

Project Name:	Minster Court, Courtwick Lane, Littlehampton BN17 7RN
Document Reference:	153.5003/TN/2
Document Name:	Minster Court Technical Note
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1. INTRODUCTION

- 1.1 This Drainage Strategy has been prepared by Paul Basham Associates on behalf of SHW (Stiles Harold Williams Partnership) to support a planning application for a commercial expansion to an existing site. The land is situated at Minster Court, Courtwick Lane, Littlehampton, BN17 7RN. A location plan is provided in **Figure 1** and a proposed site layout can be found in **Appendix A**.

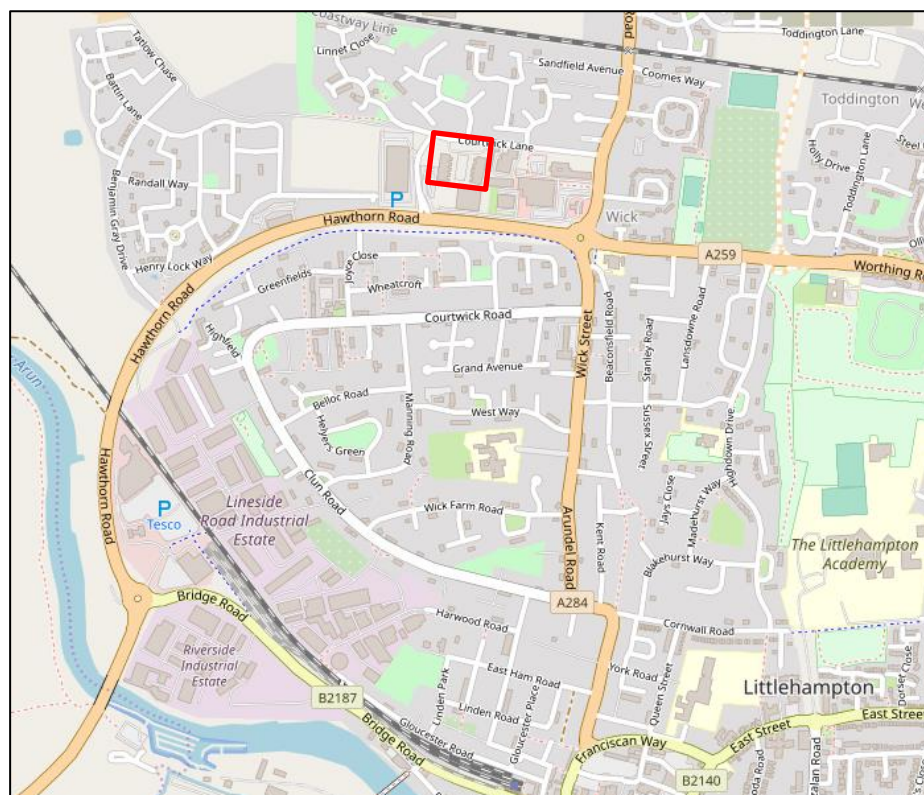


Figure 1: Site Location Plan

- 1.1 The site is located at Minster Court Industrial Estate, Wick, Littlehampton. The site neighbours the A259 (Worthing Road/ Hawthorne Road) to south with the A284 (Lyminster Road) to the east. The site is approximately 1.5km north of Littlehampton town centre. The nearest significant watercourse is the River Arun which is location 1.15km to the south west of the site.
- 1.2 The site is currently a brown field site comprising of 10 commercial units with associated hardstanding. Under the new proposals, the site is looking to expand to include an additional 4 new units providing a combined commercial floor space of approximately 12,000Sq.ft.
- 1.3 Vehicular access to the site is currently gained via Courtwick Lane, in the North-West of the site. The existing access is to be relocated to the Central-North under the proposal, and additional car parking spaces will also be provided.

Scope of the report

- 1.4 This report outlines the technical note for the development site with regards to surface water and foul water flows generated by the proposed development, and its effects on the existing sewer networks.
- 1.5 This document has been prepared based on the following information:
 - Consultation with the landowner
 - Southern Water Sewer Records
 - Topographical Survey information
 - Architectural design information
 - Environment Agency data
 - British Geological Society data.

2. EXISTING DRAINAGE

- 2.1 As per the Southern Water Sewer Mapping Records located in **Appendix B**, shows that both Foul and Surface Water networks are located in the highway of Goldcrest Avenue, with additional networks in Kingfisher Avenue and Courtwick Lane.

Existing Surface Water Drainage

- 2.2 The existing surface water network shows that there are two separate networks in the vicinity of the site. One in the highway running north in Goldcrest Avenue and one running west along Courtwick Lane to a ditch opposite the site.
- 2.3 Greenfield run off rates have been estimated using the HR Wallingford calculator on the UK SuDS website, based on the proposed development area of circa 0.12ha. A copy of these calculations is shown in **Appendix C**. The results have been summarised in **Table 1** below:

Greenfield runoff rates		Default	Edited
Qbar (l/s)		0.36	0.36
1 in 1 year (l/s)		0.31	0.31
1 in 30 years (l/s)		0.83	0.83
1 in 100 years (l/s)		1.15	1.15

Table 2: Estimated Greenfield Runoff Rates

Existing Foul Water Drainage

- 2.4 The existing foul water network shows that there are two separate foul water networks within the vicinity of the site. One running north in Goldcrest Avenue, and the other the west in Kingfisher Road which joins the network in Goldcrest Avenue via Swift Way.

