CAMERON DARROCH ASSOCIATES

APPENDIX IV

CAMERON DARROCH ASSOCIATES KESTREL BUSINESS CENTRE, PRIVATE ROAD No. 2, COLWICK, NOTTINGHAM, NG4 2JR



DRAINAGE STRATEGY

THE FOLLOWING TEXT DESCRIBES THE SURFACE WATER DRAINAGE DISPOSAL STRATEGY FOR THIS DEVELOPMENT. THE SITE IS CLASSIFIED AS BROWNFIELD (BEING PREVIOUSLY USED FOR RESIDENTIAL PURPOSES.) KEY POINTS FOR THE STRATEGY ARE AS FOLLOWS:

 HULDWS:
 THE FIRST CHOICE FOR SURFACE WATER IS ATTENUATION WITH DIRECT INFLITRATION, HOWEVER SITE INVESTIGATIONS IDENTIFIED THAT SHALLOW INFILTRATION WAS NOT FEASIBLE DUE TO POOR INFILTRATION IRATES ACHEVED. THERE ARE NO WATERCOURSES WITHIN CLOSE PROXIMITY OF THE SITE. NEITHER IS THERE A SURFACE WATER SEWER. FURTHER DEEP BORE INVESTIGATION GOOD INFILTRATION RATES AS INDICATED BELOW. DRILLING CONTINUED TO 30.0M AND NO GROUND WATER WAS ENCOUNTERED;



PRELIMINARY

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P1	MJC	26.06.23	PRELIMINARY		
REV	INITIALS	DATE	DETAIL		
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(CAN	ЛЕF	RON DARROCH ASS	OCIA	TES
C	ONS	ULTI	NG CIVIL AND STRUCTURAL EI	NGINEE	RS
KE	STREL BU	SINESS CE	NTRE, PRIVATE ROAD No. 2, COLWICK, NOTTINGHAM, NG4 2JR		
TEL	: 0115 940	0631 FAX	0115 9400645		
E-N	AIL: struct	ures@darro	och-engineering.co.uk		
CI	FNT			JOB NO	
	2				
	BAF	RCHE	STER	CDA-2	601
PR	OJECT			DRG NO	
	PR	OPOS	ED CARE HOME TOP DARTEORD		
	RO	AD. HI	EXTABLE.	טט ן	100
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тіт	ΊLE			REVISION	P2
				SCALE	1:125 @ A0
	DR/	AINAG	E DESIGN DRAWING	DATE	APR 2023
				DRAWN BY	MJC
				CHKD	0EI



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.411	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	\checkmark
Time of Entry (mins)	5.00	Enforce best practice design rules	\checkmark

<u>Nodes</u>

Name	Area (ha)	T of E (mins)	Add Inflow (I/s)	Cover Level (m)	Diameter (mm)	Depth (m)
S1	0.029	5.00	0.0	61.160	450	0.900
S2	0.000	5.00	0.0	61.000	1200	4.120
S3	0.002	5.00	0.0	57.950	1200	1.100
S4	0.036	5.00	0.0	57.960	1200	1.560
S7	0.005	5.00	0.0	57.960	1200	1.660
S8	0.003	5.00	0.0	57.980	1200	1.740
S10	0.011	5.00	0.0	57.940	1200	1.800
S11	0.000	5.00	0.0	57.940	1200	1.815
S12	0.000	5.00	0.0	57.800	1200	1.700
BHSA07	0.000	5.00	0.0	57.600	1200	1.550

<u>Links</u>

Name	US	DS	Length	ks (mm) /	US IL	DS IL	Fall	Slope	Dia	T of C	Rain
	Node	Node	(m)	n	(m)	(m)	(m)	(1:X)	(mm)	(mins)	(mm/hr)
1.000	S1	S2	37.700	0.600	60.260	59.800	0.460	82.0	150	5.57	50.0
1.001	S2	S3	4.500	0.600	56.880	56.850	0.030	150.0	225	5.64	50.0
1.002	S3	S4	9.870	0.600	56.850	56.400	0.450	21.9	225	5.69	50.0
1.003	S4	S7	22.200	0.600	56.400	56.300	0.100	222.0	225	6.12	50.0
1.004	S7	S8	9.250	0.600	56.300	56.240	0.060	154.2	225	6.27	50.0
1.005	S8	S10	19.400	0.600	56.240	56.140	0.100	194.0	225	6.61	50.0
1.006	S10	S11	2.520	0.600	56.140	56.125	0.015	168.0	225	6.65	50.0
1.007	S11	S12	7.800	0.600	56.125	56.100	0.025	312.0	225	6.83	50.0
1.008	S12	BHSA07	2.520	0.600	56.100	56.050	0.050	50.4	225	6.85	50.0

Name	Vel	Сар	Flow	US	DS	Σ Area	Σ Add	Pro	Pro
	(m/s)	(I/s)	(I/s)	Depth	Depth	(ha)	Inflow	Depth	Velocity
				(m)	(m)		(I/s)	(mm)	(m/s)
1.000	1.111	19.6	3.9	0.750	1.050	0.029	0.0	45	0.869
1.001	1.065	42.3	3.9	3.895	0.875	0.029	0.0	46	0.670
1.002	2.806	111.6	4.2	0.875	1.335	0.031	0.0	29	1.351
1.003	0.873	34.7	9.1	1.335	1.435	0.067	0.0	79	0.739
1.004	1.050	41.8	9.8	1.435	1.515	0.072	0.0	73	0.858
1.005	0.935	37.2	10.2	1.515	1.575	0.075	0.0	80	0.800
1.006	1.006	40.0	11.7	1.575	1.590	0.086	0.0	83	0.875
1.007	0.735	29.2	11.7	1.590	1.475	0.086	0.0	99	0.695
1.008	1.846	73.4	11.7	1.475	1.325	0.086	0.0	60	1.357

