Drainage Statement

for

Land Off Canal Mews, Barnham, West Sussex

ARCH ASSOCIATES

CONSULTING CIVIL AND STRUCTURAL ENGINEERS

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DRAINAGE STATEMENT

for

Land Off Canal Mews,
Barnham, West Sussex

Client:
Seaward Properties

ISSUE		A	B
Issued By	C. Hendry	C Hendry	C Hendry
Date	April 2021	May 2021	28th May 2021
Purpose	Planning	Planning	Planning
Approved By	CH	CH	CH

Project No. SPR032

The Town House, St.George's Square, Bishops Waltham, Southampton, Hampshire, SO32 1AF
[redacted]
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1.0 Introduction

Arch Associates has been appointed by Seaward Properties Ltd to undertake the detailed foul and surface water drainage design at the proposed development in Canal Mews, Barnham.

This Drainage Statement and accompanying detailed drainage design have been prepared for submission to the local LPA/LLFA for discharge of the relevant planning conditions. LPA ref: BN/66/19/PL.

2.0 The Site

The circa 0.11 hectare site is greenfield land currently covered in vegetation. The south-east and south-west boundaries are bounded by Nightingale Lane and Canal Mews, which currently provide level access to the site. The north-west boundary is formed of an 1800m high close boarded fence with a footpath beyond and the north-eastern boundary is marked with a mature hedge. To the south is a mixture of single and two storey housing, to the east a large public 'green' space and to the north and west, bungalows. A mature tree is located in the southern corner of the site and there are saplings along to the boundary with Nightingale Lane.

The site is located within a suburban residential neighbourhood. Barnham Railway is located approximately 104m to the south of the site and a circa 1 hectare of glasshouses tomatoes farm is located approximately 148m to the east.

A review of the UK Government's Flood-Warning Information Services mapping online indicates that the site is located within Flood Zone 1, very low risk of flooding. Refer to the screenshot above.

Existing Site Topography and Drainage

The site has a gradient fall from south-east to north-west at a gradient of 1:33. The topography survey shows the highest spot level within the site is at circa 49.87mAOD in the south-eastern boundary, and the lowest spot is at circa 48.74mAOD at the site entry in the north-west corner of the site. Refer to the topographical survey in **Appendix 1**.

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Review of the Southern Water asset plan confirms that there is an existing 150mm diameter foul water sewer in Halliford Drive running in north to south-westerly direction, with the nearest manhole being manhole ref. 2501 located at the T-junction with Barn Rise to the west of the site. There are no existing public surface water sewers presented within the vicinity of the site on the Southern Water asset location plans. Refer to the Southern Water asset plan in **Appendix 2**.

A CCTV drainage survey has been undertaken by Happy Drains Ltd on 2nd Jan 2018. The survey shows that an existing 150mm diameter private foul sewer runs across the site from north-east to the south-west, which is then connected to a 150mm diameter foul sewer in Canal Mews. A diversion is proposed on-site in order to accommodate the development proposals. Refer to the CCTV Survey in **Appendix 3**.

In addition, a general layout plan prepared for the neighbouring development site indicates that there is an existing ditch located to the north west of the site, which runs in north-west to south-west direction. This ditch is then run into a culvert that runs down the wester flank of the site. Refer to the Croudace Homes' General Layout plan in **Appendix 4** and the topographical survey in **Appendix 1**.

Geology, Infiltration Capacity and Groundwater

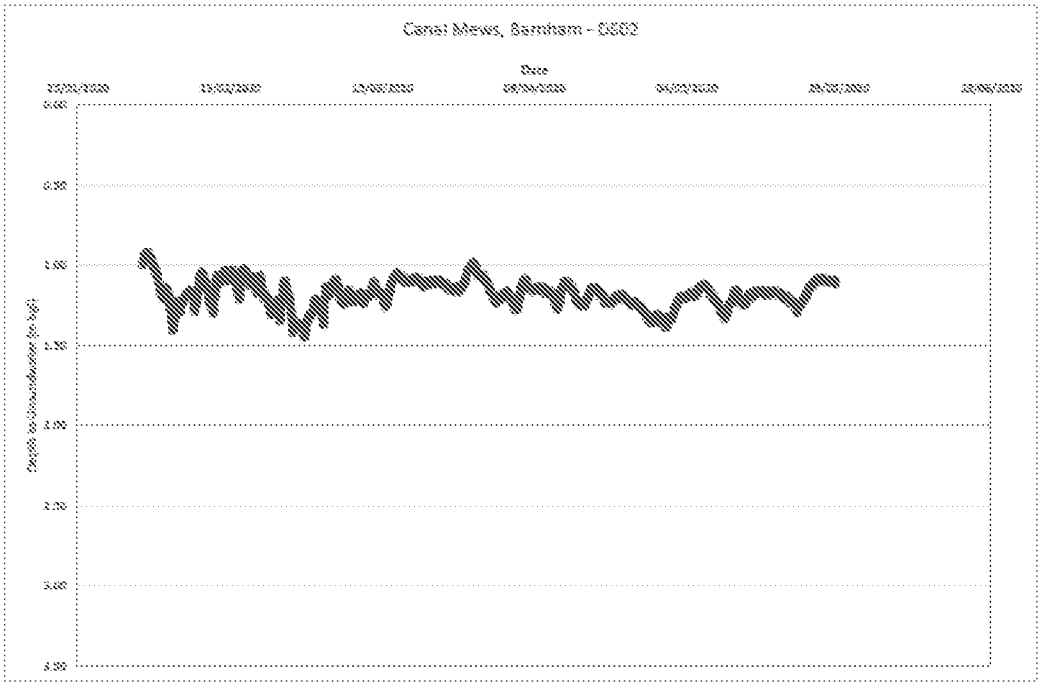
A site investigation has been undertaken by Ground and Water, ref: GWPR4066/GIR/February 2021 V1.01. Refer to **Appendix 5** for relevant extracts. The investigation confirms that the site is underlain by fine grained sands and clays of the River Terrace Deposits.

Infiltration testing was completed in late January 2021 and the results are tabulated below.

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Soakage Testing Results							
Strata	Trial Hole	Test Number	Depth (m bgl)	Start Depth (m bgl)	Finish Depth (m bgl)	Time Taken (mins)	Infiltration Rate (m/sec)
Granular Undif. River Terrace Deposits	TP1a	1*	1.25	0.75	1.10	1260	1.827 x 10^-6
		2**	1.15	0.49	1.15	6150	7.729 x 10^-7
		3**	1.10	0.54	1.10	8640	4.013 x 10^-7
Cohesive Undif. River Terrace Deposits	TP2b	1*	1.25	0.72	0.99	1260	1.326 x 10^-6
		2**	1.15	0.51	1.15	6165	6.602 x 10^-7
		3**	1.10	0.45	1.10	8640	4.685 x 10^-7
	TP3b	1*	1.20	0.66	0.71	90	2.749 x 10^-6
		2**	1.12	0.62	1.12	6141	9.867 x 10^-7
		3*	1.10	0.67	0.94	8640	2.213 x 10^-7
*These tests were deemed incomplete (i.e. less than 75% of the volume of water drained into the soils) **These tests were noted to fill overnight/a number of days since the last monitoring round, and therefore these rates may be conservative.							

Groundwater monitoring has been provided by Tweadie Evans Consulting, the results of which are shown in the graph below, as well as in **Appendix 6**.



In addition to the TEC monitoring, the Ground & Water investigation reports striking groundwater at 1.30m bgl and 1.70m bgl in late January.

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3.0 Proposed Foul and Surface Water Drainage

3.1 Foul Water

It is proposed to discharge the foul water run-off from the site into the existing 150mm diameter foul sewer located to the south-west of the site, via a new foul network gravity system. The proposed foul water drainage strategy has been designed in accordance with the Sewers for Adoption 7th Edition and Part H of the Building Regulations. Refer to **Appendix 7** – Drainage Strategy Drawing for details.

The length of the existing sewer that runs across the site will need to be diverted in order to accommodate the proposed development site layout. Any new connections and alterations in drainage flows to the existing sewers will have to be agreed with Southern Water and Third Parties under the Water Industry Act (WIA) Section 106 Agreement.

The hydraulic design for the discharge rate for the foul wastewater design has been calculated in accordance with Sewers for Adoption 7th Edition which states design flow rates for dwellings should be 4000l/day. Therefore, the discharge rate for the proposed residential development of 2 dwellings equates to a peak foul discharge rate of approximately 0.10 litres/second. Refer to **Appendix 8** for the drainage calculations.

3.2 Surface Water

Given the high groundwater and poor infiltration capacity of the soils, traditional buried soakaways are not deemed suitable for this development. This is also noted with the site investigation report by Ground & Water.

The run-off from the roof areas is to be diverted via gravity into a shallow crate storage unit within the rear soft landscaping where it will be allowed to infiltrate where possible using a permeable geotextile wrapping. However, infiltration will not be accounted for in the calculations and therefore the tank will be designed for attenuation storage only. Refer to Appendix 9 for Calculations.

Permeable paving with a porous subbase and permeable geotextile is proposed for the driveways of both plots so that high level infiltration can be

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used to drain the hardstanding. However, as the target half drain down time will not be achieved, an overflow will be provided in the wider surface water drainage system. The attenuation tank will therefore be designed to cater for the car park areas and the storage within the subbase will not be accounted for in the tank calculations for conservatism.

Impermeable Roof Areas:

Plot 1 – 99m^2

Plot 2 – 110m^2

Parking Areas:

Plot 1 – 40m^2

Plot 2 – 48m^2

Total Area Draining into Attenuation Tank = 297m^2

Overland/surface exceedance flows due to extreme events or blockage of drainage systems would naturally flow towards the north-west of the site, and into the existing ditch where it will then flow into the culvert. The buildings would remain safe due to the FFL being set at a minimum of 150mm above the proposed ground levels generally.

Maintenance of SUDS features:

The maintenance regime of the surface water drainage system and its components is outlined on the drainage strategy drawing. This maintenance will be the responsibility of the future dwelling owners. The table below taken from The SUDS Manual 2015 (CIRIA C753) outline the required maintenance of the cellular attenuation crate system and permeable paving.

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TABLE 23.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
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
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	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

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing 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 – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate 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

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APPENDIX 1

Topographical Survey

E960.000

E1000.000

E1040.000

N560.000

N520.000

N

RIDGE 13.11

EAVE 10.27

EAVE 10.26

RIDGE 13.16

EAVE 10.38

EAVE 10.41

Culvert IL 7.335

CB 1.60m

CB 1.60m

Paved 1.60m

Paved 1.60m

Paved 1.60m

8.15

8.09

8.03

8.50

8.72

8.89

8.40

8.82

8.82

MH CL. 8.75

RIDGE 13.59

EAVE 11.68

RIDGE 14.81

MH CL. 7.95 IL. 7.13

MH CL. 7.55 IL. 6.83

150ø

8.10

8.37

8.82

9.02

8.91

8.35

8.87

8.16

Conc. Blocks

Channel

SV

8.08

8.10

8.09

8.10

8.08

8.08

Grass

Grass

Grass

Grass

Grass

8.75

8.95

9.12

9.07

9.04

9.03

8.59

8.77

9.08

MH CL. 8.26 IL. 6.65

Brick Paving 37.0m

8.37

8.30

8.29

8.29

8.29

8.31

8.52

8.52

8.88

9.03

9.06

9.15

RIDGE 14.38

EAVE 11.32

MH CL. 7.68 IL. 6.68

Brick Paving

8.57

8.56

8.82

8.81

8.79

C A N A L M E W S

Grass

Oak CL.50 H.12.0 S.8.0

SV

FH

8.98

9.07

9.04

9.07

9.05

STN 2

Brick Paving

Grass

Brick Paving

9.11

9.14

9.16

9.17

9.18

9.21

9.06

9.15

9.21

8.14

8.14

8.13

8.12

RNB

9.06

9.08

9.05

Brick Paving

RIDGE 16.35

EAVE 14.22

STN 1

8.13

9.20

9.08

9.15

9.22

RIDGE 17.31

EAVE 14.35

8.15

LEGEND

Survey Station	▲	Embankment	
Fence			
Hedge		Power Line	
FWS		Telecom Line	T
SWS		Elec. Main	E
Water	W	Gas Main	G

AV	Air Valve	MP	Metal Post
BS	Bus Stop	MH	Manhole
BT	British Telecom	MB	Metal Bollard
BW	Brick Wall	P	Post
CB	Conc Bollard	PJ	Petrol J/Ceptor
CL	Cover Level	RG	Road Gully
EB	Electric Box	RNB	Road Name Board
EC	Electric Cover	RS	Road Sign
EP	Electricity Pole	RW	Retaining Wall
FH	Fire Hydrant	SA	Soakaway
FL	Floorlevel	SC	Stopcock
G	Gully	SV	Sluice Valve
GM	Gas Meter	TP	Telegraph Pole
GV	Gas Valve	TCB	Telephone Box
H	Height	TJB	Telejunc.Box
IL	Invert Level	TL	Traffic Light
IC	Inspection Chamber	V	Valve
KO	Kerb Offset	VP	Vent Pipe
LB	Letter Box	WL	Water Level
LH	Lamp Hole	WM	Water Meter
LP	Lamp Post	WO	Water Outlet
MKR	Marker	WV	Water Valve

FENCE TYPES

BW	Barbed Wire	CW	Chicken Wire
CB	Close Board	IW	Interwoven
CI	Corrugated Iron	IR	Iron Railing
CL	Chain Link	OB	Openboard
CPL	Conc Panel	PR	Post and rail
CP	Chestnut Paling	PW	Post and Wire

DATUM

ARBITRARY DATUM

Notes

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

All Tree Heights Are Estimated

Stuart Bailey
Land Survey
18 Kings Road
New Haw
Surrey
KT15 3BG
[redacted]

