltration rates range between 3.57 x 10-4 m/s and 9.99 x 10-5 m/s within two locations (noted SK01 and SK03 on **Figure 3.1** below). A third location (noted SK02) was noted to comprise more clay content, with infiltration rates between 1.41 x 10-5 m/s and 1.52 x 10-6 m/s.

[1] Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/.
[2] The SuDS Manual (C753). CIRIA 2015.

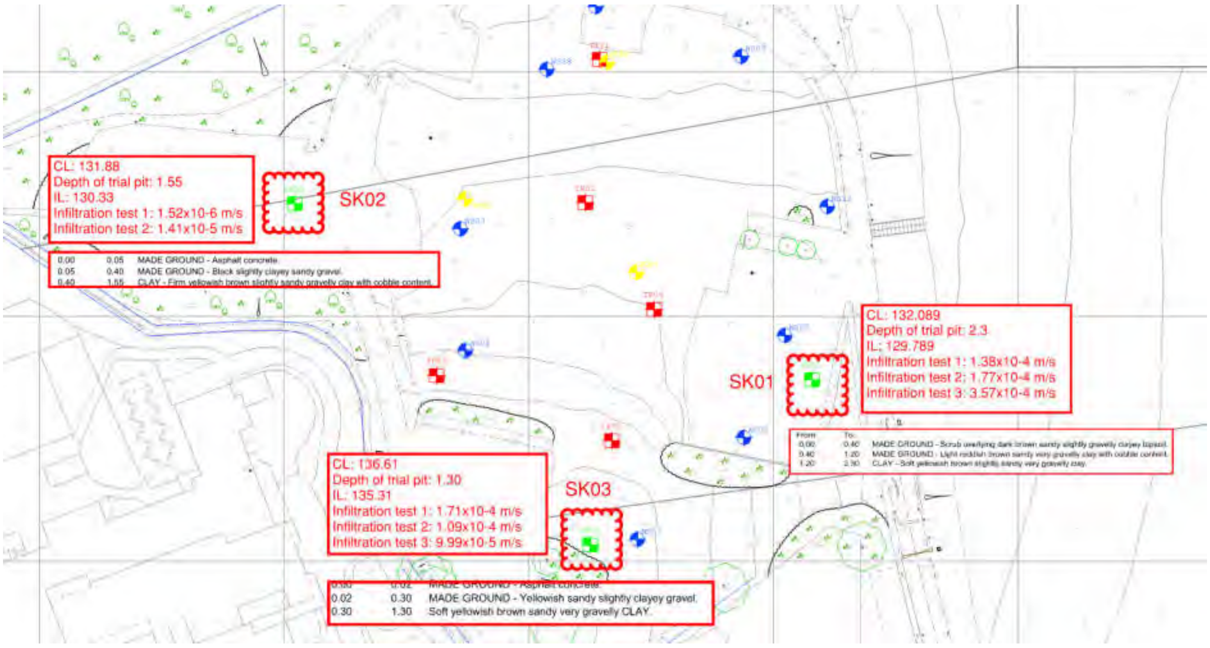


Figure 3.1: Results of soakaway tests

3.9 The site investigation suggests that the risk of contaminants migrating to the groundwater is very low. See extract below:

5.4 Protection of Controlled Waters

Exceedance of lead and PAHs have been recorded within shallow Made Ground materials. The potential for leaching contaminants is considered limited within the underlying Lower Coal Measures which have recorded predominately fine deposits with occasional granular lenses grading into a mudstone. The closest surface water course is located 107m north and the underlying Coal Measures are classified as a Secondary A aquifer. On this basis the risk posed to controlled waters is considered very low.

Figure 3.2: Extract from Site Investigation report by HSP (May 23)

3.10 No groundwater has been encountered during the intrusive site investigation including when digging up trial pits at a depth higher than 3m and within the boreholes which are more than 15m deep.

3.11 Therefore, it is proposed to discharge surface water via infiltration into the ground using soakaways, permeable paving systems and a rain garden.

<u>Discharge to a surface water body</u>

3.12 Further discussions with the LLFA suggested exploring discharge to the watercourse which is located approximately 100m north of the site.

3.13 Any possible discharge to the watercourse would be restricted to Greenfield runoff rates as advised by the LLFA. Although the pre-application advice suggested the site was Brownfield, the LLFA suggested considering the site as Greenfield as it had not been developed over the last 5 years.

3.14 A Greenfield run-off rate of 24.4l/s (Qbar) has been calculated using MicroDrainage as shown on **Figure 3.3** below and would be proposed for this option.

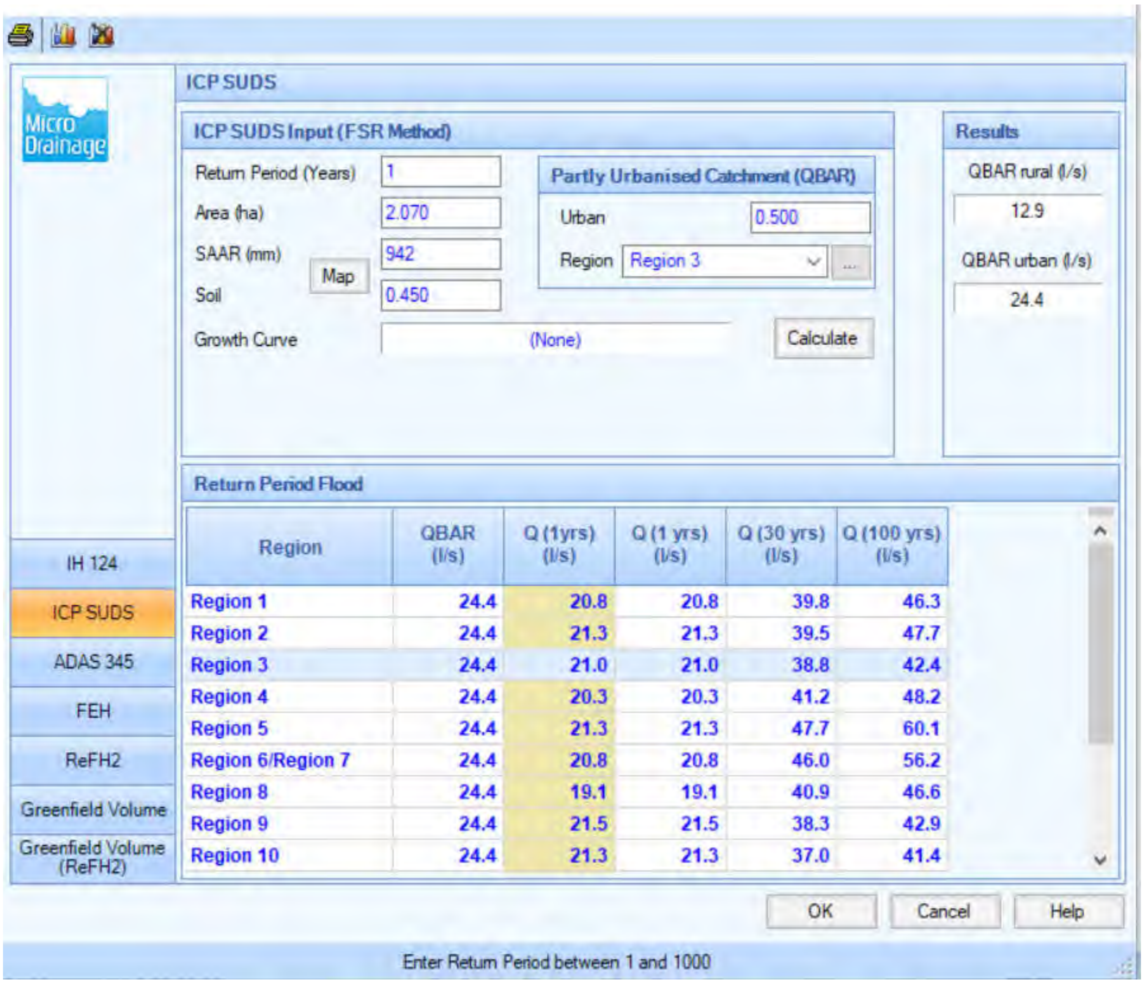


Figure 3.3: Greenfield runoff calculation using MicroDrainage

3.15 The existing surface water drainage on site was initially thought to run to the north and discharge into the watercourse as per **Figure 3.4** below.

Figure 3.4: CCTV Survey Plan by Jet Aire Services

3.16 However, after further investigation has been carried out, including a CCTV Survey conducted in August 2023 (Reference number JA/88754), it was confirmed that the existing surface water drainage discharges to the combined Yorkshire Water sewer in Wiggan Lane. The Yorkshire Water assets are shown in **Appendix 5**.

3.17 The Yorkshire Water records show a surface water sewer approximately 270m to the northeast of the site along a small residential road called Chalwood.

3.18 In a further attempt to explore the option to discharge to the watercourse, a meeting on site was arranged with the LLFA on 29th August 2023 to assess the viability of running a new drain to that sewer.

3.19 There are many existing trees and 3no. large and steep embankments that would need to be considered if running a new drain from the proposed development site to the Yorkshire Water surface sewer. The most viable route has been identified as shown in **Figure 3.5** below.