3. FLOOD RISK

- 3.1 Flood Plain Mapping provided by the Environment Agency indicates that the site lies within Flood Zone 1.
- 3.2 Flood Zone 1 is defined as comprising “land assessed as having less than 1 in 1000 annual probability of river flooding (0.1%).
- 3.3 On this basis, the site is considered to have a low risk of flooding and therefore does not have to pass the Sequential or Exception Tests. See extract of Flood Zone Identification Map in Figure 4.

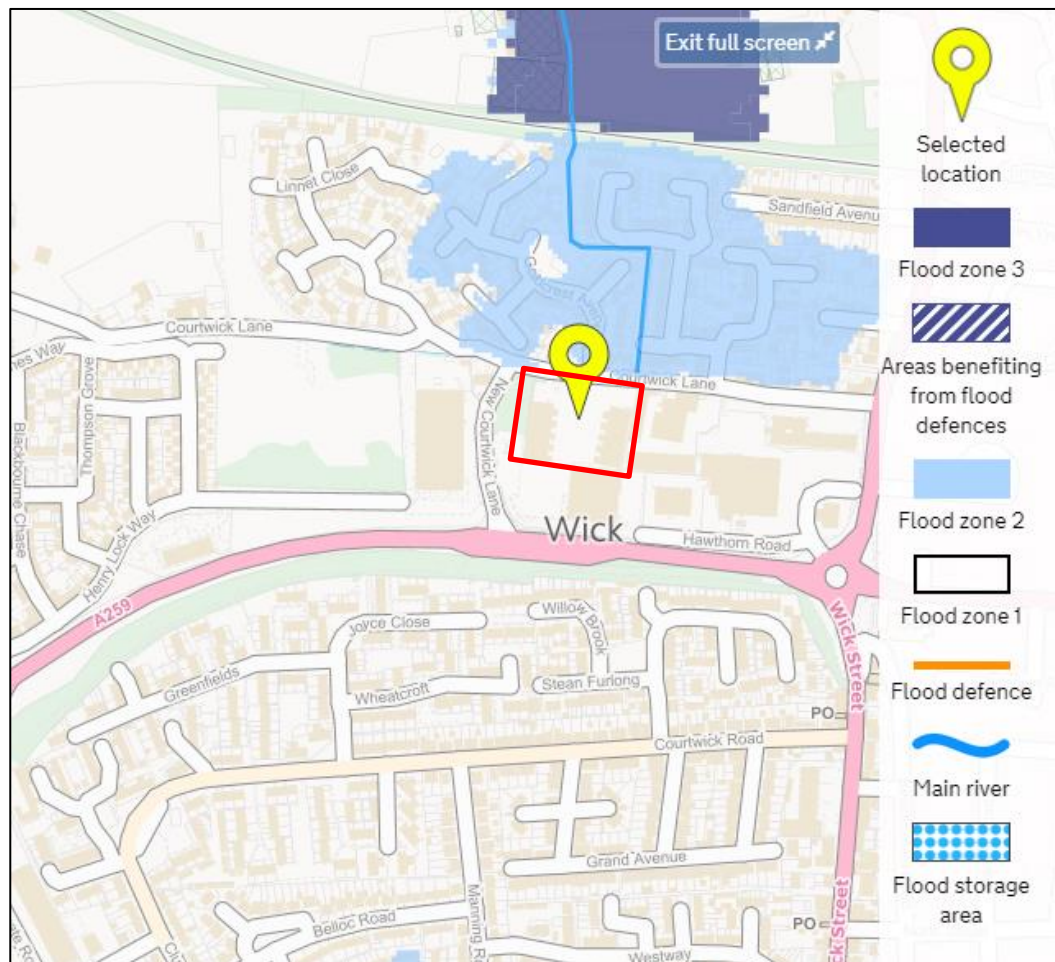


Figure 4: Flood Zone Identification Map

4. POTENTIAL SURFACE WATER DRAINAGE STRATEGY

- 4.1 For the discharge generated from the development into the existing Surface Water Network, it is proposed to limit the runoff to the greenfield runoff rate of 1.15 l/s, which is equivalent to the 1 in 100 year storm event. The main reason for adopting the higher greenfield runoff rate is to avoid the potential risks of sediments build-up inside the pipes and cause blockages.
- 4.2 A strategy that involves collecting and attenuating the surface water runoff generated from the development impervious area of 1270m², and then discharging at a limited flow rate into the existing watercourse. The surface water runoff will be drained by gravity, via underground drainage pipes, and into a proposed cellular attenuation crate system measured by 10m x 9m x 1.2m deep with a net storage volume of 102.6m³. The conveyed runoff would then be limited by a vortex flow-control device, which will be housed inside a manhole within the proposed site boundary, at a discharging rate of 1.15 l/s. A copy of the Micro-Drainage Calculations can be found in **Appendix D**.