		Cam	eron Da	rroch Asso	ciates	File: HEX	TABLE_SYSTI	EM 1.pfd	Page 2		
		Kest	Kestrel Business Centre			Network: Storm Network			BARCH	BARCHESTER	
CAUSEVV	41 😈	Priva 🛛	Private Road 2, Colwick			SEL			HEXTA	HEXTABLE	
		Nott	ingham			FEB 2024	1		SW SYS	STEM 1	
					Pipeline S	<u>Schedule</u>					
Link	Length	Slope	Dia	Link	US CL	US IL	US Depth	DS CL	DS IL	DS Depth	
	(m)	(1:X)	(mm)	Туре	(m)	(m)	(m)	(m)	(m)	(m)	
1.000	37.700	82.0	150	Circular	61.160	60.260	0.750	61.000	59.800	1.050	
1.001	4.500	150.0	225	Circular	61.000	56.880	3.895	57.950	56.850	0.875	
1.002	9.870	21.9	225	Circular	57.950	56.850	0.875	57.960	56.400	1.335	
1.003	22.200	222.0	225	Circular	57.960	56.400	1.335	57.960	56.300	1.435	
1.004	9.250	154.2	225	Circular	57.960	56.300	1.435	57.980	56.240	1.515	
1.005	19.400	194.0	225	Circular	57.980	56.240	1.515	57.940	56.140	1.575	
1.006	2.520	168.0	225	Circular	57.940	56.140	1.575	57.940	56.125	1.590	
1.007	7.800	312.0	225	Circular	57.940	56.125	1.590	57.800	56.100	1.475	
1.008	2.520	50.4	225	Circular	57.800	56.100	1.475	57.600	56.050	1.325	

Link	US Node	Dia (mm)	Node Type	МН Туре	DS Node	Dia (mm)	Node Type	МН Туре
1.000	S1	450	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.002	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.003	S4	1200	Manhole	Adoptable	S7	1200	Manhole	Adoptable
1.004	S7	1200	Manhole	Adoptable	S8	1200	Manhole	Adoptable
1.005	S8	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
1.006	S10	1200	Manhole	Adoptable	S11	1200	Manhole	Adoptable
1.007	S11	1200	Manhole	Adoptable	S12	1200	Manhole	Adoptable
1.008	S12	1200	Manhole	Adoptable	BHSA07	1200	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connection	IS	Link	IL (m)	Dia (mm)
S1	61.160	0.900	450					
				\bigcirc				
					0	1.000	60.260	150
S2	61.000	4.120	1200		1	1.000	59.800	150
				\bigcirc				
					0	1.001	56.880	225
S3	57.950	1.100	1200		1	1.001	56.850	225
				\bigcirc				
					0	1.002	56.850	225
S4	57.960	1.560	1200		1	1.002	56.400	225
				\bigcirc				
					0	1.003	56.400	225
S7	57.960	1.660	1200		1	1.003	56.300	225
				\bigcirc				
					0	1.004	56.300	225
S8	57.980	1.740	1200		1	1.004	56.240	225
				\bigcirc				
					0	1.005	56.240	225



Cameron Darroch Associates	File: HEXTABLE_SYSTEM 1.pfd	Page 3
Kestrel Business Centre	Network: Storm Network	BARCHESTER
Private Road 2, Colwick	SEL	HEXTABLE
Nottingham	FEB 2024	SW SYSTEM 1

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10	57.940	1.800	1200	1	1.005	56.140	225
				0	1.006	56.140	225
S11	57.940	1.815	1200	1	1.006	56.125	225
				\bigcirc			
				0	1.007	56.125	225
S12	57.800	1.700	1200	1	1.007	56.100	225
				\bigcirc			
				0	1.008	56.100	225
BHSA07	57.600	1.550	1200	1	1.008	56.050	225
				\bigcirc			

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	х
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.411	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	х
Winter CV	0.840	Check Discharge Volume	х

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	40	0	0

Node S7 Online Orifice Control

Flap Valve	х	Invert Level (m)	56.300	Diameter (m)	0.024
Downstream Link	1.004	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	\checkmark	Design Flow (I/s)	1.2		

Node S7 Depth/Area Storage Structure

Base Inf Coeffic Side Inf Coeffic	ient (m/l ient (m/l	nr) 0.00000 nr) 0.00000	D Safe	ty Facto Porosity	r 2.0 y 0.95	Time to h	Invert L alf empt	evel (m) ty (mins)	56.300 0
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	
0.000	133.0	0.0	0.300	133.0	0.0	0.600	133.0	0.0	
0.100	133.0	0.0	0.400	133.0	0.0	0.700	133.0	0.0	
0.200	133.0	0.0	0.500	133.0	0.0	0.800	133.0	0.0	

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Node BHSA07 Deep Bore Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.49320	Invert Level (m)	42.600	Borehole Diameter	0.200
Side Inf Coefficient (m/hr)	0.49320	Time to half empty (mins)	405	Borehole Depth (m)	15.000
Safety Factor	2.0	Diameter (m)	1.350	Inf Depth (m)	10.000
Porosity	1.00	Depth (m)		Number Required	4

Node S12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)0.00000Side Inf Coefficient (m/hr)0.00000