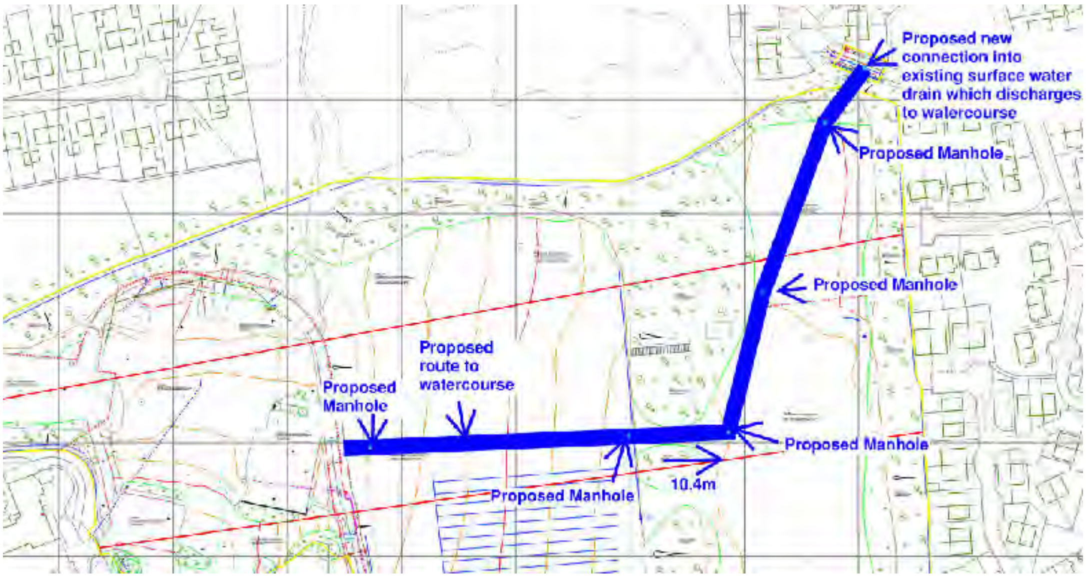


Figure 3.5: Proposed route to discharge to Yorkshire Water surface water sewer

3.20 The option above will involve installing a new 330m long drain through the playing fields which are in use by Sports England, through steep embankments which would require deep excavations. This new drain would need to be maintained by Kirklees Council which own the land adding another complication to this option.

3.21 Based on the above, it was agreed on site that the soakaway option could be progressed as a preferred option.

Discharge to the sewer

3.22 Discharge to the Yorkshire Water sewer would be possible if re-using the existing drainage connection on site which is located north of the site and discharges to a drain running through the woodland area and discharges to Yorkshire Water combined sewer.

3.23 A pre-development enquiry was submitted to Yorkshire Water who confirmed infiltration and discharge to the watercourse would need to be explored first before considering discharging to the combined sewer.

3.24 It is understood the above is also the recommendation from the LLFA.

Peak Flow Control

3.25 To comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems S2-S3[3], for previously developed sites, the proposed runoff rate must be "as close as reasonably practicable" to the Greenfield runoff rates but should never exceed the rate of discharge prior to redevelopment for that event.

[3] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

3.26 Kirklees Council's LLFA response in the Pre-Planning application states that for a Climate Change factor of 30% should be considered. Further discussions with the LLFA suggested the use of 40%.

3.27 Therefore, the surface water drainage has been designed for all rainfall periods up to the 1 in 100 year event + 40% CC with consideration for all durations up to 24 hours.

3.28 The soakaways and permeable paving area have been sized using the infiltration rates recorded during the infiltration tests. A sensitivity check has also been carried out considering a reduction of up to 50% of that infiltration rate design value over time although the detailed design of the soakaway tanks can consider a suitable arrangement to prevent silt from entering the tanks structure.

3.29 Half drain times have been checked on MicroDrainage and can be achieved within a 24-hour period after the storm event.

3.30 MicroDrainage calculations are presented in **Appendix 4**.

Runoff Volume Control

3.31 The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S6[4] states that where reasonably practical the runoff volume from a development for the 1 in 100-year 6-hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume. Where it is not reasonably practicable to constrain the volume of runoff from a development at or below the existing volume, then the runoff must be discharged in a manner that does not adversely affect flood risk, i.e.:

i. The additional runoff volume resulting from the development (the 'long term storage volume') should be discharged separately from the site at a rate of 2l/s/ha or less. Or,
ii. All the runoff volume from the development should be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions or less. Or,
iii. All the runoff volume from the development should be discharged at a rate of 2l/s/ha or less.

3.32 The existing impermeable area is 6,612m^2.

3.33 An estimate of the pre-development runoff volume from the 1 in 30-year 6 hour storm has been calculated using an average intensity of 29.2 mm/hr based on FSR data. The existing and post-development runoff volumes are compared within **Table 3.1**.

[4] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

Table 3.1: Runoff Volume Comparison

Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3)
193m^3	0	-193m^3

3.34 The proposed surface water drainage strategy for the new development provides a large betterment compared to the existing regime as the surface water from the existing hardstanding area currently discharges to the Yorkshire Water combined sewer.

Attenuated Storage

3.35 The site is divided into 4no main catchment areas:

- Catchment area 1 - The western half of the building and western external area discharge to a 361m^3 soakaway tank located under the outdoor learning area.
- Catchment area 2 - The eastern half of the building and eastern external area discharge to a 140m^3 soakaway tank located under the playground area.
- Catchment area 3 - The car park in the southwest corner of the site works in isolation with permeable paving which will let the water infiltrate into the ground.
- Catchment area 4 - The other car park and access road to the southeast corner of the park also work in isolation and a permeable paving system is also proposed to collect the surface water and let it infiltrate into the ground.

3.36 A small area of approximately 50m^2 near the entrance to the southeast corner of the site will drain to a rain garden.

3.37 It is proposed to position the soakaway tanks a minimum of 5m from building structures and top of embankments or boundary as per best practice and to minimise the risk of re-emergence of water in the embankment. Where possible, that distance will increase to 10m.

3.38 An impermeable barrier along the embankments can be considered if re-emergence of water is deemed to be a potential issue.

3.39 Some of the car park will be laid on a slope. Therefore, it is proposed to introduce check dams to maximise storage within the porous subbase. The MicroDrainage model is based on a subbase depth of 300mm laid flat. To provide an equivalent storage volume within the subbase on sections of the car park laid in 1 in 21, it is proposed to install check dams at 5m intervals and lay the porous subbase to a depth of 450mm which will provide slightly more storage compared to what has been modelled on MicroDrainage.

3.40 A void ratio of 30% within the porous subbase has been assumed.

3.41 The Microdrainage calculations confirm the suitability of the above volumes of attenuation with consideration of all storm events up to the 1 in 100 year storm event + 40% Climate Change, durations up to 24 hours, reduction of infiltration up to 50% over time and half drain time within a 24 hour period after the storm event. In the critical storm durations, there is shown to be no flooding.

Sustainable Drainage Systems

3.42 As part of the drainage strategy the surface water runoff from the current site will be attenuated within soakaways and porous subbase under the car park areas.

3.43 French drains and rain gardens are also proposed to drain hardstanding areas which will provide another source of attenuation, water quality and amenity benefits.

3.44 These SuDS features are shown on the surface and foul water layout for ref. 22308-BWB-XX-XX-DR-C-0500_Proposed Drainage which is included as **Appendix 3**.

Residual Risk and Designing for Exceedance

3.45 In addition to the volume of storage provided within the main attenuation, there will be capacity within upstream pipes, channels and filter drains which has not been accounted for at this stage and a further level of redundancy to the network will therefore be provided.

3.46 Levels fall away from buildings to minimise the risk of flooding in exceedance events. Refer to the Flood Risk Assessment reference HSP2022-C4164-C&S-FRAS1-1069 for further information.

4. MAINTENANCE

4.1 The school will be responsible for maintaining the drainage features, including vegetation maintenance, and regular manhole and gully inspections.

4.2 Requirements for ongoing maintenance of the drainage network should form part of the Operation and Maintenance manual for the site and should be undertaken by the school. Any specialist or proprietary products that are specified at detailed design should have a manufacturer specific maintenance regime which should be included within the document.

4.3 It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage, but some examples are included below.

i. All drainage features should be in open areas which are readily accessible.

ii. Gullies should be inspected and de-silted at least once a year, where necessary.

iii. Pipes, and manholes should be inspected and de-silted at least once a year, where necessary.

iv. Regular inspections of the soakaways should be undertaken to remove litter/debris, invasive/colonising vegetation and silt build up as necessary. Inlet and outlet structures to be regularly inspected, with remedial work as required to maintain water flows and prevent silt/vegetation build up.

v. If permeable paving is incorporated within the layout, it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.

5. FOUL WATER DRAINAGE

5.1 The proposed foul water network will be connecting into the existing Yorkshire Water combined sewer which is located to the northwest corner of the site. Please refer to the Proposed Drainage Layout, in **Appendix 3**.

5.2 A pre-development enquiry was submitted to Yorkshire Water who confirmed that a foul connection at that location would be acceptable.

5.3 Based on the current layouts and design, most of the foul network is expected to drain by gravity.

5.4 Based on 231 staff, the total flow per day is expected to be 20,790L, which is equivalent to an average flow of 0.72l/s based on 8h per day. Whether the peak flow is derived from the average flow or by using the Discharge Unit method assuming 24 toilets, the peak flow is expected to be less than 5l/s.