Rev. Suffix	Date	Initial	Revision Details
A	04/19		Drainage Added

Cad Operator | Approved By | Date

Levelling — **Datum**

LEVELS - ORDNANCE SURVEY (OSGM02)

Client

SEAWARD PROPERTIES

Location

CANAL MEWS
BARNHAM

Drawing Title

Site Survey

Job No. 1716

Drawing Number 1716/01A

Scale 1:200m

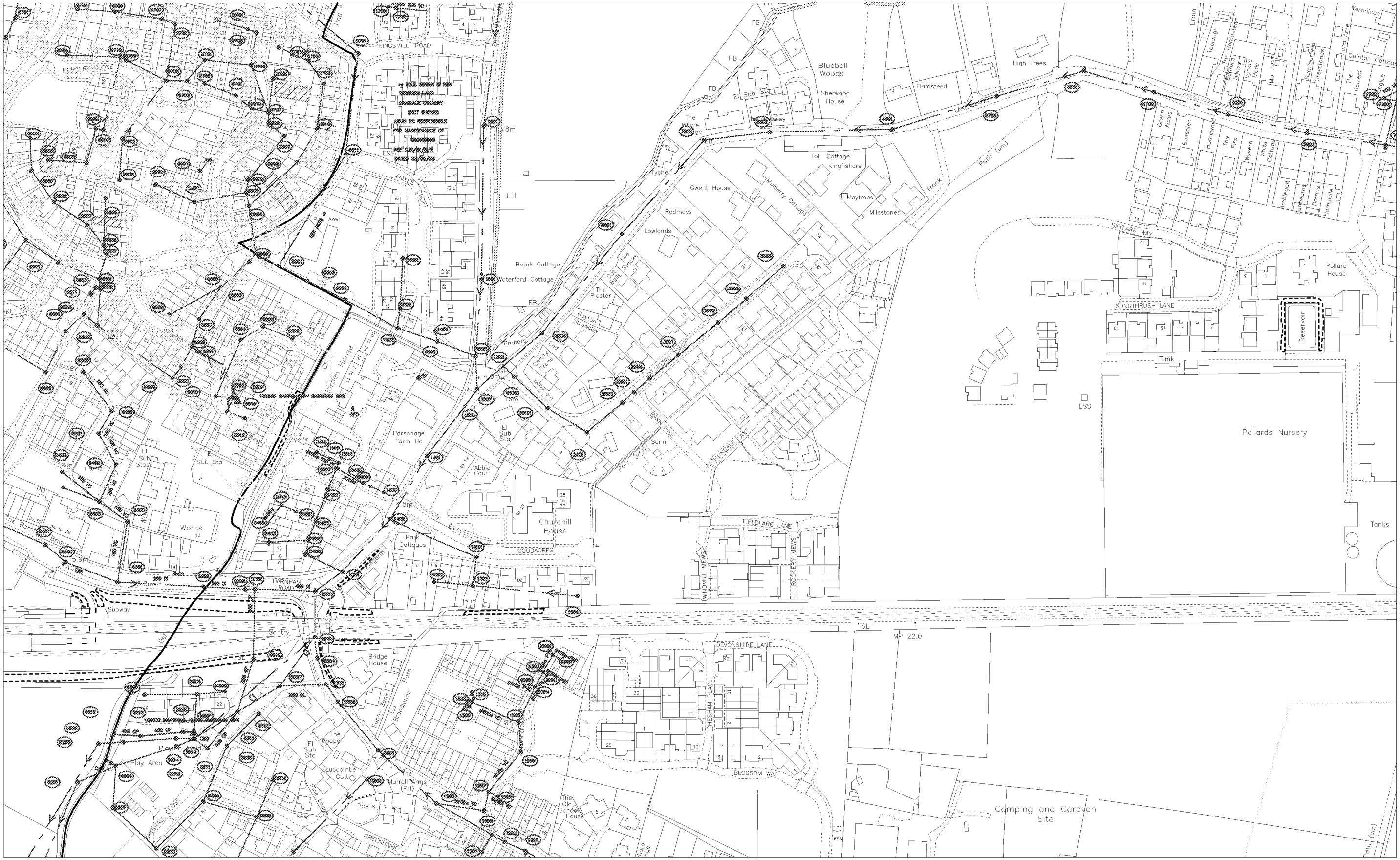
Date January 2017

APPENDIX 2

Southern Water Sewer Plan

SEWER RECORDS PAGE 1 OF 2

104781



104203

495845

496789

O.S. REF. SU9604SW	Drawn by: gujskew	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site.
	Scale: 1:2500	*WARNING: SAC pipes are construction of Bonded Asbestos Cement* *WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement*
Title: 317229_Land off Canal Mews	Date: 15/11/2018	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

N

Southern Water

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SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	
0201X	6.9	5.29	225	VC	CIRC	
0202X	7.05	5.83	175	VC	CIRC	
0203X	6.86	5.44	175	VC	CIRC	
0204X			UNK	UNK	CIRC	
0205X			OTHER	BRC	CIRC	
0301X	3.91	2.18	300	VC	CIRC	
0302Y	3.47	2.15	450	DI	CIRC	
0305X	5.06		250	DI	CIRC	
0306X	5.69	4.29	225	VC	CIRC	
0307X	5.2	1.92	375	CP	CIRC	
0308X	3.25	2.57	450	DI	CIRC	
0309X	3.25	2.06	600	CP	CIRC	
0310X	4.2	1.891	525	CP	CIRC	
0311Y	4.61	1.841	525	CP	CIRC	*
0311X	4.61	1.841	375	CP	CIRC	*
0312X			OTHER	BRC	CIRC	
0402X	3.85	2.63	150	PF	CIRC	
0403X	3.58	2.64	150	PF	CIRC	
0404X	3.79	2.57	150	PF	CIRC	
0405X	3.8	2.52	150	VC	CIRC	
0406X	3.77	2.71	150	PF	CIRC	
0407X	3.69	2.99	150	PF	CIRC	
0409X			UNK	UNK	CIRC	
040DX			UNK	UNK	CIRC	
0410X			100	PF	CIRC	
0411X			100	PF	CIRC	
0412X			100	PF	CIRC	
0413X			UNK	UNK	CIRC	
042DX			UNK	UNK	CIRC	
0453X	3.74	2.44	375	CP	CIRC	
0454X	3.65	2.37	375	CP	CIRC	
0502X	4.07	1.7	150	VC	CIRC	
0504X	4.51	2.35	150	VC	CIRC	
0505X	4.36	2.52	150	VC	CIRC	
0506X	4.22	2.78	150	VC	CIRC	
0507X	3.99	2.89	225	VC	CIRC	
0508X	4.06	2.96	225	VC	CIRC	
050PX	4.18	4.17	100	PVC	CIRC	
0512X	3.98	2.26	150	VC	CIRC	
0552X	4.51	2.87	300	VC	CIRC	
0553X	4.37	2.97	225	VC	CIRC	
0554X	4.15	3.11	150	VC	CIRC	
0601X	4.16	2.96	225	VC	CIRC	
0602X	4.5	3.18	225	VC	CIRC	
0603X	4.75	3.88	150	VC	CIRC	
0604X	5.13		225	VC	CIRC	
0605X	5.16		225	VC	CIRC	
0606X	5.11	3.46	225	VC	CIRC	
0607X	5.05	3.6	225	VC	CIRC	
0608X	5.04	3.64	225	VC	CIRC	
0609X	4.85		150	VC	CIRC	
0610X	4.89		150	VC	CIRC	
0611X	4.82	3.24	225	VC	CIRC	
0653X	4.79		525	CP	CIRC	
0654X	4.5	3.61	150	VC	CIRC	
0655X	4.74	3.95	150	VC	CIRC	
0656X	5.2	4.65	150	VC	CIRC	
0657X	5	4.28	150	VC	CIRC	
0658X	5		150	VC	CIRC	
0659X	4.87	4.16	150	VC	CIRC	
0660X	5.06	4.47	150	VC	CIRC	
0662X	4.91		150	VC	CIRC	
0663X	4.93	3.98	150	VC	CIRC	
0664X	4.88		150	VC	CIRC	
0665X	4.87	4.86	150	VC	CIRC	
0667X	4.83	3.91	300	VC	CIRC	
0701X	5.3	3.31	225	VC	CIRC	
0702X	4.93	3.81	150	VC	CIRC	
0703X	5.06	4.05	150	VC	CIRC	
0704X	5.09	4.42	150	VC	CIRC	
0705X	5.26	4.09	150	VC	CIRC	
0706X	5.33		150	VC	CIRC	
0707X	5.03	3.71	225	VC	CIRC	
0708X	5.05	4.15	150	VC	CIRC	
0709X	5.02	3.87	225	VC	CIRC	
0710X	5.06	4.27	150	VC	CIRC	
0712X	5.29		150	VC	CIRC	
0751X	5.18	4.48	150	VC	CIRC	
0752X	5.1	4.41	150	VC	CIRC	
0753X	5.05	5.04	150	VC	CIRC	
0754X	5.06	4.51	150	VC	CIRC	
0757X	4.95		600	CP	CIRC	
0759X	5.31	4.14	150	VC	CIRC	
0760X	5.02	4.29	150	VC	CIRC	
0761X	5.02	4.45	150	VC	CIRC	
0762X	5.29	4.3	150	VC	CIRC	
0763X	5.24	4.37	150	VC	CIRC	
0764X	5.26	4.46	150	VC	CIRC	
0765X	5.24	4.41	150	VC	CIRC	
0766X	5.17	4.14	300	VC	CIRC	
0767X	5.23		300	VC	CIRC	
0768X	5.01	3.95	300	VC	CIRC	
0769X	5.07	4.04	150	VC	CIRC	
0770X	5.24	3.95	300	VC	CIRC	
1201X	8.58	6.02	225	VC	CIRC	
1202X	8.45		225	VC	CIRC	
1203X	7.54	5.81	225	VC	CIRC	
1204X			UNK	UNK	UNK	
1205X	2.35		UNK	VC	CIRC	
1206X			UNK	VC	CIRC	
1207X			UNK	VC	CIRC	
1208X			UNK	VC	CIRC	
120DX			225	VC	CIRC	
121DX			UNK	VC	CIRC	
1301X	8.06	6.59	150	VC	CIRC	
1302X			UNK	UNK	CIRC	
1303X	1.4		UNK	VC	CIRC	
130DX			UNK	VC	CIRC	
131DX			UNK	VC	CIRC	
1401X	4.59	2.4	300	VC	CIRC	
1402X	5.15	2.3	300	VC	CIRC	
1403X	7.76		150	VC	CIRC	
142DX			UNK	UNK	CIRC	
1501X	5.21	2.76	300	VC	CIRC	
1502X	4.57	2.82	225	VC	CIRC	
1503X	4.85	3.19	150	VC	CIRC	
1504X	4.69	4.04	100	VC	CIRC	
1505X	4.63	2.79	225	VC	CIRC	
1506X	3.93	2.55	300	VC	CIRC	
1507X	4.26	2.55	300	VC	CIRC	
1508X	4.65	3.29	150	VC	CIRC	
150DX	4.4	2.65	175	VC	CIRC	
151DX	4.26	2.5	300	VC	CIRC	
1601X	6.84	4.39	300	VC	CIRC	
1602X	5.69	3.81	150	VC	CIRC	
1709X			100	VC	CIRC	
170DX			100	VC	CIRC	
2301X	9.05	9.04	150	VC	CIRC	
2302X	0.8		UNK	PVC	CIRC	
2303X			UNK	VC	CIRC	
2304X			UNK	VC	CIRC	
230DX			UNK	PVC	CIRC	
231DX			UNK	PVC	CIRC	
232DX			UNK	PVC	CIRC	
2401X	7.22	6.07	150	VC	CIRC	
2501X	7.52	6.39	150	VC	CIRC	
2502X	7.38	6.29	150	VC	CIRC	
2503X	6.14	4.71	150	VC	CIRC	
2504X	4.69	2.87	175	VC	CIRC	
2505X	7.6	6.49	150	VC	CIRC	
2601X	4.8	3.12	175	VC	CIRC	
3501X	7.68	6.67	150	VC	CIRC	
3502X	7.88	6.87	150	VC	CIRC	
3503X	8.02	7.04	150	VC	CIRC	
3601X	5.07	3.48	175	VC	CIRC	
3602X	5.74	4.09	175	VC	CIRC	
3603X	8.13	7.23	150	VC	CIRC	
4601X	7.54	5.37	175	VC	CIRC	
5701X	8.51	5.93	175	VC	CIRC	
5702X	8.24	5.61	175	VC	CIRC	
6701X	9.44	6.27	175	VC	CIRC	
6702X			175	VC	CIRC	
7601X	9.51	6.6	175	VC	CIRC	
7602X	9.21	6.45	175	VC	CIRC	
7702X			100	VC	CIRC	
770DX			100	VC	CIRC	
8201X	2.8	0.96	375	CP	CIRC	
8401X	6.41	4.11	175	VC	CIRC	
8402X	5.88	3.78	175	UNK	CIRC	
8403X	6.59	5.17	150	VC	CIRC	
840DX			100	VC	UNK	
8501X	7.42	5.37	150	VC	CIRC	
8502X	7.33	5.77	150	VC	CIRC	
8509X	6.63	4.96	150	VC	CIRC	
8550X	7.46	5.38	300	VC	CIRC	
8551X	7.28	7.27	150	VC	CIRC	
8553X	7.78	5.54	300	VC	CIRC	
8555X	7.73	6.37	150	VC	CIRC	
8601X	7.82	5.57	150	VC	CIRC	
8602X	8.4	5.88	150	VC	CIRC	
8606X	8.62	7.11	150	VC	CIRC	
8607X	8.81	7.52	150	VC	CIRC	
8608X	9.06	9.05	150	VC	CIRC	
8609X	8.71	7.66	150	VC	CIRC	
8650X	8.09	6.14	150	VC	CIRC	
8651X	7.82	6.22	150	VC	CIRC	
8652X	8.6	6.78	150	VC	CIRC	
8653X	8.89	7.52	150	VC	CIRC	
8654X	9.03	8.08	150	VC	CIRC	
8656X	8.71	7.37	150	VC	CIRC	
8657X	8.52	6.9	150	VC	CIRC	
8701X	8.74	7	150	VC	CIRC	
8702X	8.92	8.1	100	VC	CIRC	
8703X	7.88	6.82	150	VC	CIRC	
8704X	8.35	6.98	150	VC	CIRC	
8750X	8.02	5.53	225	VC	CIRC	
8752X	8.59	6.89	150	VC	CIRC	
8753X	8.79	6.99	150	VC	CIRC	
8754X	8.91	7.35	150	VC	CIRC	
8755X	8.1	6.5	150	VC	CIRC	
8756X	8.43	6.76	150	VC	CIRC	
9202X	3.15	1.7	350	PF	CIRC	
9203X	2.86	0.86	350	PF	CIRC	
9204Y	2.58	1.21	300	VC	CIRC	*
9204X	2.58	0.97	375	CP	CIRC	*
9206X	2.69	1.19	300	VC	CIRC	
9207X	2.88	2.32	150	VC	CIRC	
9208X			OTHER	BRC	CIRC	
9209X			OTHER	BRC	CIRC	
920PX	3.5		450	CP	CIRC	
9210X			OTHER	BRC	CIRC	
9211X	4.53	1.816	525	CP	CIRC	
9212Z	3.58	1.82	450	CP	CIRC	*
9212Y	3.58	3.58	375	CP	CIRC	*
9212X	3.58		350	PF	CIRC	*
9213X	3.66	1.07	375	CP	CIRC	
9214X	3		350	PF	CIRC	
9215X	3.5	1.879	450	CP	CIRC	
9216X	2.82	1.77	450	CP	CIRC	
9301X	4.1	2.85	250	DI	CIRC	
9302X	3.45	2.82	300	DI	CIRC	
9304X			UNK	UNK	UNK	
9305X			UNK	UNK	CIRC	
930DX			UNK	UNK	CIRC	
9400X	5.27	3.22	150	VC	CIRC	
9401X	6.52	4.36	150	VC	CIRC	
9402X	6.34	3.96	150	VC	CIRC	
9403X	6.27	3.75	150	VC	CIRC	
9501X	7.48	5.23	150	VC	CIRC	
9502X	7.25	4.93	150	VC	CIRC	
9503X	7.45	5.09	150	VC	CIRC	
9504X	5.42	4.59	150	VC	CIRC	
9505X	5.43	4.43	150	VC	CIRC	
9506X	5.14	4.36	150	VC	CIRC	
9507X	5.67	4.33	150	VC	CIRC	
9508X	5.34	4.12	150	VC	CIRC	
9509X	6.25	5.27	150	VC	CIRC	
9510X	4	1.76	150	VC	CIRC	
9511X	5.4	4.45	150	VC	CIRC	
9512X	7.41	5.09	150	VC	CIRC	
9513X	7.51	6.13	150	VC	CIRC	
9514X	7.52	6.35	150	VC	CIRC	
9515X	6.44	4.5	150	VC	CIRC	
9516X	4.01	2.04	150	VC	CIRC	
9550X	6.53	5.76	150	VC	CIRC	
9551X	5.38		150	VC	CIRC	
9552X	6.26	5.64	150	VC	CIRC	
9553X	5.27	4.72	150	VC	CIRC	
9554X	5.46	4.72	150	VC	CIRC	
9555X	7.06	6.13	150	VC	CIRC	
9556X	6.91	4.76	300	VC	CIRC	
9557X	7.2	5.17	300	VC	CIRC	
9558X	7.48	5.3	300	VC	CIRC	
9559X	6.96	6.95	150	VC	CIRC	
9560X	5.42		150	VC	CIRC	
9561X	5.44	4.76	150	VC	CIRC	
9562X	4.03	2.74	300	VC	CIRC	
9563X	3.99	2.67	300	VC	CIRC	
9601X	5.62	4.97	150	VC	CIRC	
9602X	6.05		150	VC	CIRC	
9603X	7.16	6.03	150	VC	CIRC	
9604X	7.51	6.71	150	VC	CIRC	
9605X	8.04	6.66	150	VC	CIRC	
9606X	7.67	5.82	150	VC	CIRC	
9607X	8.11	6.63	150	VC	CIRC	
9608X	8.19	7.33	150	VC	CIRC	
9609X	8.33	6.93	150	VC	CIRC	
9610X	8.19	6.75	150	VC	CIRC	
9611X	7.59	5.49	150	VC	CIRC	
9612X	7.59	5.93	150	VC	CIRC	