Safety Factor 2.0 Porosity 0.95 Tir

Invert Level (m) 56.100 Time to half empty (mins) 0

Depth (m)	Area (m²)	Inf Area (m²)									
0.000	56.0	0.0	0.400	56.0	0.0	0.800	56.0	0.0	1.200	56.0	0.0
0.100	56.0	0.0	0.500	56.0	0.0	0.900	56.0	0.0			
0.200	56.0	0.0	0.600	56.0	0.0	1.000	56.0	0.0			
0.300	56.0	0.0	0.700	56.0	0.0	1.100	56.0	0.0			



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Kestrel Business Centre	Network: Storm Network	BARCHESTER
Private Road 2, Colwick	SEL	HEXTABLE
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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US	Peak	Level	Depth	Inflow	Node	Flood	Status
	Node	(mins)	(m)	(m)	(I/s)	Vol (m³)	(m³)	
15 minute winter	S1	11	60.313	0.053	5.3	0.0425	0.0000	OK
15 minute winter	S2	11	56.935	0.055	5.1	0.0625	0.0000	ОК
15 minute winter	S3	11	56.884	0.034	5.4	0.0395	0.0000	ОК
15 minute summer	S4	9	56.511	0.111	11.3	0.1771	0.0000	ОК
240 minute winter	S7	232	56.389	0.089	2.6	11.2980	0.0000	ОК
15 minute winter	S8	11	56.260	0.020	0.7	0.0237	0.0000	ОК
15 minute winter	S10	10	56.186	0.046	2.6	0.0574	0.0000	ОК
15 minute summer	S11	10	56.179	0.054	2.4	0.0612	0.0000	ОК
60 minute winter	S12	43	56.119	0.019	1.5	1.0418	0.0000	OK
120 minute winter	BHSA07	96	42.618	-13.432	0.9	0.8030	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (I/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S1	1.000	S2	5.1	0.932	0.261	0.2072
15 minute winter	S2	1.001	S3	5.1	0.928	0.122	0.0254
15 minute winter	S3	1.002	S4	5.5	0.554	0.049	0.1118
15 minute summer	S4	1.003	S7	11.8	1.341	0.341	0.2255
240 minute winter	S7	Orifice	S8	0.3			
15 minute winter	S8	1.005	S10	0.6	0.261	0.017	0.0726
15 minute winter	S10	1.006	S11	2.6	0.427	0.065	0.0164
15 minute summer	S11	1.007	S12	2.6	0.865	0.089	0.0294
60 minute winter	S12	1.008	BHSA07	1.0	0.625	0.013	0.0039
120 minute winter	BHSA07	Infiltration		0.6			



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Kestrel Business Centre	Network: Storm Network	BARCHESTER
Private Road 2, Colwick	SEL	HEXTABLE
Nottingham	FEB 2024	SW SYSTEM 1

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (I/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	60.337	0.077	10.1	0.0614	0.0000	ОК
15 minute winter	S2	11	56.956	0.076	9.8	0.0865	0.0000	ОК
15 minute winter	S3	11	56.897	0.047	10.5	0.0543	0.0000	ОК
15 minute winter	S4	10	56.545	0.145	22.9	0.2315	0.0000	ОК
600 minute winter	S7	465	56.471	0.171	2.3	21.7691	0.0000	ОК
15 minute winter	S8	11	56.268	0.028	1.2	0.0321	0.0000	ОК
15 minute winter	S10	9	56.205	0.065	4.9	0.0820	0.0000	ОК
15 minute winter	S11	8	56.201	0.076	5.0	0.0858	0.0000	ОК
30 minute winter	S12	23	56.130	0.030	3.9	1.6093	0.0000	ОК
120 minute winter	BHSA07	90	42.635	-13.415	1.7	1.5390	0.0000	ОК

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (I/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S1	1.000	S2	9.8	1.102	0.497	0.3345
15 minute winter	S2	1.001	S3	9.8	1.116	0.231	0.0400
15 minute winter	S3	1.002	S4	10.5	0.685	0.094	0.1625
15 minute winter	S4	1.003	S7	23.0	1.542	0.663	0.3528
600 minute winter	S7	Orifice	S8	0.5			
15 minute winter	S8	1.005	S10	1.2	0.293	0.032	0.1176
15 minute winter	S10	1.006	S11	5.0	0.537	0.124	0.0265
15 minute winter	S11	1.007	S12	5.1	1.060	0.174	0.0464
30 minute winter	S12	1.008	BHSA07	2.3	0.792	0.031	0.0073
120 minute winter	BHSA07	Infiltration		1.2			