5.5 The proposed connection is subject to a S106 application to Yorkshire Water.

6. SUMMARY

6.1 This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards, specifically the hierarchy of discharge, runoff rate and volume criterion.

6.2 This SDS is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

6.3 The new development is shown to provide attenuated storage to accommodate the 1 in 100-year +40% climate change storm with no flooding expected for the associated critical storms.

6.4 It is anticipated that the responsibility for the ongoing inspection and maintenance of the drainage systems will lie with the school.

6.5 It is envisaged that the drainage layout will be further detailed during the RIBA stage 4 and 5, as the development layout is finalised.

APPENDICES

Appendix 1: Topographical Survey

KEY FOR UNDERGROUND SERVICES

Foul water	
Surface water	
Other	
Gas	GAS
Electric	E
Telephone	BT
Cable TV	CATV
Unidentified	U
Water	W
Closed Circuit TV	CCTV
Communications	COM
Heating Pipe	HP
Empty Duct	ED
Fibre Optics	FO
Vents	V
Pipe	PIPE
Traffic Signal	TS
Gauge Lines	G
Vapor Recovery	VR
Offsets	O
Fuel	F

Where chamber extents are significantly greater than the cover size, their approximate extents are shown thus;

ABBREVIATION KEY

AR	assumed route	PTG	pipe to ground
BD	base bend	PTS	pipe to surface
BD	backdrop	RE	rodding eye
BL	bed level	RWP	rainwater pipe
CL	cover level	SV	stop valve
CR	cable riser	SVP	soil vent pipe
DP	down pipe	TE	trapped exit
EOT	end of trace	TFR	taken from records
EP	electricity pole	TP	telegraph pole
FH	fire hydrant	UTF	unable to find
G	gully	UTL	unable to lift
GV	gas valve	UTS	unable to survey
HOR	head of run	UTT	unable to trace
HL	high level	VP	vent pipe
IC	inspection chamber	WL	water level
IL	invert level	WM	water meter
MH	manhole	WO	wash out valve
PR	pipe riser	D	depth

UTILITY SURVEY NOTES

Electromagnetic and/or ground penetrating radar techniques have been used to locate and map underground utilities and features on this drawing. HSP have made every endeavour to make sure that the information contained within this drawing is accurate and of the highest quality. However, the results from these types of surveys are not infallible and should the location or depth of services/features be of particular importance to a project, then it is strongly advised that trial excavations should be undertaken to confirm survey results.

HSP have used all record drawings that were available to us by the client or by the statutory utility providers at the time of the survey. Any information taken from these drawings (ie pipe sizes, material) is not guaranteed. Services located from record drawings will be shown and annotated as taken from records (tfr). Historic record information is often incomplete/inaccurate and cannot be relied upon.

A single line indicating a utility may indicate the presence of multiple services within close proximity to each other. Where a single line type is shown we recommend hand digging within 0.5m, to expose hidden services.

Where quoted, depth information of underground services/features is stated. Depths are generally +/- 10% accurate, but cannot be guaranteed. Any depths shown are usually to the top of the service/feature. Gravity sewers and drains are usually to invert (base of drainage channel) unless otherwise stated.

At HSP we use skilled staff and modern calibrated equipment to perform our surveys. However, the completeness of any underground survey cannot be 100% guaranteed and we cannot be held responsible for any inaccuracies beyond those that could be reasonably expected by a competent company.

Contractors utilizing our drawings for intrusive work should take all reasonable measures to work safely in accordance with hsg47 guidelines "avoiding danger from underground services".

Site specific notes:

The utility survey area is indicated on the drawing within the layer UG-survey Boundary.

HSP recommend to have all heavily silted/blocked manholes and drainage lines jetted, cleared and re-surveyed thereafter.

HSP strongly recommend having a CCTV survey of all the drainage within the survey area to obtain a more complete picture including but not limited to the position/location of inaccessible/buried manholes and lateral connections.

Due to the nature of the survey area there is an extremely high possibility of coming across old, disused and disconnected services during excavation.

At the time of the survey the playing field was extremely waterlogged which drastically limitted the effectiveness of the ground penetrating radar.

Any service with either TFR (taken from records) or AR (assumed route) written on it is to be used as a guide only and is not to be treated as accurate.

Key:

Av	Air valve	G:	Girth circumference	Sv	Stop valve
Bg	Back gully	Gy	Gully	TCB	Telephone call box
BH	Borehole	Ht.	Height	TTL:	Tree top level
BM	Benchmark	IC	Inspection cover	THL	Threshold level
Boll	Bollard	IFL	Internal floor level	TCB	Telephone call box
Bs	Bus stop	IL	Invert level	TL	Traffic light
BT	British Telecom	Lb	Letter box	THL	Threshold level
Bg	Back Gully	Lp	Lamp Post	Tp	Telegraph post
CL	Cover Level	MG	Multigirth	Ts	Traffic signal
CBX	Control box	MH	Manhole	TT	Tactile paving
CPS	Concrete paving slab	Mkr	Marker post	Twl:	Top of wall level
CTV	Cable TV cover	NVP	No visible pipes	UTL	Unable to lift
Elc	Electric cover	PInv	Pipe invert	WL	Water level
Ep	Electricity post	Pb	Post box	Wm	Water meter
Er	Earth rod	Re	Rodding eye	Wo	Wash out
Fh	Fire hydrant	Sp	Sign post		
Fs	Flagstaff	St	Stop tap		

Road
Drop Kerb
Verge Tarmac
Verge Concrete
Verge Grass
Verge
Tops
Bottoms

Ordnance Survey information is provided for a guide only.
OS BUILDING OUTLINE
OS DETAIL

Station	Easting (m)	Northing (m)	Level (m)
M1	416014.640	419373.960	123.405
M2	415982.643	419498.972	129.309
M3	415961.000	419593.140	131.226
M4	415869.272	419541.783	134.028
M5	415900.647	419482.971	137.758
M6	415917.457	419394.266	131.349

REV	BY	DATE	DETAILS	CKD

STATUS: For Information

CLIENT
Frank Shaw Associates

PROJECT
Joseph Norton SEMH School

TITLE
Topographical & Utilities Survey

hsp consulting
Lawrence House, 6 Meadowbank Way, Eastwood, Nottingham, NG16 3SB
Tel: 01773 535555 www.hspconsulting.com

SCALE	PROJECT NO.	SHEET SIZE
1:1000	C4164	A1

DATE	DRAWN	CHECKED
13.01.2023	LK	LAB

DRAWING NO. C4164-HSP-00-00-DR--C-510
REV P01

Appendix 2: Proposed Site Layout Plan

The use of drawings by the Customer acts as an agreement to the following statements. The Customer must not use the drawings if it does not agree with any of the following statements:

All drawings are based upon site information supplied by third parties and as such their accuracy cannot be guaranteed. All features are approximate and subject to clarification by a detailed topographical survey, statutory service enquiries and confirmation of the legal boundaries. Do not scale the drawings. Figured dimensions must be used in all cases. All dimensions must be checked on site. Any discrepancies must be reported in writing to Colour-UDL before proceeding. All drawings are copyright protected. Refer to full Terms & Conditions at www.colour-udl.com

KEY

Site Boundary

SOFTSCAPE

- Existing Trees (RPZ dashed)
- Existing Trees to be removed
- Proposed Trees
- Hedgerow Planting
- Ornamental Shrub Planting
- Native Shrub Planting
- Wildflower Meadow Seeding
- Wetland / Pond Margin Seeding
- Woodland Undergrowth Seeding
- Grazing Pasture Seeding
- Amenity Grass Seeding
- Reinforced Grass Turf

HARDSCAPE

- Retaining Wall (refer to Engineer's details)
- 2.0m high Freestanding Wall (refer to Engineer's details)
- Slab Paving
- Blacktop Tarmac
- Coloured Tarmac
- Wet Pour Safety Surface
- Timber Decking
- MUGA Sports Surface
- Permeable Paving
- Reinforced Gravel
- Seating

FENCING

- 3.0m Closeboard Vertical Featheredge Fencing
- 3.0m Rebound Weld Mesh Fencing
- 2.4m Anti-climb Weld Mesh Fencing
- 1.8m Anti-climb Weld Mesh Fencing
- 1.5m Anti-climb Weld Mesh Fencing
- 1.5m Galvanised Wire Mesh Fencing to Goats Enclosure (75-150mm mesh size)
- 1.5m Galvanised Wire Mesh Fencing to Chicken Run (25mm mesh size)
- 1.1m Galvanised Wire Mesh Fencing to Pigs Enclosure (75-150mm mesh size) with electr. pasture tape to bottom
- 1.1m Timber Picket Fencing to Veg. beds with 600mm high rabbit-proof wire netting
- 1.1m Cleft Chestnut Fencing