LINE STYLES / COLOURS

Brown — Foul
Foul Syphon Sewer
Foul Vacuum Main
Foul Rising Main
Red — Combined
Combined Syphon Sewer
Combined Rising Main
Lateral Drain
Orange — Building Over Agreement Area
Dark Blue — Treated Effluent
Purple — Sludge
Sewer Catchment
Section 104 Area
Light Blue — Surface Water
Surface Water Rising Main
Yellow — Private
Green — Access Shaft
D — D Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Rainforced Concrete
GRP	Glass Rainforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Span Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

Manhole (SW)
Manhole (F&C)
Lamp hole (SW)
Lamp hole (F&C)
Pumping Station (SW)
Pumping Station (F&C)
Side entry manhole (SW)
Side entry Manhole (F&C)
Blind shaft (SW)
Blind shaft (F&C)
Ejector station (SW)
Ejector station (F&C)
Watertight door (SW)
Watertight door (F&C)
Flushing ch. Mn-e (SW)
Flushing ch. Mn-e (F&C)
Flushing ch. No-e (SW)
Flushing ch. No-e (F&C)
Demarcation Chamber

LEGEND - SEWERS

Washout (SW)
Washout (F&C)
Rodding Eye (SW)
Rodding Eye (F&C)
Gauging point (SW)
Gauging point (F&C)
Intercept chamber (SW)
Intercept chamber (F&C)
Storm Tank (SW)
Storm Tank (F&C)
Vortex chamber (SW)
Vortex chamber (F&C)
Label ellipse
Dummy/S24 manhole
Outfall
Penstock chamber
Damboards
Storm Overflow
Backdrop manhole

Other (s)
Other
Change in sewer (s)
Change in sewer
Reflux valve
Flap valve
Cascade
Anode
Valve
Closed Valve
Air Valve
Hatch box (SW)
Hatch box (F&C)
Diraction arrow
Emptying valve
Catchpit
Soakaway
Inlet
Balancing Pond

Wastewater treatment works
Marine treatment works
Outfall headworks
Vent
Vent column
Tidal storage tank
Blank end
Head of Public Sewer
Micro Pumping Station

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

1st digit: hundred metre easting identifier
2nd digit: hundred metre northing identifier
3rd digit: sewer type identifier
0-4 = Foul/Combined
5-9 = Surface Water
4th digit: next sequential node

Drawn by:	gujskew
Title:	317229_Land off Canal Mews
Date:	15/11/2018

Southern Water

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APPENDIX 3

Extracts of CCTV Drainage Survey

Happy Drains Ltd
Unit 12A Chalex Industrial Estate, Manor Hall Road, Southwick, BN42 4NN
[redacted]

Ref C0007059 Date: 2nd January 2018

David West
Seaward Properties Ltd
Land off Canal Mews
Barnham
PO22 0JH

Dear Sirs

1. DESCRIPTION OF PROPERTY

Residential Properties.

2. DRAINAGE SYSTEM

This is a foul drainage system accessible by FW1. The pipework is circular in shape, 150mm in diameter and PVC plastic material. Further specific variations can be found in the report content.

3. SHARED

The sections identified within the property boundary are for the sole use of this property and therefore the responsibility of the site owner to maintain.

The sections as shared or beyond the property boundary generally are the legal responsibility of the local water company to maintain.

4. CIRCUMSTANCES

- Survey arranged for planned building works.

5. SUMMARY

- No access to manhole Fw1 - located on private property.
- No access to manhole Fw5 - Behind locked gates in private road.
- No structural defects all free flowing.
- Communal drainage from manhole Fw4

If you require more information or wish to discuss this matter, please contact us.

Yours sincerely

Happy Drains Ltd

Company No: 08267395
Registered office:
100 Church Street
Brighton, East Sussex
BN1 1UJ

Checkatrade.com Where reputation matters
Which? Trusted trader
CHAS Accredited Contractor

ARUN DISTRICT COUNCIL BN/44/21/DOC

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Project

Project Name	LAND OFF CANAL MEWS
Project Description	GENERAL CCTV
Start Date	02/01/2018
Project Status	Complete
Inspection Standard	MSCC5 Sewers & Drainage (GB) (SRM5 Scoring)

ARUN DISTRICT COUNCIL BN/44/21/DOC

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

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Project Name	Project Number:	Date:
LAND OFF CANAL MEWS	**C0007059**	**05/01/2018**

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Section Profile P-4
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Section: 2; FW2 - FW4 3
Section: 3; FW3 - FW4 5
Section: 4; FW4 - FW5 7

ARUN DISTRICT COUNCIL BN/44/21/DOC

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Scoring Summary

Project Name :	Project Number :	Date :
LAND OFF CANAL MEWS	**C0007059**	**05/01/2018**

Structural Defects

Section	Pipe Ref	Grade	Description
Acceptable Structural Condition			

Grade 3: Best practice suggests consideration should be given to repairs in the medium term.
Grade 4: Best practice suggests consideration should be given to repairs to avoid a potential collapse.
Grade 5: Best practice suggests that this pipe is at risk of collapse at any time. Urgent consideration should be given to repairs to avoid total failure

Service / Operational Defects

Section	Pipe Ref	Grade	Description
4	FW4X	4	Attached deposits, grease at 12 o'clock, 5% cross-sectional area loss

Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.
Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potentia blockages.
Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Abandoned Surveys

Section	Pipe Ref	Description
All Surveys Completed		

Information

These summaries are based on the SRM grading from the WRC.

ARUN DISTRICT COUNCIL BN/44/21/DOC

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Project Information

Project Name:	Client's Ref:	Contractor's Ref:	Project Date:
LAND OFF CANAL MEWS	**C0007059**	**C0007059**	**05/01/2018**

Project Description: GENERAL CCTV

Site

Company or Site Name: Seaward Properties Ltd
Contact: David West
Department:
Street: Canal Mews
Town or City: Barnham PO22 0JH
Phone: [redacted]
Fax:
Mobile:
Email:

Contractor

Company or Site Name: Happy Drains Ltd
Contact: David/Will
Department:
Street: Unit 12a Chalex Industrial Estate Manor Hall Road
Town or City: Southwick East Sussex BN42 4NH
Phone: [redacted]
Fax:
Mobile:
Email: [redacted]

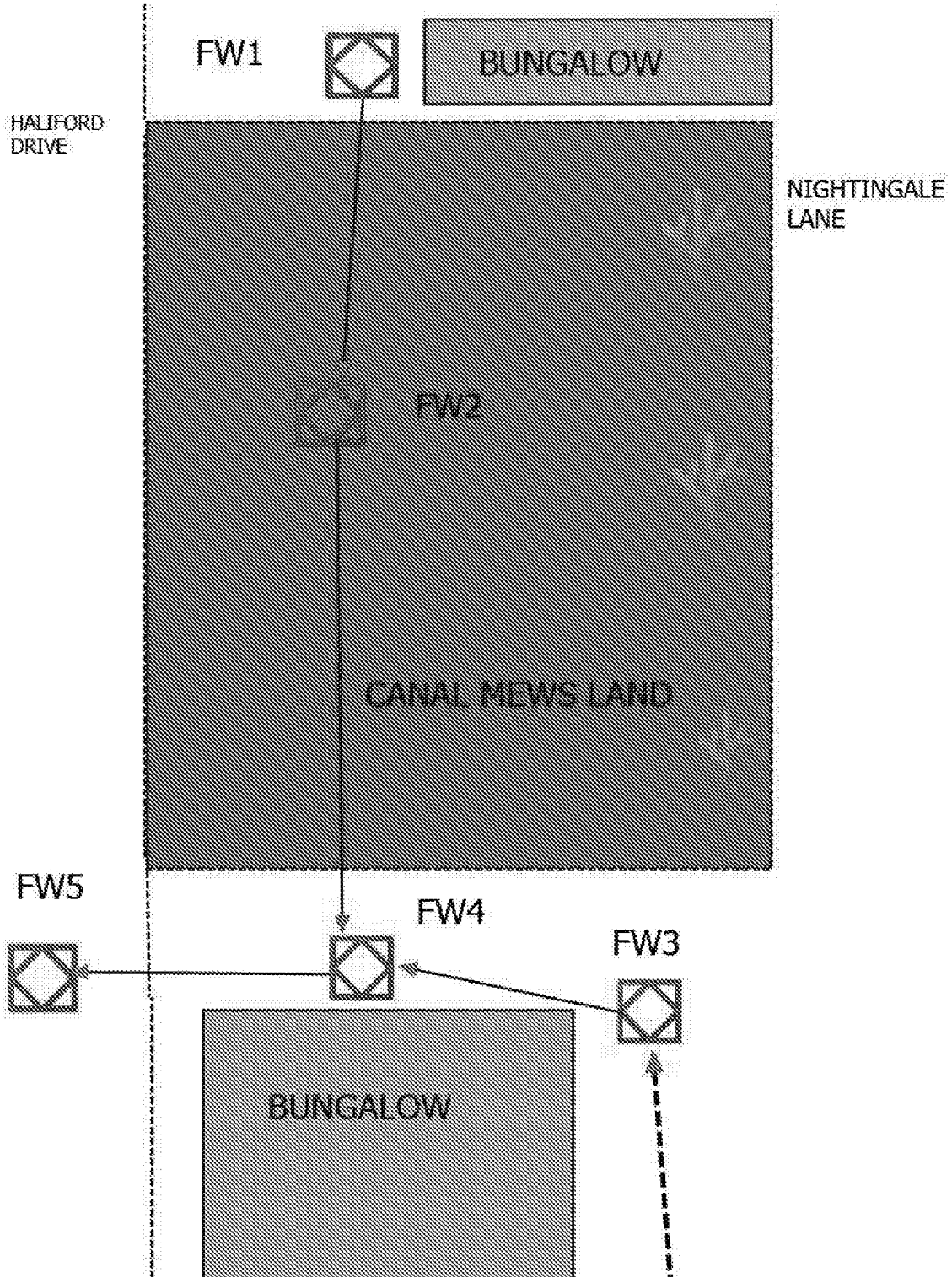
ARUN DISTRICT COUNCIL BN/44/21/DOC

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Project Information

Project Name:	Client's Ref:	Contractor's Ref:	Project Date:
LAND OFF CANAL MEWS	**C0007059**	**C0007059**	**05/01/2018**