			Kestr	el Busi	ness C	entre		Netwo	ork: St	torm l	Networl	<		
			Privat Notti	e Road Igham	d 2, Co	lwick		SEL 15/02	/2024	1				
			NOUL	51011			I	10,02,	2024	•				
						<u> </u>	<u>Design S</u>	ettings						
Rain	fall Met	hodolo	y F	SR			Max	imum	Time	of Co	ncentra m Baiat	tion (mi	ns) 30.0	0
ν Δη	lditional	Flow (13) Z %) C)					ivid	Minin	num Ve	locitv (m	n/s) 1.00	
Au	FS	R Regi	on E	ingland	d and \	Wales					Conne	ection T	/pe Leve	l Soffits
	M5-	-60 (m	m) 2	0.000				Ν	linim	um Ba	ackdrop	Height ((m) 0.20	0
		Ratio	o-R C	.411				Preferred Cover Depth (m) 0.900						
			CV C	.750					Inclu	de Int	ermedi	ate Grou	ınd √	
Tim	ne of Ent	ry (mii	ns) 5	6.00				Enforce best practice design re					les √	
							<u>Nod</u>	<u>es</u>						
			Nam	e A (I	rea ha)	T of E (mins)	Add Inflov	Co v Le	ver vel	Diar (m	neter າm)	Depth (m)		
			\$20	٥	007	5 00	(i/s) 0 (ן) 57	ייי 980		450	0.750		
			S21	0.	003	5.00	0.0	57.	830		450	0.750		
			S22	0.	020	5.00	0.0	57.	500		450	0.750		
			S23	0.	022	5.00	0.0	57.	980		450	1.380		
			S24	0.	000	5.00	0.0) 57.	820		450	1.395		
			S25	0.	072	5.00	0.0	57.	710		1200	2.350		
			S26	0.	000	5.00	0.0) 57.	360		1200	2.060		
			S27	0.	018	5.00	0.0	57.	230		1200	1.970		
			S29	0.	000	5.00	0.0) 56.	430		1200	1.330		
			531	0.	007	5.00	0.0	J 56.	170		1200	1.200		
			332 522	U.	000	5.00	0.0	ט 55. רים ר	400 400		1200	1.600		
			992 BH2Qu	0.)3 0	000	5.00	0.0 0.0	, 57. , 57	400 400		1350	2.000		
			DHISA	,5 0.	000	5.00	0.	5 57.	400		1350	2.700		
							<u>Lini</u>	<u>(S</u>						
Name	US	DS	Le	ngth	ks (m	m) /	US IL	DS I	L	Fall	Slope	Dia	T of C	Rain
20 000	INOCIE S20	(NOC)	e (m) 400	n o	600	(m)	(m) 57.09	20 ((m)	(T:X)	(mm)	(mins)	(mm/nr)
20.000	520 521	521 574	י ק	. 4 00 200	0 N	.000	57 080	56.41	, v v 5 (0.100	49.3 7 C	150) 5.09	50.0
	S22	S23	18	.080	0 0	.600	56.750	56.60	00 (0.150	120 5	150) 5.33	50.0
21.000		523	11	.840	0	.600	56.600	56.42	<u>25</u> (0.175	67.7	150	5.49	50.0
21.001 21.001	S23	324			5		FC 425	56.39	0 (0.035	72.9	225	5.52	50.0
21.000 21.001 20.002	S23 S24	524 S25	2	.550	0	.600	56.425							
21.000 21.001 20.002 20.003	S23 S24 S25	524 S25 S26	2 13	.550 .000	0 0	.600 .600	55.360	55.30	00 (0.060	216.7	225	5 5.76	50.0
21.000 21.001 20.002 20.003 20.004	S23 S24 S25 S26	S25 S26 S27	 2 13 5	.550 .000 .670	0 0 0	.600 .600 .600	55.360 55.300	55.30 55.20	00 (60 (0.060 0.040	216.7 141.8	225 225	5 5.76 5 5.85	50.0 50.0
21.000 21.001 20.002 20.003 20.004 20.005	S23 S24 S25 S26 S27	524 525 526 527 529	 2 13 5 16	.550 .000 .670 .370	0 0 0 0	.600 .600 .600 .600	55.360 55.300 55.260	55.30 55.20 55.10	00 (50 (00 (0.060 0.040 0.160	216.7 141.8 102.3	225 225 225	5 5.76 5 5.85 5 6.06	50.0 50.0 50.0
21.000 21.001 20.002 20.003 20.004 20.005 20.006	S23 S24 S25 S26 S27 S29	524 525 526 527 529 531	2 13 5 16 3	.550 .000 .670 .370 .580	0 0 0 0	.600 .600 .600 .600 .600	55.360 55.300 55.260 55.100	55.30 55.20 55.10 54.97	00 (0 50 (0 00 (0 70 (0	0.060 0.040 0.160 0.130	216.7 141.8 102.3 27.5	225 225 225 225 225	5 5.76 5 5.85 5 6.06 5 6.08	50.0 50.0 50.0 50.0
21.000 21.001 20.002 20.003 20.004 20.005 20.006	S23 S24 S25 S26 S27 S29 Nar	S24 S25 S26 S27 S29 S31	2 13 5 16 3 Vel	.550 .000 .670 .370 .580 Cap	0 0 0 0 Flov	.600 .600 .600 .600 .600	55.360 55.300 55.260 55.100 S	55.30 55.20 55.10 54.97	00 0 50 0 20 0 70 0 Σ Are	0.060 0.040 0.160 0.130	216.7 141.8 102.3 27.5 Add	225 225 225 225 Pro	5 5.76 5 5.85 5 6.06 5 6.08 Pro	50.0 50.0 50.0 50.0
21.000 21.001 20.002 20.003 20.004 20.005 20.006	S23 S24 S25 S26 S27 S29 Nar	S24 S25 S26 S27 S29 S31 me	2 13 5 16 3 Vel m/s)	.550 .000 .670 .370 .580 Cap (I/s)	0 0 0 0 Flov (I/s)	.600 .600 .600 .600 .600 v U) Dej	55.360 55.300 55.260 55.100 S [pth De	55.30 55.20 55.10 54.97 54.97	00 (50 (00 (70 (Σ Are (ha)	0.060 0.040 0.160 0.130 a Σ In	216.7 141.8 102.3 27.5 Add	225 225 225 225 Pro Depth	5 5.76 5 5.85 5 6.06 5 6.08 Pro Velocity	50.0 50.0 50.0 50.0
21.000 21.001 20.002 20.003 20.004 20.005 20.006	S23 S24 S25 S26 S27 S29 Nar	S24 S25 S26 S27 S29 S31 me	2 13 5 16 3 Vel m/s)	.550 .000 .670 .370 .580 Cap (I/s)	0 0 0 0 Flov (I/s)	.600 .600 .600 .600 .600 v U) Dej (n	55.360 55.300 55.260 55.100 S [pth De n) (1	55.3(55.2(55.1(54.9))S pth m)	00 0 50 0 70 0 Σ Are (ha)	0.060 0.040 0.160 0.130 a Σ In	216.7 141.8 102.3 27.5 Add flow (I/s)	225 225 225 Pro Depth (mm)	5 5.76 5 5.85 5 6.06 6 6.08 Pro Velocity (m/s)	50.0 50.0 50.0 50.0