Rev	Amendments	Date	Drwn	Chkd
31	Revised Substation location	21.09.23	TK	-

Project
Joseph Norton Academy, Deighton

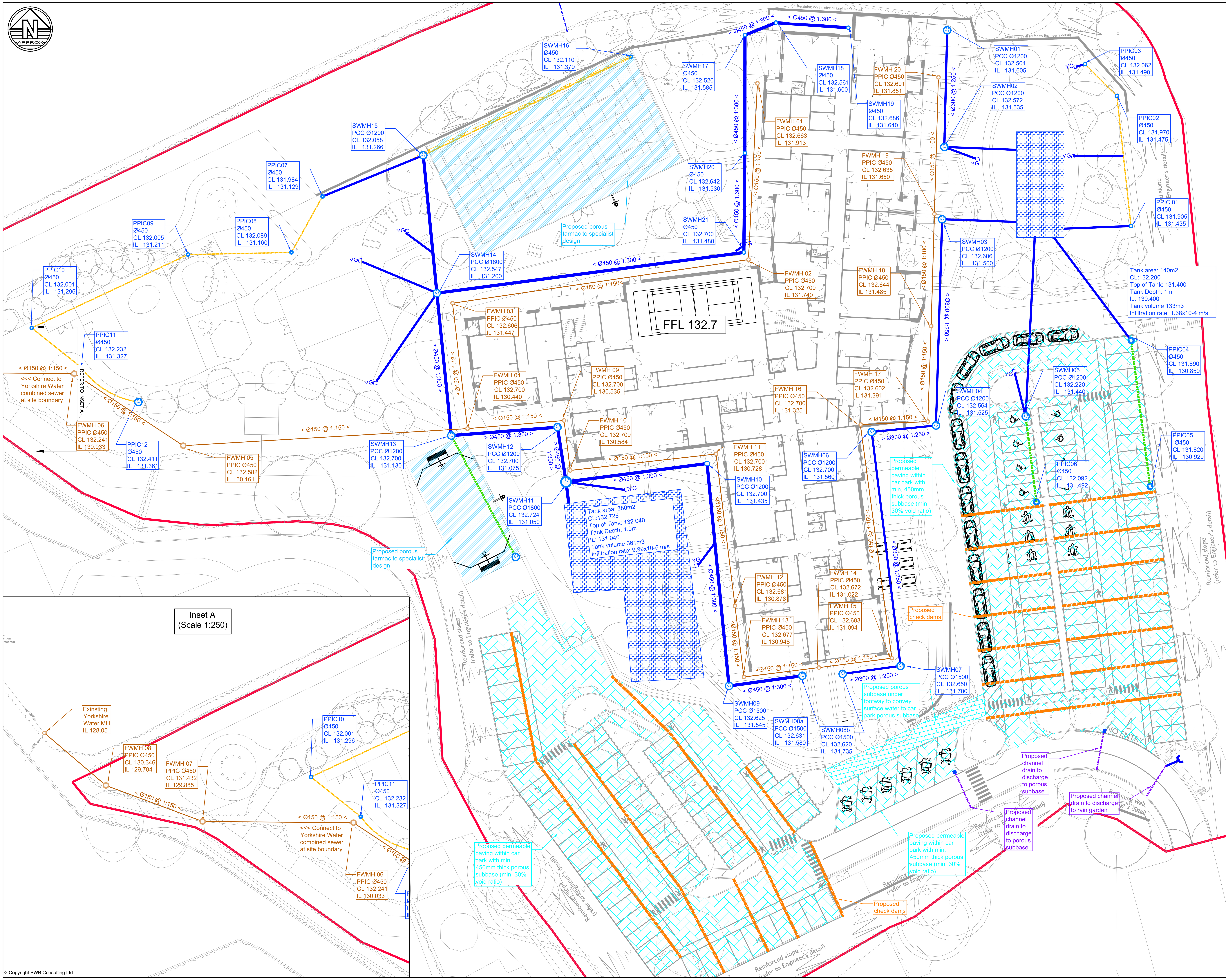
Drawing Title
General Arrangement Plan
Landscape Layout

Project No.	Scale @ A2	Project Status
2352	1:500	For Planning

Drawing No.	Revision
L-2352-GAP-1000	31

London 0203 924 9888
Newcastle 0191 24 24 224
York 01904 925 888
colour-udl.com
colour

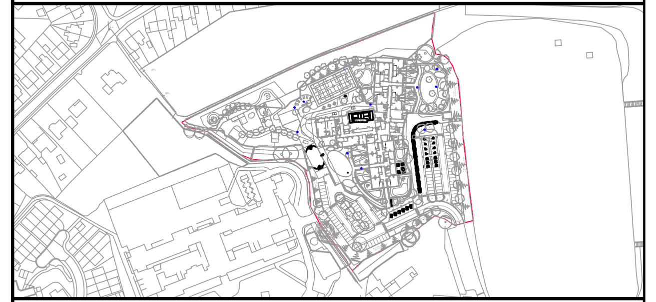
Appendix 3: Indicative Drainage Strategy



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.

Key Plan



Legend

- Proposed surface water
- Attenuation Cells
- Permeable Paving
- Porous Sub-base
- Channel Drains
- Perforated Pipes
- Proposed Foul Sewer Drainage
- Existing Drainage
- Filter Drain
- Gully

Rev	Date	Details of issue / revision	Drw	Rev
P4	26.09.23	Updated infiltration rate	DA	JB
P3	06.09.23	Updated to reflect soakaway discharge	GK	JB
P2	18.08.23	Updated Drainage Layout	GK	MR
P1	11.05.23	Preliminary Issue	DA	JB

Issues & Revisions

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Client

Frank Shaw Architect

Project Title

Deighton SEMH School

Drawing Title

Proposed Drainage

Drawn:	D. Amrouni		Reviewed:	J. Benard
BWB Ref:	220983	Date: 11.05.23	Scale@A1:	1:250

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
22308-BWB-XX-XX-DR-C-0500	S2	P04

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Appendix 4: MicroDrainage Network Model

Catchment Area 1 – North West Soakaway

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (%)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	10.938	0.036	0.329	0.019	5.00	0.0	0.600	o	450	Pipe/Conduit
S1.001	32.679	0.110	0.337	0.050	0.00	0.0	0.600	o	450	Pipe/Conduit
S1.002	20.688	0.036	0.174	0.028	0.00	0.0	0.600	o	450	Pipe/Conduit
S1.003	8.092	0.027	0.334	0.066	0.00	0.0	0.600	o	450	Pipe/Conduit
S1.004	15.771	0.053	0.336	0.034	0.00	0.0	0.600	o	450	Pipe/Conduit
S1.005	21.012	0.121	0.576	0.030	0.00	0.0	0.600	o	450	Pipe/Conduit
S2.000	10.631	0.036	0.339	0.012	5.00	0.0	0.600	o	450	Pipe/Conduit
S2.001	5.094	0.017	0.334	0.003	0.00	0.0	0.600	o	450	Pipe/Conduit
S2.002	17.408	0.057	0.327	0.010	0.00	0.0	0.600	o	450	Pipe/Conduit
S2.003	14.686	0.049	0.334	0.030	0.00	0.0	0.600	o	450	Pipe/Conduit
S2.004	45.469	0.281	0.618	0.058	0.00	0.0	0.600	o	450	Pipe/Conduit
S3.000	33.896	0.113	0.333	0.035	5.00	0.0	0.600	o	450	Pipe/Conduit
S3.001	20.405	0.068	0.333	0.035	0.00	0.0	0.600	o	450	Pipe/Conduit
S1.006	21.678	0.798	3.681	0.134	5.00	0.0	0.600	o	450	Pipe/Conduit
S1.007	19.849	0.200	1.008	0.078	0.00	0.0	0.600	o	450	Pipe/Conduit
S1.008	6.988	0.200	2.862	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	131.581	0.019	0.0	1.16	184.7
S1.001	131.545	0.068	0.0	1.17	186.8
S1.002	131.435	0.097	0.0	0.84	133.7
S1.003	131.399	0.163	0.0	1.17	185.9
S1.004	131.372	0.197	0.0	1.17	186.6
S1.005	131.319	0.227	0.0	1.54	244.9
S2.000	131.636	0.012	0.0	1.18	187.3
S2.001	131.600	0.015	0.0	1.17	186.0
S2.002	131.583	0.024	0.0	1.16	184.2
S2.003	131.526	0.055	0.0	1.17	185.9
S2.004	131.477	0.113	0.0	1.60	253.8
S3.000	131.379	0.035	0.0	1.17	185.9
S3.001	131.266	0.070	0.0	1.17	185.8
S1.006	131.198	0.544	0.0	3.91	622.3
S1.007	130.400	0.622	0.0	2.04	324.6
S1.008	130.200	0.622	0.0	3.45	548.5

