LAND OFF SHEPPEY WAY, IWADE

SURFACE WATER MANAGEMENT STATEMENT

MIDDLEFIELDS LTD

SEPTEMBER 2019

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DOCUMENT CONTROL

Job No	P912	
File Reference	G:\workfiles\P912 IWADE\REPORTS\P912-DOC01-Surface Water Management Statement-Issue 1.docx	
	Name	Date
Prepared By	B Fox	18/09/19
Checked By	Graham Eves	19/09/19

Issue	Approved By	Date	Comments
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1. EXECUTIVE SUMMARY

1.1. This Surface Water Management Statement has been prepared in connection with proposals for 14 retirement cottages for sheltered accommodation on land off Sheppey Way, Iwade.

1.2. The site lies entirely within Flood Zone 1.

1.3. The site is undeveloped and the available evidence identifies that the use of soakaways will not provide a suitable means of draining surface water runoff from development on the site. It will therefore be necessary to use flow balancing methods in order to store and attenuate surface water runoff to the greenfield runoff rates which in this instance is a minimum practicable controlled flow rate of 2 l/s.

1.4. The required storage will be provided using oversized pipes and an underground geocellular tank. Outflow from the storage facilities is controlled by means of suitable vortex flow control device before discharge to an offsite sewer. Car parking bays will be formed of 'lined' pervious pavement as a means of a collection of rainfall / runoff and as Source Control.

1.5. The overall conclusions drawn from this Surface Water Management Statement are that a suitable means of drainage can be provided to serve the proposed development in terms of the disposal of surface water runoff.

2. INTRODUCTION

2.1. This Surface Water Management Statement has been prepared on behalf of Middlefields Ltd in connection with proposals for residential development on land off Sheppey Way, Iwade.

2.2. The overall site comprises around 0.38 hectares, and is located to the west of Sheppey Way to the south of the village of Iwade, which lies in the Borough of Swale. The post code is ME9 8TY, and the approximate grid reference for the site is 589913, 167119. The location of the site is shown edged red on **Figure 1** below and lies entirely within Flood Zone 1.

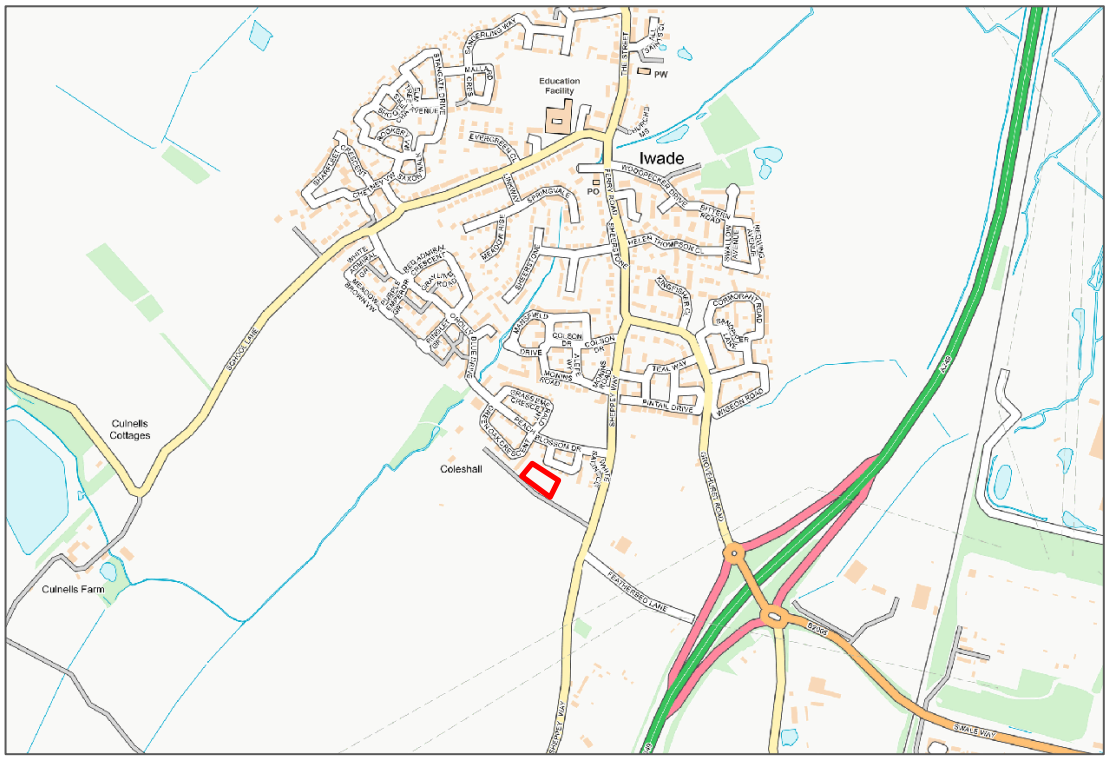


Figure 1: Site Location Plan

2.3. The main purpose of this Surface Water Management Statement is to provide sufficient information in support of a planning application to demonstrate that a suitable means of drainage can be provided to serve the proposed development in terms of the disposal of surface water runoff.

3. SITE CONTEXT

Site Description and Site Levels

3.1. The site is currently undeveloped in agricultural use and bounded by a new housing estate to north of the site and agricultural land and hedgerow to the south.

3.2. The nearest watercourse is the Iwade Stream which is situated 0.2km to the northwest of the site. The Iwade Stream flows from southwest to northeast through the village of Iwade which is designated as a 'main river'.

3.3. A Topographical Survey was undertaken by J. C. White in June 2019 and a copy of Drawing Number 19/00/060/1 is reproduced in **Appendix 1.** The Topographical Survey indicates that the site falls from a high point of approximately 18.60m Above Ordnance Datum (AOD) towards the northwestern boundary at 18.3m AOD and Sheppey Way at 17.70m AOD.

3.4. No formal drainage features (ditches or sewers) are identified on the site based on the desktop information reviewed.

Ground Conditions

3.5. The British Geological Survey (BGS) geological mapping of the area shows the site is underlain by London Clay Formation (clay and silt) bedrock and Head (clay and silt) superficial deposits.

3.6. Based on the Flood Studies Report Winter Rainfall Acceptance Potential (WRAP) Map, as shown reproduced on Drawing Number P912/01 in **Appendix 2**, the site is located in a 'Soil Index Class 4' area. Soil Index Class 4 has a low winter rainfall acceptance potential and a high standard percentage runoff, and so suggests the underlying soil has poor permeability.

3.7. The Cranfield Soil and AgriFood Institute (CSAI), incorporating the National Soil Resources Institute (NSRI,) at Cranfield University maintains soil reports and maps for England and Wales. The Soilscapes dataset map indicates that the site lies on the boundary between 'Loamy soils with naturally high groundwater' which are 'naturally wet' and 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils' which have 'impeded drainage'. After heavy rainfall, particularly during the winter, the subsoil becomes waterlogged, resulting in very wet ground conditions.

Groundwater Source Protection

3.8. From an inspection of the Environment Agency's Aquifer Designation Map on its website the site's underlying bedrock and superficial deposits are classified as 'Unproductive strata' which is defined as geological strata with low permeability that have negligible significance for water supply or river base flow. A copy of the Environment Agency's Aquifer Designation Map is reproduced in **Figure 2** below.

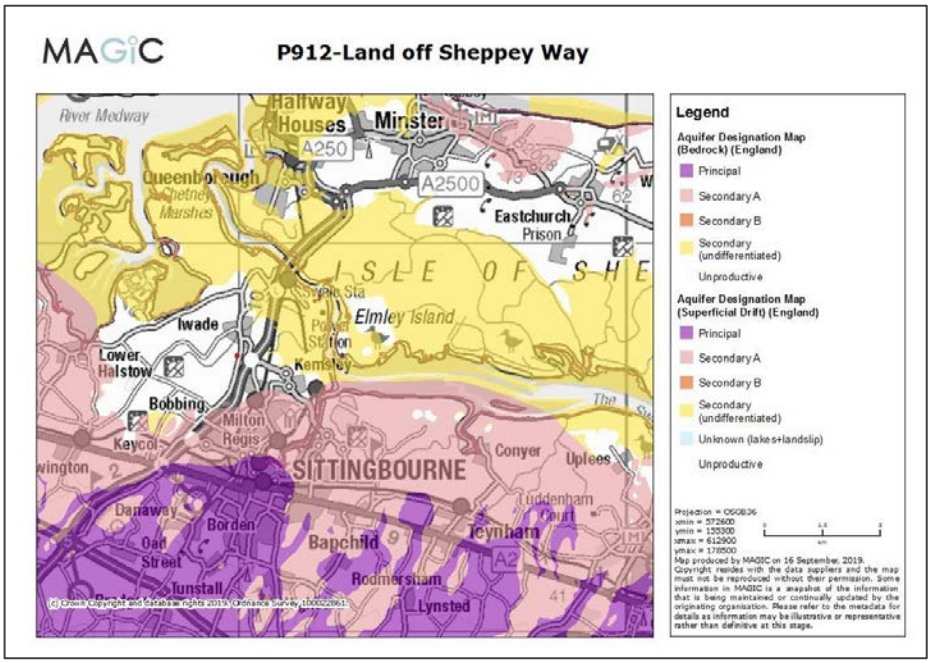


Figure 2: Environment Agency's Aquifer Designation Map

3.9. From an inspection of the Environment Agency's Groundwater Source Protection Zone Map the site does not fall within a Groundwater Source Protection Zone.

Flood Hazards

3.10. As the site is less than 1 hectare in Flood Zone 1 (which is land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding) a formal site-specific flood risk assessment is not required to support a planning application for the proposed development. An examination of the Government's Flood Mapping data identifies that the site is not at risk of flooding from surface water or reservoirs.

Development Proposals

3.11. The development proposals comprise 14 retirement cottages for sheltered accommodation. A copy of the Proposed Site Plan, Drawing Number 766 P02, prepared by CDP Architecture Ltd, showing the development proposals, is reproduced in **Appendix 3**.

4. SURFACE WATER DRAINAGE STRATEGY

Design Criteria

Climate Change

4.1. The NPPF requires development to take account of the impacts of climate change. The allowances to be made for climate change effects when assessing flood risk and designing drainage systems are related to the lifetime of the development. Residential development should be considered for a life of a minimum of 100 years[1].

4.2. The peak rainfall intensity allowances to be used when designing urban drainage systems are given in Table 2 of guidance published by the Environment Agency in February 2019[2]. Both the central and upper end allowances need to be assessed to understand the range of impact. The total potential change anticipated for 2060 to 2115 is 20% for the central category, and 40% for the upper end category.

Standard of Protection

4.3. In terms of providing an acceptable standard of protection against flooding for new development, paragraph 54[3] in the Flood Risk and Coastal Change Planning Practice Guidance that no flooding of property should occur as a result of the 'design flood' corresponding to a 1 in 100 year fluvial flood event, or a 1 in 200 tidal flood event, taking account of climate change[4].

4.4. The Government published its 'Non-statutory technical standards for sustainable drainage systems' in March 2015. They should be used in conjunction with the NPPF and planning practice guidance. Standard S7 states that the drainage system must be designed so that flooding does not occur on any part of the site for a 1 in 30 year rainfall event. Standard S8 goes on to state that the drainage system must be designed so that flooding does not occur during a 1 in 100 year rainfall event in any part of a building (including a basement); or in any utility plant susceptible to water within the development.

Sustainable Drainage Systems

4.5. Paragraph 51[5] in the Flood Risk and Coastal Change Planning Practice Guidance advises that sustainable drainage systems are designed to control surface water runoff close to where it falls and mimic natural drainage as closely as possible. Sustainable drainage systems provide opportunities to:

- reduce the causes and impacts of flooding;
- remove pollutants from urban runoff at source;
- combine water management with green space with benefits for amenity, recreation and wildlife.

[1] Planning Practice Guidance Reference ID: 7-026-20140306
[2] Environment Agency (February 2019) 'Flood risk assessments: climate change allowances'
[3] Planning Practice Guidance Reference ID: 7-054-20150415
[4] Planning Practice Guidance Reference ID: 7-055-20140306
[5] Planning Practice Guidance Reference ID: 7-051-20150323

4.6. The Guidance[6] advises that, generally, the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

4.7. Section 3.2 of Approved Document H of the Building Regulations also promotes the drainage hierarchy.

4.8. The 'Non-statutory technical standards for sustainable drainage systems' relates to the design, construction, operation and maintenance of sustainable drainage systems and have been published as guidance. The Government expect these standards to apply to all developments of 10 homes or more and so are applicable to this scheme.