1.230

1.245

1.095

1.835

1.745

1.105

0.975

0.020

0.042

0.052

0.124

0.124

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0.0

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0.0

0.0

41

52

51

109

97

95

66

0.678

1.034

1.030

0.874

1.028

1.202

1.940

21.000

21.001

20.002

20.003

20.004

20.005

20.006

0.914

1.224

1.534

0.884

1.096

1.292

2.502

16.2

21.6

61.0

35.2

43.6

51.4

99.5

2.7

5.7

7.0

16.8

16.8

19.2

19.2

0.600

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1.105

			Cam Kest	eron Dar rel Busin	rroch Ass ess Cent	sociates re	File: H	IEXTAB ork: Sto	LE_SYSTE orm Netw	M 2.pfd ork	Page 2	
			Nott	ingham	2, 011	CK	15/02	/2024				
						<u>Li</u>	nks				-	
Name	US	DS	I	.ength	ks (mm)/ US		5 IL	Fall S	lope [Dia To [.]	f C Rain
	Node	Nod	е	(m)	'n	 (m) (r	n)	(m) (:	1:X) (n	nm) (mi	ns) (mm/hr
20.007	S31	S32		3.870	0.6	00 54.9	70 54.	800 ().170	22.8	225 6.	.11 50.0
20.008	S32	S33		8.000	0.6	00 54.8	00 54.	750 ().050 1	60.0	225 6.	.24 50.0
20.009	S33	BHSA	03	2.470	0.6	00 54.7	50 54.	700 ().050	49.4	225 6.	.26 50.0
	Na	me	Vel	Сар	Flow	US	DS	Σ Area	ο Σ Add	Pro	Pro	
		- (m/s)	(l/s)	(I/s)	Depth	Depth	(ha)	Inflow	/ Depti	n Velocit	ty
			• •			(m)	(m)	. ,	(I/s)	(mm)	(m/s))
	20.0	07 2	.754	109.5	20.2	0.975	1.375	0.149	0.0	. 65	5 2.12	20
	20.0	008 1	.031	41.0	22.0	1.375	2.425	0.162	2 0.0) 117	7 1.04	18
	20.0	009 1	.865	74.2	22.0	2.425	2.475	0.162	2 0.0) 84	1 1.63	32
						<u>Pipeline</u>	Schedu	<u>le</u>				
Linl	k Len	gth S	lope	Dia	Link	US CI	. US	IL US	5 Depth	DS CL	DS IL	DS Denth
	(n											Do Deptii
	(n) (1:X)	(mm)	Туре	(m)	(m)	(m)	(m)	(m)	(m)
20.00	00 7.4	n) (400	1:X) 49.3	(mm) 150	Type Circula	(m) r 57.98	(m 57.2 () 30	(m) 0.600	(m) 57.830	(m) 57.080	(m) 0.600
20.00 20.00	00 7.4 01 5.1	n) (400 200	1:X) 49.3 7.9	(mm) 150 150	Type Circula Circula	(m) or 57.98 or 57.83	(m 57.2 57.0) 30 80	(m) 0.600 0.600	(m) 57.830 57.820	(m) 57.080 56.425	(m) 0.600 1.245
20.00 20.00 21.00	00 7.4 01 5.1 00 18.4	n) (400 200 080 1	1:X) 49.3 7.9 20.5	(mm) 150 150 150	Type Circula Circula Circula	(m) r 57.98 r 57.83 r 57.50	(m) 57.2 57.0 57.0 56.7) 30 80 50	(m) 0.600 0.600 0.600	(m) 57.830 57.820 57.980	(m) 57.080 56.425 56.600	(m) 0.600 1.245 1.230
20.00 20.00 21.00 21.00	00 7.4 01 5.1 00 18.4 01 11.4	n) (400 200 080 1 840	1:X) 49.3 7.9 20.5 67.7	(mm) 150 150 150 150	Type Circula Circula Circula Circula	(m) ar 57.98 ar 57.83 ar 57.50 ar 57.98	(m) 57.2 57.0 57.0 56.7 56.6) 30 80 50 00	(m) 0.600 0.600 0.600 1.230	(m) 57.830 57.820 57.980 57.820	(m) 57.080 56.425 56.600 56.425	(m) 0.600 1.245 1.230 1.245
20.00 20.00 21.00 21.00 20.00	00 7. 01 5. 00 18. 01 11. 02 2.	n) (400 200 080 1 840 550	1:X) 49.3 7.9 20.5 67.7 72.9	(mm) 150 150 150 150 225	Type Circula Circula Circula Circula Circula	(m) r 57.98 r 57.83 r 57.50 r 57.98 r 57.98	(m) 57.2 57.0 57.0 56.7 56.6 56.6) 30 80 50 00 25	(m) 0.600 0.600 0.600 1.230 1.170	(m) 57.830 57.820 57.980 57.820 57.710	(m) 57.080 56.425 56.600 56.425 56.390	(m) 0.600 1.245 1.230 1.245 1.095
20.00 20.00 21.00 21.00 20.00 20.00	00 7. 01 5. 00 18. 01 11. 02 2. 03 13.	n) (400 200 080 1 840 550 000 2	1:X) 49.3 7.9 20.5 67.7 72.9 16.7	(mm) 150 150 150 225 225	Type Circula Circula Circula Circula Circula	(m) 17 57.98 17 57.83 17 57.50 17 57.98 17 57.82 17 57.71 17 57.71	(m) 57.2 57.0 57.0 56.7 56.6 55.4 55.3) 30 80 50 00 25 60	(m) 0.600 0.600 1.230 1.170 2.125	(m) 57.830 57.820 57.980 57.820 57.710 57.360	(m) 57.080 56.425 56.600 56.425 56.390 55.300	(m) 0.600 1.245 1.230 1.245 1.095 1.835