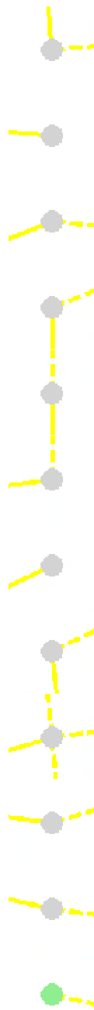
Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdr (mm)
SSWMH08a	132.631	1.050	Open Manhole	1500	S1.000	131.581	450				
SSWMH09	132.625	1.080	Open Manhole	1500	S1.001	131.545	450	S1.000	131.545	450	
SSWMH10	132.700	1.265	Open Manhole	1200	S1.002	131.435	450	S1.001	131.435	450	
SSWMH11	132.724	1.325	Open Manhole	1200	S1.003	131.399	450	S1.002	131.399	450	
SSWMH12	132.700	1.328	Open Manhole	1200	S1.004	131.372	450	S1.003	131.372	450	
SSWMH13	132.700	1.381	Open Manhole	1200	S1.005	131.319	450	S1.004	131.319	450	
SSWMH19	132.686	1.050	Open Manhole	1200	S2.000	131.636	450				
SSWMH18	132.561	0.961	Open Manhole	1200	S2.001	131.600	450	S2.000	131.600	450	
SSWMH17	132.520	0.937	Open Manhole	1200	S2.002	131.583	450	S2.001	131.583	450	
SSWMH20	132.642	1.116	Open Manhole	1200	S2.003	131.526	450	S2.002	131.526	450	
SSWMH21	132.700	1.223	Open Manhole	1200	S2.004	131.477	450	S2.003	131.477	450	
SSWMH16	132.200	0.821	Open Manhole	1200	S3.000	131.379	450				
SSWMH15	132.058	0.792	Open Manhole	1200	S3.001	131.266	450	S3.000	131.266	450	
SSWMH14	132.547	1.351	Open Manhole	1800	S1.006	131.198	450	S1.005	131.198	450	
								S2.004	131.196	450	
								S3.001	131.198	450	
STANK	132.200	1.800	Open Manhole	1200	S1.007	130.400	450	S1.006	130.400	450	
SOUTFALL	132.200	2.000	Open Manhole	1200	S1.008	130.200	450	S1.007	130.200	450	
S	132.200	2.200	Open Manhole	1200		OUTFALL		S1.008	130.000	450	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SSWMH08a	415921.637	419526.230	415921.637	419526.230	Required	
SSWMH09	415910.780	419524.894	415910.780	419524.894	Required	
SSWMH10	415907.495	419557.407	415907.495	419557.407	Required	
SSWMH11	415886.951	419554.971	415886.951	419554.971	Required	
SSWMH12	415885.706	419562.967	415885.706	419562.967	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SSWMH13	415869.987	419561.681	415869.987	419561.681	Required	
SSWMH19	415928.498	419621.592	415928.498	419621.592	Required	
SSWMH18	415917.911	419622.559	415917.911	419622.559	Required	
SSWMH17	415913.177	419620.676	415913.177	419620.676	Required	
SSWMH20	415913.279	419603.269	415913.279	419603.269	Required	
SSWMH21	415913.132	419588.584	415913.132	419588.584	Required	
SSWMH16	415896.571	419617.450	415896.571	419617.450	Required	
SSWMH15	415865.956	419602.901	415865.956	419602.901	Required	
SSWMH14	415868.058	419582.605	415868.058	419582.605	Required	
STANK	415847.332	419576.253	415847.332	419576.253	Required	
SOUTFALL	415827.667	419578.949	415827.667	419578.949	Required	
S	415820.845	419580.466			No Entry	



PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	450	SSWMH08a	132.631	131.581	0.600	Open Manhole	1500
S1.001	o	450	SSWMH09	132.625	131.545	0.630	Open Manhole	1500
S1.002	o	450	SSWMH10	132.700	131.435	0.815	Open Manhole	1200
S1.003	o	450	SSWMH11	132.724	131.399	0.875	Open Manhole	1200
S1.004	o	450	SSWMH12	132.700	131.372	0.878	Open Manhole	1200
S1.005	o	450	SSWMH13	132.700	131.319	0.931	Open Manhole	1200
S2.000	o	450	SSWMH19	132.686	131.636	0.600	Open Manhole	1200
S2.001	o	450	SSWMH18	132.561	131.600	0.511	Open Manhole	1200
S2.002	o	450	SSWMH17	132.520	131.583	0.487	Open Manhole	1200
S2.003	o	450	SSWMH20	132.642	131.526	0.666	Open Manhole	1200
S2.004	o	450	SSWMH21	132.700	131.477	0.773	Open Manhole	1200
S3.000	o	450	SSWMH16	132.200	131.379	0.371	Open Manhole	1200
S3.001	o	450	SSWMH15	132.058	131.266	0.342	Open Manhole	1200
S1.006	o	450	SSWMH14	132.547	131.198	0.899	Open Manhole	1800
S1.007	o	450	STANK	132.200	130.400	1.350	Open Manhole	1200
S1.008	o	450	SOUTFALL	132.200	130.200	1.550	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (%)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	10.938	0.329	SSWMH09	132.625	131.545	0.630	Open Manhole	1500
S1.001	32.679	0.337	SSWMH10	132.700	131.435	0.815	Open Manhole	1200
S1.002	20.688	0.174	SSWMH11	132.724	131.399	0.875	Open Manhole	1200
S1.003	8.092	0.334	SSWMH12	132.700	131.372	0.878	Open Manhole	1200
S1.004	15.771	0.336	SSWMH13	132.700	131.319	0.931	Open Manhole	1200
S1.005	21.012	0.576	SSWMH14	132.547	131.198	0.899	Open Manhole	1800
S2.000	10.631	0.339	SSWMH18	132.561	131.600	0.511	Open Manhole	1200
S2.001	5.094	0.334	SSWMH17	132.520	131.583	0.487	Open Manhole	1200
S2.002	17.408	0.327	SSWMH20	132.642	131.526	0.666	Open Manhole	1200
S2.003	14.686	0.334	SSWMH21	132.700	131.477	0.773	Open Manhole	1200
S2.004	45.469	0.618	SSWMH14	132.547	131.196	0.901	Open Manhole	1800
S3.000	33.896	0.333	SSWMH15	132.058	131.266	0.342	Open Manhole	1200
S3.001	20.405	0.333	SSWMH14	132.547	131.198	0.899	Open Manhole	1800
S1.006	21.678	3.681	STANK	132.200	130.400	1.350	Open Manhole	1200
S1.007	19.849	1.008	SOUTFALL	132.200	130.200	1.550	Open Manhole	1200
S1.008	6.988	2.862	S	132.200	130.000	1.750	Open Manhole	1200

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.019	0.019	0.019
1.001	User	-	100	0.050	0.050	0.050
1.002	User	-	100	0.015	0.015	0.015
	User	-	100	0.014	0.014	0.028
1.003	User	-	100	0.020	0.020	0.020
	User	-	100	0.021	0.021	0.041
	User	-	100	0.025	0.025	0.066
1.004	User	-	100	0.034	0.034	0.034
1.005	User	-	100	0.016	0.016	0.016
	User	-	100	0.013	0.013	0.030
2.000	User	-	100	0.012	0.012	0.012
2.001	User	-	100	0.003	0.003	0.003
2.002	User	-	100	0.010	0.010	0.010
2.003	User	-	100	0.010	0.010	0.010
	User	-	100	0.010	0.010	0.020
	User	-	100	0.010	0.010	0.030
2.004	User	-	100	0.025	0.025	0.025
	User	-	100	0.012	0.012	0.037
	User	-	100	0.021	0.021	0.058
3.000	User	-	100	0.029	0.029	0.029
	User	-	100	0.006	0.006	0.035
3.001	User	-	100	0.035	0.035	0.035
1.006	User	-	100	0.070	0.070	0.070
	User	-	100	0.051	0.051	0.120
	User	-	100	0.014	0.014	0.134
1.007	User	-	100	0.053	0.053	0.053
	User	-	100	0.025	0.025	0.078
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.622	0.622	0.622

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	6000
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.000
Return Period (years)	1	Ratio R	0.337
Region	England and Wales	Profile Type	Summer

Synthetic Rainfall Details

Cv (Summer)	0.750	Storm Duration (mins)	30
Cv (Winter)	0.840		

Storage Structures for Storm

Cellular Storage Manhole: STANK, DS/PN: S1.007

Invert Level (m) 129.900 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.17982 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.35964

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	380.0	380.0	1.001	0.0	458.0
1.000	380.0	458.0			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.316
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SSWMH08a	15 Winter	1	+0%				
S1.001	SSWMH09	15 Winter	1	+0%				
S1.002	SSWMH10	15 Winter	1	+0%				
S1.003	SSWMH11	15 Winter	1	+0%				
S1.004	SSWMH12	15 Winter	1	+0%				
S1.005	SSWMH13	15 Winter	1	+0%				
S2.000	SSWMH19	15 Winter	1	+0%				
S2.001	SSWMH18	15 Winter	1	+0%				
S2.002	SSWMH17	15 Winter	1	+0%				
S2.003	SSWMH20	15 Winter	1	+0%				
S2.004	SSWMH21	15 Winter	1	+0%				
S3.000	SSWMH16	15 Winter	1	+0%				
S3.001	SSWMH15	15 Winter	1	+0%				
S1.006	SSWMH14	15 Winter	1	+0%				
S1.007	STANK	120 Winter	1	+0%				
S1.008	SOUTFALL	15 Summer	1	+0%	100/120 Winter			