Surface Water Management

4.9. A sustainable drainage strategy, involving the implementation of SuDS, is proposed for managing the disposal of surface water runoff from the proposed development on the site. The strategy has regard to the advice in CIRIA C753 'The SuDS Manual' and Kent County Council's requirements as set out in its 'Drainage and Policy Statement'.

4.10. Based on the ground conditions discussed above the use of soakaways will not provide a suitable means of draining surface water runoff from development on the site. It is therefore necessary to use flow balancing methods in order to store and attenuate surface water runoff to greenfield runoff rates (or minimum practicable controlled flow rate of 2 l/s).

Greenfield Runoff

4.11. The ICP SuDS module in the MicroDrainage design software enables the calculation of greenfield runoff rates based on the IH124 estimation method with pro-rata values for sites smaller than 50ha. Rainfall and soil parameters have been obtained from maps in Volume V of the Flood Studies Report (FSR) within the MicroDrainage Source Control software. FSSR 2 and 14 regional growth curve factors are used to calculate the greenfield peak flow rates for 1, 30 and 100 year return periods.

4.12. The FSR WRAP Map, shown in **Appendix 2**, indicates the site is located in 'Soil Index Class 4'. A Soil Index value of 0.45 has there been used to calculate Q_{BAR} in IH Report 124.

4.13. Copies of the MicroDrainage greenfield runoff calculations for the site are included in **Appendix 4**. A summary of the greenfield runoff rates for the various return period events is shown in **Table A**. The mean annual peak rate of runoff, referred to as Q_{BAR} in IH Report 124, is 1.6 l/s.

Table A: Greenfield Runoff Rates

Return Period (Years)	1	Q_{BAR}	30	100
Greenfield Runoff Rates (l/s/ha)	3.4	4.0	9.1	12.9
Greenfield Runoff Rates (l/s)	1.3	1.6	3.6	5.0

[6] Planning Practice Guidance Reference ID: 7-080-20150323

4.14. Kent County Council's 'Drainage and Policy Statement' sets the minimum achieved controlled flow rate of 2 l/s. This is due to constraints on the size of the hydraulic control unit while keeping the risk of blockage to an acceptable level.

4.15. As such it is proposed to limited the developed rate of runoff to 2 l/s, for all rainfall events up to the 100 year return period event, including an allowance for climate change, the proposed development would reduce flood risk overall when compared to existing greenfield rates.

Attenuation Storage

4.16. The required storage to achieve the restricted runoff rate will be provided using oversized pipes and underground geocellular tank. Outflow from the storage facilities is controlled by means of suitable vortex flow control device.

4.17. Car parking bays will be formed of 'lined' pervious pavement as a means of a collection of rainfall / runoff and as Source Control.

4.18. A direct outfall to the Iwade Stream some 200m to the north is not achievable and therefore a connection into the local sewer network in the development area to the north of the site is proposed.

4.19. Enquiries have been made to Southern Water to establish the location of the existing public sewers in the vicinity of the site. A copy of Southern Water's response and public sewer map are reproduced in **Appendix 5**. The Southern Water asset maps do not show any 'public' sewers in the development to the north of the site or in Sheppey Way. The sewers which serve the development site to the north have yet to be 'adopted' by Southern Water and therefore do not appear on their asset maps. Due to the presence of sewers to the north of the there is an adequate point of connection for the proposed development.

4.20. The land to the north was granted outline planning consent (planning reference: SW/08/1127) in June 2011. Drawing No. 690488/C/204 Rev A 'Section 104 Agreement Surface Water S104 Layout East System' was submitted as part of application reference SW/081127/CCH to comply with the planning conditions of the outline planning consent. The surface water drainage strategy makes allowance for a 5 l/s baseflow from the area of land which includes the application site. It is therefore concluded that the sewers in the development site to the north have been designed to take into account development on the application site. It is proposed to restrict the discharge rate from the proposed development to 2 l/s which is less than the 5 l/s capacity allowed for in the offsite sewer.

4.21. The proposed Care Home development (Ref: 19/501160/REM) to the east of the application site proposes to connect into the sewer system in the development area to the north at a controlled discharge rate of 1.4 l/s. If in due course the outflow rate from the proposed Care Home development is increased to 2 l/s then the peak flows from both development sites will be 4 l/s (which is less than 5 l/s allowed for). The offsite sewer in the development land to the north has been designed to take this flow rate into account.

4.22. A preliminary surface water drainage strategy is shown on the Preliminary Surface Water Drainage Strategy Plan, Drawing No. P912/02, a copy of which is contained in **Appendix 6**.

4.23. Pollution control measures include use of lined pervious pavement on car parking bays and use of deep trapped gullies in other road areas.

4.24. The proposed drainage strategy would ensure that surface water arising from the developed site would be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

SuDS Management Train

4.25. In terms of the SuDS 'management train', the drainage strategy for the proposed development seeks to address the quality and quantity of runoff as follows:-

i) Prevention

4.26. Prevention is the use of good site design and housekeeping measures to prevent pollution. Good site design includes the provision of pervious paving to retain sediment, and soft landscaping within the site to encourage evapotranspiration. The housekeeping measures cover maintenance of the drainage system and general site maintenance.

ii) Source Control

4.27. Source control is the control of runoff at or very near its source. The use of lined pervious pavements intercepts rainfall at source before discharging the runoff into the below ground attenuation system.

iii) Site Control

4.28. Site control is the management of water from several sub-catchments within a site. The proposed surface water drainage system amalgamates the runoff from the roofs, roads, and paved areas, for each area of development on the site, and deals with it in a combination of oversized pipes and a geocellular tank to reduce the rate of runoff from the site.

4.29. The pervious paving would contribute to the pollutant and sediment removal capability of the SuDS management train.

iv) Regional Control

4.30. Regional control is the management of runoff from more than one site and so in this case is covered by the site control techniques.

Surface Water Flow Balancing

4.31. The use of flow balancing methods, comprising oversized pipes and a geocellular tank is proposed in order to attenuate surface water runoff to the identified rate of 2 l/s with discharge to the local sewer system.

4.32. A Network model has been created in MicroDrainage, software system, and the 1 in 1, 30, 100 year events, plus 20% and 40% increases in peak rainfall intensity to take account of climate change, have been simulated. The outflow from the drainage system has been constrained to 2.0 l/s, and hence a reduced rate of runoff for higher return periods. Copies of the MicroDrainage simulation results are reproduced in **Appendix 7** and summarised in **Table B** below.

4.33. **Table B** shows the peak runoff rate from the development during the 1 in 1 year, 1 in 30, and 1 in 100 year rainfall events plus climate change, for the pre-development and post development situations.

Table B: Comparison of Runoff Rates and Attenuation Storage Volumes

Storm Event	Pre Development 'Greenfield' Runoff Rate (l/s)	Allowable Discharge Rate (l/s)	Proposed Discharge Rate (l/s)	Attenuation Storage (m^3)*
1 in 1	1.3	2.0	1.2	7
1 in 30	3.6	2.0	1.2	36
1 in 100	5.0	2.0	1.4	61
1 in 100 + 20%	N/A	2.0	1.5	83
1 in 100 + 40%	N/A	2.0	1.6	105

Notes: * volume of attenuation storage utilised in geocellular tank and length of 900mm diameter pipe.

4.34. Accordingly the detailed engineering design of the site will need to demonstrate that a minimum of 105 m^3 of surface water attenuation is proposed. The 30 year level of attenuation will be provided within the pipe system (to be adopted by Southern Water). The remaining level of attenuation will be provided within the permeable paving areas, including the car park surface, and will be demonstrated when the detailed designs are submitted and can be subject to an appropriate condition.

4.35. The proposed storage areas and oversized pipes which provided this level of attenuation are shown on the Preliminary Drainage Strategy Plan, Drawing No. P912/02 in Appendix 6, which indicates the location and sizes of the required storage facilities to serve the various development areas.

4.36. The above plan and calculations demonstrate that a suitable means of drainage can be provided to drain the developed site in terms of surface water runoff in accordance with the guidance and standards laid down.

Non-statutory technical standards for sustainable drainage systems

4.37. **Table C** demonstrates how the proposed development complies with the relevant standards of the Government's 'Non-statutory technical standards for sustainable drainage systems'.

Table C: Compliance with Non-statutory technical standards for sustainable drainage systems

Standard	Justification for compliance
Flood risk outside the development	
S1	N/A – discharge to a sewer.
Peak flow control	
S2	From inspection of **Table B** it can be seen that the peak runoff rate from the development to the offsite sewer for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event never exceed the peak greenfield runoff rate for the same event.
S3	N/A - the site is a greenfield development.
Volume control	
S5	N/A – the site is a greenfield development so S4 and S6 apply.
S4 & S6	As a result of the proposed development the amount of impermeable area increases which has implications for runoff volume. Ground conditions dictate that the use of infiltration drainage would be unsuitable and therefore would not be viable means to dispose of this additional volume. From inspection of **Table B** it can be seen that the runoff volume is discharged at a rate that does not adversely affect flood risk which equates to 2 l/s (the lowest practicable discharge rate).

Flood Risk within the development	
S7	The surface water drainage system and site ground levels will be designed so that flooding does not occur on any part of the site for a 1 in 30 year rainfall event. The proposed geocellular tank and oversized pipes are sized to accommodate the 1 in 100 year rainfall event (including a 40% allowance for climate change) with no flooding. S7 is satisfied based on the calculations contained in Appendix 7.
S8	The surface water drainage system and site ground levels will be designed so that flooding does not occur on any part of the site for a 1 in 100 year rainfall event. The proposed geocellular tank and oversized pipes are sized to accommodate the 1 in 100 year rainfall event (including a 40% allowance for climate change) with no flooding. S8 is satisfied based on the calculations contained in Appendix 7.
S9	The design of the site ensures that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.
Structural integrity	
S10	Components would be designed to ensure structural integrity of the drainage system under anticipated loading conditions over the design life of the development.
S11	The materials specified by the designer at the detailed design stage would be of a suitable nature and quality for their intended use.
Designing for maintenance considerations	
S12	N/A - Pumping is not proposed.
Construction	
S13	The mode of construction with the existing sewer would comply with the appropriate standards and be inspected by the relevant authority so would not be prejudicial to the structural integrity and functionally of the drainage system.
S14	Any damage to the drainage system would be rectified before the drainage system is completed to the satisfaction of the relevant authority.

Overland Flood Flow Paths

4.38. Overland flood flow paths would follow the natural topography of the land along the access road towards Sheppey Way.

Residual Risk

4.39. The proposed drainage measures would ensure that there is little or no residual risk of property flooding occurring during events well in excess of the minimum acceptable standard of protection for new property, which requires that no flooding of property should occur as a result of a one in 100 year storm event including an appropriate allowance for climate change.

4.40. For extreme events it is considered that the proposed development would intercept any uncontrolled overland flow and direct it into the proposed drainage system. The proposed drainage measures would ensure the proposed development would have adequate flood protection for extreme events over the lifetime of the development.

5. MAINTENANCE STRATEGY

5.1. In terms of the maintenance strategy for the proposed drainage measures, the main surface drainage systems would be adopted by Southern Water, in its role as sewerage undertaker, under a Section 104 Agreement of the Water Industry Act 1991. Southern Water would therefore be responsible for the future maintenance of the adopted drainage systems

5.2. As Southern Water does not presently adopt surface water attenuation features it is proposed that any such feature (such as a geocellular tank) would be maintained by a Management Company.

5.3. Roads and footways, including highway drainage and gullies, to be adopted under Section 38 of the Highways Act 1980, would be maintained by Kent County Council in its role as local highway authority.

5.4. An outline Maintenance plan for the SuDS components in accordance with this guidance are set out in **Table D** below.