20.00 20.00 21.00 21.00 20.00 20.00 20.00	00 7.4 01 5.1 00 18.4 01 11.4 02 2.1 03 13.4 04 5.4	n) (400 200 080 1 840 550 000 2 670 1	1:X) 49.3 7.9 20.5 67.7 72.9 16.7 41.8	(mm) 150 150 150 225 225 225	Type Circula Circula Circula Circula Circula Circula	(m) ar 57.98 ar 57.83 ar 57.50 ar 57.98 ar 57.82 ar 57.71 ar 57.36	(m) 57.2 57.0 57.0 56.7 56.6 56.4 55.3 55.3) 30 80 50 00 25 60 00	(m) 0.600 0.600 1.230 1.170 2.125 1.835	(m) 57.830 57.820 57.980 57.820 57.710 57.360 57.230	(m) 57.080 56.425 56.600 56.425 56.390 55.300 55.260	(m) 0.600 1.245 1.230 1.245 1.095 1.835 1.745
20.00 20.00 21.00 20.00 20.00 20.00 20.00	00 7.4 01 5.1 00 18.4 01 11.4 02 2.4 03 13.4 04 5.4 05 16.4	n) (400 200 080 1 840 550 000 2 670 1 370 1	1:X) 49.3 7.9 20.5 67.7 72.9 16.7 41.8 .02.3	(mm) 150 150 150 225 225 225 225	Type Circula Circula Circula Circula Circula Circula Circula	(m) 57.98 57.83 57.50 57.50 57.98 57.82 57.71 57.36 r 57.36 r 57.23	(m) 57.2 57.0 57.0 56.7 56.6 56.4 55.3 55.3 55.3) 30 80 50 00 25 60 00 60	(m) 0.600 0.600 1.230 1.170 2.125 1.835 1.745	(m) 57.830 57.820 57.980 57.820 57.710 57.360 57.230 56.430	(m) 57.080 56.425 56.600 56.425 56.390 55.300 55.260 55.100	(m) 0.600 1.245 1.230 1.245 1.095 1.835 1.745 1.105
20.00 20.00 21.00 20.00 20.00 20.00 20.00 20.00	00 7. 01 5. 00 18. 01 11. 02 2. 03 13. 04 5. 05 16. 05 3.	n) (400 200 550 550 200 2550 2670 1 370 1 5580	1:X) 49.3 7.9 20.5 67.7 72.9 16.7 .41.8 .02.3 27.5	(mm) 150 150 150 225 225 225 225 225 225	Type Circula Circula Circula Circula Circula Circula Circula	(m) or 57.98 or 57.83 or 57.50 or 57.98 or 57.82 or 57.71 or 57.36 or 57.23 or 56.43	(m) 57.2 57.0 55.7 56.6 55.4 55.3 55.3 55.2 55.1) 30 80 50 00 25 60 00 60 00	(m) 0.600 0.600 1.230 1.170 2.125 1.835 1.745 1.105	(m) 57.830 57.820 57.980 57.820 57.710 57.360 57.230 56.430 56.170	(m) 57.080 56.425 56.600 56.425 56.390 55.300 55.260 55.260 55.100 54.970	(m) 0.600 1.245 1.230 1.245 1.095 1.835 1.745 1.105 0.975
20.00 20.00 21.00 20.00 20.00 20.00 20.00 20.00 20.00	00 7.4 01 5.1 00 18.4 01 11.4 02 2.1 03 13.4 04 5.1 05 16.4 06 3.1 07 3.4	n) (400 200 840 550 000 2 670 1 3370 1 580 870	1:X) 49.3 7.9 20.5 67.7 72.9 16.7 41.8 02.3 27.5 22.8	(mm) 150 150 150 225 225 225 225 225 225 225	Type Circula Circula Circula Circula Circula Circula Circula Circula	(m) 17 57.98 17 57.50 17 57.50 17 57.82 17 57.82 17 57.36 17 57.36 17 57.23 17 56.43 17 56.17	(m) 57.2 57.0 57.0 56.7 56.6 55.3 55.3 55.3 55.2 55.1 54.9) 30 80 50 00 25 60 00 60 00 70	(m) 0.600 0.600 1.230 1.170 2.125 1.835 1.745 1.105 0.975	(m) 57.830 57.820 57.980 57.820 57.710 57.360 57.230 56.430 56.170 56.400	(m) 57.080 56.425 56.600 56.425 56.390 55.300 55.260 55.260 55.100 54.970 54.800	(m) 0.600 1.245 1.230 1.245 1.095 1.835 1.745 1.105 0.975 1.375
20.00 20.00 21.00 20.00 20.00 20.00 20.00 20.00 20.00 20.00	00 7. 01 5. 00 18. 01 11. 02 2. 03 13. 04 5. 05 16. 06 3. 07 3. 08 8.	n) (400 200 840 550 000 2 670 1 370 1 580 870 000 1	1:X) 49.3 7.9 20.5 67.7 72.9 16.7 41.8 02.3 27.5 22.8 60.0	(mm) 150 150 150 225 225 225 225 225 225 225 225 225	Type Circula Circula Circula Circula Circula Circula Circula Circula Circula	(m) ar 57.98 ar 57.50 ar 57.50 ar 57.82 ar 57.71 ar 57.36 ar 57.23 ar 57.23 ar 56.43 ar 56.17 ar 56.40	(m) 57.2 57.0 57.0 56.7 55.3 55.3 55.3 55.2 55.1 54.9 54.8) 30 80 50 00 25 60 00 60 00 70 00	(m) 0.600 0.600 1.230 1.170 2.125 1.835 1.745 1.105 0.975 1.375	(m) 57.830 57.820 57.980 57.820 57.710 57.360 57.230 56.430 56.430 56.400 56.400 57.400	(m) 57.080 56.425 56.600 56.425 56.390 55.300 55.260 55.260 55.100 54.970 54.800 54.750	(m) 0.600 1.245 1.230 1.245 1.095 1.835 1.745 1.105 0.975 1.375 2.425