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	SSWMH08a	131.629	-0.402	0.000	0.02			2.2	OK
S1.001	SSWMH09	131.612	-0.383	0.000	0.04			7.2	OK
S1.002	SSWMH10	131.547	-0.338	0.000	0.11			9.7	OK
S1.003	SSWMH11	131.507	-0.342	0.000	0.13			15.9	OK
S1.004	SSWMH12	131.480	-0.342	0.000	0.13			19.1	OK
S1.005	SSWMH13	131.419	-0.350	0.000	0.11			21.8	OK
S2.000	SSWMH19	131.663	-0.423	0.000	0.01			1.4	OK
S2.001	SSWMH18	131.638	-0.412	0.000	0.01			1.6	OK
S2.002	SSWMH17	131.628	-0.405	0.000	0.02			2.6	OK
S2.003	SSWMH20	131.585	-0.391	0.000	0.04			5.5	OK
S2.004	SSWMH21	131.541	-0.386	0.000	0.05			11.2	OK
S3.000	SSWMH16	131.428	-0.401	0.000	0.03			4.2	OK
S3.001	SSWMH15	131.340	-0.376	0.000	0.05			7.6	OK
S1.006	SSWMH14	131.298	-0.350	0.000	0.11			55.0	OK
S1.007	STANK	130.013	-0.837	0.000	0.00		55	0.0	OK
S1.008	SOUTFALL	130.200	-0.450	0.000	0.00			0.0	OK

PN	US/MH Name	Level Exceeded
S1.000	SSWMH08a	
S1.001	SSWMH09	
S1.002	SSWMH10	
S1.003	SSWMH11	
S1.004	SSWMH12	
S1.005	SSWMH13	
S2.000	SSWMH19	
S2.001	SSWMH18	
S2.002	SSWMH17	
S2.003	SSWMH20	
S2.004	SSWMH21	
S3.000	SSWMH16	
S3.001	SSWMH15	
S1.006	SSWMH14	
S1.007	STANK	
S1.008	SOUTFALL	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.316
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SSWMH08a	15 Winter	30	+0%				
S1.001	SSWMH09	15 Winter	30	+0%				
S1.002	SSWMH10	15 Winter	30	+0%				
S1.003	SSWMH11	15 Winter	30	+0%				
S1.004	SSWMH12	15 Winter	30	+0%				
S1.005	SSWMH13	15 Winter	30	+0%				
S2.000	SSWMH19	15 Winter	30	+0%				
S2.001	SSWMH18	15 Winter	30	+0%				
S2.002	SSWMH17	15 Winter	30	+0%				
S2.003	SSWMH20	15 Winter	30	+0%				
S2.004	SSWMH21	15 Winter	30	+0%				
S3.000	SSWMH16	15 Winter	30	+0%				
S3.001	SSWMH15	15 Winter	30	+0%				
S1.006	SSWMH14	15 Winter	30	+0%				
S1.007	STANK	120 Winter	30	+0%				
S1.008	SOUTFALL	15 Summer	30	+0%	100/120 Winter			

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	SSWMH08a	131.681	-0.350	0.000	0.04			5.5	OK
S1.001	SSWMH09	131.676	-0.319	0.000	0.12			20.0	OK
S1.002	SSWMH10	131.631	-0.254	0.000	0.30			27.4	OK
S1.003	SSWMH11	131.592	-0.257	0.000	0.37			45.8	OK
S1.004	SSWMH12	131.566	-0.256	0.000	0.38			55.2	OK
S1.005	SSWMH13	131.494	-0.275	0.000	0.32			62.9	OK
S2.000	SSWMH19	131.690	-0.396	0.000	0.03			3.4	OK
S2.001	SSWMH18	131.670	-0.380	0.000	0.04			4.4	OK
S2.002	SSWMH17	131.663	-0.370	0.000	0.05			7.3	OK
S2.003	SSWMH20	131.634	-0.342	0.000	0.12			16.3	OK
S2.004	SSWMH21	131.594	-0.333	0.000	0.15			33.8	OK
S3.000	SSWMH16	131.463	-0.366	0.000	0.06			10.2	OK
S3.001	SSWMH15	131.400	-0.316	0.000	0.13			19.7	OK
S1.006	SSWMH14	131.368	-0.280	0.000	0.31			153.9	OK
S1.007	STANK	130.264	-0.586	0.000	0.00		112	0.0	OK
S1.008	SOUTFALL	130.200	-0.450	0.000	0.00			0.0	OK

PN	US/MH Name	Level Exceeded
S1.000	SSWMH08a	
S1.001	SSWMH09	
S1.002	SSWMH10	
S1.003	SSWMH11	
S1.004	SSWMH12	
S1.005	SSWMH13	
S2.000	SSWMH19	
S2.001	SSWMH18	
S2.002	SSWMH17	
S2.003	SSWMH20	
S2.004	SSWMH21	
S3.000	SSWMH16	
S3.001	SSWMH15	
S1.006	SSWMH14	
S1.007	STANK	
S1.008	SOUTFALL	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.316
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SSWMH08a	15 Winter	100	+40%				
S1.001	SSWMH09	15 Winter	100	+40%				
S1.002	SSWMH10	15 Winter	100	+40%				
S1.003	SSWMH11	15 Winter	100	+40%				
S1.004	SSWMH12	15 Winter	100	+40%				
S1.005	SSWMH13	15 Winter	100	+40%				
S2.000	SSWMH19	15 Winter	100	+40%				
S2.001	SSWMH18	15 Winter	100	+40%				
S2.002	SSWMH17	15 Winter	100	+40%				
S2.003	SSWMH20	15 Winter	100	+40%				
S2.004	SSWMH21	15 Winter	100	+40%				
S3.000	SSWMH16	15 Winter	100	+40%				
S3.001	SSWMH15	15 Winter	100	+40%				
S1.006	SSWMH14	15 Winter	100	+40%				
S1.007	STANK	240 Winter	100	+40%				
S1.008	SOUTFALL	240 Winter	100	+40%	100/120 Winter			

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	SSWMH08a	131.749	-0.282	0.000	0.07			9.7	OK
S1.001	SSWMH09	131.746	-0.249	0.000	0.22			35.7	OK
S1.002	SSWMH10	131.715	-0.170	0.000	0.53			49.0	OK
S1.003	SSWMH11	131.676	-0.173	0.000	0.67			82.4	OK
S1.004	SSWMH12	131.650	-0.172	0.000	0.69			99.4	OK
S1.005	SSWMH13	131.566	-0.203	0.000	0.58			113.5	OK
S2.000	SSWMH19	131.718	-0.368	0.000	0.05			6.2	OK
S2.001	SSWMH18	131.704	-0.346	0.000	0.07			8.1	OK
S2.002	SSWMH17	131.698	-0.335	0.000	0.09			13.2	OK
S2.003	SSWMH20	131.676	-0.300	0.000	0.21			29.5	OK
S2.004	SSWMH21	131.638	-0.289	0.000	0.27			61.0	OK
S3.000	SSWMH16	131.505	-0.324	0.000	0.11			18.4	OK
S3.001	SSWMH15	131.462	-0.254	0.000	0.24			35.8	OK
S1.006	SSWMH14	131.437	-0.211	0.000	0.55			278.2	OK
S1.007	STANK	130.686	-0.164	0.000	0.02		220	4.8	OK
S1.008	SOUTFALL	130.686	0.036	0.000	0.00			0.0	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	SSWMH08a	
S1.001	SSWMH09	
S1.002	SSWMH10	
S1.003	SSWMH11	
S1.004	SSWMH12	
S1.005	SSWMH13	
S2.000	SSWMH19	
S2.001	SSWMH18	
S2.002	SSWMH17	
S2.003	SSWMH20	
S2.004	SSWMH21	
S3.000	SSWMH16	
S3.001	SSWMH15	
S1.006	SSWMH14	
S1.007	STANK	
S1.008	SOUTFALL	

Catchment Area 2 – North East Soakaway

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.304	4-8	0.053

Total Area Contributing (ha) = 0.358

Total Pipe Volume (m^3) = 17.739

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	17.211	0.069	249.4	0.017	5.00	0.0	0.600	o	300	Pipe/Conduit
S1.001	22.092	0.088	251.0	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.000	8.637	0.035	246.8	0.011	5.00	0.0	0.600	o	300	Pipe/Conduit
S2.001	34.706	0.138	251.5	0.032	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.002	9.463	0.038	249.0	0.053	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.003	18.870	0.076	248.3	0.027	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.002	14.551	1.047	13.9	0.060	0.00	0.0	0.600	o	300	Pipe/Conduit
S3.000	12.992	0.051	254.7	0.011	5.00	0.0	0.600	o	300	Pipe/Conduit
S3.001	22.729	1.041	21.8	0.015	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.000	21.907	0.072	304.3	0.025	5.00	0.0	0.600	o	300	Pipe/Conduit
S4.001	18.669	0.450	41.5	0.014	0.00	0.0	0.600	o	300	Pipe/Conduit
S5.000	6.628	0.013	509.8	0.007	5.00	0.0	0.600	o	300	Pipe/Conduit
S5.001	19.274	0.038	507.2	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit
S5.002	15.485	1.035	15.0	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.003	3.870	0.200	19.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.004	3.870	0.200	19.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	131.604	0.017	0.0	0.99	70.0
S1.001	131.535	0.043	0.0	0.99	69.8
S2.000	131.734	0.011	0.0	1.00	70.4
S2.001	131.699	0.043	0.0	0.99	69.8
S2.002	131.561	0.095	0.0	0.99	70.1
S2.003	131.523	0.122	0.0	0.99	70.2
S1.002	131.447	0.225	0.0	4.24	299.6
S3.000	131.492	0.011	0.0	0.98	69.3
S3.001	131.441	0.026	0.0	3.38	238.9
S4.000	130.922	0.025	0.0	0.90	63.3
S4.001	130.850	0.039	0.0	2.45	173.0
S5.000	131.486	0.007	0.0	0.69	48.7
S5.001	131.473	0.028	0.0	0.69	48.9
S5.002	131.435	0.067	0.0	4.09	288.8
S1.003	130.400	0.358	0.0	3.59	253.8
S1.004	130.200	0.358	0.0	3.59	253.8