Table D: Operation and maintenance requirements SuDS Features

Maintenance Schedule	Required Action	Typical Frequency
Geocellular Tank		
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required.
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required.
Pervious Pavement		
Regular Maintenance	Brushings and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations
Occasional maintenance	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

6. CONCLUSIONS

6.1. This Surface Water Management Statement has been prepared in connection with proposals for comprise 14 retirement cottages for sheltered accommodation on land off Sheppey Way, Iwade.

6.2. The overall site comprises 0.38 hectares, and is located to the west of Sheppey Way to the south of the village of Iwade.

6.3. The British Geological Survey (BGS) geological mapping of the area shows the site is underlain by London Clay Formation bedrock and Head superficial deposits. The available evidence suggests the use of soakaways would not provide a suitable means of draining surface water runoff from development on the site.

6.4. It is therefore necessary to use flow balancing methods in order to store and attenuate surface water runoff to the greenfield runoff rates which in this instance is a minimum practicable controlled flow rate of 2 l/s.

6.5. No formal drainage features (ditches or sewers) are identified on the site. A discharge to the Iwade Stream is not achievable and discharge to the local sewer network to the north of the site is proposed. The required storage will be provided using oversized pipes and an underground geocellular tank. Outflow from the storage facilities is controlled by means of suitable vortex flow control device. Car parking bays will be formed of 'lined' pervious pavement as a means of a collection of rainfall / runoff and as Source Control.

6.6. Preliminary calculations have been undertaken for the design of oversized pipes and attenuation requirements using MicroDrainage software. These preliminary calculations demonstrate that a suitable means of drainage can be provided to drain the developed site in terms of surface water runoff in accordance with the guidance and standards laid down.

6.7. The proposed drainage strategy would ensure that surface water arising from the developed site would be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

6.8. The proposed development complies with the relevant standards of the Government's 'Non-statutory technical standards for sustainable drainage systems'.

6.9. A maintenance strategy for the proposed surface water drainage measures to serve the development has been set out in this document and can be covered by a suitably worded condition.

6.10. The overall conclusions drawn from this Surface Water Management Statement are that a suitable means of drainage can be provided to serve the proposed development in terms of the disposal of surface water runoff.

Appendices

Appendix 1

LEGEND

SERVICES

AV	AIR VENT
CAJB	CABLE JUNCTION BOX
CATV	CABLE TELEVISION COVER
CD	CABLE DUCT
CIP	CABLE INSPECTION POINT
EIC	ELECTRIC INSPECTION COVER
EJB	ELECTRIC JUNCTION BOX
EP	ELECTRICITY POLE
ER	EARTHING ROD
FH	FIRE HYDRANT
GIC	GAS INSPECTION COVER
GJB	GAS JUNCTION BOX
GV	GAS VENT
JB	JUNCTION BOX
MK(E)	SERVICE MARKER (ELECTRIC)
MK(G)	SERVICE MARKER (GAS)
MK(W)	SERVICE MARKER (WATER)
OHW	OVERHEAD WIRE
SC(G)	STOP COCK (GAS)
SC(W)	STOP COCK (W)
STP	SUPPORT FOR TELEPHONE POLE
SV	STOP VALVE
TIC	TELEPHONE INSPECTION COVER
TJB	TELEPHONE JUNCTION BOX
TP	TELEPHONE POLE
WIC	WATER INSPECTION COVER
WM	WATER METER

DRAINAGE

BD	BACK DROP
BL	BASE/BED LEVEL
CL	COVER LEVEL
CP	CATCH PIT
DC	DRAINAGE CHANNEL
DP	DOWN PIPE
G	GULLY
IC	INSPECTION COVER
IL	INVERT LEVEL
MH(C)	MANHOLE (COMBINED)
MH(F)	MANHOLE (FOUL)
MH(S)	MANHOLE (SURFACE WATER)
RE	RODDING EYE
RWP	RAIN WATER PIPE
SEG	SIDE ENTRY GULLY
SVP	SOIL VENT PIPE
UTL	UNABLE TO LIFT
VP	VENT PIPE
WO	WASH OUT

FEATURES

B	BOLLARD
BH	BORE HOLE
BP	BRICK PILLAR
BS	BUS STOP
CPS	CONCRETE PAVING SLABS
FB	FLOWER BED
LB	LITTER BIN
LC	LIGHTING COLUMN
P	POST
PB	POST BOX
RNP	ROAD NAME PLATE
RS	ROAD SIGN
RW	RETAINING WALL
SP	SIGN POST
SU	STEP(S) UP
TCB	TELEPHONE CALL BOX
TH	TRIAL HOLE
TS	TREE STUMP

LEVEL

DPC	DAMP PROOF COURSE
THL	THRESHOLD LEVEL
T.O.C	TOP OF CHIMNEY
T.O.W	TOP OF WALL
WL	WATER LEVEL

INTERNAL

CLG	CEILING LEVEL
DHL	DOOR HEAD LEVEL
FL	FLOOR LEVEL
SCLG	SUSPENDED CEILING LEVEL
US	UNDERSIDE
USB	UNDERSIDE OF BEAM
WCL	WINDOW CILL LEVEL
WHL	WINDOW HEAD LEVEL

CONTROL

OSBM	ORDNANCE SURVEY BENCH MARK
STN	SURVEY STATION
TBM	TEMPORARY BENCH MARK

TREE (girth/spread/height/species/no. of boles)

DIRECTION OF LEAN

1 PHOTOGRAPH NUMBER, LOCATION & DIRECTION

GATE — GATES
FENCE
BUILDING
OVER HEAD BUILDING LINE
FACE OF WALL
BACK OF RETAINING WALL
LINE
CHANGE OF SURFACE
EDGE OF UNDERGROWTH

BANKING
TOP OF BANK
BOTTOM OF BANK
KERB
DROP KERB
VERGE
10.25 CONTOUR WITH VALUE
E OHW T
OVER HEAD WIRE
HEDGE/TREE LINE

FOR FUTURE SURVEY WORK OR SETTING OUT, J C WHITE GEOMATICS LIMITED QUOTED SURVEY CONTROL COORDINATES & LEVELS MUST BE USED. UNDER NO CIRCUMSTANCES SHOULD ANY OTHER SURVEYED POINTS ON THE DRAWING BE USED OTHER THAN AS A GROSS ERROR CHECK.

TREE GIRTHS AND SPREADS ARE QUOTED AS A MEAN SIZE, AND SHOWN TO SCALE.

WHILST EVERY EFFORT IS MADE TO IDENTIFY TREE SPECIES AND GAUGE HEIGHTS, NO RESPONSIBILITY CAN BE TAKEN FOR THE ACCURACY OF THIS INFORMATION.

WHILST EVERY EFFORT IS MADE TO ENSURE THAT PIPE DIAMETERS, INVERT LEVELS AND DRAINAGE TYPES ARE CORRECT, THE ACCURACY OF THIS INFORMATION CANNOT BE GUARANTEED, AND IT IS STRONGLY RECOMMENDED THAT EXISTING INFORMATION IS CHECKED PRIOR TO THE COMMENCEMENT OF ANY DETAILED DESIGN AND CONSTRUCTION WORKS.

LEVELS AT KERB LINES ARE CHANNEL LEVELS.

ALL COORDINATES ARE BASED ON A LOCAL GRID CENTERED ON AN OS ACTIVE RINEX DERIVED COORDINATE FOR STN JCW1. ALL COORDINATES HAVE BEEN COMPUTED USING A SCALE FACTOR OF 1.00000.

DUE TO THE UNMAINTAINED NATURE OF THE SITE, IT CANNOT BE GUARANTEED THAT ALL FEATURES HAVE BEEN SURVEYED.

SURVEY LEVELS ADJUSTED TO FIT TO EXISTING "SURVEY SOLUTIONS" TOPOGRAPHICAL SURVEY DATED 30/07/2018.

LEVELS ARE BASED ON STATION ST03 (VALUE 18.321).

OS DATA SHOWN IN GREY.

CONTROL SCHEDULE

STATION	EASTING	NORTHING	HEIGHT	DESCRIPTION
JCW1	589922.337	167113.630	18.578	Peg
JCW2	589982.114	167067.255	18.375	Peg

REV.	DESCRIPTION	DATE	INITIAL
A	BOUNDARY SET-OUT PEGS ADDED [18/06/121]	03.06.19	PV

J. C. WHITE
Geomatics Limited
Shrine Barn, Shrine Farm, Sandling Road, Postling, Hythe, Kent, CT21 4HE
Tel : 01303 261212 Fax : 01303 264040
Email : survey@jcwhite.co.uk Web site : www.jcwhite.co.uk

- GPS Surveys
- Volumetric Surveys
- Topographical Surveys
- Measured Building Surveys
- Laser Scanning
- Setting Out
- Boundary Disputes
- Engineering Surveys
- Deformation & Settlement Surveys
- Scan to BIM Modelling

CLIENT

Middlefields Ltd.

JOB TITLE

Sheppy Way,
Iwade, Kent,
ME9 8TY.

DRAWING TITLE

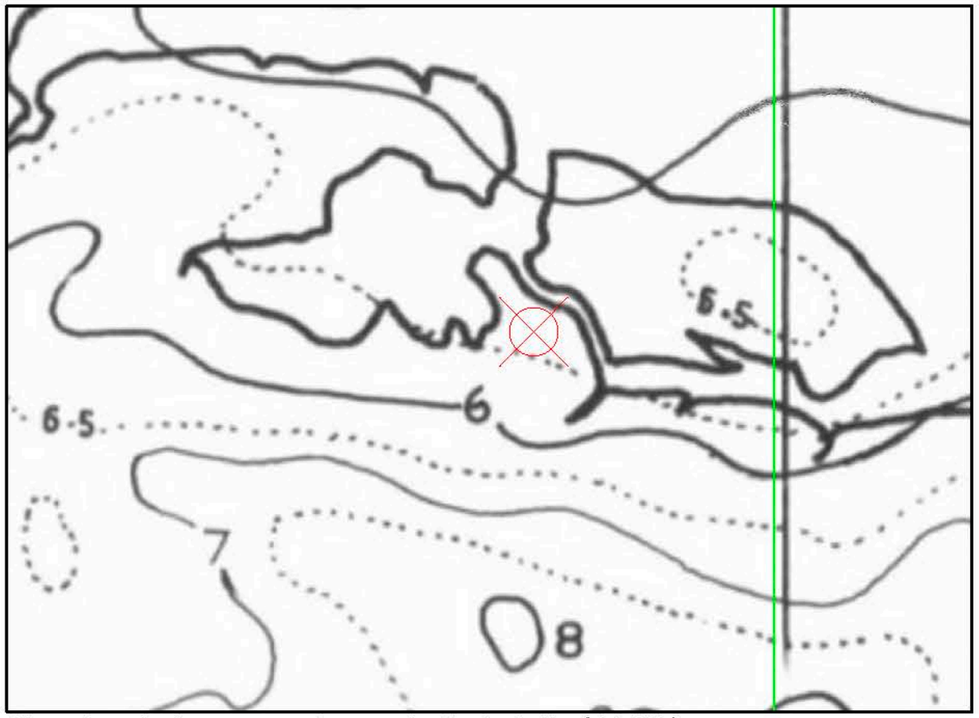
Topographical Survey

JOB No. *19/00/060*	DATE *March 2019*
SURVEYED BY *PV*	DRAWN BY *PV*
SCALE *1:200*	DWG. No. *1* REV. No.
CAD PLOT DATE *11.09.2019*	ORIGINAL SHEET SIZE *A1*
CADFILE NAME *1900060 - Iwade - Topographical Survey_REV_A.dwg*	