5. POTENTIAL FOUL WATER DRAINAGE STRATEGY

- 5.1 It is proposed to connect into the existing foul water network via a Section 106 Agreement (Water Industry Act 1991) with Southern Water.
- 5.2 The foul water drainage strategy has been designed based on Southern Water's design flow rate for commercial premises of 300 litres per day per 100m². The four proposed buildings have an approximate total area of 1270m², with each building footprint being approximately 317m². Therefore, the foul water will be discharged from the site at a rate of 0.088l/s, based on a 12-hours usage per day basis.

6. SUMMARY AND RECOMMENDATIONS

- 6.1 This technical note concludes that in the context of existing ground conditions, as long as the overall developed area red-line boundaries are outside of the flood zones and long-term flood risk areas, the development is suitable without the need for the Sequential or Exception tests.
- 6.2 This drainage strategy employed is likely to consist of the following:
- Underground piped network
 - Attenuated storage and limited discharge to the existing surface water network located in Goldcrest Avenue.
- 6.3 The proposed cellular attenuation crate system is measured by 10m x 9m x 1.2m deep, providing a net storage volume of 102.6m³. This has been indicatively shown on the Proposed Drainage Layout Drawing situated in Appendix D.
- 6.4 The foul water drainage strategy has been designed based on Southern Water's design flow rate for commercial premises of 300 litres per day per 100m². The four proposed buildings have an approximate total area of 1270m², with each building footprint being approximately 317m². Therefore, the foul water will be discharged from the site at a rate of 0.088l/s, based on a 12-hours usage per day basis.
- 6.5 A Section 106 (Water Industry Act 1991) will need to be applied and agreed with Southern Water prior to connecting into the existing foul water sewer network. There will be a connection fee associated with the application, and a new infrastructure charge that is chargeable per property.

Appendix A Proposed Site Layout

153.5003 Minster Court, Littlehampton, BN17 7RN
Flood Risk Assessment & Drainage Strategy

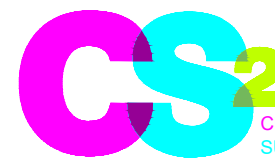
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REV B	EXISTING CAR PARKING NUMBERS ADDED	07.08.19	CS
REV A	PROPOSED UNITS 11-14 HANDED, BOUNDARY TO AREA TO RIGHT OF FRONTAGE AMENDED, EXTENT OF PROPOSED SOFT LANDSCAPING ADDED	02.08.19	CS

REV	DESCRIPTION	DATE	INITIAL
STAGE:			