Project Description: GENERAL CCTV



ARUN DISTRICT COUNCIL BN/44/21/DOC

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Profile

Project Name:	Project Number:	Project Date:
LAND OFF CANAL MEWS	**C0007059**	**05/01/2018**

Sectio No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Expected Length [m]	Inspected Length [m]
2	FW2	FW4	10/01/2018	CANAL MEWS	Polyvinyl chloride	23.50	23.50
3	FW3	FW4	02/01/2018	CANAL MEWS	Polyvinyl chloride	9.10	9.10
4	FW4	FW5	10/01/2018	CANAL MEWS	Polyvinyl chloride	35.70	35.70
3 x Circular 150 = 68.30 Expected Length [m] (68.30 Inspected Length [m])							

Sectio No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Expected Length [m]	Inspected Length [m]
1	FW1	FW2	05/01/2018	CANAL MEWS	Polyvinyl chloride	17.80	17.80
1 x Circular 150/150 = 17.80 Expected Length [m] (17.80 Inspected Length [m])							

Total: 4 = 86.10 Expected Length [m] (86.10 Inspected Length [m])

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Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Inspection - 05/01/2018 - FW1X

Section:	Inspection:	Date:	Time:	Client's Ref :	Weather:	Pre Cleaned:	PLR:
1	1	05/01/18	10:29	C0007059	Rain	Yes	FW1X

Operator:	Vehicle:	Camera:	Preset Length [m]:	Criticality Grade:	Type of Pipe:
Mpl	EX58 OLO	Xti			Gravity drain/sewer

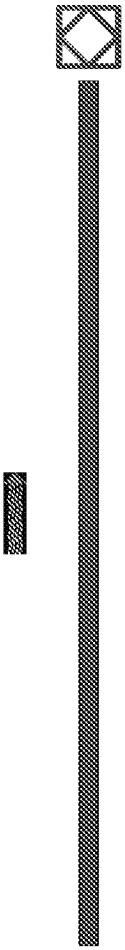
Town or Village:	Barnham	Insp Dir:	FW2 ⇐ FW1	US MH:	FW1
Road:	Canal Mews	Inspected Length:	17.80 m	US Depth:	
Location:	Fields (farmland and public open space)	Total Length:	17.80 m	DS MH:	FW2
Surface Cover:	Grass	Pipe Length:	0.00 m	DS Depth:	1.50 m

Use:	Foul	Pipe Shape:	Circular
Lining Type:	None	Height / Width:	150 / 150 mm
Inspection Purpose:	Routine inspection of condition	Pipe Material:	Polyvinyl chloride
Year Constructed:		Flow Control:	No flow control

Comment:
Recommendation:

1:155	Position m	Code	Observation	Grade

Depth: 1.50
FW2



Structural defects	Constructional features
Service and maintenance defects	Miscellaneous features

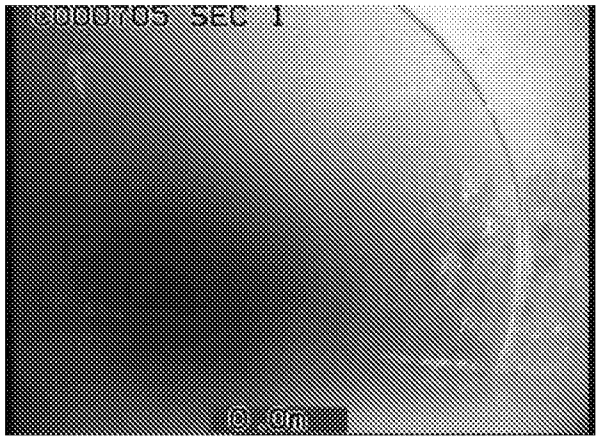
Note: In line with the WRc SRM, plastic pipes are not scored against structural defects.

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

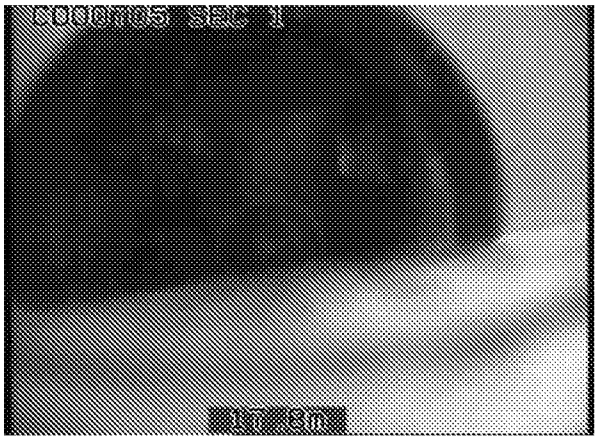
Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Pictures - 05/01/2018 - FW1X

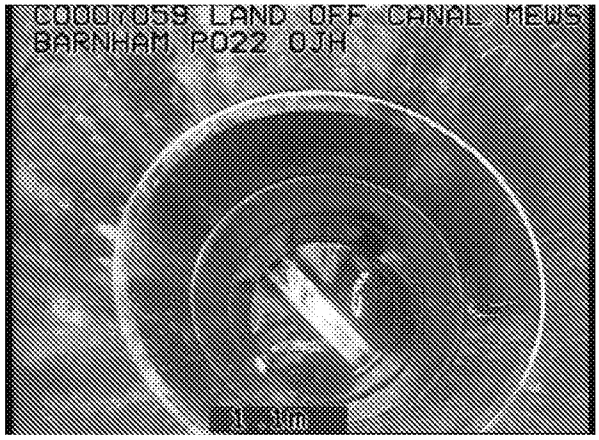
Section Number:	Inspection Direction:	PLR:	Client's Ref:	Contractor's Ref:
1	FW2 ⇐ FW1	FW1X	C0007059	C0007059



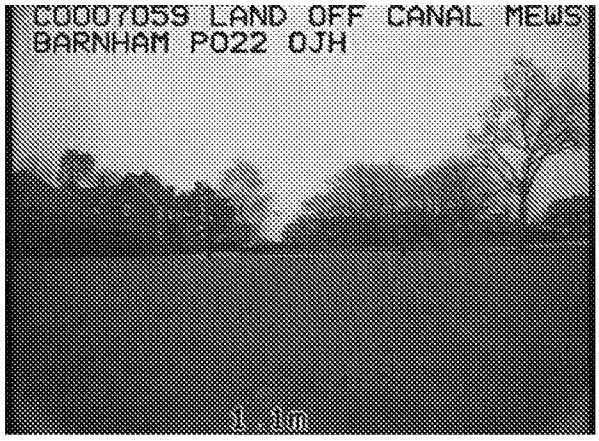
FW1X_0d76fe4c-d64b-4dff-a029-d21ec7f79804_20180110_193300_411.jpg, , 0.00m
Start node type, manhole, reference number: FW2



FW1X_ae57d161-f9c4-4092-a28d-53740de2bdf6_20180110_193636_768.jpg, , 17.80m
Finish node type, manhole, reference number: FW1 / NO



FW1X_94c783ad-9477-49a7-978e-bf66089f40ef_20180110_193136_514.jpg, 00:00:00, 0.00m
General photograph taken at this point / OVERVIEW



FW1X_7f90da61-620c-44cc-a96b-bed728392652_20180110_193059_014.jpg, 00:00:00, 0.00m
General photograph taken at this point / OVERVIEW

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Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Inspection - 10/01/2018 - FW2X

Section:	Inspection:	Date:	Time:	Client's Ref :	Weather:	Pre Cleaned:	PLR:
2	2	10/01/18	19:37	C0007059	Rain	Yes	FW2X

Operator:	Vehicle:	Camera:	Preset Length [m]:	Criticality Grade:	Type of Pipe:
Mpl	EX58 OLO	Xti			Gravity drain/sewer

Town or Village:	Barnham	Insp Dir:	FW2 ⇝ FW4	US MH:	FW2
Road:	Canal Mews	Inspected Length:	23.50 m	US Depth:	1.50 m
Location:	Fields (farmland and public open space)	Total Length:	23.50 m	DS MH:	FW4
Surface Cover:	Grass	Pipe Length:	0.00 m	DS Depth:	1.90 m

Use:	Foul	Pipe Shape:	Circular
Lining Type:	None	Height / Width:	150 / 0 mm
Inspection Purpose:	Routine inspection of condition	Pipe Material:	Polyvinyl chloride
Year Constructed:		Flow Control:	No flow control

Comment:
Recommendation:

1:204	Position m	Code	Observation	Grade



Structural defects	Constructional features
Service and maintenance defects	Miscellaneous features

Note: In line with the WRc SRM, plastic pipes are not scored against structural defects.

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Pictures - 10/01/2018 - FW2X

Section Number:	Inspection Direction:	PLR:	Client's Ref:	Contractor's Ref:
2	**FW2 ⋙ FW4**	**FW2X**	**C0007059**	**C0007059**



FW2X_3e2d9e45-481b-4e36-b275-d35d78e19be5_20160110_194004_497.jpg, 00:00:00, 0.00m
Start node type, manhole, reference number: FW2



FW2X_123d7814-9d39-47bc-8a50-48c4b4c2e600_20160110_194216_024.jpg, , 23.50m
Finish node type, manhole, reference number: FW4

ARUN DISTRICT COUNCIL BN/44/21/DOC

Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Inspection - 02/01/2018 - FW3X

Section:	Inspection:	Date:	Time:	Client's Ref :	Weather:	Pre Cleaned:	PLR:
3	3	02/01/18	19:43	C0007059	Rain	Yes	FW3X

Operator:	Vehicle:	Camera:	Preset Length [m]:	Criticality Grade:	Type of Pipe:
Mpl	EX58 OLO	Xti			Gravity drain/sewer

Town or Village:	Barnham	Insp Dir:	FW3 ⇝ FW4	US MH:	FW3
Road:	Canal Mews	Inspected Length:	9.10 m	US Depth:	1.80 m
Location:	Other pedestrian area	Total Length:	9.10 m	DS MH:	FW4
Surface Cover:	Block Paved	Pipe Length:	0.00 m	DS Depth:	1.90 m

Use:	Foul	Pipe Shape:	Circular
Lining Type:	None	Height / Width:	150 / 0 mm
Inspection Purpose:	Routine inspection of condition	Pipe Material:	Polyvinyl chloride
Year Constructed:		Flow Control:	No flow control

Comment:
Recommendation:

1:79	Position m	Code	Observation	Grade



Structural defects	Constructional features
Service and maintenance defects	Miscellaneous features

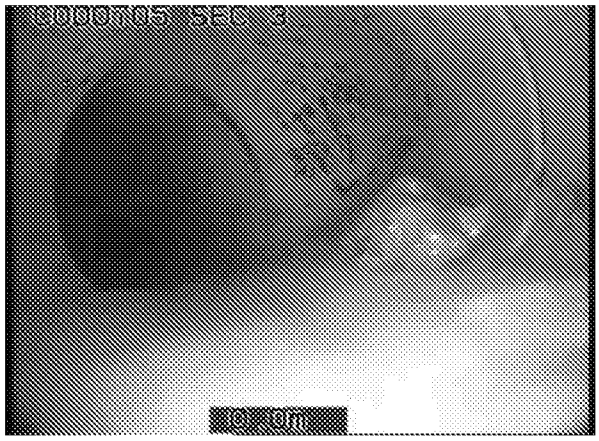
Note: In line with the WRc SRM, plastic pipes are not scored against structural defects.