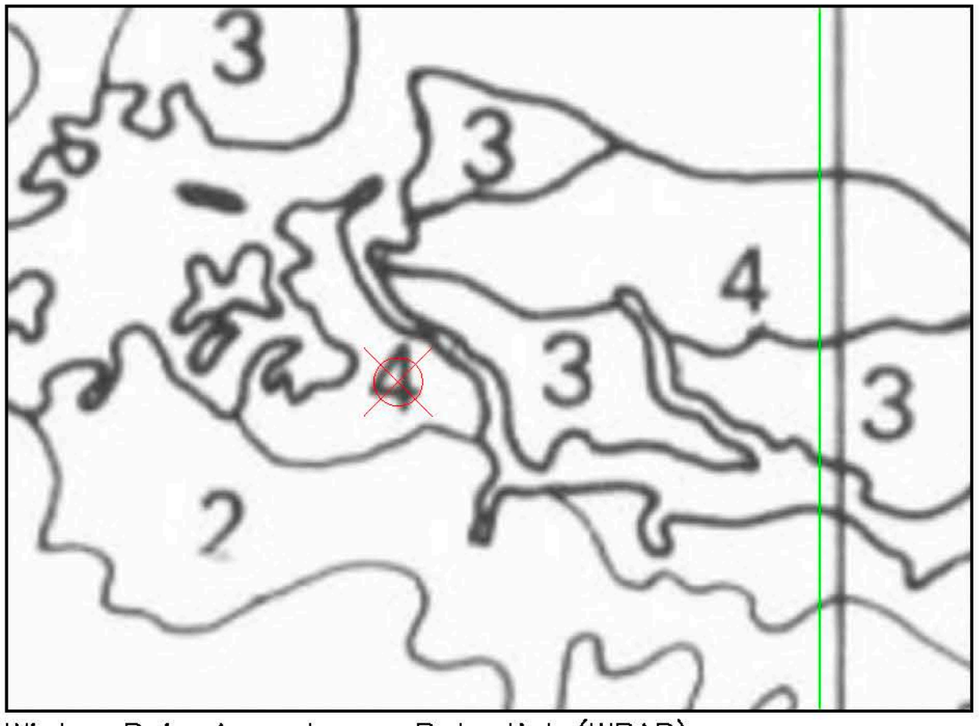
167140mN
167120mN
167100mN
167080mN
167060mN
589860mE
589880mE
589900mE
589920mE
589940mE
589960mE
589980mE
NUTMEG CRESCENT
building
peg
gross
STN JCW1 18.578
STN JCW2 18.375

Appendix 2

Location Plan



Standard Average Annual Rainfall (SAAR) (in hundreds of mm)



Winter Rain Acceptance Potential (WRAP)

PFA consulting

Stratton Park House, Wanborough Road
Swindon, SN3 4HG

Telephone
01793 828000

Website
www.pfaplc.com

For Planning
These drawings are produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

NOTES

1. Standard Average Annual Rainfall (SAAR) and Winter Rain Acceptance Potential (WRAP) map extracts shown on this drawing are reproduced from the maps contained in Volume V of the Flood Studies Report – NERC:1975.

Soil Classification			
Soil Class (WRAP)	Soil Index (IoH)	SPR (FEH)	SI (ADAS)
1	0.15	10	0.1
2	0.30	30	0.5
3	0.40	37	0.8
4	0.45	47	1.0
5	0.50	53	1.3

Rev	Date	Description	Drawn	Check
P	19.09.19	First issue.	BF	GE

Status
FOR PLANNING

Client
Middlefields Ltd

Project
Land at Sheppey Way, Iwade

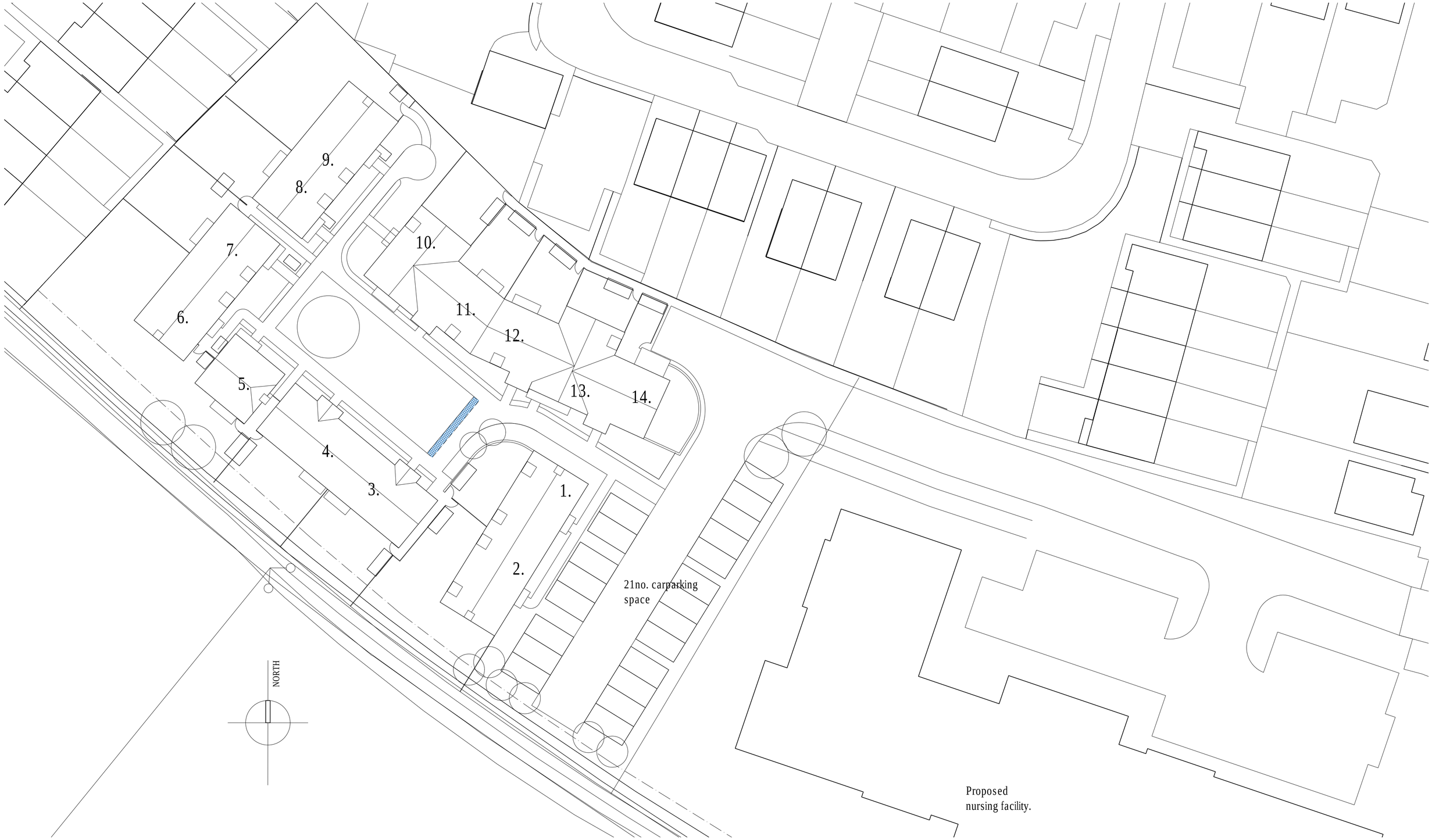
Drawing Title
SAAR and WRAP Maps

Drawing No.
P912/01

Date: September 2019 | Scale: NTS

E-Mail: bfox@pfaplc.com

Appendix 3



Rev.	Description	Int.	Date

Client
HUME PLANNING

Job Title
PROPOSED RETIREMENT COTTAGES AT IWADE

CDP Architecture Ltd
22-23 North Lane,Canterbury
Kent,CT2 7EE
Tel: 01227 458181 Fax: 01227 451543
info@thinkcdp.com www.thinkcdp.com

1:200 scale bar
0m 4.0m 8.0m 12.0m 16.0m
CDP original printed to scale. Prints from PDF's could distort

Drawing Title
PROPOSED SITE PLAN

Scale @ A1	1:200
Drawn	MW
Date	AUG 2019
Checked	

STATUS:

Preliminary/Comment	
Planning	
Building Regulations	
Tender	
Construction	
As built	

766 : P02

A1

Appendix 4

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.450
Area (ha)	1.000	Urban	0.000
SAAR (mm)	650	Region Number	Region 7

Results l/s

QBAR Rural	4.0
QBAR Urban	4.0
Q2 years	3.5
Q1 year	3.4
Q30 years	9.1
Q100 years	12.9

ICP SUDS Mean Annual Flood

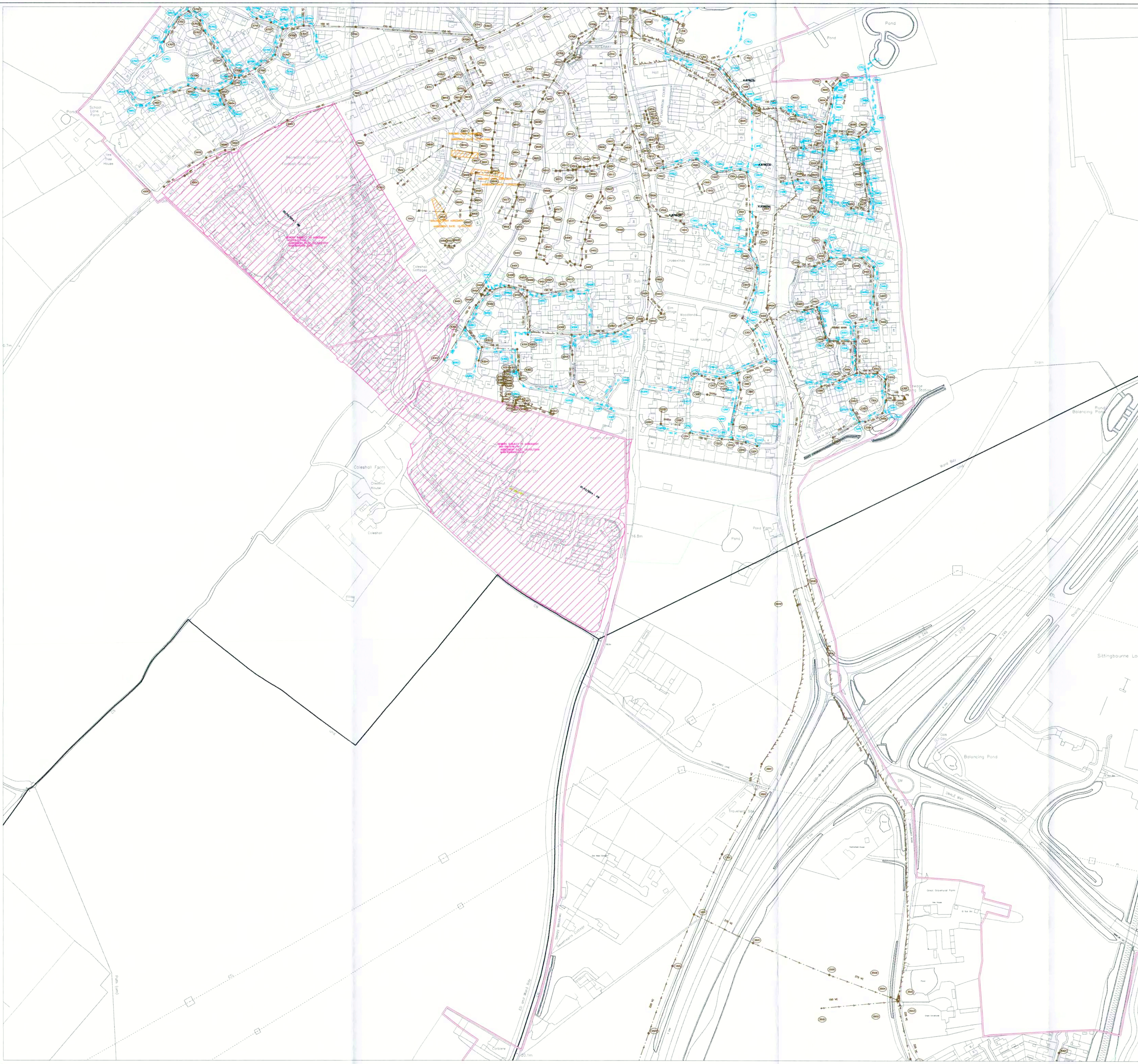
Input

Return Period (years)	2	Soil	0.450
Area (ha)	0.391	Urban	0.000
SAAR (mm)	650	Region Number	Region 7

Results l/s

QBAR Rural	1.6
QBAR Urban	1.6
Q2 years	1.4
Q1 year	1.3
Q30 years	3.6
Q100 years	5.0