PLANNING



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PROJECT:
MINSTER COURT, COURTWICK LANE,
LITTLEHAMPTON. BN17 7RN

TITLE:
PROPOSED SITE PLAN - OPTION B

DRAWN: CS	CHECKED: LS	DATE: 07/08/2019
SCALE: 1:200 @ A1	DRAWING NO. 1054486/P02	REV: B

Appendix B

Southern Water Sewer Mapping Records

153.5003 Minster Court, Littlehampton, BN17 7RN
Flood Risk Assessment & Drainage Strategy

Paul Basham Associates Ltd
Report No. 153.5003/TN/2

103869



TQ0203NW



Southern Water

503050

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0303X			UNK	UNK	CIRC	3706X	2.6	-0.87	150	VC	CIRC	4803X	2	-0.63	150	VC	CIRC	6752X	2.34	1.55	150	VC	CIRC
0304X			UNK	UNK	CIRC	3707X	2.56	-1.52	150	VC	CIRC	4806X			UNK	UNK	CIRC	6801X	3.56	2.6	225	VC	CIRC
0305X			UNK	UNK	CIRC	3708X	2.65	-0.78	150	VC	CIRC	4807X			UNK	UNK	CIRC	6802X	3.97	2.42	225	VC	CIRC
030DX			150	VC	CIRC	3709X	2.53	-0.65	150	VC	CIRC	4850X	2.03	1.1	300	CP	CIRC	680BX			UNK	UNK	UNK
031DX			UNK	UNK	CIRC	370PY	1.87		100	CI	CIRC	4851X	1.92	0.88	225	VC	CIRC	680DX			UNK	UNK	UNK
032DX			UNK	UNK	CIRC	3710X	1.88	-1.89	150	VC	CIRC	4852X	1.68	1.06	225	VC	CIRC	682BX			UNK	UNK	UNK
033DX			UNK	UNK	CIRC	3711X	1.81	-1.29	150	VC	CIRC	5301X	4.64	2.76	225	VC	CIRC	682DX			UNK	UNK	UNK
0701X	4.97	3.01	150	VC	CIRC	3712X			UNK	UNK	CIRC	5302X	4.79	2.89	225	VC	CIRC	683BX			150	VC	CIRC
0801X	5.46	3.47	150	VC	CIRC	3750X	2.52	1.35	375	CP	CIRC	5404X			UNK	VC	CIRC	684BX			150	VC	CIRC
0802X	5.05	2.84	150	VC	CIRC	3751X	2.65	1.2	375	CP	CIRC	5405X			UNK	VC	CIRC	684DX			150	VC	CIRC
1303X			UNK	UNK	CIRC	3752Y	2.58	1.07	750	CP	RECT	5406X	4.2	1.345	225	VC	CIRC	6850X	3.54	1.84	225	CP	CIRC
1304X			UNK	UNK	CIRC	3752X	2.58	1.07	750	CP	RECT	5407X	4.35	0.908	225	VC	CIRC	6851X	3.92	2.53	150	VC	CIRC
1305X			UNK	UNK	CIRC	3753X	2.46	1.03	225	VC	CIRC	5504X	3.75	1.722	225	VC	CIRC	7301X	5.37	4.07	150	VC	CIRC
1306X			UNK	UNK	CIRC	3754X	2.61	0.98	750	CP	RECT	5601X	2.21	1.51	225	VC	CIRC	7302X	5.28	4.42	150	VC	CIRC
1307X			UNK	UNK	UNK	3754Y	2.61	0.98	750	CP	RECT	561PX			100	CI	CIRC	7303X			UNK	UNK	UNK
1310X			100	VC	CIRC	3755X	2.46	0.94	225	VC	CIRC	5650X	3.18	1.21	OTHER	CO	RECT	7304X			UNK	UNK	CIRC
1313X			UNK	UNK	CIRC	3756X	2.71	1.02	750	CP	RECT	5651X	3.06	1.21	OTHER	CO	RECT	730DX			UNK	UNK	UNK
1315X			100	VC	CIRC	3756Y	2.71	1.02	750	CP	RECT	5652X	3.1	1.21	OTHER	CO	RECT	731DX			100	VC	CIRC
1701X	3.97	2.18	150	VC	CIRC	3757X	2.46	0.98	225	VC	CIRC	5750X	2.14	0.89	375	CP	CIRC	732DX			UNK	UNK	UNK
1702X	3.57	1.77	150	VC	CIRC	3758X	2.58	1.39	300	CP	CIRC	5751X	2.19		300	CP	CIRC	734DX			UNK	UNK	UNK
1703X	3.15	1.07	150	VC	CIRC	3759Y	2.73	0.95	750	CP	RECT	5752X	2.09	1.26	225	CP	CIRC	73ADX			UNK	UNK	CIRC
1704X	2.92	1.51	150	VC	CIRC	3759Y	2.73	0.95	750	CP	RECT	5753X	1.85	1.27	225	CP	CIRC	73BDX			UNK	UNK	CIRC
1705X	3.09	1.3	150	VC	CIRC	3760X	2.47	0.91	225	VC	CIRC	5754X	1.81	1.28	225	CP	CIRC	7401X		0.38	300	VC	CIRC
1751X	3.14	1.92	225	VC	CIRC	3761X	2.73	0.97	750	CP	RECT	5801X	2.09	0.07	150	VC	CIRC	7402X	3.73	0.03	300	VC	CIRC
1751X	1.99	1.99	225	VC	CIRC	3761Y	2.73	0.97	750	CP	RECT	580DX			UNK	UNK	UNK	7403X	3.96	1.07	150	VC	CIRC
1801X		0.9	150	VC	CIRC	3762X	2.41	0.94	225	VC	CIRC	5850X	1.91	1.23	300	CP	CIRC	7404X			UNK	UNK	CIRC
1802X	3.15	0.84	150	VC	CIRC	3763X	2.47	0.72	300	CP	CIRC	5851X	2.08	0.96	300	CP	CIRC	740BX			UNK	UNK	UNK
1803X	2.92	0.52	150	VC	CIRC	3801X	1.86	-0.32	150	VC	CIRC	5852X	2.96	1.51	225	CP	CIRC	740DX			UNK	UNK	UNK
1850X	2.93	1.8	225	VC	CIRC	3850X	2.57	0.94	750	CP	RECT	5853X		1.36	225	CP	CIRC	741BX			UNK	UNK	UNK
2302X			UNK	UNK	CIRC	3850Y	2.57	0.94	750	CP	RECT	6301X	4.15		OTHER	CP	CIRC	741DX			UNK	UNK	UNK