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

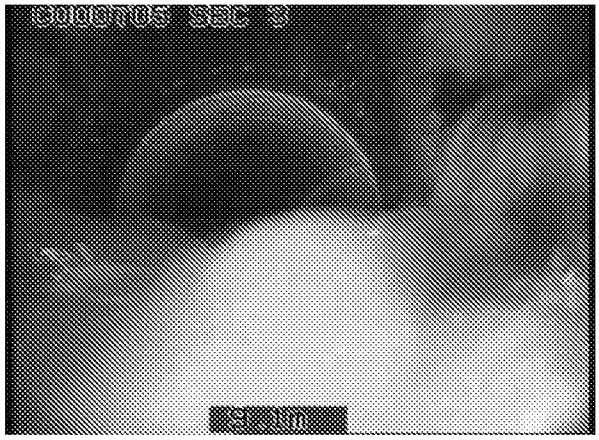
Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Pictures - 02/01/2018 - FW3X

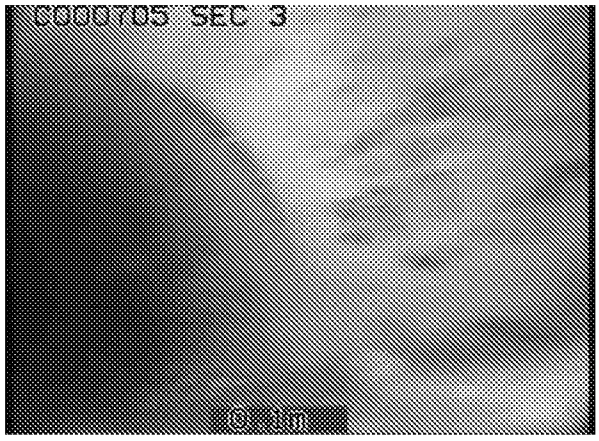
Section Number:	Inspection Direction:	PLR:	Client's Ref:	Contractor's Ref:
3	**FW3 ⋙ FW4**	**FW3X**	**C0007059**	**C0007059**



FW3X_ec21d8f3-e28e-4486-895b-98986cc3c2d7_20180110_194747_359.jpg, 00:00:00, 0.00m
Start node type, manhole, reference number: FW3



FW3X_87f3fb8b-06d2-4f23-9bf1-9e042a1563d5_20180110_194933_042.jpg, 00:00:00, 9.10m
Finish node type, manhole, reference number: FW4



FW3X_31ec5b81-d325-4d26-9daa-c960a3abd43a_20180110_194828_893.jpg, , 0.01m
Line deviates left

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[redacted]

Section Inspection - 10/01/2018 - FW4X

Section:	Inspection:	Date:	Time:	Client's Ref :	Weather:	Pre Cleaned:	PLR:
4	4	10/01/18	19:49	C0007059	Rain	Yes	FW4X

Operator:	Vehicle:	Camera:	Preset Length [m]:	Criticality Grade:	Type of Pipe:
Mpl	EX58 OLO	Xti			Gravity drain/sewer

Town or Village:	Barnham	Insp Dir:	FW4 ~> FW5	US MH:	FW4
Road:	Canal Mews	Inspected Length:	35.70 m	US Depth:	1.90 m
Location:	Other pedestrian area	Total Length:	35.70 m	DS MH:	FW5
Surface Cover:	Concrete Highway	Pipe Length:	0.00 m	DS Depth:	

Use:	Foul	Pipe Shape:	Circular
Lining Type:	None	Height / Width:	150 / 0 mm
Inspection Purpose:	Routine inspection of condition	Pipe Material:	Polyvinyl chloride
Year Constructed:		Flow Control:	No flow control

Comment:
Recommendation:

1:310	Position m	Code	Observation	Grade



Structural defects	Constructional features
Service and maintenance defects	Miscellaneous features

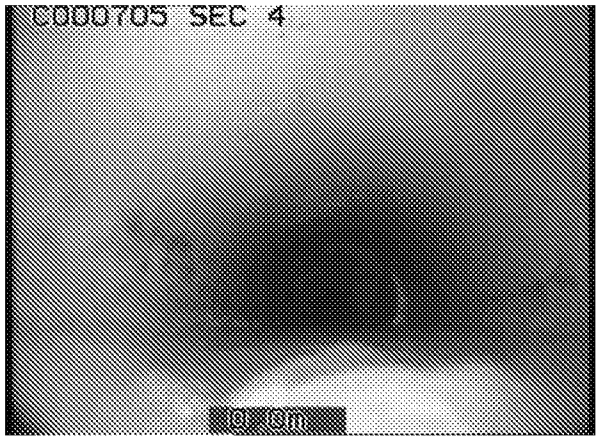
Note: In line with the WRc SRM, plastic pipes are not scored against structural defects.

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	0.0	0.0	0.0	1.0	1	5.0	0.1	5.0	4.0

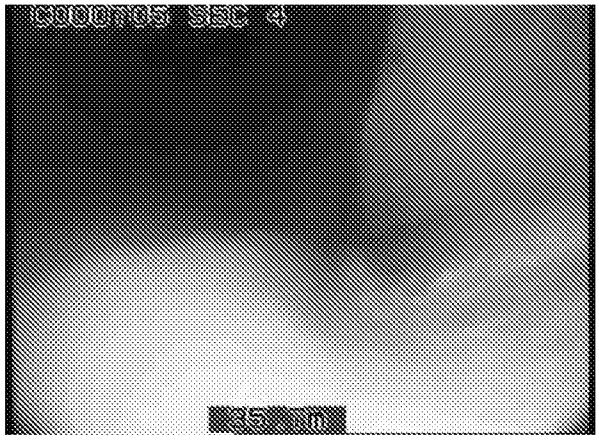
Happy Drains Ltd
Unit 12a Chalex Industrial Estate Manor Hall Road, Southwick East Sussex BN42 4NH
[redacted]

Section Pictures - 10/01/2018 - FW4X

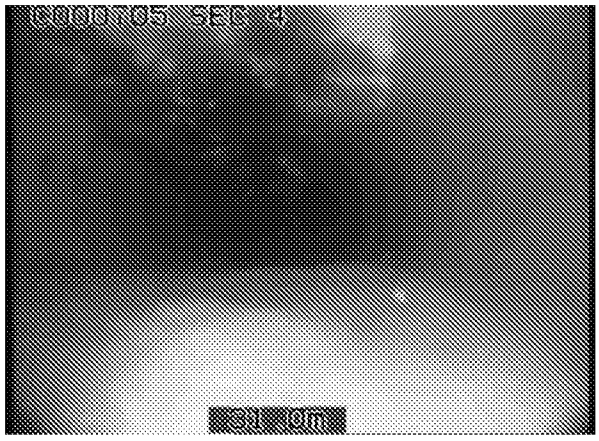
Section Number:	Inspection Direction:	PLR:	Client's Ref:	Contractor's Ref:
4	**FW4 ⋙ FW5**	**FW4X**	**C0007059**	**C0007059**



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FW4X_e9b28669-9564-4422-bd69-d97c942bd698_20180110_200309_751.jpg, 00:07:43, 35.70m
Finish node type, manhole, reference number: FW5 /



FW4X_d168865b-8a15-48a5-abc0-75b79300f2b4_20180110_200004_508.jpg, 00:08:06, 31.00m
Attached deposits, grease at 12 o'clock, 5% cross-sectional

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APPENDIX 4

Croudace Homes Layout Plan

ARUN DISTRICT COUNCIL BN/44/21/DOC



Crudace
HOMES GROUP

BARNHAM
GOODACRES

GENERAL LAYOUT
SHEET 1 OF 2

APPENDIX 5

Extracts of Ground & Water SI Report

a CBR of 4.5% being applicable. The cohesive soils were generally described as sandy gravelly silty clay therefore they were **likely to be frost susceptible.**

Undifferentiated River Terrace Deposits (granular)
Roads and hardstanding constructed on the granular Undifferentiated River Terrace Deposits should be designed based on a CBR value of 30.0%. This is based on reference to Table C1 of TRL1132 and average construction conditions. Based on wet conditions a CBR of 20.0% should be adopted, with dry conditions a CBR of 40.0% being applicable. The granular soils generally had 8.4 – 10.4% passing the 150µm sieve in geotechnical testing, therefore they were **likely to be frost susceptible.**

All formation levels for roads and hardstanding should be proof rolled to highlight any soft areas which should then be dug out and replaced with selected granular material compacted in thin layers to a suitable specification.

6.6 Surface Water Disposal

Soakage testing in accordance with BRE365 was undertaken within TP1a, TP2b and TP3b, with the results tabulated below.

Soakage Testing Results							
Strata	Trial Hole	Test Number	Depth (m bgl)	Start Depth (m bgl)	Finish Depth (m bgl)	Time Taken (mins)	Infiltration Rate (m/sec)
Granular Undif. River Terrace Deposits	TP1a	1*	1.25	0.75	1.10	1260	1.827 x 10^-6
		2**	1.15	0.49	1.15	6150	7.729 x 10^-7
		3**	1.10	0.54	1.10	8640	4.013 x 10^-7
Cohesive Undif. River Terrace Deposits	TP2b	1*	1.25	0.72	0.99	1260	1.328 x 10^-6
		2**	1.15	0.51	1.15	6165	6.602 x 10^-7
		3**	1.10	0.46	1.10	8640	4.685 x 10^-7
	TP3b	1*	1.20	0.66	0.71	90	2.749 x 10^-6
		2**	1.12	0.62	1.12	6141	9.867 x 10^-7
		3*	1.10	0.67	0.94	8640	2.213 x 10^-7
***These tests were deemed incomplete (i.e. less than 75% of the volume of water drained into the soils)** ****These tests were noted to fill overnight/a number of days since the last monitoring round, and therefore these rates may be conservative.**							

Based on the infiltration rates provided above, and the shallow groundwater encountered, soakaway systems may not be proved to be appropriate for the site.

Any soakaways should be located sufficiently away from buildings and infrastructure, in order to prevent undermining of foundations.

The site was located on a Secondary (A) Aquifer comprising superficial deposits of the Undifferentiated River Terrace Deposits, underlain by Unproductive Strata associated with the London Clay Formation. The ground conditions encountered generally comprised a capping of Made Ground overlying the Undifferentiated River Terrace Deposits.

Examination of the Environment Agency records showed that the site was not located within a Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater.

Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources.

The principles of sustainable urban drainage system (SUDS) should be applied to reduce the risk of flooding from surface water ponding.

ARUN DISTRICT COUNCIL BN/44/21/DOC

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP1	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15			MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.35			MADE GROUND: Brown gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded flint (80%), brick (10%) and glass (10%).
								Yellowish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS).
	▼				1.30			Orangish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.50			End of Borehole at 1.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted for the full depth of the trial hole (1.50m bgl). A groundwater strike was noted at 1.40m bgl.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP1	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15			MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.35			MADE GROUND: Brown gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded flint (80%), brick (10%) and glass (10%).
								Yellowish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS).
	▼				1.30			Orangish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.50			End of Borehole at 1.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted for the full depth of the trial hole (1.50m bgl). A groundwater strike was noted at 1.40m bgl.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP1a	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15			MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.35			MADE GROUND: Brown gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded flint (80%), brick (10%) and glass (10%).
								Yellowish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS).
					1.25			End of Borehole at 1.250m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted for the full depth of the trial hole (1.25m bgl). No groundwater was encountered

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP2	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.25			MADE GROUND: Brown/greyish brown clayey gravelly sand. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded, flint (70%), brick (20%), and concrete (10%).
					0.45			Yellowish brown/brown gravelly sandy CLAY, with greyish brown and orangish brown mottling. Sand was fine to coarse. Gravel was rare, fine to coarse, sub-angular to sub-rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
	▼				1.65			Orangish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.70			End of Borehole at 1.700m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted to a proved depth of 1.70m bgl. No groundwater strikes were encountered.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP2a	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.25			MADE GROUND: Brown/greyish brown clayey gravelly sand. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded, flint (70%), brick (20%), and concrete (10%).
					0.45			Yellowish brown/brown gravelly sandy CLAY, with greyish brown and orangish brown mottling. Sand was fine to coarse. Gravel was rare, fine to coarse, sub-angular to sub-rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.20			End of Borehole at 1.200m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted for the full depth of the trial hole (1.20m bgl). No groundwater strikes were encountered.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP2b	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.25			MADE GROUND: Brown/greyish brown clayey gravelly sand. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded, flint (70%), brick (20%), and concrete (10%).
					0.45			Yellowish brown/brown gravelly sandy CLAY, with greyish brown and orangish brown mottling. Sand was fine to coarse. Gravel was rare, fine to coarse, sub-angular to sub-rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.25			End of Borehole at 1.250m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted for the full depth of the trial hole (1.25m bgl). No groundwater strikes were encountered.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP3	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.25			MADE GROUND: Brown/greyish brown clayey gravelly sand. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded, brick (40%), flint (30%), concrete (20%) and carbonaceous material (10%).
					0.45			Yellowish brown/brown gravelly sandy CLAY, with greyish brown and orangish brown mottling. Sand was fine to coarse. Gravel was rare, fine to coarse, sub-angular to sub-rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
	▼				1.65			Orangish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.70			End of Borehole at 1.700m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted to a proved depth of 1.70m bgl. No groundwater strikes were encountered.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP3a	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.25			MADE GROUND: Brown/greyish brown clayey gravelly sand. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded, brick (40%), flint (30%), concrete (20%) and carbonaceous material (10%).
					0.45			Yellowish brown/brown gravelly sandy CLAY, with greyish brown and orangish brown mottling. Sand was fine to coarse. Gravel was rare, fine to coarse, sub-angular to sub-rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.20			End of Borehole at 1.200m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted for the full depth of the trial hole (1.20m bgl). No groundwater strikes were encountered.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP3b	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.25			MADE GROUND: Brown/greyish brown clayey gravelly sand. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded, brick (40%), flint (30%), concrete (20%) and carbonaceous material (10%).
					0.45			Yellowish brown/brown gravelly sandy CLAY, with greyish brown and orangish brown mottling. Sand was fine to coarse. Gravel was rare, fine to coarse, sub-angular to sub-rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					1.20			End of Borehole at 1.200m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted for the full depth of the trial hole (1.20m bgl). No groundwater strikes were encountered.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP4	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			MADE GROUND: Brown clayey very gravelly sand. Sand was fine to coarse. Gravel was occasional, angular to sub-angular, fine to coarse brick (40%), concrete (40%) and flint (20%).
					0.70			MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
	▼				1.80			Brownish grey/orangish brown mottled gravelly sandy CLAY. Sand was fine to coarse. Gravel was rare, fine to coarse, sub-rounded to rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
					2.00			Yellowish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS).
								End of Borehole at 2.000m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted to a proved depth of 1.30m bgl. No groundwater strikes were encountered.