Appendix 5

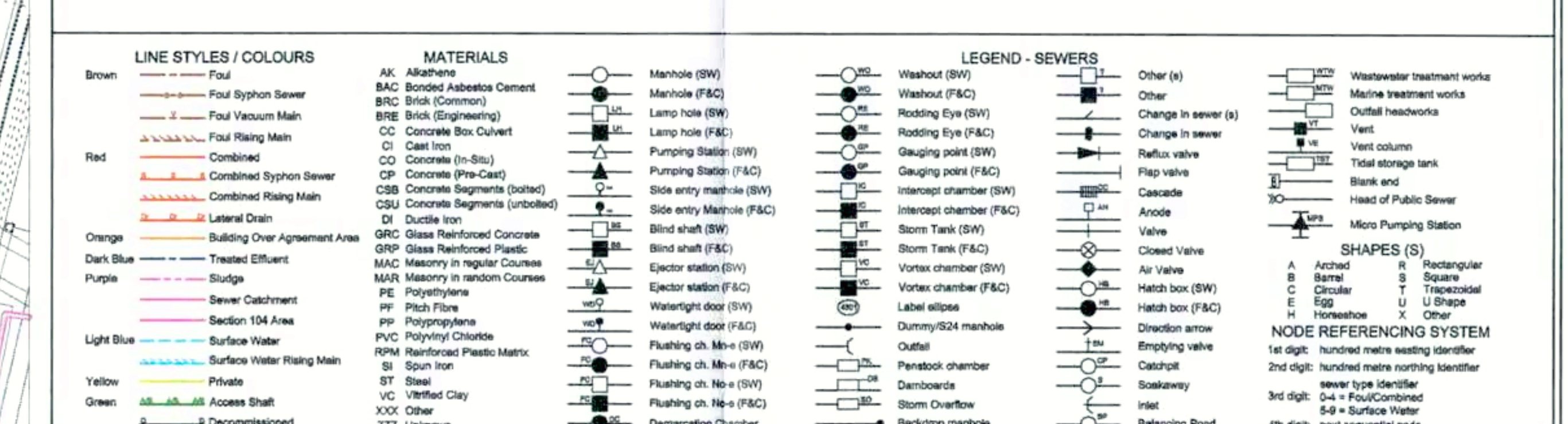


SEWER RECORDS

Node	Cover	Invert	Size	Material	Shape	
0201X			UNK	UNK	CIRC	
020DX			UNK	UNK	CIRC	
0250X	16.39	14.19	300	VC	CIRC	
0251X	16.56	15.15	150	VC	CIRC	
0301X	15.09	13.55	150	VC	CIRC	
0303X	15.17	13.72	150	VC	CIRC	
0350X	15.79	14.42	225	VC	CIRC	
0351Y	15.37	13.13	225	VC	CIRC	
0352X	15.21	13.34	225	VC	CIRC	
0353X	15.11	13.66	150	VC	CIRC	
0356X	15.54	13.87	225	VC	CIRC	
0401X	11.84	10.52	150	VC	CIRC	
0402X	11.79	10.48	150	VC	CIRC	
0403X	13.7	11.9	150	VC	CIRC	
0404X	14.66	12.62	150	VC	CIRC	
0405X	13.58	11.39	150	VC	CIRC	
0406X	15.03	13.22	150	VC	CIRC	
0407X			100	VC	CIRC	
040DX			150	VC	CIRC	
0450X	13.88	12.01	300	VC	CIRC	
0501X	19.89	11.82	225	VC	CIRC	*
0501X	11.73	10.41	150	VC	CIRC	*
0502X	11.5	10.13	150	VC	CIRC	
0503X	11.09	9.92	150	VC	CIRC	
0504X	10.93	9.76	150	VC	CIRC	
0505X	10.47	9.53	150	VC	CIRC	
0506X	10.75	9.35	150	VC	CIRC	
0507X	10.11	8.71	150	VC	CIRC	
0508X	11.47	9.29	150	VC	CIRC	
0509X	8.77		150	VC	CIRC	
0510X	12.93	11.03	150	VC	CIRC	
0511X	11.41	9.22	250	VC	CIRC	
0512X	8.97		150	VC	CIRC	
0513X	9.23		150	VC	CIRC	
0514X	10.27	7.26	150	VC	CIRC	
0515X	10.17	7.08	150	VC	CIRC	
0516X	12.11	10.09	150	VC	CIRC	
0517X	10.36	8.96	150	VC	CIRC	
0602X	9.07	7.36	150	VC	CIRC	
0604X	9.26	7.21	150	VC	CIRC	
0605X	9.11	7.16	150	VC	CIRC	
0606X	9.16	7.02	150	VC	CIRC	
0607X	8.87	6.97	150	VC	CIRC	
0608X	9.09	6.92	150	VC	CIRC	
0609X	8.5	6.615	250	VC	CIRC	
060DX			UNK	VC	CIRC	
0610X	7.422	5.892	250	VC	CIRC	
0611X	9.15	6.86	150	VC	CIRC	
0613X			UNK	VC	CIRC	
0614X			UNK	VC	CIRC	
0615X			UNK	VC	CIRC	
0616X			UNK	UNK	CIRC	
0617X			UNK	UNK	CIRC	
0618X			UNK	UNK	CIRC	
0701X	6.967	5.177	450	VC	CIRC	
1201X	13.85	10.53	150	VC	CIRC	
1202X	14.04	10.69	150	VC	CIRC	
1203X	14.28	12.33	150	VC	CIRC	
1204X	14.85	12.93	150	VC	CIRC	
1250X	14.03	10.98	300	CP	CIRC	
1251X	14.29	12.55	225	VC	CIRC	
1252X	14.79	13.11	150	VC	CIRC	
1253X	15.67	13.98	150	VC	CIRC	
1254X	13.83	10.87	300	CP	CIRC	
1255X	13.67	10.81	375	CP	CIRC	
1301X	13.92	9.93	150	VC	CIRC	
1302X	14.11	12.08	150	VC	CIRC	
1303X	14.26	12.18	150	VC	CIRC	
1304X	14.45	12.51	150	VC	CIRC	
1305X	13.75	10.04	150	VC	CIRC	
1306X	13.61	10.11	150	VC	CIRC	
1308X			UNK	UNK	CIRC	
1350X	13.69	10.67	375	CP	CIRC	
1351X	13.81	10.64	375	CP	CIRC	
1352X	14	10.57	375	CP	CIRC	
1353X	14.15	12.42	300	CP	CIRC	
1354X	14.3	12.54	300	CP	CIRC	
1355X	14.52	12.81	225	VC	CIRC	
1356X	14.65	12.97	225	VC	CIRC	
1357X	14.9	13.22	225	VC	CIRC	
1501X	16.63	10.4	225	VC	CIRC	*
1501X	12.09	7.92	150	VC	CIRC	*
1502X	11.79	7.72	150	VC	CIRC	
1503X	10.59	7.32	150	VC	CIRC	
1504X	13.15	10.4	150	VC	CIRC	
1505X	12.97	10.34	150	VC	CIRC	
150DX			UNK	VC	CIRC	
1550X	13.03	10.11	225	VC	CIRC	
1551X	12.87	9.88	225	VC	CIRC	
1552X	13.39	10.25	225	VC	CIRC	
1553X	10.55	7.91	225	VC	CIRC	
1554X	11.75	7.46	300	CP	CIRC	
1555X	12.05	7.32	300	CO	CIRC	
1600X	9.6	8	150	VC	CIRC	
1601X	16.29	9.2	375	VC	CIRC	*
1601X	9.63	7.47	150	VC	CIRC	*
1602X	11.39	7.54	150	VC	CIRC	
1603X			UNK	VC	CIRC	
1650X	9.74	6.22	450	CP	CIRC	
1651X	11.37	7.62	300	CP	CIRC	
1700X	8.48	6.8	150	VC	CIRC	
1701X	8.12	4.77	225	VC	CIRC	*
1701X	16.44	11.79	225	VC	CIRC	*
1702X	8.65	5.15	150	VC	CIRC	
1703X			150	PE	CIRC	
1750X	7.69	6.01	225	VC	CIRC	
1751X	6.88	5.53	300	VC	CIRC	
1753X	8.48	5.8	525	CP	CIRC	
1754X	7.7	5.55	525	CP	CIRC	
200DX			150	PE	CIRC	
200WX	14.9		150	PE	CIRC	
2201X	12.82	11.5	150	VC	CIRC	
2202X	13.42	11.07	150	VC	CIRC	
2250X	12.71	11.41	225	VC	CIRC	
2251X	13.33	11.21	225	VC	CIRC	
2252X	12.72	11.32	225	VC	CIRC	
2253X	12.94	11.21	225	VC	CIRC	
2254X	13.44	10.93	225	VC	CIRC	
2301X	13.7	9.36	150	VC	CIRC	
2302X	13.68	9.64	150	VC	CIRC	
2350X	11.83	10.36	150	VC	CIRC	
2351X	13.68	10.33	375	CP	CIRC	
2352X	13.75	10.17	375	CP	CIRC	
2401X	11.74	10.28	150	VC	CIRC	
2402X	11.99	10.78	150	VC	CIRC	
2403X	11.85	10.34	150	VC	CIRC	
2404X	12.07	10.64	150	VC	CIRC	
2405X	13.19	11.13	150	VC	CIRC	
2406X	13.58	9.21	150	VC	CIRC	
2407X	13.02	8.97	150	VC	CIRC	
2408X	12.77	8.79	150	VC	CIRC	
2409X	12.66	8.62	150	VC	CIRC	
240AX	13.18		150	PE	CIRC	
2450X	11.66	9.74	225	VC	CIRC	
2451X	11.96	10.62	150	VC	CIRC	
2452X	11.81	10.45	150	VC	CIRC	
2453X	12.67	9.51	375	CP	CIRC	
2454X	12.77	9.6	375	CP	CIRC	
2455X	13.07	9.75	375	CP	CIRC	
2456X	13.28	9.89	375	CP	CIRC	
2457X	13.55	9.99	375	CP	CIRC	
2458X	12.68	9.47	375	CO	CIRC	
2501X	12.69	8.31	150	VC	CIRC	
2502X	12.66	8.1	150	VC	CIRC	
2503X	12.16	7.98	150	VC	CIRC	
2504X			UNK	VC	CIRC	
2505X			UNK	VC	CIRC	
2506X			UNK	VC	CIRC	
2507X	12.38	10.63	150	PVC	CIRC	
2508X	12.2	10.42	150	PVC	CIRC	
2509X	12.07	10.24	150	PVC	CIRC	
2510X	12.3	10.66	150	PVC	CIRC	
2550X	12.73	9.37	375	CP	CIRC	
2551X	12.58	9.02	375	CP	CIRC	
2552X	12.69	7.76	450	CP	CIRC	
2553X	12.12	7.21	450	CP	CIRC	
2554X	12.33	10.68	150	PVC	CIRC	
2555X	12.06	10.58	150	PVC	CIRC	
2556X	12.25	10.81	150	PVC	CIRC	
2601X	16.48	8.48	375	VC	CIRC	*
2601X	12.48	10.2	150	PVC	CIRC	*
2602X	11.18	8.43	150	PVC	CIRC	
2603X	10.94	8.21	150	PVC	CIRC	
2604X	10.86	7.88	150	PVC	CIRC	
2605X	10.41	7.73	150	PVC	CIRC	
260ZX			150	PE	CIRC	
2650X	12.19	7.12	450	CP	CIRC	
2651X	11.66	6.95	450	CP	CIRC	
2652X	10.44	6.44	450	CP	CIRC	
2653X	12.42	10.38	225	PVC	CIRC	