2303X			UNK	UNK	CIRC	3851X	2.43	0.91	225	VC	CIRC	6302X	5.1	4.05	150	VC	CIRC	742DX			UNK	UNK	UNK
2305X			100	VC	CIRC	3852X	2.58	0.96	750	CP	RECT	6303X	3.62	2.37	375	VC	CIRC	743DX			UNK	UNK	UNK
2306X			100	VC	CIRC	3852X	2.58	0.96	750	CP	RECT	6304X	3.49	2.33	375	VC	CIRC	744DX			UNK	UNK	UNK
2600X	2.68	0.013	150	VC	CIRC	3853X	2.48	0.92	225	VC	CIRC	6305X	5.41	2.59	225	VC	CIRC	7450X	3.81	1.63	900	CP	CIRC
2700X	2.55	-0.48	150	VC	CIRC	4301X	5.11	3.03	225	VC	CIRC	631DX			375	VC	CIRC	7451X	3.52	1.43	900	CP	CIRC
2701X	2.56	-0.59	150	VC	CIRC	4302X	5.12	3.08	225	VC	CIRC	6350X	4	1.62	450	CP	CIRC	7501X	4.08	1.72	225	VC	CIRC
2702X	3.17	1.75	150	VC	CIRC	4303X	5.07	3.15	225	VC	CIRC	6351X	5.08	3.44	225	VC	CIRC	7502X	4.21	2.06	225	VC	CIRC
2703X			UNK	UNK	CIRC	4305X	5	3.35	150	VC	CIRC	6401X	3.8		525	CP	CIRC	7503X	4.33	2.52	225	VC	CIRC
270DX			UNK	UNK	CIRC	4308X	5.11	3.53	150	VC	CIRC	6402X	3.75		OTHER	CP	CIRC	750DX			UNK	UNK	UNK
271DX			150	VC	CIRC	4309X			100	PVC	CIRC	6403X	3.9	2.41	375	VC	CIRC	751DX			UNK	UNK	UNK
2750X		1.3	375	CP	CIRC	4401X			UNK	UNK	CIRC	6404X	3.76	0.19	300	VC	CIRC	752DX			UNK	UNK	UNK
2751X	2.55	1.51	300	CP	CIRC	4402X			UNK	UNK	CIRC	6406X	4.22	0.502	225	VC	CIRC	753DX			225	VC	CIRC
2752X	2.46	1.58	225	VC	CIRC	4403X			UNK	UNK	CIRC	640DX			300	VC	CIRC	754DX			UNK	UNK	UNK
2800X			150	VC	CIRC	441DX			UNK	UNK	CIRC	641DX			300	VC	CIRC	7601X	3.03	1.27	300	VC	CIRC
2801X	2.48	0.56	150	VC	CIRC	4601X	2.2	0.7	150	VC	CIRC	6450X	3.86	1.36	OTHER	CO	RECT	7602X	4.3	2.18	225	CP	CIRC
2802X	2.78	0.64	150	VC	CIRC	4603X			UNK	UNK	HORS	6451X	3.84	1.37	OTHER	CO	RECT	7603X			UNK	UNK	CIRC
2803X	2.69	0.34	150	VC	CIRC	4604X			UNK	UNK	UNK	6452X	3.78	1.36	OTHER	CO	RECT	7604X			UNK	VC	CIRC
2805X	2.87	0.12	150	VC	CIRC	4650X	2.9	1.21	OTHER	CO	RECT	6501X	3.38	0.39	300	VC	CIRC	760BX			UNK	UNK	UNK
2850X	2.49	1.56	225	VC	CIRC	4651X			OTHER	CO	RECT	6502X	3.26	0.46	300	VC	CIRC	761BX			300	VC	CIRC
2851X	2.67	1.53	300	CO	CIRC	4652X	1.94	1.25	225	VC	CIRC	650DX			300	VC	CIRC	761DX			300	VC	CIRC
2852X	2.83	1.73	225	VC	CIRC	4701X	1.95	0.305	150	VC	CIRC	6550X	3.3	1.31	OTHER	CO	RECT	762BX			UNK	UNK	CIRC
2853X	2.85	1.64	225	VC	CIRC	4702X	2.18	-0.12	150	VC	CIRC	6551X	2.97	1.26	OTHER	CO	CIRC	762DX			UNK	UNK	UNK
3303X	4.82	3.92	150	VC	CIRC	4703X	2.15		150	VC	UNK	6601X	2.36	1.31	225	VC	CIRC	763BX			UNK	UNK	CIRC
3304X			100	VC	CIRC	4704X	2.17	-0.02	150	VC	CIRC	6602X	2.91	0.87	300	VC	CIRC	763DX			UNK	UNK	UNK
330DX			100	VC	CIRC	4705X	2.53	-0.87	150	VC	CIRC	6603X			UNK	VC	CIRC	764BX			225	CP	CIRC
3601X	2.75	0.94	150	VC	CIRC	4706X			150	VC	UNK	6604X			UNK	VC	CIRC	764DX			UNK	UNK	UNK
3602X	2.68	0.67	150	VC	CIRC	4707X			UNK	UNK	CIRC	660DX			225	VC	CIRC	7650X	2.98	1.49	375	CP	CIRC
3603X	2.36	-0.16	150	VC	CIRC	4708X			UNK	UNK	CIRC	6650X	2.98	1.21	OTHER	CO	RECT	76ABX			300	VC	CIRC
3650X	2.77	1.56	300	VC	CIRC	4709X			UNK	UNK	CIRC	6651X	2.88	1.21	OTHER	CO	RECT	76BBX			UNK	VC	CIRC
3651X	2.57	1.45	375	CP	CIRC	470DX			UNK	UNK	CIRC	6701X	2.22	1.59	225	VC	CIRC	7701X	2.99	1.67	300	VC	CIRC
3701X	2.53	-0.21	150	VC	CIRC	4750X	1.94	1.13	300	CP	CIRC	6702X	2.7	1.46	225	VC	CIRC	7702X	2.93	1.45	300	VC	CIRC
3702X	2.65	-0.71	150	VC	CIRC	4751X	2.18	0.86	525	CP	CIRC	670DX			UNK	UNK	UNK	7703X	2.89	1.41	300	VC	CIRC
3703X	2.48	0.45	150	VC	CIRC	4752X	2.19	0.79	525	CP	CIRC	671DX			100	VC	CIRC	7704X	3.52	1.92	225	CP	CIRC
3704X	2.47	-1.39	150	VC	CIRC	4753X	2.38	1.49	225	VC	CIRC	6750X	2.03	1.38	150	VC	CIRC	7705X		2.16	225	CP	CIRC
3705X	2.48	-0.98	150	VC	CIRC	4802X	2	0.38	150	VC	CIRC	6751X	2.21	1.49	150	VC	CIRC	770DX			UNK	UNK	UNK