Link	US	Dia	Node	MH	DS	Dia	Node	MH
	Node	(mm)	Туре	Туре	Node	(mm)	Туре	Туре
20.000	S20	450	Manhole	Adoptable	S21	450	Manhole	Adoptable
20.001	S21	450	Manhole	Adoptable	S24	450	Manhole	Adoptable
21.000	S22	450	Manhole	Adoptable	S23	450	Manhole	Adoptable
21.001	S23	450	Manhole	Adoptable	S24	450	Manhole	Adoptable
20.002	S24	450	Manhole	Adoptable	S25	1200	Manhole	Adoptable
20.003	S25	1200	Manhole	Adoptable	S26	1200	Manhole	Adoptable
20.004	S26	1200	Manhole	Adoptable	S27	1200	Manhole	Adoptable
20.005	S27	1200	Manhole	Adoptable	S29	1200	Manhole	Adoptable
20.006	S29	1200	Manhole	Adoptable	S31	1200	Manhole	Adoptable
20.007	S31	1200	Manhole	Adoptable	S32	1200	Manhole	Adoptable
20.008	S32	1200	Manhole	Adoptable	S33	1200	Manhole	Adoptable
20.009	S33	1200	Manhole	Adoptable	BHSA03	1350	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S20	57.980	0.750	450					
				\bigcirc				
					0	20.000	57.230	150

	Cameron I Kestrel Bu Private Ro Nottingha	Darroch A siness Ce ad 2, Colv m	Associates ntre wick	File: HE Networ SEL 15/02/2	XTABL rk: Sto 2024	.E_SYSTEN rm Netwo	И 2.pfd ork	Page 3
			Manho	ole Schedul	<u>e</u>			
Node	CL (m)	Depth (m)	Dia (mm)	Connectio	ons	Link	IL (m)	Dia (mm)
S21	57.830	0.750	450		1	20.000	57.080	150
				\bigcirc				
					0	20.001	57.080	150
S22	57.500	0.750	450	\bigcirc				
					0	21.000	56.750	150
S23	57.980	1.380	450	\bigcirc	1	21.000	56.600	150
					0	21.001	56.600	150
S24	57.820	1.395	450		1	21.001	56.425	150
				\bigcirc	2	20.001	56.425	150
					0	20.002	56.425	225
S25	57.710	2.350	1200	\bigcirc	1	20.002	56.390	225
					0	20.003	55.360	225
S26	57.360	2.060	1200	\bigcirc	1	20.003	55.300	225
					0	20.004	55.300	225
527	57.230	1.970	1200	\bigcirc	1	20.004	55.260	225
\$20	56 / 30	1 330	1200		1	20.005	55 100	225
525	50.450	1.550	1200	\bigcirc	1	20.005	55.100	223
	56 476	1 2 2 2	1202		0	20.006	55.100	225
531	56.170	1.200	1200	\bigcirc	1	20.006	54.970	225
	PO / - -	4 665	4005		0	20.007	54.970	225
\$32	56.400	1.600	1200	\bigcirc	1	20.007	54.800	225
					0	20.008	54.800	225
S33	57.400	2.650	1200	\bigcirc	1	20.008	54.750	225
					0	20.009	54.750	225
BHSA03	57.400	2.700	1350	\bigcirc	1	20.009	54.700	225