Trial Pit Log

Project Name: 2 Bungalows, Canal Mews	Client: Seawards Properties	Date: 21/01/2021
Location: Barnham, West Sussex PO22 0DP	Contractor:	
Project No. : GWPR4066	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP5	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown slightly gravelly sandy clay. Sand was fine to coarse. Gravel was occasional, fine to coarse, sub-angular to sub-rounded flint.
					0.25			MADE GROUND: Brown/greyish brown clayey gravelly sand. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded, brick (60%), concrete (20%) and flint (20%).
					0.60			Greyish brown/yellowish brown clayey gravelly SAND, with reddish brown mottling and frequent black specks. Sand was fine to coarse. Gravel was occasional, fine to coarse, angular to sub-rounded flint. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS)
	▼				1.70			Yellowish brown silty SAND. Sand was fine to coarse. (UNDIFFERENTIATED RIVER TERRACE DEPOSITS).
					2.30			End of Borehole at 2.300m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Fresh roots were noted to a proved depth of 1.70m bgl. Dead roots were noted to a proved depth of 1.50m bgl. No groundwater strikes were encountered.

APPENDIX 6

Groundwater Monitoring By TEC

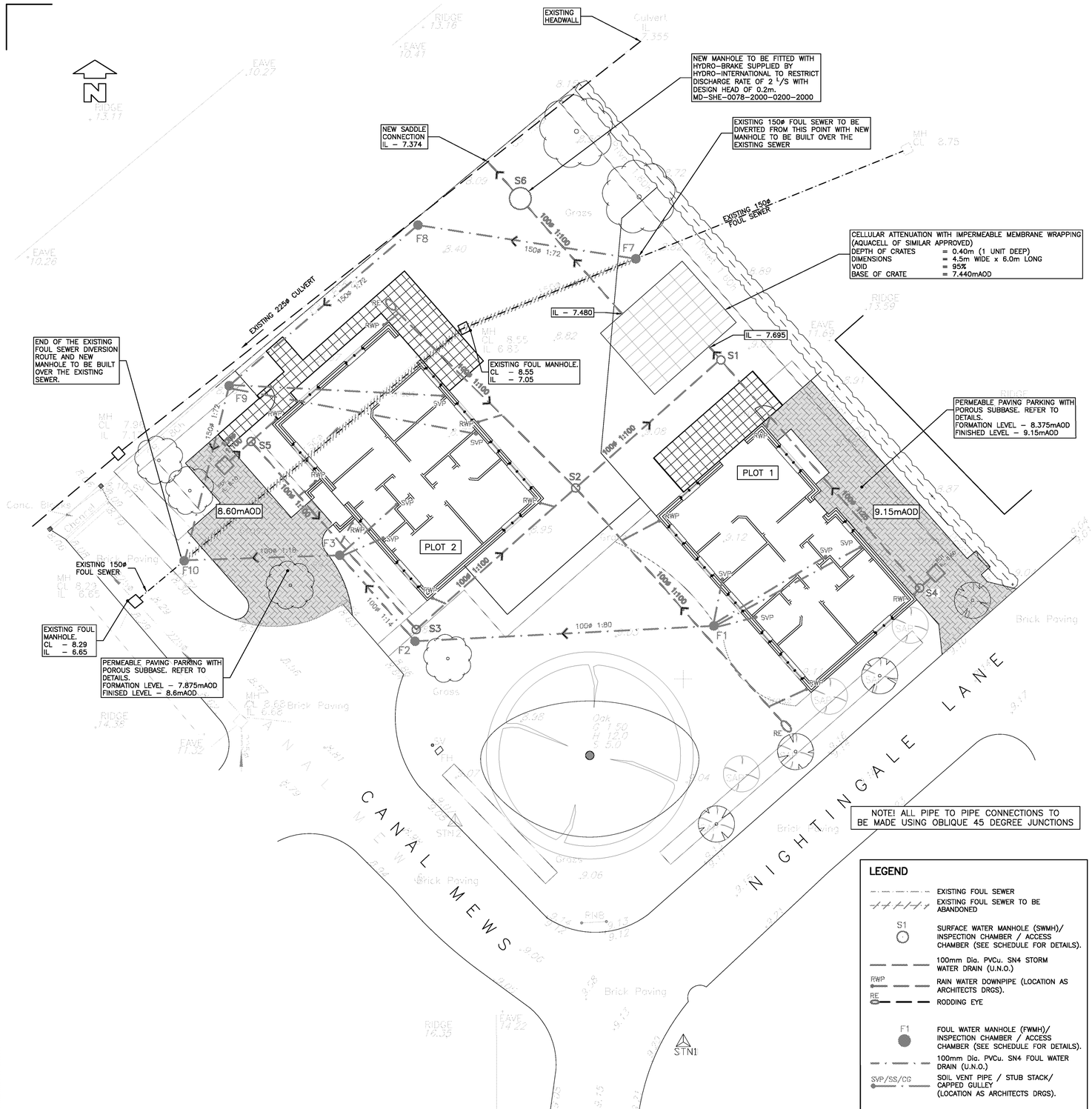
```
ERROR: undefined
OFFENDING COMMAND: get

STACK:

/quit
-dictionary-
-mark-
```

APPENDIX 7

Drainage Strategy Drawing & Details



NOTE! ALL PIPE TO PIPE CONNECTIONS TO BE MADE USING OBLIQUE 45 DEGREE JUNCTIONS

LEGEND

- EXISTING FOUL SEWER
- EXISTING FOUL SEWER TO BE ABANDONED
- S1 — SURFACE WATER MANHOLE (SWMH)/ INSPECTION CHAMBER / ACCESS CHAMBER (SEE SCHEDULE FOR DETAILS).
- 100mm Dia. PVCu. SN4 STORM WATER DRAIN (U.N.O.)
- RWP — RAIN WATER DOWNPIPE (LOCATION AS ARCHITECTS DRGS).
- RE — RODDING EYE
- F1 — FOUL WATER MANHOLE (FWMH)/ INSPECTION CHAMBER / ACCESS CHAMBER (SEE SCHEDULE FOR DETAILS).
- 100mm Dia. PVCu. SN4 FOUL WATER DRAIN (U.N.O.)
- SVP/SS/CG — SOIL VENT PIPE / STUB STACK/ CAPPED GULLEY (LOCATION AS ARCHITECTS DRGS).
- SITE BOUNDARY
- ??.?? + — EXISTING GROUND LEVEL (BASED ON ARBITRARY DATUM).
- PERMEABLE PAVING
- CELLULAR ATTENUATION CRATE SYSTEM WRAPPED WITH IMPERMEABLE MEMBRANE
- PDT — 710x710x150 SEL PERMAVOID DIFFUSER UNIT

CHECK SCALE 1:100@A1 / 1:200@A3

0mm 10 20 30 40 50 60 CHECK SCALE 1:1@A1 / 1:2@A3

SUDS OPERATION & MAINTENANCE

GENERAL

MAINTENANCE SCHEDULE	REQUIRED ACTION	FREQUENCY
REGULAR MAINTENANCE	REMOVE SEDIMENT & DEBRIS FROM PRE-TREATMENT DEVICES & FLOOR OF INSPECTION TUBE OR CHAMBER	ANNUALLY
	CLEANING OF ANY GUTTERS & ANY FILTERS ON DOWNPIPES	ANNUALLY
	TRIMMING ANY ROOTS THAT MAY BE CAUSING BLOCKAGES	ANNUALLY (OR AS REQUIRED).
MONITORING	INSPECT SILT TRAPS AND NOTE RATE OF SEDIMENT ACCUMULATION	MONTHLY IN THE FIRST YEAR & THEN ANNUALLY

OPERATION AND MAINTENANCE REQUIREMENTS FOR PERMEABLE PAVING

MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
REGULAR MAINTENANCE	BRUSHING 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 - PAY PARTICULAR ATTENTION TO AREAS WHERE WATER RUNS ONTO PERVIOUS SURFACE FROM ADJACENT IMPERMEABLE AREAS AS THIS AREA IS MOST LIKELY TO COLLECT THE MOST SEDIMENT
OCCASIONAL MAINTENANCE	STABILISE AND MOW CONTRIBUTING AND ADJACENT AREAS	AS REQUIRED
	REMOVAL OF WEEDS OR MANAGEMENT USING GLYPHOSPATE 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 50mm 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 SUB-STRUCTURES 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 HOURS AFTER LARGE STORMS IN FIRST SIX MONTHS
	INSPECT SILT ACCUMULATION RATES AND ESTABLISH APPROPRIATE BRUSHING FREQUENCIES	ANNUALLY
	MONITOR INSPECTION CHAMBERS	ANNUALLY
	INSPECT TREATED TIMBER EDGING AND REPLACE AS AND WHEN REQUIRED.	ANNUALLY

OPERATION AND MAINTENANCE REQUIREMENTS FOR ATTENUATION STORAGE TANKS

MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
REGULAR MAINTENANCE	INSPECT AND IDENTIFY ANY AREA 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 RISK TO PERFORAMCE)	MONTHLY
	FOR SYSTEMS WHERE RAINFALL INFILTRATES INTO THE TANK FROM ABOVE, CHECK SURFACE OF FILTER FOR BLOCKAGE BY SEDIMENT, ALGAE OR OTHER MATTER, REMOVE AND REPLACE SURFACE INFILTRATION MEDIUM AS NECESSARY	ANNUALLY
	REMOVED SEDIMENT FROM PRE-TREATMENT STRUCTURES AND/OR INTERNAL FOREBAYS	ANNUALLY, OR AS REQUIRED
REMEDIAL ACTIONS	REPAIR/REHABILITATE INLETS, OUTLETS, 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 REQUESTED

FOUL MANHOLE SCHEDULE

REF	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	SIZE	TYPE	COVER	COMMENTS
F1	9.150	8.400	0.750	450ø	TYPE 3	B125 300x300	
F2	8.900	7.600	1.300	450ø	TYPE 3	B125 300x300	
F3	8.850	7.150	1.700	450ø	TYPE 3	B125 450x450	
F7	8.820	~7.200	1.620	450ø	TYPE 3	B125 450x450	START OF THE DIVERSION ROUTE. NEW MANHOLE TO BE INSTALLED OVER THE EXISTING 150mm DIA. FOUL SEWER.
F8	8.200	7.030	1.170	450ø	TYPE 3	B125 450x450	
F9	8.200	6.830	1.370	450ø	TYPE 3	B125 450x450	
F10	8.330	6.700	1.630	450ø	TYPE 3	C250 450x450	END OF THE DIVERSION ROUTE. NEW MANHOLE TO BE INSTALLED OVER THE EXISTING 150mm DIA. FOUL SEWER.

SURFACE WATER MANHOLE SCHEDULE

REF	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	SIZE	TYPE	COVER	COMMENTS
S1	9.000	7.724	1.276	450ø	TYPE 3	B125 450x450	300MM SUMP/CATCHPIT
S2	8.850	7.830	1.020	450ø	TYPE 3	B125 450x450	
S3	8.900	7.945	0.955	450ø	TYPE 3	B125 450x450	
S4	9.100	8.400	0.700	450ø	TYPE 3	B125 450x450	300MM SUMP/CATCHPIT
S5	8.850	8.082	0.768	450ø	TYPE 3	B125 450x450	300MM SUMP/CATCHPIT
S6	8.300	7.395	0.905	1200ø	TYPE 2	C250 675X675	HYDRO-BRAKE SUPPLIED BY HYDRO-INTERNATIONAL TO RESTRICT FLOW RATE TO 2 L/S, WITH DESIGN HEAD AT 0.2m

NOTES

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4. THE TOPOGRAPHY SURVEY SHOWN ON THIS DRAWING HAS BEEN PRODUCED BY STUART BAILEY LAND SURVEY ON JANUARY 2017, BASED ON ARBITRARY DATUM RATHER THAN THE TRUE DATUM INFORMATION. IT SHALL BE NOTED THAT ARCH ASSOCIATES TAKES NO RESPONSIBILITIES TO THIRD PARTIES PRODUCTS.
5. THE MAIN CONTRACTOR SHALL BE RESPONSIBLE FOR THE SETTING OUT AND ACCURACY OF ALL DIMENSIONS.
6. THE CONTRACTOR IS TO ENSURE THE STABILITY AND STRUCTURAL INTEGRITY OF THE EXISTING PROPERTY AT ALL TIMES DURING WORKS AND IS TO BE RESPONSIBLE FOR ALL PROPPING AND SHORING AS REQUIRED.
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DRAINAGE

1. ALL MATERIALS AND WORKMANSHIP TO 'SEWERS FOR ADOPTION, 7th EDITION'
2. ALL MATERIALS AND WORKMANSHIP TO COMPLY WITH BS EN 752-1: 1996
3. WHEN USING VITRIFIED CLAY PIPEWORK WITH FLEXIBLE JOINTS, SUPERSTRENGTH SHALL BE USED. ALL ADOPTABLE WORKS SHALL USE V.C PIPEWORK. FOR NON-ADOPTED SYSTEM PVCU-SN4 CLASS PIPEWORK AND FITTINGS MAY BE SUBSTITUTED.
4. CONCRETE ENCASEMENT, MINIMUM 150 BED AND HAUNCH, TO BE USED ON PIPEWORK UNDER ROADS WITH LESS THAN 1200 COVER TO CROWN.
5. UNLESS OTHERWISE STATED, ALL PIPEWORK TO BE BEDDED AND SURROUNDED IN 10mm SINGLE SIZE AGGREGATE UP TO 450mm DIAMETER. FOR LARGER PIPEWORK, 20mm SHALL BE USED.
6. REFER TO MANHOLE SCHEDULE FOR SIZES, COVERS ETC.
7. ALL MATERIALS TO COMPLY WITH THE RELEVANT BS-EN, LATEST EDITION, FOR PIPEWORK AND FITTINGS.
8. UPON COMPLETION, ALL WORKS TO BE THOROUGHLY CLEANED BY FLUSHING.