LINE STYLES / COLOURS	
Brown	Foul
Red	Foul Syphon Sewer
Red	Foul Vacuum Main
Red	Foul Rising Main
Red	Combined
Red	Combined Syphon Sewer
Red	Combined Rising Main
Orange	Lateral Drain
Orange	Building Over Agreement Area
Dark Blue	Treated Effluent
Purple	Sludge
Purple	Sewer Catchment
Purple	Section 104 Area
Light Blue	Surface Water
Light Blue	Surface Water Rising Main
Yellow	Private
Green	Access Shaft
Green	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 Reinforced Concrete</

Appendix C

HR Wallingford Greenfield Run-Off Calculations

153.5003 Minster Court, Littlehampton, BN17 7RN
Flood Risk Assessment & Drainage Strategy

Paul Basham Associates Ltd
Report No. 153.5003/TN/2

Calculated by:

Site name:

Site location:

Site coordinates

Latitude:

Longitude:

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference:

Date:

Methodology

IH124

Site characteristics

Total site area (ha)	0.12
----------------------	------

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	3	3
HOST class	---	---
SPR/SPRHOST	0.37	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm)	726	726
Hydrological region	7	7
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

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

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

Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

(3) Is $SPR/SPRHOST \leq 0.3$?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	0.36	0.36
1 in 1 year (l/s)	0.31	0.31
1 in 30 years (l/s)	0.83	0.83
1 in 100 years (l/s)	1.15	1.15

Appendix D

MicroDrainage Calculations

153.5003 Minster Court, Littlehampton, BN17 7RN
Flood Risk Assessment & Drainage Strategy

Paul Basham Associates Ltd
Report No. 153.5003/TN/2

Paul Basham Associates		Page 0
Lancaster Court Fareham Hampshire, PO15 5TU	Minster Court Courtwick Lane	
Date 19/07/2019 14:45 File 153.5003 DRAINAGE CALCS.SRCX	Designed by CLL Checked by SH	
Innovyze	Source Control 2018.1.1	