Node	Cover	Invert	Size	Material	Shape	
2654X	12.34	10.49	150	PVC	CIRC	
2655X	11.22	9.74	225	PVC	CIRC	
2656X	11.06	9.85	225	PVC	CIRC	
2657X			UNK	PVC	UNK	
2801X	15.39	12.71	225	VC	CIRC	
2802X	15.44	12.35	225	VC	CIRC	
3201X	10.5	9.2	150	VC	CIRC	
3202X	10.23	8.92	150	VC	CIRC	
3203X	10.53	9.18	150	VC	CIRC	
3204X	10.1	8.75	150	VC	CIRC	
3205X	9.91	8.52	150	VC	CIRC	
3250X	9.87	7.51	525	CP	CIRC	
3251X	10.22	8.15	300	CP	CIRC	
3252X	10.59	8.41	300	CP	CIRC	
3301X	9.96	6.72	150	VC	CIRC	
3302X	10.11	6.94	150	VC	CIRC	
3303X	10.2	7.08	150	VC	CIRC	
3304X	10.53	9.12	150	VC	CIRC	
3305X	10.97	9.47	150	VC	CIRC	
3306X	11.4	10.03	150	VC	CIRC	
3307X	10.8	7.56	150	VC	CIRC	
3308X	11.32	9.83	150	VC	CIRC	
3309X	11.44	9.94	150	VC	CIRC	
3310X	9.65	6.59	UNK	UNK	CIRC	
3350X	11.23	8.93	300	CP	CIRC	
3351X	10.93	8.79	300	CP	CIRC	
3352X	10.55	7.99	525	CP	CIRC	
3353X	10.1	7.81	525	CP	CIRC	
3354X	10.66	8.17	450	CP	CIRC	
3355X	10.85	8.23	450	CP	CIRC	
3356X	10.76	8.33	450	CP	CIRC	
3357X	11.41	9.48	225	VC	CIRC	
3401X	10.71	7.74	150	VC	CIRC	
3402X	10.32	7.93	150	VC	CIRC	
3403X	10.67	9.34	150	VC	CIRC	
3404X	10.97	9.59	150	VC	CIRC	
3405X	11.21	9.73	150	VC	CIRC	
3406X	11.77	10.01	150	VC	CIRC	
3407X	11.8	10.07	150	VC	CIRC	
3450X	11.43	10.1	150	VC	CIRC	
3451X	10.36	8.42	450	CP	CIRC	
3452X	10.8	8.6	450	CP	CIRC	
3453X	10.83	8.7	375	CP	CIRC	
3454X	10.97	8.99	300	CP	CIRC	
3455X	11.22	9.25	300	CP	CIRC	
3456X	11.74	9.52	300	CP	CIRC	
3457X	11.76	10.15	150	VC	CIRC	
3501X	16.611	15.231	225	VC	CIRC	*
3501X	11.81	10.17	150	VC	CIRC	*
3502X	11.99	10.34	150	PVC	CIRC	*
3502X	16.646	7.846	225	VC	CIRC	*
3503X	11.8	10.15	150	PVC	CIRC	*
3503X	16.99		225	VC	CIRC	*
3504X	11.85	10.03	150	PVC	CIRC	*
3504X	17.02	7.92	225	VC	CIRC	*
3505X	12.09	9.73	150	PVC	CIRC	*
3505X	21.1	8.23	375	VC	CIRC	*
3506X	16.47	8.04	375	VC	CIRC	*
3506X	11.98	10.53	150	PVC	CIRC	*
3507X	11.91	10.17	150	PVC	CIRC	
3508X	12.1	10.03	150	PVC	CIRC	
3509X	12.18	9.95	150	PVC	CIRC	
350DX			150	VC	CIRC	
3510X	12.02	9.74	150	PVC	CIRC	
3550X	11.77	9.8	225	VC	CIRC	
3551X	12.17	10.55	150	PVC	CIRC	
3552X	11.93	10.23	300	PVC	CIRC	
3553X	11.96	10.66	150	PVC	CIRC	
3554X	11.78	9.88	300	PVC	CIRC	
3555X	11.85	9.96	300	PVC	CIRC	
3556X	11.81	9.82	300	PVC	CIRC	
3557X	11.97	10.71	150	PVC	CIRC	
3558X	11.84	10.55	225	PVC	CIRC	
3559X	12.05	10.44	225	PVC	CIRC	
3560X	12.16	10.32	300	PVC	CIRC	
3561X	12.1	10.19	300	PVC	CIRC	
3601X	12.24	9.45	150	PVC	CIRC	
3602X	11.95	9.02	150	PVC	CIRC	
3603X	11.83	8.89	150	PVC	CIRC	
3604X	11.54	9.16	150	PVC	CIRC	
3605X	11.29	9.41	150	PVC	CIRC	
3606X	11.84	9.67	150	PVC	CIRC	
3607X	11.66	9.55	150	PVC	CIRC	
3608X	11.38	9.42	150	PVC	CIRC	
3609X	11.22	9.67	150	PVC	CIRC	
3610X	11.47	9.32	150	PVC	CIRC	
3650X	12.27	9.54	300	PVC	CIRC	
3651X	11.93	9.33	300	PVC	CIRC	
3652X	11.53	10.4	150	PVC	CIRC	
3653X	11.8	9.23	400	PVC	CIRC	
3654X	11.57	9.18	400	PVC	CIRC	
3655X	11.42	9.15	400	PVC	CIRC	
3656X	11.3	9.12	400	PVC	CIRC	
3657X	11.82	10.05	300	PVC	CIRC	
3658X	11.69	9.9	375	CO	CIRC	
3659X	11.45	9.75	375	CO	CIRC	
3660X	11.23	9.39	375	CO	CIRC	
3661X	11.17	9.32	400	PVC	CIRC	
3662X	11.21	9.17	400	PVC	CIRC	
3701X	11.1	9.65	150	PVC	CIRC	
3702X	11.07	9.6	150	PVC	CIRC	
3750X	11.11	9.09	400	PVC	CIRC	
3751X	11.05	9.03	400	PVC	CIRC	
3752X	11.07	8.86	600	PVC	CIRC	
3753X	10.44	8.74	600	PVC	CIRC	
430PX			100	OTHER	CIRC	
4501X	17.55	14.1	150	VC	CIRC	
450DX			OTHER	OTHER	CIRC	
4601X	17.46	14.86	150	VC	CIRC	
4650X	17.59	15.74	225	VC	CIRC	
4651X	17.7	15.55	225	VC	CIRC	
4652X	17.5	15.45	225	VC	CIRC	
4653X	17.46	15.36	300	CP	CIRC	
4701X	16.28	14.08	150	VC	CIRC	
4750X	17	15.3	225	VC	CIRC	
4751X	16.48	14.68	225	VC	CIRC	
4752X	16.3	14.55	225	VC	CIRC	
5501X	16.82	13.48	150	VC	CIRC	
5601X	14.94		150	VC	CIRC	
5602X	16.56	14.16	150	VC	CIRC	
5603X	15.87	12.72	150	VC	CIRC	
5604X	15.57	12.87	150	VC	CIRC	
5605X	15.89	12.95	150	VC	CIRC	
5606X	15.24	12.48	150	VC	CIRC	
5650X	15.28	13.63	150	VC	CIRC	
5651X	16.61	14.76	300	CP	CIRC	
5652X	15.6	13.5	225	VC	CIRC	
5653X	15.93	13.08	375	CP	CIRC	
5704X	15.86	12.11	150	VC	CIRC	
5705X	15.56	11.96	150	VC	CIRC	
5706X	16.77	14.37	150	VC	CIRC	
5707X	15.67	12.32	150	VC	CIRC	
5708X	15.43	11.88	150	VC	CIRC	
5709X	15.07	11.7	150	VC	CIRC	
5753X	15.85	13.15	300	CP	CIRC	
5754X	15.5	12.5	450	CP	CIRC	
5755X	16.8	14.8	300	CP	CIRC	
5756X	15.66	12.86	375	CP	CIRC	
5757X	15.41	12.41	450	CP	CIRC	
5758X	15.17	12.17	525	CP	CIRC	
6601X	13.61		150	VC	CIRC	
6650X	14.47	12.72	150	VC	CIRC	
6702X	14.31	10.51	150	VC	CIRC	
6703X	15.15	10.83	150	VC	CIRC	
6750X	14.74	11.45	525	CP	CIRC	
6751X	13.86	11.97	225	VC	CIRC	
6753X	13.05	11.65	300	CP	CIRC	
7501X			UNK	UNK	CIRC	
7502X	10.24		150	VC	CIRC	
7503X			150	VC	CIRC	
7601X	11.13	9.42	150	VC	CIRC	
7602X	9.91	8.84	150	VC	CIRC	
7702X	10.47	8.54	150	VC	CIRC	
8301X	11.71	10.53	150	VC	CIRC	
8302X	11.59	9.29	150	VC	CIRC	
8303X	12.89	10.64	150	VC	CIRC	
8304X	13.98	12.51	150	VC	CIRC	
8305X	15.98	14.66	100	UNK	CIRC	
830DX			100	PVC	CIRC	
8350X	14.4	12.79	150	VC	CIRC	
8351X	12.94	11.11	375	CP	CIRC	
8352X	11.71	9.87	375	CP	CIRC	
8353X	11.72	10.36	225	VC	CIRC	
8401X	11	9.04	150	VC	CIRC	
8402X	10.77	8.69	150	VC	CIRC	
8403X	10.83	8.58	150	VC	CIRC	
8404X	10.83	8.53	150	VC	CIRC	
8406X			UNK	UNK	CIRC	
8407X			UNK	UNK	CIRC	
840PX			100	PVC	CIRC	