CDM REGULATIONS 2015

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THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING No.SPR032-551

Revision	Date	Description	By
P6	28.05.21	AMENDED TO SUIT LLFA COMMENTS	CH
P5	18.05.21	AMENDED TO SUIT LLFA COMMENTS	CH
P4	12.04.21	PLOT 1 UPDATED	JH
P3	09.04.21	SITE LAYOUT & DRAINAGE UPDATED	JH
P2	12.08.19	SITE LAYOUT & DRAINAGE UPDATED	JH
P1	12.12.18	PRELIMINARY ISSUE FOR COMMENT	PJM

ARCH ASSOCIATES
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
The Town House, St. George's Square, Bishops Waltham, Southampton, Hampshire, SO32 1AF.
ace engineering

Client: SEAWARD PROPERTIES LTD.

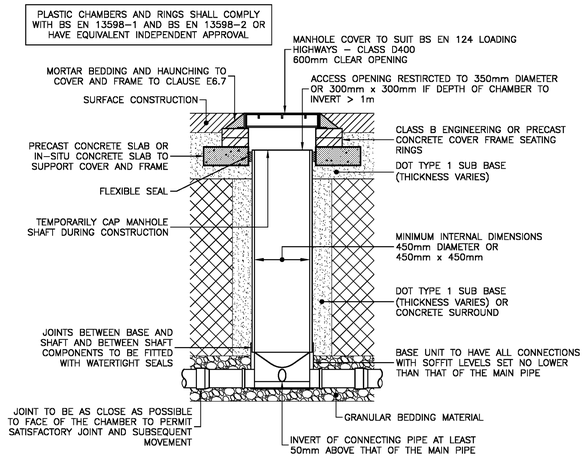
Architect: STUDIO LACK ARCHITECTURE

Project Title: LAND OFF CANAL MEWS BARNHAM

Drawing Title: DRAINAGE STRATEGY

Scale	Paper Size	Date	Drawn By	Checked By
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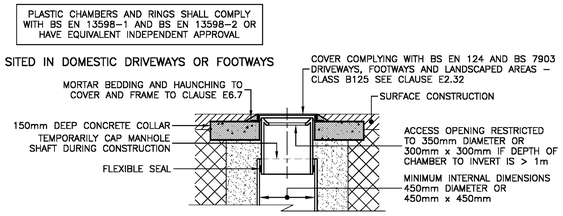
Project No.	Drawing No.	Revision
SPR032	500	P6



TYPICAL ACCESS CHAMBER DETAIL – TYPE 3 (FLEXIBLE MATERIAL DETAIL)

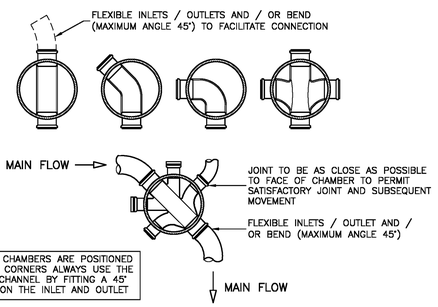
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE IN AREAS SUBJECT TO VEHICLE LOADING 3m, NON ENTRY

(1:25)



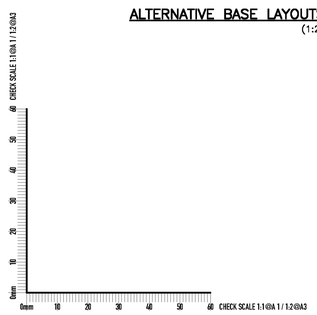
ALTERNATIVE TOP DETAILS FOR LIGHT VEHICLE LOADING AND LANDSCAPED AREAS – TYPE 3

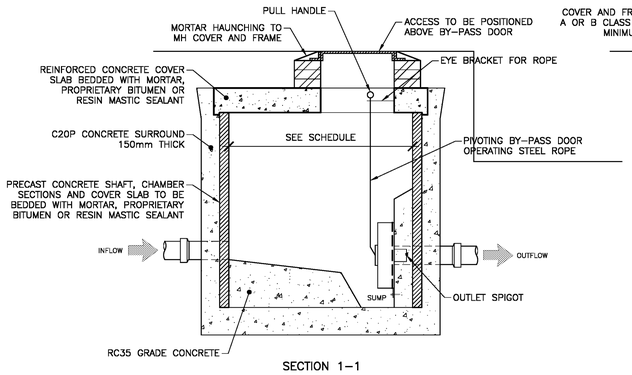
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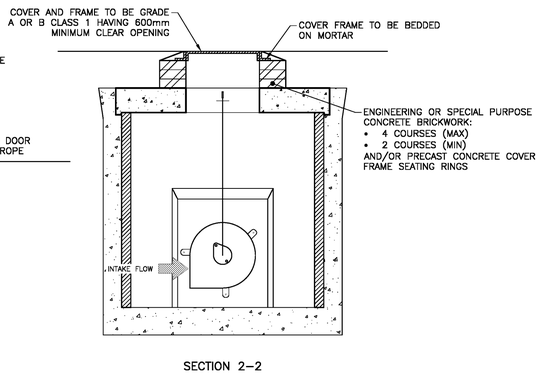
ALTERNATIVE BASE LAYOUTS FOR TYPE 3 CHAMBERS

(1:25)

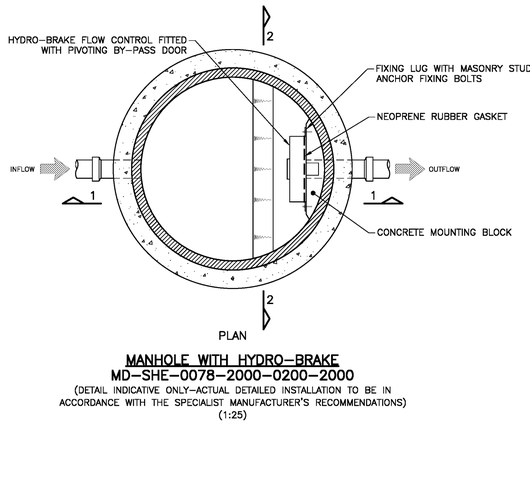




SECTION 1–1



SECTION 2–2

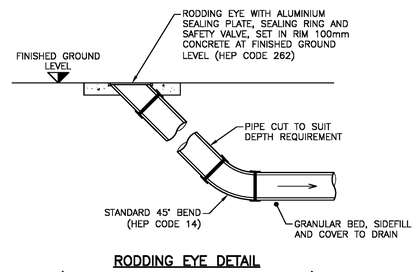


PLAN

MANHOLE WITH HYDRO–BRAKE MD–SHE–0078–2000–0200–2000

(DETAIL INDICATIVE ONLY–ACTUAL DETAILED INSTALLATION TO BE IN ACCORDANCE WITH THE SPECIALIST MANUFACTURER'S RECOMMENDATIONS)

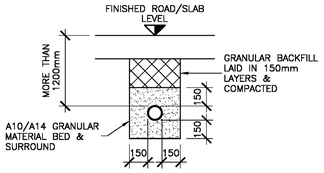
(1:25)



RODDING EYE DETAIL

(VC SHOWN – PVCu ALTERNATIVE TO SUIT)

(1:25)

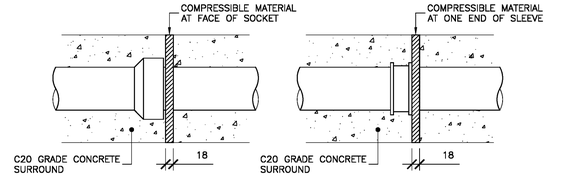


SIZE OF GRANULAR MATERIAL (TO BS 882: 1983)		
NOMINAL BORE OF PIPE (mm)	SIZE (mm)	
	SINGLE–SIZED	GRADED
100 & 150	10	–
225 & 300	10 OR 20	20 TO 5
375 – 500	20	20 TO 5

PIPE BED & SURROUND DETAIL

(CLASS S)

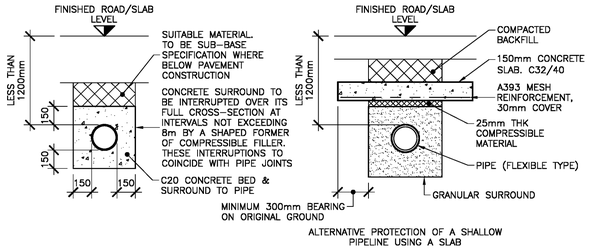
(1:25)



O–RING JOINTED PIPES

SLEEVE JOINTED PIPES

THE FLEXIBILITY OF A PIPELINE BEDDED ON, OR SURROUNDED WITH, CONCRETE SHOULD NORMALLY BE MAINTAINED BY THE PROVISION OF FLEXIBLE CONSTRUCTION JOINTS THROUGH THE CONCRETE AT PIPE JOINTS. THESE SHOULD BE MADE FROM BITUMEN IMPREGNATED INSULATING BOARD COMPLYING WITH B.S. 1142 PART 3, OR OTHER EQUALLY COMPRESSIBLE FILLER MATERIAL SUCH AS EXP&ED POLYSTYRENE. THE BOARD SHOULD BE CUT TO FIT THE PIPES & PLACED AT THE FACE OF THE PIPE SOCKETS OR AT ONE END OF SLEEVE JOINTS. THE JOINT MATERIAL SHOULD BE AT LEAST 18mm THICK PLACED AT 5.0m CENTRES MAX.



ALTERNATIVE PROTECTION OF A SHALLOW PIPELINE USING A SLAB

PROTECTION TO PIPELINES WITH LESS THAN 1200mm COVER

(1:25)

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Revision	Date	Description	By
P2	18.05.21	HYDROBRAKE REF. ADDED	JH
P1	09.04.21	PRELIMINARY ISSUE	JH

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The Town House, St. George's Square, Bishops Waltham, Southampton, Hampshire, SO32 1AF.

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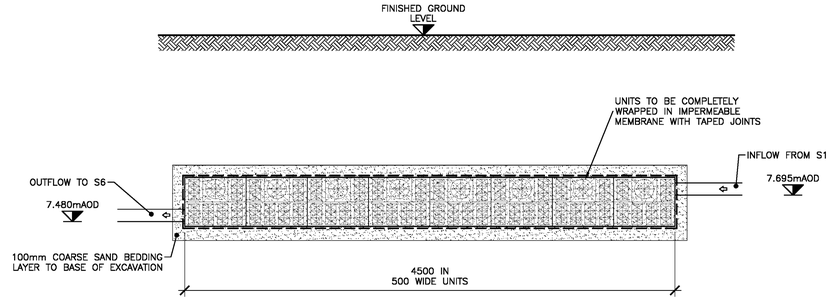
Architect: STUDIO LACK ARCHITECTURE

Project Title: LAND OFF CANAL MEWS BARNHAM

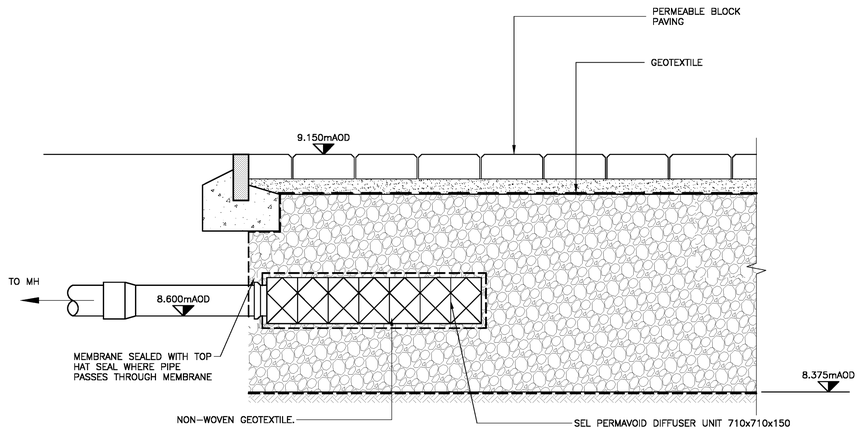
Drawing Title: DRAINAGE & EXTERNAL WORKS DETAILS SHEET 1

Scale	Paper Size	Date	Drawn By	Checked By
AS SHOWN	A1	MARCH 2021	JH	CH

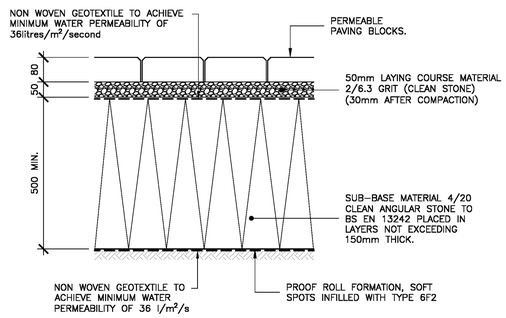
Project No.	Drawing No.	Revision
SPR032	551	P2



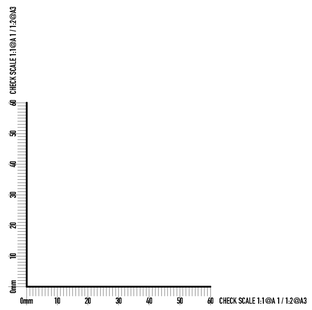
ATTENUATION TANK
[OUT OF WAVIN / INTESIO 'AQUACELL' CRATES OR SIMILAR APPROVED PROPRIETARY MODULAR SYSTEM]
(SCALE 1:25@A1)



S.E.L. PERMAVOID DIFFUSER UNIT DETAIL FOR PLOT 1. (PLOT 2 RELATIVE LEVELS SIMILAR)
(SCALE 1:25@A1)



PARKING AREAS PERMEABLE BLOCK PAVING CONSTRUCTION DETAIL
(SCALE 1:10@A1)



ARUN DISTRICT COUNCIL BN/44/21/DOC

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P3	28.05.21	UPDATED TO SUIT LLFA COMMENTS	CH
P2	18.05.21	UPDATED TO SUIT LLFA COMMENTS	CH
P1	09.04.21	PRELIMINARY ISSUE	JH

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The Town House, St. George's Square, Bishops Waltham, Southampton, Hampshire, SO32 1AF.

Client
SEAWARD PROPERTIES LTD.