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

Half Drain Time : 623 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	2.090	0.340	0.0	0.8	0.8	29.1	O K
30 min Summer	2.202	0.452	0.0	0.9	0.9	38.7	O K
60 min Summer	2.318	0.568	0.0	1.0	1.0	48.6	O K
120 min Summer	2.426	0.676	0.0	1.1	1.1	57.8	O K
180 min Summer	2.477	0.727	0.0	1.1	1.1	62.2	O K
240 min Summer	2.503	0.753	0.0	1.1	1.1	64.4	O K
360 min Summer	2.528	0.778	0.0	1.1	1.1	66.5	O K
480 min Summer	2.532	0.782	0.0	1.1	1.1	66.9	O K
600 min Summer	2.532	0.782	0.0	1.1	1.1	66.9	O K
720 min Summer	2.530	0.780	0.0	1.1	1.1	66.7	O K
960 min Summer	2.521	0.771	0.0	1.1	1.1	65.9	O K
1440 min Summer	2.489	0.739	0.0	1.1	1.1	63.2	O K
2160 min Summer	2.435	0.685	0.0	1.1	1.1	58.5	O K
2880 min Summer	2.382	0.632	0.0	1.0	1.0	54.1	O K
4320 min Summer	2.292	0.542	0.0	0.9	0.9	46.4	O K
5760 min Summer	2.219	0.469	0.0	0.9	0.9	40.1	O K
7200 min Summer	2.160	0.410	0.0	0.8	0.8	35.0	O K
8640 min Summer	2.111	0.361	0.0	0.8	0.8	30.8	O K
10080 min Summer	2.069	0.319	0.0	0.7	0.7	27.3	O K
15 min Winter	2.132	0.382	0.0	0.8	0.8	32.6	O K
30 min Winter	2.258	0.508	0.0	0.9	0.9	43.4	O K
60 min Winter	2.389	0.639	0.0	1.0	1.0	54.6	O K
120 min Winter	2.513	0.763	0.0	1.1	1.1	65.2	O K
180 min Winter	2.572	0.822	0.0	1.2	1.2	70.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	131.851	0.0	29.6	19
30 min Summer	88.566	0.0	39.8	34
60 min Summer	56.713	0.0	51.0	64
120 min Summer	35.004	0.0	63.0	122
180 min Summer	25.973	0.0	70.1	182
240 min Summer	20.877	0.0	75.1	242
360 min Summer	15.365	0.0	82.9	360
480 min Summer	12.341	0.0	88.8	438
600 min Summer	10.402	0.0	93.6	494
720 min Summer	9.042	0.0	97.6	556
960 min Summer	7.241	0.0	104.2	684
1440 min Summer	5.284	0.0	114.1	966
2160 min Summer	3.848	0.0	124.6	1380
2880 min Summer	3.068	0.0	132.5	1784
4320 min Summer	2.226	0.0	144.2	2556
5760 min Summer	1.771	0.0	153.0	3344
7200 min Summer	1.483	0.0	160.2	4104
8640 min Summer	1.284	0.0	166.4	4840
10080 min Summer	1.137	0.0	171.9	5552
15 min Winter	131.851	0.0	33.2	19
30 min Winter	88.566	0.0	44.6	33
60 min Winter	56.713	0.0	57.1	62
120 min Winter	35.004	0.0	70.5	120
180 min Winter	25.973	0.0	78.5	178

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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 (m ³)	Status
240 min Winter	2.604	0.854	0.0	1.2	1.2	73.0	O K
360 min Winter	2.638	0.888	0.0	1.2	1.2	75.9	O K
480 min Winter	2.648	0.898	0.0	1.2	1.2	76.8	O K
600 min Winter	2.646	0.896	0.0	1.2	1.2	76.6	O K
720 min Winter	2.640	0.890	0.0	1.2	1.2	76.1	O K
960 min Winter	2.627	0.877	0.0	1.2	1.2	75.0	O K
1440 min Winter	2.582	0.832	0.0	1.2	1.2	71.2	O K
2160 min Winter	2.502	0.752	0.0	1.1	1.1	64.3	O K
2880 min Winter	2.426	0.676	0.0	1.1	1.1	57.8	O K
4320 min Winter	2.297	0.547	0.0	1.0	1.0	46.8	O K
5760 min Winter	2.198	0.448	0.0	0.9	0.9	38.3	O K
7200 min Winter	2.121	0.371	0.0	0.8	0.8	31.7	O K
8640 min Winter	2.060	0.310	0.0	0.7	0.7	26.5	O K
10080 min Winter	2.012	0.262	0.0	0.7	0.7	22.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
240 min Winter	20.877	0.0	84.1	236
360 min Winter	15.365	0.0	92.9	348
480 min Winter	12.341	0.0	99.5	458
600 min Winter	10.402	0.0	104.8	558
720 min Winter	9.042	0.0	109.3	580
960 min Winter	7.241	0.0	116.7	732
1440 min Winter	5.284	0.0	126.5	1038
2160 min Winter	3.848	0.0	139.6	1488
2880 min Winter	3.068	0.0	148.4	1904
4320 min Winter	2.226	0.0	161.5	2724
5760 min Winter	1.771	0.0	171.3	3512
7200 min Winter	1.483	0.0	179.4	4256
8640 min Winter	1.284	0.0	186.4	5016
10080 min Winter	1.137	0.0	192.5	5744

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.120

Time (mins)	Area
From:	To: (ha)
0	4 0.120

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Model Details

Storage is Online Cover Level (m) 3.250

Cellular Storage Structure

Invert Level (m) 1.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	90.0	90.0	1.200	90.0	135.5	1.201	0.0	135.6

Crown Vortex Valve® Outflow Control

Design Head (m) 0.930 Vortex Valve® Type R1 SW Only Invert Level (m) 1.720
Design Flow (l/s) 1.2 Diameter (mm) 46