Node	Cover	Invert	Size	Material	Shape	
8450X	11.01	9.46	375	CP	CIRC	
8451X	10.77	9.03	450	CP	CIRC	
8501X			UNK	UNK	CIRC	
8502X	11.34	10.57	100	VC	CIRC	
8503X	10.98	10.21	100	VC	CIRC	
8504X	10.57	9.91	100	VC	CIRC	
8505X	10.52	9.76	100	VC	CIRC	
8506X	9.6	8.93	150	VC	CIRC	
8507X	9.63	8.91	150	VC	CIRC	
8508X			150	VC	CIRC	
8509X	10.99	10.1	100	VC	CIRC	
8510X	10.33	9.7	150	VC	CIRC	
8601X	9.41	8.72	150	VC	CIRC	
8602X	9.29	8.69	150	VC	CIRC	
8603X	9.07	8.46	150	VC	CIRC	
8604X	8.86	8.25	150	VC	CIRC	
8605X	8.66	8.12	150	VC	CIRC	
8606X	8.68	7.94	150	VC	CIRC	
8607X	8.64	7.82	150	VC	CIRC	
8608X	8.71	7.59	150	VC	CIRC	
8609X	10.15		150	VC	CIRC	
8610X	9.89		150	VC	CIRC	
8611X	9.51	8.64	150	VC	CIRC	
8612X	9.63	8.41	150	VC	CIRC	
8613X	9.5	8.35	150	VC	CIRC	
8614X	9.36	8.11	150	VC	CIRC	
8615X	9.08	8.1	150	VC	CIRC	
8616X	9.04	7.99	150	VC	CIRC	
8617X	9.06	8.55	150	VC	CIRC	
8701X			150	VC	CIRC	
8702X	9.11	7.83	150	VC	CIRC	
8703X	9.15	7.67	150	VC	CIRC	
8704X	9.05	7.26	150	VC	CIRC	
8705X	8.87	6.93	150	VC	CIRC	
8706X	8.9	7.58	100	VC	CIRC	
8708X			150	VC	CIRC	
8709X	9.46		150	VC	CIRC	
870DX			150	VC	CIRC	
8711X			UNK	VC	CIRC	
871DX			150	VC	CIRC	
9203X			100	UNK	CIRC	
9204X	16.84	15.39	100	UNK	CIRC	
9205X			100	PVC	CIRC	
9206X			100	PVC	CIRC	
9207X			100	PVC	CIRC	
9208X			100	PVC	CIRC	
920DX			100	UNK	CIRC	
921DX			100	UNK	CIRC	
922DX			100	UNK	CIRC	
923DX			100	UNK	CIRC	
924DX			100	UNK	CIRC	
92ADX			100	UNK	CIRC	
92BDX			100	UNK	CIRC	
92CDX			100	UNK	CIRC	
9301X	14.39	12.93	150	VC	CIRC	
9302X	15.33	13.3	150	VC	CIRC	
9303X	14.33	12.38	150	VC	CIRC	
9304X	16.44	14.55	150	VC	CIRC	
9305X	15.62	14.28	150	VC	CIRC	
9306X	15.12	14.11	150	VC	CIRC	
9307Y	16.56	15.22	100	PVC	CIRC	*
9307X	16.56	15.22	100	UNK	CIRC	*
9308X	16.4		100	UNK	CIRC	
9309X	16.45	14.99	100	PVC	CIRC	
930DX			100	UNK	CIRC	
9310X			100	UNK	CIRC	
9311X	15.47	13.87	100	UNK	CIRC	
9312X			150	UNK	CIRC	
931DX			100	UNK	CIRC	
932DX			100	UNK	CIRC	
933DX			100	UNK	CIRC	
934DX			100	UNK	CIRC	
9350X	14.38	11.45	375	CP	CIRC	
9351X	15.52	13.49	300	VC	CIRC	
9352X	16.17	13.68	300	VC	CIRC	
9353X	16.75	14	300	VC	CIRC	
9354X	14.14	11.69	225	VC	CIRC	
9355X	14.32	12.65	150	VC	CIRC	
9356X	15.17	13.31	225	VC	CIRC	
9357X	15.42	13.86	150	VC	CIRC	
93ADX			100	UNK	CIRC	
93BDX			100	UNK	CIRC	
93CDX			100	UNK	CIRC	
93DDX			100	UNK	CIRC	
93EDX			100	UNK	CIRC	
93FDX			100	UNK	CIRC	
93GDX			100	UNK	CIRC	
93HDX			100	UNK	CIRC	
93JDX			100	UNK	CIRC	
93KDX			100	UNK	CIRC	
93MDX			100	UNK	CIRC	
9401X	11.14	10.07	150	VC	CIRC	
9402X	11.1	9.85	150	VC	CIRC	
9403X	11.57	10.26	100	VC	CIRC	
9404X	11.71	10.73	100	VC	CIRC	
9405X	11.59	10.81	100	VC	CIRC	
9406X	11.47	10.75	100	VC	CIRC	
9407X	11.9	10.58	150	VC	CIRC	
9408X	11.27	9.34	150	VC	CIRC	
9409X	12.26	10.01	150	VC	CIRC	
9410X	12.64	10.16	150	VC	CIRC	
9411X	12.26	10.62	150	VC	CIRC	
9412X	13.71	11.58	150	VC	CIRC	
9450X	11.03	9.44	300	VC	CIRC	
9451X	13.16	11.45	300	VC	CIRC	
9452X	13.72	11.81	300	VC	CIRC	
9501X	10.9	9.76	150	VC	CIRC	
9502X	10.58	9.45	150	VC	CIRC	
9503X	10.35	9.22	150	VC	CIRC	
9504X	10.14	9.05	150	VC	CIRC	
9505X	9.86	8.86	150	VC	CIRC	
9506X	10.03	8.65	150	VC	CIRC	
9507X	9.97	8.51	150	VC	CIRC	
9508X	9.5	8.39	150	VC	CIRC	
9509X	9.24	7.94	150	VC	CIRC	
9510X	8.8	8.09	150	VC	CIRC	
9511X	8.77	7.99	150	VC	CIRC	
9512X	9	7.88	150	VC	CIRC	
9513X	8.95	7.82	150	VC	CIRC	
9514X	9.06	7.78	150	VC	CIRC	
9515X	9.37	8.76	150	VC	CIRC	
9516X	9.75	8.69	100	VC	CIRC	
9517X	9.46	8.32	100	VC	CIRC	
9518X	9	8.03	150	VC	CIRC	
9519X	9.2	7.88	150	VC	CIRC	
9520X	8.88	7.65	150	VC	CIRC	
9521X			UNK	VC	CIRC	
9602X	8.54	7.39	150	VC	CIRC	
9603X	8.52	7.34	150	VC	CIRC	
9604X	8.26	7.28	150	VC	CIRC	
9605X	8.26	7.22	150	VC	CIRC	
9606X	8.28	7.2	150	VC	CIRC	
9607X	8.29	7.14	150	VC	CIRC	
9608X	8.23	7.09	150	VC	CIRC	
9609X	8.18	6.92	150	VC	CIRC	
9610X	8.13	7.01	150	VC	CIRC	
9611X	8.36	6.91	150	VC	CIRC	
9612X	7.99	7.23	150	VC	CIRC	
9613X	7.46	6.55	150	VC	CIRC	
9701X	8.49	7.52	150	VC	CIRC	
9702X	8.05	6.88	150	VC	CIRC	
9703X	7.7	6.28	150	VC	CIRC	
9706X			150	VC	CIRC	
9707X			150	VC	CIRC	
9708X			150	VC	CIRC	



O.S. Ref.	TQ8967SE	Drawn by:	kumaria
Scale:	1:2500	Date:	12/08/2019

Title: 347991_Land behind Nutmeg Cres

The information contained on this plan is provided as a guide to the approximate position of existing public sewers. The accuracy thereof cannot be guaranteed.

THIS INFORMATION MUST BE TREATED WITH CAUTION AND THE ACTUAL POSITION OF THE PUBLIC SEWERS MUST
BE ESTABLISHED ON SITE, IN ALL CASES.

Southern Water must be informed before lifting manhole covers or excavating trial holes.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

N

Southern Water

Appendix 6

Manhole S102
CL: 18.200 TBC
IL : 15.320 TBC

225 Dia. @ 1:167

Manhole S101
CL: 18.300 TBC
IL : 15.593 TBC

150 Dia. @ 1:135

Manhole S100
CL: 18.500 TBC
IL : 15.850 TBC

Flow Control Manhole
Vortex Flow Control
Discharge Rate: 2 l/s

Proposed connection into surface water sewer which serves proposed Care Home development (Planning Application: 19/501160/REM).

150 Dia @ 1:150
Controlled discharge rate
1.4 l/s

Manhole SW12
CL: 18.150 TBC
IL : 16.100 TBC

Adjacent Care Home Development (19/501160/REM) utilises offsite sewer network. Coordination of site infrastructure recommended during detailed design.

Oversized Pipes
900mm Diameter

21no. car parking space

Indicative Attenuation Tank
Geocellular Wavin Q-Bic Plus
(or similar approved)
Dimensions: 4.8m (W) x 18.0 (L) x 1.23 (H)
Storage Volume: ~100 m³
Requirements to be assessed at detailed design

Lined Pervious Pavement as a means of collection of rainfall/runoff and Source Control

Proposed nursing facility.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14.

0m 10m 20m
Scale 1:200

PFA consulting

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Swindon, SN3 4HG

Telephone
01793 828000

Website
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For Planning
This drawing is produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

KEY

- Site Boundary (Indicative Only)
- Proposed Surface Water Sewer
- Potential location for Attenuation Tank
- Proposed Lined Pervious Pavement
- Offsite Surface Water Sewer

NOTES

1. Drawing is based on 'Proposed Site Plan' produced by CDP Architecture Ltd (Drawing No. 766 P02).
2. Drawing is based on Topographical Survey produced by J. C. White (Drawing No. 19/00/060/1).
3. Drainage is indicative only and is subject to detailed design and technical approval. Southern Water's asset data to be verified.

Rev	Date	Description	Drawn	Check
#	17/09/19	First Issue.	BF	GE

Status
FOR PLANNING

Client
Middlefields Ltd

Project
Land at Sheppey Way, Iwade

Drawing Title
Preliminary Surface Water Drainage Strategy

Drawing No.
P912/02

Date: September 2019 | Scale: 1:200 @ A1

E-Mail: bfox@pfaplc.com

Appendix 7

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

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	Auto Design
S1.000	26.030	0.174	149.6	0.061	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	4.819	0.028	172.1	0.038	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	20.123	0.118	170.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	22.284	0.045	495.2	0.053	5.00	0.0	0.600	o	900	Pipe/Conduit	
S1.003	16.024	0.032	500.8	0.012	0.00	0.0	0.600	o	900	Pipe/Conduit	
S1.004	26.730	0.178	150.2	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	5.465	0.036	151.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	13.430	0.090	150.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	12.264	0.082	149.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.007	24.722	0.182	135.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.008	20.736	0.123	168.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.009	20.820	0.104	200.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	87.02	5.53	17.651	0.061	0.0	0.0	0.0	0.82	14.5	14.3
S1.001	86.47	5.61	17.402	0.098	0.0	0.0	0.0	0.99	39.5	23.0
S1.002	84.25	5.95	17.374	0.098	0.0	0.0	0.0	1.00	39.7	23.0
S2.000	88.90	5.27	16.301	0.053	0.0	0.0	0.0	1.40	891.4	12.8
S1.003	83.04	6.14	16.256	0.164	0.0	0.0	0.0	1.39	886.4	36.8
S1.004	79.81	6.68	16.224	0.181	0.0	0.0	0.0	0.82	14.5«	39.2
S1.005	79.19	6.79	16.046	0.181	0.0	0.0	0.0	0.81	14.4«	39.2
S3.000	88.83	5.27	16.100	0.000	0.0	0.0	0.0	0.82	14.5	0.0
S1.006	77.83	7.04	16.010	0.181	0.0	0.0	0.0	0.82	14.5«	39.2
S1.007	75.37	7.52	15.850	0.181	0.0	0.0	0.0	0.86	15.2«	39.2
S1.008	73.71	7.87	15.593	0.181	0.0	0.0	0.0	1.00	39.9	39.2
S1.009	72.46	8.14	15.320	0.181	0.0	0.0	0.0	1.28	141.0	39.2

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	150	S1	18.664	17.651	0.863	Open Manhole	1200
S1.001	o	225	S2	18.667	17.402	1.040	Open Manhole	1200
S1.002	o	225	S3	18.696	17.374	1.097	Open Manhole	1200
S2.000	o	900	S4-Tank	18.701	16.301	1.500	Open Manhole	1800
S1.003	o	900	S5	18.642	16.256	1.486	Open Manhole	1800
S1.004	o	150	S6-CON	18.545	16.224	2.171	Open Manhole	1800
S1.005	o	150	S7	18.579	16.046	2.383	Open Manhole	1200
S3.000	o	150	SSW12	18.515	16.100	2.265	Open Manhole	1200
S1.006	o	150	S8	18.554	16.010	2.394	Open Manhole	1200
S1.007	o	150	S100	18.500	15.850	2.500	Open Manhole	1200
S1.008	o	225	S101	18.300	15.593	2.482	Open Manhole	1200
S1.009	o	375	S102	18.200	15.320	2.505	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	26.030	149.6	S2	18.667	17.477	1.040	Open Manhole	1200
S1.001	4.819	172.1	S3	18.696	17.374	1.097	Open Manhole	1200
S1.002	20.123	170.5	S5	18.642	17.256	1.161	Open Manhole	1800
S2.000	22.284	495.2	S5	18.642	16.256	1.486	Open Manhole	1800
S1.003	16.024	500.8	S6-CON	18.545	16.224	1.421	Open Manhole	1800
S1.004	26.730	150.2	S7	18.579	16.046	2.383	Open Manhole	1200
S1.005	5.465	151.8	S8	18.554	16.010	2.394	Open Manhole	1200
S3.000	13.430	150.0	S8	18.554	16.010	2.393	Open Manhole	1200
S1.006	12.264	149.6	S100	18.500	15.928	2.422	Open Manhole	1200
S1.007	24.722	135.8	S101	18.300	15.668	2.482	Open Manhole	1200
S1.008	20.736	168.6	S102	18.200	15.470	2.505	Open Manhole	1350
S1.009	20.820	200.2	SS104-TBC	18.100	15.216	2.509	Open Manhole	900

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.013	0.013	0.013
	User	-	100	0.013	0.013	0.026
	User	-	100	0.010	0.010	0.036
	User	-	100	0.005	0.005	0.040
	User	-	100	0.005	0.005	0.046
	User	-	100	0.015	0.015	0.061
1.001	User	-	100	0.033	0.033	0.033
	User	-	100	0.005	0.005	0.038
1.002	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.015	0.015	0.015
	User	-	100	0.038	0.038	0.053
1.003	User	-	100	0.012	0.012	0.012
1.004	User	-	100	0.018	0.018	0.018
1.005	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.181	0.181	0.181

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)
S1.009	SS104-TBC	18.100	15.216	14.691	900	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S6-CON, DS/PN: S1.004, Volume (m³): 15.0

Unit Reference	MD-SHE-0055-2000-2276-2000
Design Head (m)	2.276
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	55
Invert Level (m)	16.224
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.276	2.0	Kick-Flo®	0.493	1.0
Flush-Flo™	0.242	1.2	Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.1	0.800	1.2	2.000	1.9	4.000	2.6	7.000	3.4
0.200	1.2	1.000	1.4	2.200	2.0	4.500	2.7	7.500	3.5
0.300	1.2	1.200	1.5	2.400	2.0	5.000	2.9	8.000	3.6
0.400	1.2	1.400	1.6	2.600	2.1	5.500	3.0	8.500	3.7
0.500	1.0	1.600	1.7	3.000	2.3	6.000	3.1	9.000	3.8
0.600	1.1	1.800	1.8	3.500	2.4	6.500	3.2	9.500	3.9