Architect
STUDIO LACK ARCHITECTURE

Project Title
LAND OFF CANAL MEWS
BARNHAM

Drawing Title
DRAINAGE & EXTERNAL WORKS DETAILS SHEET 2

Scale	Paper Size	Date	Drawn By	Checked By
AS SHOWN	A1	MARCH 2021	JH	CH

Project No.	Drawing No.	Revision
SPR032	552	P3

APPENDIX 8

Foul Water Drainage Calculations

Foul Water Design Flows

	DWF (l/day)	Daily Design / Peak Flow (l)		No. of Units	Q l/s	
General Housing per dwelling (3 persons)	600	4000		2	0.09	
School per pupil	80	528				
Assembly Hall per seat	10	66				
Cinema per seat	10	66				
Theatre per seat	10	66				
Sports Hall per person	50	330				
Hotel per room	550	3630				
Guest House per room	200	1320				
Motel per room	300	1980				
Holiday Apartment per person	150	990				
Leisure Park per person	220	1452				
Caravan Pk standard per space	250	1650				
Caravan Pk serviced per space	450	2970				
Camping site standard per space	200	1320				
Camping site serviced per space	350	2310				
Public House per seat	150	990				
Restaurant/Day Care Centre per person	270	1782				
Drive in restaurant per seat	380	2508				
Hospital per bed	750	4950				
Nursing/Care Homes per bed	375	2475				
Offices per 100m²	750	4950				
Shopping Centre per 100m²	400	2640				
Warehouse per 100m²	150	990				
Commercial premises per 100m²	300	1980				
Manufacturing unit per 100m²	550	3630				
				Total Flow =	**0.1 l/s**	(6x DWF)

**Sourced from Thames Water Foul Flows*

APPENDIX 9

Surface Water Drainage Calculations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 38 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	7.758	0.278	0.0	2.6	2.6	7.1	O K
30 min Summer	7.809	0.329	0.0	2.8	2.8	8.4	O K
60 min Summer	7.826	0.346	0.0	2.8	2.8	8.9	O K
120 min Summer	7.813	0.333	0.0	2.8	2.8	8.5	O K
180 min Summer	7.784	0.304	0.0	2.7	2.7	7.8	O K
240 min Summer	7.751	0.271	0.0	2.6	2.6	6.9	O K
360 min Summer	7.693	0.213	0.0	2.4	2.4	5.5	O K
480 min Summer	7.644	0.164	0.0	2.2	2.2	4.2	O K
600 min Summer	7.603	0.123	0.0	2.0	2.0	3.2	O K
720 min Summer	7.566	0.086	0.0	2.0	2.0	2.2	O K
960 min Summer	7.503	0.023	0.0	2.0	2.0	0.6	O K
1440 min Summer	7.480	0.000	0.0	1.7	1.7	0.0	O K
2160 min Summer	7.480	0.000	0.0	1.2	1.2	0.0	O K
2880 min Summer	7.480	0.000	0.0	1.0	1.0	0.0	O K
4320 min Summer	7.480	0.000	0.0	0.7	0.7	0.0	O K
5760 min Summer	7.480	0.000	0.0	0.6	0.6	0.0	O K
7200 min Summer	7.480	0.000	0.0	0.5	0.5	0.0	O K
8640 min Summer	7.480	0.000	0.0	0.4	0.4	0.0	O K
10080 min Summer	7.480	0.000	0.0	0.4	0.4	0.0	O K
15 min Winter	7.760	0.280	0.0	2.6	2.6	7.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	124.544	0.0	9.3	16
30 min Summer	84.215	0.0	12.6	28
60 min Summer	54.368	0.0	16.3	44
120 min Summer	33.870	0.0	20.2	80
180 min Summer	25.280	0.0	22.8	114
240 min Summer	20.382	0.0	24.4	148
360 min Summer	15.043	0.0	27.1	212
480 min Summer	12.112	0.0	29.0	276
600 min Summer	10.228	0.0	30.6	338
720 min Summer	8.904	0.0	32.1	400
960 min Summer	7.147	0.0	34.3	502
1440 min Summer	5.233	0.0	37.7	0
2160 min Summer	3.822	0.0	41.3	0
2880 min Summer	3.054	0.0	44.0	0
4320 min Summer	2.222	0.0	48.0	0
5760 min Summer	1.771	0.0	51.0	0
7200 min Summer	1.486	0.0	53.5	0
8640 min Summer	1.288	0.0	55.7	0
10080 min Summer	1.142	0.0	57.5	0
15 min Winter	124.544	0.0	9.4	16

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	7.813	0.333	0.0	2.8	2.8	8.6	O K
60 min Winter	7.826	0.346	0.0	2.8	2.8	8.9	O K
120 min Winter	7.795	0.315	0.0	2.7	2.7	8.1	O K
180 min Winter	7.749	0.269	0.0	2.6	2.6	6.9	O K
240 min Winter	7.702	0.222	0.0	2.4	2.4	5.7	O K
360 min Winter	7.624	0.144	0.0	2.1	2.1	3.7	O K
480 min Winter	7.551	0.071	0.0	2.0	2.0	1.8	O K
600 min Winter	7.494	0.014	0.0	2.0	2.0	0.4	O K
720 min Winter	7.480	0.000	0.0	1.9	1.9	0.0	O K
960 min Winter	7.480	0.000	0.0	1.5	1.5	0.0	O K
1440 min Winter	7.480	0.000	0.0	1.1	1.1	0.0	O K
2160 min Winter	7.480	0.000	0.0	0.8	0.8	0.0	O K
2880 min Winter	7.480	0.000	0.0	0.6	0.6	0.0	O K
4320 min Winter	7.480	0.000	0.0	0.5	0.5	0.0	O K
5760 min Winter	7.480	0.000	0.0	0.4	0.4	0.0	O K
7200 min Winter	7.480	0.000	0.0	0.3	0.3	0.0	O K
8640 min Winter	7.480	0.000	0.0	0.3	0.3	0.0	O K
10080 min Winter	7.480	0.000	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	84.215	0.0	12.6	29
60 min Winter	54.368	0.0	16.3	48
120 min Winter	33.870	0.0	20.3	86
180 min Winter	25.280	0.0	22.7	122
240 min Winter	20.382	0.0	24.5	156
360 min Winter	15.043	0.0	27.1	222
480 min Winter	12.112	0.0	29.0	288
600 min Winter	10.228	0.0	30.7	326
720 min Winter	8.904	0.0	32.1	0
960 min Winter	7.147	0.0	34.3	0
1440 min Winter	5.233	0.0	37.7	0
2160 min Winter	3.822	0.0	41.3	0
2880 min Winter	3.054	0.0	44.0	0
4320 min Winter	2.222	0.0	48.0	0
5760 min Winter	1.771	0.0	51.0	0
7200 min Winter	1.486	0.0	53.5	0
8640 min Winter	1.288	0.0	55.7	0
10080 min Winter	1.142	0.0	57.5	0

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.200	Shortest Storm (mins)	15
Ratio R	0.338	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.030

Time (mins) From:	To:	Area (ha)
0	4	0.030

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Model Details

Storage is Online Cover Level (m) 9.000

Cellular Storage Structure

Invert Level (m) 7.480 Safety Factor 3.0
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)
0.000	27.0	24.0	0.401	0.0	32.0
0.400	27.0	32.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0078-2000-0200-2000
Design Head (m)	0.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	78
Invert Level (m)	7.395
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.200	2.0
Flush-Flo™	0.107	2.0
Kick-Flo®	0.169	1.9
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)
0.100	2.0	1.200	4.6	3.000	7.0	7.000	10.8
0.200	2.0	1.400	4.9	3.500	7.6	7.500	11.2
0.300	2.4	1.600	5.2	4.000	8.1	8.000	11.5
0.400	2.7	1.800	5.5	4.500	8.6	8.500	11.9
0.500	3.0	2.000	5.8	5.000	9.1	9.000	12.3
0.600	3.3	2.200	6.0	5.500	9.6	9.500	12.6
0.800	3.8	2.400	6.3	6.000	10.0		
1.000	4.2	2.600	6.5	6.500	10.4		

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Summary of Results for 100 year Return Period (+40%)

Half Drain Time exceeds 7 days.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.476	0.101	0.0	0.0	0.0	1.3	O K
30 min Summer	8.514	0.139	0.0	0.0	0.0	1.9	O K
60 min Summer	8.557	0.182	0.0	0.0	0.0	2.5	O K
120 min Summer	8.603	0.228	0.0	0.0	0.0	3.1	O K
180 min Summer	8.615	0.240	0.0	0.1	0.1	3.3	O K
240 min Summer	8.616	0.241	0.0	0.1	0.1	3.3	O K
360 min Summer	8.619	0.244	0.0	0.2	0.2	3.4	O K
480 min Summer	8.621	0.246	0.0	0.2	0.2	3.4	O K
600 min Summer	8.622	0.247	0.0	0.2	0.2	3.4	O K
720 min Summer	8.622	0.247	0.0	0.2	0.2	3.4	O K
960 min Summer	8.622	0.247	0.0	0.2	0.2	3.4	O K
1440 min Summer	8.620	0.245	0.0	0.2	0.2	3.4	O K
2160 min Summer	8.619	0.244	0.0	0.2	0.2	3.4	O K
2880 min Summer	8.618	0.243	0.0	0.2	0.2	3.3	O K
4320 min Summer	8.616	0.241	0.0	0.1	0.1	3.3	O K
5760 min Summer	8.614	0.239	0.0	0.1	0.1	3.3	O K
7200 min Summer	8.612	0.237	0.0	0.1	0.1	3.3	O K
8640 min Summer	8.611	0.236	0.0	0.1	0.1	3.3	O K
10080 min Summer	8.610	0.235	0.0	0.1	0.1	3.2	O K
15 min Winter	8.476	0.101	0.0	0.0	0.0	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	124.544	0.0	0.0	19
30 min Summer	84.215	0.0	0.0	34
60 min Summer	54.368	0.0	0.0	64
120 min Summer	33.870	0.0	0.0	124
180 min Summer	25.280	0.0	0.4	180
240 min Summer	20.382	0.0	0.7	196
360 min Summer	15.043	0.0	1.1	242
480 min Summer	12.112	0.0	1.5	302
600 min Summer	10.228	0.0	1.7	362
720 min Summer	8.904	0.0	1.9	426
960 min Summer	7.147	0.0	2.3	542
1440 min Summer	5.233	0.0	2.8	792
2160 min Summer	3.822	0.0	3.3	1144
2880 min Summer	3.054	0.0	3.7	1492
4320 min Summer	2.222	0.0	4.2	2192
5760 min Summer	1.771	0.0	4.6	2920
7200 min Summer	1.486	0.0	4.9	3672
8640 min Summer	1.288	0.0	5.1	4400
10080 min Summer	1.142	0.0	5.2	4976
15 min Winter	124.544	0.0	0.0	19

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	8.514	0.139	0.0	0.0	0.0	1.9	O K
60 min Winter	8.557	0.182	0.0	0.0	0.0	2.5	O K
120 min Winter	8.603	0.228	0.0	0.0	0.0	3.1	O K
180 min Winter	8.616	0.241	0.0	0.1	0.1	3.3	O K
240 min Winter	8.617	0.242	0.0	0.1	0.1	3.3	O K
360 min Winter	8.620	0.245	0.0	0.2	0.2	3.4	O K
480 min Winter	8.621	0.246	0.0	0.2	0.2	3.4	O K
600 min Winter	8.621	0.246	0.0	0.2	0.2	3.4	O K
720 min Winter	8.621	0.246	0.0	0.2	0.2	3.4	O K
960 min Winter	8.620	0.245	0.0	0.2	0.2	3.4	O K
1440 min Winter	8.618	0.243	0.0	0.2	0.2	3.4	O K
2160 min Winter	8.616	0.241	0.0	0.1	0.1	3.3	O K
2880 min Winter	8.614	0.239	0.0	0.1	0.1	3.3	O K
4320 min Winter	8.612	0.237	0.0	0.1	0.1	3.3	O K
5760 min Winter	8.610	0.235	0.0	0.1	0.1	3.2	O K
7200 min Winter	8.609	0.234	0.0	0.1	0.1	3.2	O K
8640 min Winter	8.609	0.234	0.0	0.0	0.0	3.2	O K
10080 min Winter	8.608	0.233	0.0	0.0	0.0	3.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
30 min Winter	84.215	0.0	0.0	34
60 min Winter	54.368	0.0	0.0	64
120 min Winter	33.870	0.0	0.0	124
180 min Winter	25.280	0.0	0.4	172
240 min Winter	20.382	0.0	0.7	192
360 min Winter	15.043	0.0	1.1	252
480 min Winter	12.112	0.0	1.5	316
600 min Winter	10.228	0.0	1.7	380
720 min Winter	8.904	0.0	1.9	446
960 min Winter	7.147	0.0	2.3	568
1440 min Winter	5.233	0.0	2.8	820
2160 min Winter	3.822	0.0	3.3	1164
2880 min Winter	3.054	0.0	3.7	1528
4320 min Winter	2.222	0.0	4.2	2204
5760 min Winter	1.771	0.0	4.6	2824
7200 min Winter	1.486	0.0	4.9	3704
8640 min Winter	1.288	0.0	5.1	4256
10080 min Winter	1.142	0.0	5.3	5048

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.200	Shortest Storm (mins)	15
Ratio R	0.338	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

Time (mins) From:	To:	Area (ha)
0	4	0.005

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Model Details

Storage is Online Cover Level (m) 9.150

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	13.3	Slope (1:X)	500.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.375	Cap Volume Depth (m)	0.500

Pipe Overflow Control

Diameter (m)	0.100	Entry Loss Coefficient	0.500
Slope (1:X)	100.0	Coefficient of Contraction	0.600
Length (m)	2.000	Upstream Invert Level (m)	8.600
Roughness k (mm)	0.600		

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