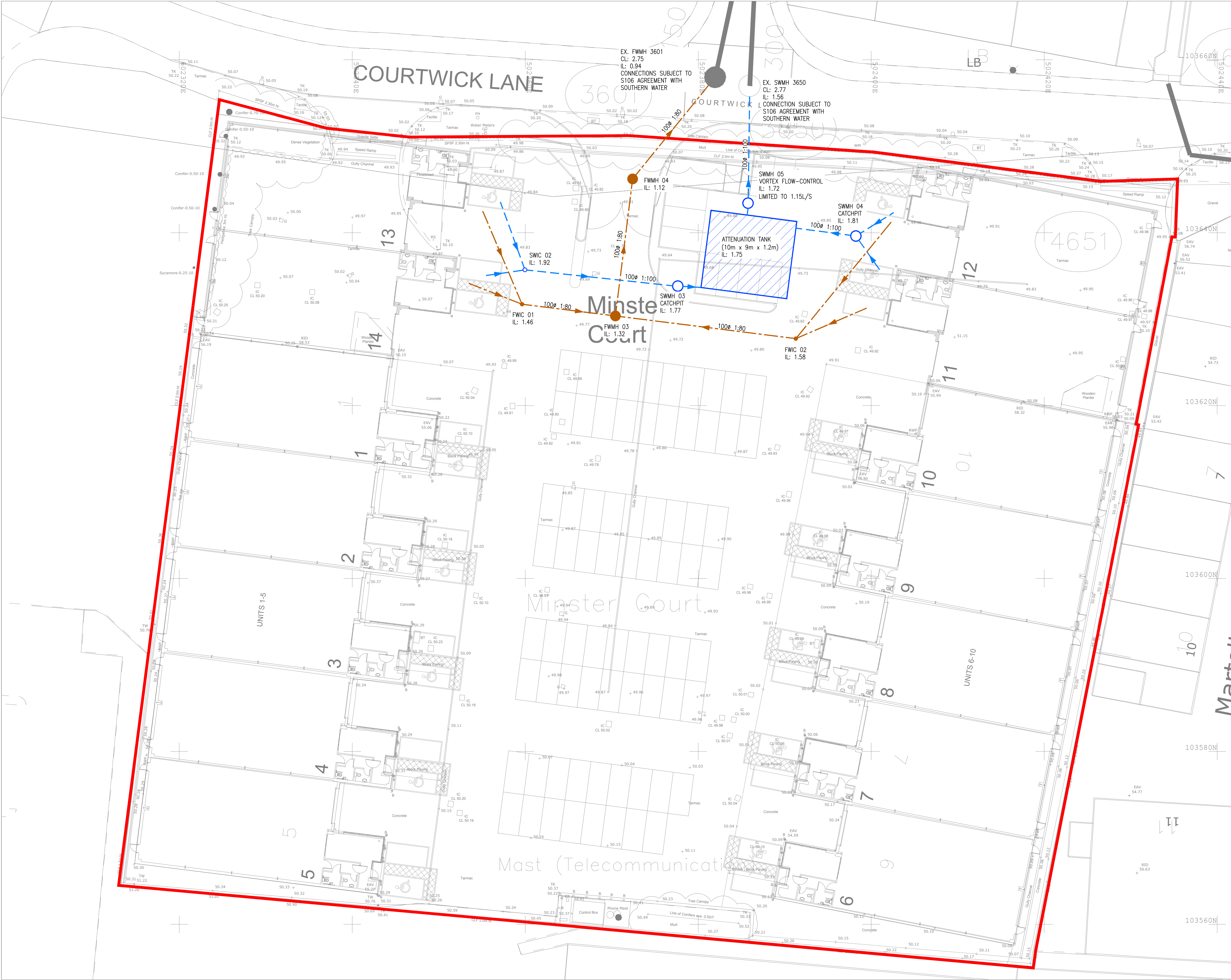
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.4	0.800	1.1	2.000	1.8	4.000	2.5	7.000	3.3
0.200	0.6	1.000	1.3	2.200	1.9	4.500	2.7	7.500	3.4
0.300	0.7	1.200	1.4	2.400	1.9	5.000	2.8	8.000	3.5
0.400	0.8	1.400	1.5	2.600	2.0	5.500	2.9	8.500	3.6
0.500	0.9	1.600	1.6	3.000	2.2	6.000	3.1	9.000	3.8
0.600	1.0	1.800	1.7	3.500	2.3	6.500	3.2	9.500	3.9

Appendix E

Proposed Drainage Strategy Drawing

153.5003 Minster Court, Littlehampton, BN17 7RN
Flood Risk Assessment & Drainage Strategy

Paul Basham Associates Ltd
Report No. 153.5003/TN/2



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- ### LEGEND:
- SITE BOUNDARY (APPROX.)
 - PROPOSED SURFACE WATER SEWER
 - S.W. MANHOLE / INSPECTION CHAMBER
 - PROPOSED CELLULAR STORAGE (8m x 5m x 1.2m DEEP)
 - PROPOSED FOUL SEWER
 - FOUL WATER MANHOLE/ INSPECTION CHAMBER
 - EXISTING DRAINAGE NETWORK
 - EXISTING FOUL/ SURFACE WATER MANHOLE

Rev	Description	Date	By	Chkd



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SHW

Client

Project Name
MINSTER COURT, COURTWICK LANE
LITTLEHAMPTON, BN17 7RN

Title
PROPOSED DRAINAGE STRATEGY

Project Phase
PRELIMINARY

Checked By	Checked Date	Drawn By	Drawn Date
SH	21.08.19	CLL	21.08.19

Client Drawing No.	Scale	Revision
	1:200 (AT A1 SIZE)	

PBA Drawing No.	Revision
153.0003.501	-