Storage Structures for Storm

Cellular Storage Manhole: S4-Tank, DS/PN: S2.000

Invert Level (m) 16.571 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	86.4	0.0	1.230	86.4	0.0	1.231	0.0	0.0

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) 19.600	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.400	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	299.0
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
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow Vol (m³)	Maximum Vol (m³)
S1.000	S1	15 minute 1 year Winter I+0%	18.664	17.735	-0.066	0.000	0.59		0.090
S1.001	S2	15 minute 1 year Winter I+0%	18.667	17.506	-0.121	0.000	0.44		0.115
S1.002	S3	15 minute 1 year Winter I+0%	18.696	17.465	-0.134	0.000	0.34		0.135
S2.000	S4-Tank	120 minute 1 year Winter I+0%	18.701	16.648	-0.553	0.000	0.00		7.152
S1.003	S5	120 minute 1 year Winter I+0%	18.642	16.648	-0.508	0.000	0.01		4.757
S1.004	S6-CON	120 minute 1 year Winter I+0%	18.545	16.648	0.274	0.000	0.09		4.071
S1.005	S7	1440 minute 1 year Summer I+0%	18.579	16.078	-0.118	0.000	0.10		0.052
S3.000	SSW12	60 minute 1 year Winter I+0%	18.515	16.100	-0.150	0.000	0.00		0.000
S1.006	S8	1440 minute 1 year Summer I+0%	18.554	16.041	-0.119	0.000	0.09		0.059
S1.007	S100	1440 minute 1 year Summer I+0%	18.500	15.879	-0.121	0.000	0.08		0.028
S1.008	S101	1440 minute 1 year Summer I+0%	18.300	15.620	-0.198	0.000	0.03		0.025
S1.009	S102	1440 minute 1 year Summer I+0%	18.200	15.338	-0.357	0.000	0.01		0.019

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.000	S1	0.8	8.1	OK
S1.001	S2	0.7	12.5	OK
S1.002	S3	0.8	12.4	OK
S2.000	S4-Tank	0.0	1.7	OK
S1.003	S5	0.1	3.1	OK
S1.004	S6-CON	0.5	1.2	SURCHARGED
S1.005	S7	0.4	1.2	OK
S3.000	SSW12	0.0	0.0	OK
S1.006	S8	0.5	1.2	OK
S1.007	S100	0.5	1.2	OK
S1.008	S101	0.5	1.2	OK
S1.009	S102	0.4	1.2	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	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 589960 167104	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	299.0
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)	30
Climate Change (%)	0

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow Vol (m³)	Maximum Vol (m³)
S1.000	S1	15 minute 30 year Winter I+0%	18.664	17.999	0.198	0.000	1.37		0.388
S1.001	S2	15 minute 30 year Summer I+0%	18.667	17.662	0.035	0.000	1.00		0.546
S1.002	S3	15 minute 30 year Winter I+0%	18.696	17.534	-0.065	0.000	0.83		0.263
S2.000	S4-Tank	360 minute 30 year Winter I+0%	18.701	16.990	-0.211	0.000	0.00		36.095
S1.003	S5	360 minute 30 year Winter I+0%	18.642	16.990	-0.166	0.000	0.00		11.694
S1.004	S6-CON	360 minute 30 year Winter I+0%	18.545	16.990	0.616	0.000	0.09		9.125
S1.005	S7	360 minute 30 year Winter I+0%	18.579	16.078	-0.118	0.000	0.10		0.052
S3.000	SSW12	60 minute 30 year Winter I+0%	18.515	16.100	-0.150	0.000	0.00		0.000
S1.006	S8	360 minute 30 year Winter I+0%	18.554	16.041	-0.119	0.000	0.09		0.059
S1.007	S100	360 minute 30 year Winter I+0%	18.500	15.879	-0.121	0.000	0.08		0.028
S1.008	S101	360 minute 30 year Winter I+0%	18.300	15.620	-0.198	0.000	0.03		0.025
S1.009	S102	360 minute 30 year Winter I+0%	18.200	15.338	-0.357	0.000	0.01		0.019

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.000	S1	1.1	18.9	SURCHARGED
S1.001	S2	0.8	28.5	SURCHARGED
S1.002	S3	1.0	29.8	OK
S2.000	S4-Tank	0.0	1.0	OK
S1.003	S5	0.1	2.0	OK
S1.004	S6-CON	0.5	1.2	SURCHARGED
S1.005	S7	0.4	1.2	OK
S3.000	SSW12	0.0	0.0	OK
S1.006	S8	0.5	1.2	OK
S1.007	S100	0.5	1.2	OK
S1.008	S101	0.5	1.2	OK
S1.009	S102	0.4	1.2	OK

+0%% Sensitivity 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	FEH	Data Type	Point
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 589960 167104		

Margin for Flood Risk Warning (mm)	299.0
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
Sensitivity flows(s) (%)	0, +20, +40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow Vol (m³)	Maximum Vol (m³)
S1.000	S1	15 minute 100 year Winter Q+0%	18.664	18.226	0.425	0.000	1.74		0.645
S1.001	S2	15 minute 100 year Winter Q+0%	18.667	17.681	0.054	0.000	1.34		0.610
S1.002	S3	15 minute 100 year Winter Q+0%	18.696	17.605	0.006	0.000	1.06		0.383
S2.000	S4-Tank	480 minute 100 year Winter Q+0%	18.701	17.289	0.088	0.000	0.04		61.397
S1.003	S5	480 minute 100 year Winter Q+0%	18.642	17.302	0.146	0.000	0.02		15.701
S1.004	S6-CON	480 minute 100 year Winter Q+0%	18.545	17.310	0.936	0.000	0.10		11.758
S1.005	S7	480 minute 100 year Winter Q+0%	18.579	16.080	-0.116	0.000	0.12		0.056
S3.000	SSW12	60 minute 100 year Winter Q+0%	18.515	16.100	-0.150	0.000	0.00		0.000
S1.006	S8	480 minute 100 year Winter Q+0%	18.554	16.042	-0.118	0.000	0.11		0.063
S1.007	S100	480 minute 100 year Winter Q+0%	18.500	15.881	-0.119	0.000	0.10		0.030
S1.008	S101	480 minute 100 year Winter Q+0%	18.300	15.621	-0.197	0.000	0.04		0.027
S1.009	S102	480 minute 100 year Winter Q+0%	18.200	15.341	-0.354	0.000	0.01		0.023

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.000	S1	1.4	24.1	SURCHARGED
S1.001	S2	1.0	38.3	SURCHARGED
S1.002	S3	1.0	38.1	SURCHARGED
S2.000	S4-Tank	0.1	21.6	SURCHARGED
S1.003	S5	0.1	8.6	SURCHARGED
S1.004	S6-CON	0.5	1.4	SURCHARGED
S1.005	S7	0.5	1.4	OK
S3.000	SSW12	0.0	0.0	OK
S1.006	S8	0.5	1.4	OK
S1.007	S100	0.5	1.4	OK

+0%% Sensitivity 100 year Return Period
Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.008	S101	0.5	1.4	OK
S1.009	S102	0.5	1.4	OK

+20%% Sensitivity 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	FEH	Data Type	Point
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 589960 167104		

Margin for Flood Risk Warning (mm)	299.0
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
Sensitivity flows(s) (%)	0, +20, +40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow Vol (m³)	Maximum Vol (m³)
S1.000	S1	15 minute 100 year Winter Q+20%	18.664	18.485	0.684	0.000	2.02		0.938
S1.001	S2	15 minute 100 year Winter Q+20%	18.667	17.757	0.130	0.000	1.56		0.796
S1.002	S3	15 minute 100 year Winter Q+20%	18.696	17.653	0.054	0.000	1.23		0.448
S2.000	S4-Tank	480 minute 100 year Winter Q+20%	18.701	17.549	0.348	0.000	0.05		83.408
S1.003	S5	480 minute 100 year Winter Q+20%	18.642	17.572	0.416	0.000	0.03		16.991
S1.004	S6-CON	480 minute 100 year Winter Q+20%	18.545	17.582	1.208	0.000	0.11		12.491
S1.005	S7	480 minute 100 year Winter Q+20%	18.579	16.082	-0.114	0.000	0.13		0.059
S3.000	SSW12	60 minute 100 year Winter Q+20%	18.515	16.100	-0.150	0.000	0.00		0.000
S1.006	S8	480 minute 100 year Winter Q+20%	18.554	16.044	-0.116	0.000	0.12		0.066
S1.007	S100	480 minute 100 year Winter Q+20%	18.500	15.882	-0.118	0.000	0.10		0.031
S1.008	S101	480 minute 100 year Winter Q+20%	18.300	15.622	-0.196	0.000	0.04		0.028
S1.009	S102	480 minute 100 year Winter Q+20%	18.200	15.343	-0.352	0.000	0.01		0.025

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.000	S1	1.6	27.9	FLOOD RISK
S1.001	S2	1.1	44.6	SURCHARGED
S1.002	S3	1.1	44.4	SURCHARGED
S2.000	S4-Tank	0.1	27.6	SURCHARGED
S1.003	S5	0.1	11.7	SURCHARGED
S1.004	S6-CON	0.5	1.5	SURCHARGED
S1.005	S7	0.5	1.5	OK
S3.000	SSW12	0.0	0.0	OK
S1.006	S8	0.5	1.5	OK
S1.007	S100	0.5	1.5	OK

+20%% Sensitivity 100 year Return Period
Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.008	S101	0.5	1.5	OK
S1.009	S102	0.5	1.5	OK

+40%% Sensitivity 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	FEH	Data Type	Point
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 589960 167104		

Margin for Flood Risk Warning (mm)	299.0
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
Sensitivity flows(s) (%)	0, +20, +40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow Vol (m³)	Maximum Vol (m³)
S1.000	S1	15 minute 100 year Winter Q+40%	18.664	18.664	0.863	0.340	2.25		1.472
S1.001	S2	15 minute 100 year Winter Q+40%	18.667	17.838	0.211	0.000	1.78		0.926
S1.002	S3	960 minute 100 year Winter Q+40%	18.696	17.784	0.185	0.000	0.32		0.602
S2.000	S4-Tank	960 minute 100 year Winter Q+40%	18.701	17.835	0.634	0.000	0.06		104.878
S1.003	S5	960 minute 100 year Winter Q+40%	18.642	17.844	0.688	0.000	0.04		17.799
S1.004	S6-CON	960 minute 100 year Winter Q+40%	18.545	17.857	1.483	0.000	0.12		13.192
S1.005	S7	960 minute 100 year Winter Q+40%	18.579	16.083	-0.113	0.000	0.14		0.061
S3.000	SSW12	60 minute 100 year Winter Q+40%	18.515	16.100	-0.150	0.000	0.00		0.000
S1.006	S8	960 minute 100 year Winter Q+40%	18.554	16.045	-0.115	0.000	0.12		0.069
S1.007	S100	960 minute 100 year Winter Q+40%	18.500	15.883	-0.117	0.000	0.11		0.033
S1.008	S101	960 minute 100 year Winter Q+40%	18.300	15.624	-0.194	0.000	0.05		0.030
S1.009	S102	960 minute 100 year Winter Q+40%	18.200	15.344	-0.351	0.000	0.01		0.028

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.000	S1	1.8	31.1	FLOOD
S1.001	S2	1.3	50.8	SURCHARGED
S1.002	S3	0.7	11.3	SURCHARGED
S2.000	S4-Tank	0.1	32.1	SURCHARGED
S1.003	S5	0.1	18.8	SURCHARGED
S1.004	S6-CON	0.5	1.6	SURCHARGED
S1.005	S7	0.5	1.6	OK
S3.000	SSW12	0.0	0.0	OK
S1.006	S8	0.5	1.6	OK
S1.007	S100	0.6	1.6	OK

+40%% Sensitivity 100 year Return Period
Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.008	S101	0.5	1.6	OK
S1.009	S102	0.6	1.6	OK