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.010	0.010	0.010
	User	-	100	0.008	0.008	0.017
1.001	User	-	100	0.014	0.014	0.014
	User	-	100	0.011	0.011	0.026
2.000	User	-	100	0.011	0.011	0.011
2.001	User	-	100	0.011	0.011	0.011
	User	-	100	0.021	0.021	0.032
2.002	User	-	100	0.020	0.020	0.020
	User	-	100	0.023	0.023	0.043
	User	-	100	0.009	0.009	0.053
2.003	User	-	100	0.017	0.017	0.017
	User	-	100	0.010	0.010	0.027
1.002	User	-	100	0.029	0.029	0.029
	User	-	100	0.031	0.031	0.060
3.000	User	-	100	0.011	0.011	0.011
3.001	User	-	100	0.012	0.012	0.012
	User	-	100	0.004	0.004	0.015
4.000	User	-	100	0.025	0.025	0.025
4.001	User	-	100	0.014	0.014	0.014
5.000	User	-	100	0.007	0.007	0.007
5.001	User	-	100	0.020	0.020	0.020
5.002	User	-	100	0.040	0.040	0.040
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.358	0.358	0.358

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	S	132.200	130.000	130.000	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	1440
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.337		

Storage Structures for Storm

Cellular Storage Manhole: STANK, DS/PN: S1.003

Invert Level (m) 130.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.25000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.49680

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	140.0	140.0	1.000	140.0	194.0	1.001	0.0	194.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.338 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SSWMH01	15 Winter	1	+0%					131.642	-0.262
S1.001	SSWMH02	15 Winter	1	+0%					131.591	-0.244
S2.000	SSWMH08b	15 Winter	1	+0%					131.769	-0.265
S2.001	SSWMH07	15 Winter	1	+0%					131.752	-0.247
S2.002	SSWMH06	15 Winter	1	+0%					131.648	-0.213
S2.003	SSWMH04	15 Winter	1	+0%					131.616	-0.207
S1.002	SSWMH03	15 Winter	1	+0%					131.509	-0.238
S3.000	SPPIC06	15 Winter	1	+0%					131.524	-0.268
S3.001	SSWMH05	15 Winter	1	+0%					131.462	-0.279
S4.000	SPPIC05	15 Winter	1	+0%	100/60 Summer				130.967	-0.255
S4.001	SPPIC04	15 Winter	1	+0%	100/30 Winter				130.884	-0.266
S5.000	SPPIC03	15 Winter	1	+0%					131.533	-0.253
S5.001	SPPIC02	15 Winter	1	+0%					131.530	-0.243
S5.002	SPPIC01	15 Winter	1	+0%					131.469	-0.266
S1.003	STANK	60 Winter	1	+0%	30/15 Winter				130.566	-0.134
S1.004	SOUTFALL	60 Winter	1	+0%	1/15 Summer				130.567	0.067

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SSWMH01	0.000	0.04			2.1	OK	
S1.001	SSWMH02	0.000	0.08			4.8	OK	
S2.000	SSWMH08b	0.000	0.02			1.3	OK	
S2.001	SSWMH07	0.000	0.07			4.6	OK	
S2.002	SSWMH06	0.000	0.18			10.0	OK	
S2.003	SSWMH04	0.000	0.21			12.6	OK	
S1.002	SSWMH03	0.000	0.09			23.4	OK	
S3.000	SPPIC06	0.000	0.02			1.4	OK	
S3.001	SSWMH05	0.000	0.01			3.0	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	SPPIC05	0.000	0.05			3.0	OK	
S4.001	SPPIC04	0.000	0.03			4.5	OK	
S5.000	SPPIC03	0.000	0.02			0.9	OK	
S5.001	SPPIC02	0.000	0.08			3.0	OK	
S5.002	SPPIC01	0.000	0.03			7.1	OK	
S1.003	STANK	0.000	0.01		46	0.9	OK	
S1.004	SOUTFALL	0.000	0.00			0.0	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.338 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SSWMH01	15 Winter	30	+0%					131.670	-0.234
S1.001	SSWMH02	15 Winter	30	+0%					131.631	-0.204
S2.000	SSWMH08b	15 Winter	30	+0%					131.801	-0.233
S2.001	SSWMH07	15 Winter	30	+0%					131.793	-0.206
S2.002	SSWMH06	15 Winter	30	+0%					131.724	-0.137
S2.003	SSWMH04	15 Winter	30	+0%					131.695	-0.128
S1.002	SSWMH03	15 Winter	30	+0%					131.555	-0.192
S3.000	SPPIC06	15 Winter	30	+0%					131.540	-0.252
S3.001	SSWMH05	15 Winter	30	+0%					131.479	-0.262
S4.000	SPPIC05	15 Winter	30	+0%	100/60 Summer				130.995	-0.227
S4.001	SPPIC04	120 Winter	30	+0%	100/30 Winter				130.921	-0.229
S5.000	SPPIC03	15 Winter	30	+0%					131.574	-0.212
S5.001	SPPIC02	15 Winter	30	+0%					131.572	-0.201
S5.002	SPPIC01	15 Winter	30	+0%					131.495	-0.240
S1.003	STANK	120 Winter	30	+0%	30/15 Winter				130.920	0.220
S1.004	SOUTFALL	120 Winter	30	+0%	1/15 Summer				130.950	0.450

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SSWMH01	0.000	0.09			5.2	OK	
S1.001	SSWMH02	0.000	0.21			13.2	OK	
S2.000	SSWMH08b	0.000	0.06			3.3	OK	
S2.001	SSWMH07	0.000	0.20			13.1	OK	
S2.002	SSWMH06	0.000	0.54			29.1	OK	
S2.003	SSWMH04	0.000	0.61			37.3	OK	
S1.002	SSWMH03	0.000	0.27			68.2	OK	
S3.000	SPPIC06	0.000	0.06			3.4	OK	
S3.001	SSWMH05	0.000	0.04			8.3	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	SPPIC05	0.000	0.13			7.4	OK	
S4.001	SPPIC04	0.000	0.03			4.1	OK	
S5.000	SPPIC03	0.000	0.06			2.3	OK	
S5.001	SPPIC02	0.000	0.23			8.5	OK	
S5.002	SPPIC01	0.000	0.09			21.3	OK	
S1.003	STANK	0.000	0.01		112	1.0	SURCHARGED	
S1.004	SOUTFALL	0.000	0.00			0.0	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm) 19.000	Cv (Summer)	0.750
Region England and Wales	Ratio R 0.338	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SSWMH01	120 Winter	100	+40%					131.731	-0.173
S1.001	SSWMH02	120 Winter	100	+40%					131.731	-0.104
S2.000	SSWMH08b	15 Winter	100	+40%					131.876	-0.158
S2.001	SSWMH07	15 Winter	100	+40%					131.872	-0.127
S2.002	SSWMH06	15 Winter	100	+40%					131.843	-0.018
S2.003	SSWMH04	15 Winter	100	+40%					131.802	-0.021
S1.002	SSWMH03	120 Winter	100	+40%					131.733	-0.014
S3.000	SPPIC06	120 Winter	100	+40%					131.727	-0.065
S3.001	SSWMH05	120 Winter	100	+40%					131.727	-0.014
S4.000	SPPIC05	120 Winter	100	+40%	100/60 Summer				131.745	0.523
S4.001	SPPIC04	120 Winter	100	+40%	100/30 Winter				131.746	0.596
S5.000	SPPIC03	120 Winter	100	+40%					131.724	-0.062
S5.001	SPPIC02	120 Winter	100	+40%					131.725	-0.048
S5.002	SPPIC01	120 Winter	100	+40%					131.728	-0.007
S1.003	STANK	120 Winter	100	+40%	30/15 Winter				131.760	1.060
S1.004	SOUTFALL	120 Winter	100	+40%	1/15 Summer				131.792	1.292

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SSWMH01	0.000	0.06			3.4	OK	
S1.001	SSWMH02	0.000	0.14			8.4	OK	
S2.000	SSWMH08b	0.000	0.11			5.8	OK	
S2.001	SSWMH07	0.000	0.35			22.3	OK	
S2.002	SSWMH06	0.000	0.87			47.0	OK	
S2.003	SSWMH04	0.000	1.00			60.7	OK	
S1.002	SSWMH03	0.000	0.18			44.1	OK	
S3.000	SPPIC06	0.000	0.04			2.2	OK	
S3.001	SSWMH05	0.000	0.02			5.2	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	SPPIC05	0.000	0.08			4.7	FLOOD RISK	
S4.001	SPPIC04	0.000	0.05			6.8	FLOOD RISK	
S5.000	SPPIC03	0.000	0.04			1.5	OK	
S5.001	SPPIC02	0.000	0.15			5.4	FLOOD RISK	
S5.002	SPPIC01	0.000	0.05			13.2	FLOOD RISK	
S1.003	STANK	0.000	0.02		190	2.4	SURCHARGED	
S1.004	SOUTFALL	0.000	0.00			0.0	SURCHARGED	

Catchment Area 3 – South West Car Park

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.105	4-8	0.037

Total Area Contributing (ha) = 0.142

Total Pipe Volume (m^3) = 4.868

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	36.658	0.000	0.0	0.061	5.00	0.0	0.600	o	300	Pipe/Conduit
S1.001	27.732	0.000	0.0	0.081	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.002	4.478	0.000	0.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	130.400	0.061	0.0	0.00	0.0
S1.001	130.400	0.142	0.0	0.00	0.0
S1.002	130.400	0.142	0.0	0.00	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.061	0.061	0.061
1.001	User	-	100	0.042	0.042	0.042
	User	-	100	0.024	0.024	0.065
	User	-	100	0.016	0.016	0.081
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.142	0.142	0.142

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.002	S	132.200	130.400	130.400	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	1440
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.337		

Storage Structures for Storm

Porous Car Park Manhole: S1, DS/PN: S1.000

Infiltration Coefficient Base (m/hr)	0.17982	Width (m)	15.0
Membrane Percolation (mm/hr)	1	Length (m)	23.0
Max Percolation (l/s)	0.1	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	130.400	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: S2, DS/PN: S1.001

Infiltration Coefficient Base (m/hr)	0.17982	Width (m)	40.0
Membrane Percolation (mm/hr)	1	Length (m)	23.0
Max Percolation (l/s)	0.3	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	130.400	Cap Volume Depth (m)	0.300

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.338 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	30 Winter	1	+0%					130.430	-0.270	0.000
S1.001	S2	60 Winter	1	+0%					130.418	-0.282	0.000
S1.002	S3	120 Winter	1	+0%					130.418	-0.282	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.01		11	0.4	OK	
S1.001	S2	0.00		15	0.1	OK	
S1.002	S3	0.00			0.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000   Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0   MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0   Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500   Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0   Number of Offline Controls 0   Number of Time/Area Diagrams 0
Number of Online Controls 1   Number of Storage Structures 2   Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model   FSR M5-60 (mm) 19.000   Cv (Summer) 0.750
Region England and Wales   Ratio R 0.338   Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	30 Winter	30	+0%					130.455	-0.245	0.000
S1.001	S2	30 Winter	30	+0%					130.436	-0.264	0.000
S1.002	S3	30 Winter	30	+0%					130.435	-0.265	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.04		9	1.1	OK	
S1.001	S2	0.02		11	0.4	OK	
S1.002	S3	0.00			0.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	19.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.338	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	S1	30 Winter	100	+40%					130.502	-0.198	0.000
S1.001	S2	30 Winter	100	+40%					130.456	-0.244	0.000
S1.002	S3	30 Winter	100	+40%					130.457	-0.243	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.20		12	5.5	OK	
S1.001	S2	0.03		11	0.7	OK	
S1.002	S3	0.00			0.0	OK	

Catchment Area 4 – South East Car Park

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.080	4-8	0.019

Total Area Contributing (ha) = 0.099

Total Pipe Volume (m³) = 2.571

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	15.641	0.000	0.0	0.044	5.00	0.0	0.600	o	300	Pipe/Conduit
S1.001	19.159	0.000	0.0	0.056	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.002	1.575	0.000	0.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	131.700	0.044	0.0	0.00	0.0
S1.001	131.700	0.099	0.0	0.00	0.0
S1.002	131.700	0.099	0.0	0.00	0.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.044	0.044	0.044
1.001	User	-	100	0.056	0.056	0.056
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.099	0.099	0.099

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.002	S	132.200	131.700	130.400	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	1440
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.337		

Storage Structures for Storm

Porous Car Park Manhole: S2, DS/PN: S1.001

Infiltration Coefficient Base (m/hr)	0.24840	Width (m)	28.8
Membrane Percolation (mm/hr)	1	Length (m)	30.0
Max Percolation (l/s)	0.2	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	131.700	Cap Volume Depth (m)	0.300

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	19.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.338	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	15 Winter	1	+0%	100/15 Winter				131.803	-0.197
S1.001	S2	15 Winter	1	+0%					131.719	-0.281
S1.002	S3	120 Winter	1	+0%					131.718	-0.282

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.000	0.25			5.3	OK	
S1.001	S2	0.000	0.00		8	0.1	OK	
S1.002	S3	0.000	0.00			0.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	19.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.338	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	15 Winter	30	+0%	100/15 Winter				131.874	-0.126
S1.001	S2	30 Winter	30	+0%					131.742	-0.258
S1.002	S3	30 Winter	30	+0%					131.741	-0.259

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.000	0.62			13.1	OK	
S1.001	S2	0.000	0.02		9	0.4	OK	
S1.002	S3	0.000	0.00			0.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR M5-60 (mm)	19.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.338	Cv (Winter)	0.840

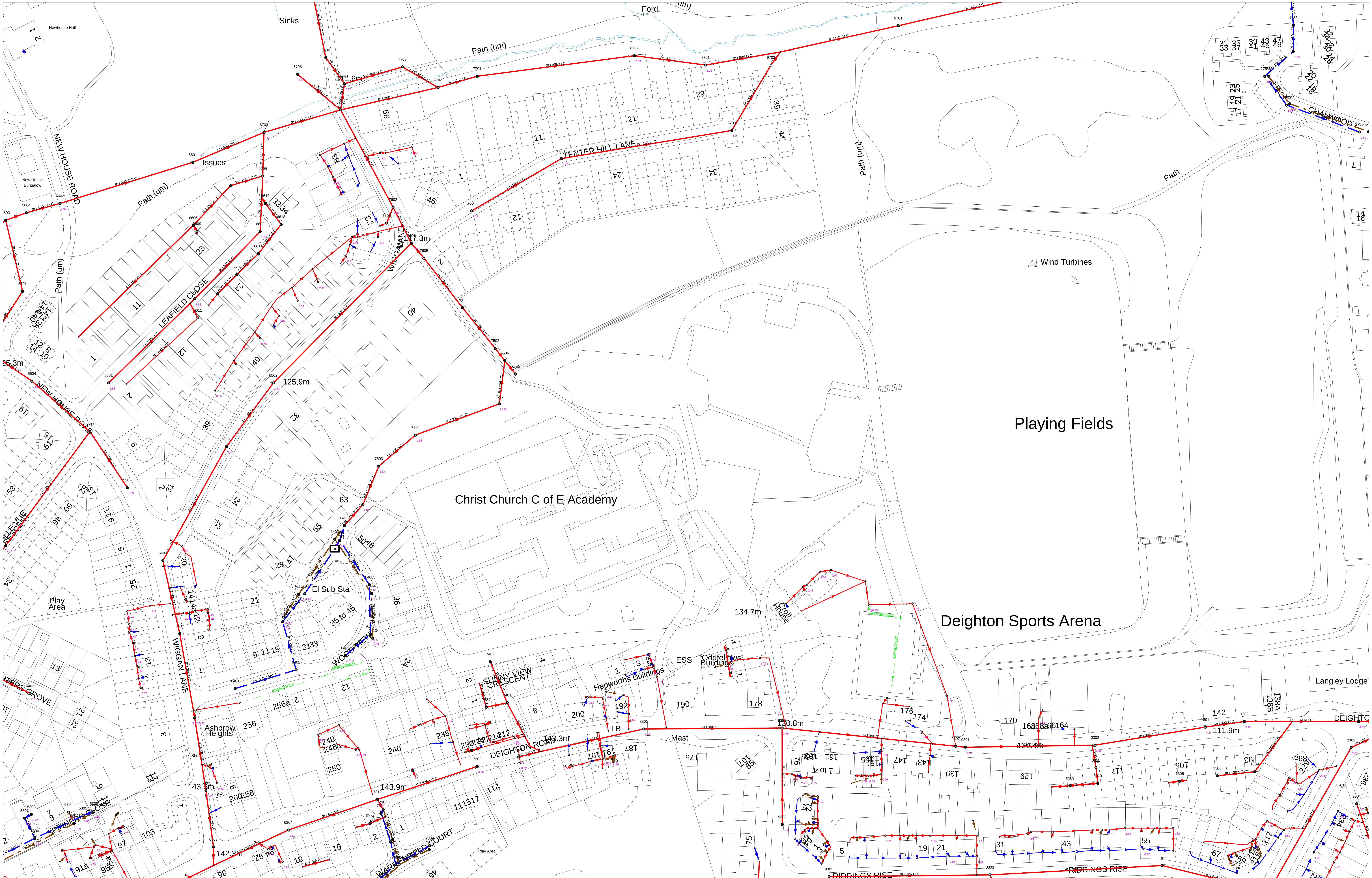
Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	15 Winter	100	+40%	100/15 Winter				132.008	0.008
S1.001	S2	30 Winter	100	+40%					131.763	-0.237
S1.002	S3	30 Winter	100	+40%					131.763	-0.237

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.000	1.07			22.4	FLOOD RISK	
S1.001	S2	0.000	0.03		8	0.7	OK	
S1.002	S3	0.000	0.00			0.0	OK	

Appendix 5: Yorkshire Water Sewer Records



415768 : 419477	Map Name : SE1519SE	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	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 : 01/09/2023, 10:10:56	Date Gen : 01/09/2023, 10:20:27
			Source : Sewer Network Enquiry	

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

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