	Cameron Darro	ch Associates	File: HEXTABLE	E_SYSTEM 2.pfd	Page 4	
4	estrel Busines	s Centre	Network: Stor	m Network		
F	Private Road 2,	Colwick	SEL			
1	lottingham		15/02/2024			
			•			
		<u>Simulatio</u>	<u>n Settings</u>			
Dainfall Ma	thedelegy F	'D		Analysis Snood	Normal	
Raintait Me	CR Region Fr	oK Valand and Walay	_	Analysis Speed	Normai	
Г Г МЛ	5 Region El	1914110 and Wale:	Drain D	own Timo (mins)	x 240	
 	Batio-R 0	/.000 /11	Additiona	l Storage (m ³ /ba)	240	
Si Si	Immer CV 0	750	Check [Discharge Rate(s)	20.0 X	
	Winter CV 0.	840	Check D	ischarge Volume	x	
			1	U		
		Storm D	urations			
15 30 60	120 1	80 240	360 480	600 720	960 14	440
Retu	urn Period Cl	imate Change	Additional Area	a Additional Flo	w	
	(years)	(CC %)	(A %)	(Q %)		
	2	0	(2	0	
	30	0	()	0	
	100	40	(J	0	
		Node S26 Online	orifice Contro			
				<u>-</u>		
Fla	o Valve x	Design De	epth (m) 1.200	Discharge	Coefficient 0.	600
Replaces Downstrea	m Link √	Design F	low (l/s) 1.2	0		
Invert Le	vel (m) 55.30	00 Diam	eter (m) 0.022	2		
	<u>Noc</u>	le S26 Depth/Are	ea Storage Struc	<u>cture</u>		
Base Inf Coefficient (m/hr) 0.000	00 Safety Fa	ctor 2.0	Invert	Level (m) 55	.300
Side Inf Coefficient (m/hr) 0.0000	00 Porc	osity 0.95	Time to half emp	oty (mins) 0	
Depth Ar	a Inf Area	Denth Are	a Inf Area	Donth Area	Inf Area	
(m) (m	(m^2)	(m) (m ²	(m^2)	(m) (m^2)	(m ²)	
0.000 180		0 300 180	0 00		0.0	
0.100 180	0.0 0.0	0.400 180	.0 0.0	0.700 180.0	0.0	
0.200 180	0.0 0.0	0.500 180	.0 0.0	0.800 180.0	0.0	
		1	1			
	Noc	le S33 Depth/Are	ea Storage Struc	<u>cture</u>		
Base Inf Coefficient (m/hr) 0.000	00 Safety Fa	ctor 2.0	Invert	Level (m) 54	.750
Side Inf Coefficient (m/hr) 0.0000	DO Porc	osity 0.95	lime to half em	oty (mins) 0	
Denth Area Inf Area	Denth A	rea Inf Area	Denth Are	a Inf Area	Donth Area	Inf Area
(m) (m^2) (m^2)	(m) (r	m^2 (m^2)	(m) (m ²	(m^2)	(m) (m^2)	(m ²)
	0.400 5	1.0 0.0	0.800 51.0	0 0.0	1.200 51.0	0.0
0.100 51.0 0.0	0.500 5	1.0 0.0	0.900 51.0	0 0.0		
0.200 51.0 0.0	0.600 5	1.0 0.0	1.000 51.0	0.0		
0.300 51.0 0.0	0.700 5	1.0 0.0	1.100 51.0	0.0		
	Node BHS	A03 Deep Bore S	oakaway Storag	<u>ge Structure</u>		
Baca Inf Coofficient /m /h	0 0 0 0 0 0 0 0		art lovel (m)	12 400 Barr	holo Diamatar	0.200
Base ini Coefficient (m/ni Side Inf Coefficient (m/hi) 0.33300	Time to half a	mnty (minc)	13 Bore		0.200 15.000
Side ini Coenicient (m/m	1 0.93900		nipry (mins) 2 liameter (m) 1	350	Inf Denth (m)	10.000
Porosit	v 1.00	U	Depth (m)	Nur	nber Required	4
	,					-

Cameron Darroch Associates	File: HEXTABLE_SYSTEM 2.pfd	Page 5
Kestrel Business Centre	Network: Storm Network	
Private Road 2, Colwick	SEL	
Nottingham	15/02/2024	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (I/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S20	10	57.255	0.025	1.3	0.0085	0.0000	ОК
15 minute winter	S21	10	57.098	0.018	1.9	0.0042	0.0000	ОК
15 minute winter	S22	10	56.798	0.048	3.7	0.0334	0.0000	ОК
15 minute winter	S23	10	56.664	0.064	7.6	0.0305	0.0000	ОК
15 minute winter	S24	10	56.494	0.069	9.4	0.0109	0.0000	ОК
15 minute winter	S25	8	55.681	0.321	22.5	0.5601	0.0000	ОК
720 minute winter	S26	675	55.434	0.134	1.8	23.1263	0.0000	ОК
15 minute winter	S27	10	55.301	0.041	3.4	0.0542	0.0000	ОК
15 minute winter	S29	11	55.130	0.030	3.4	0.0336	0.0000	ОК
15 minute winter	S31	10	55.001	0.031	4.6	0.0391	0.0000	ОК
15 minute winter	S32	10	54.869	0.069	7.0	0.0886	0.0000	ОК
30 minute winter	S33	22	54.788	0.038	5.5	1.8884	0.0000	ОК
60 minute winter	BHSA03	47	42.434	-12.266	3.1	1.4792	0.0000	ОК
Link Event	US	Li	nk	DS	Outflow	Velocity	Flow/Ca	p Link
(Upstream Depth) Node			Node	(I/s)	(m/s)		Vol (m³)
15 minute winter	S20	20.00	00	S21	1.3	0.849	0.05	0 0.0112
15 minute winter	S21	20.00	01	S24	1.9	0.442	0.02	9 0.0235
15 minute winter	S22	21.0	00	S23	3.6	0.608	0.22	6 0.1088
15 minute winter	S23	21.0	01	S24	7.5	1.005	0.34	8 0.0888
15 minute winter	S24	20.00	02	S25	9.3	1.004	0.15	2 0.0236
15 minute winter	S25	20.00	03	S26	25.5	1.612	0.72	6 0.2615
720 minute winte	r S26	Orifi	ce	S27	0.4			
15 minute winter	S27	20.00	05	S29	3.4	0.841	0.06	5 0.0658
15 minute winter	S29	20.00	06	S31	3.3	1.040	0.03	3 0.0115
15 minute winter	S31	20.00	07	S32	4.6	0.716	0.04	2 0.0262
15 minute winter	S32	20.00	08	S33	7.0	1.212	0.17	0 0.0515

BHSA03

3.7

2.2

0.906

0.050

0.0101

20.009

30 minute winter S33

60 minute winter BHSA03 Infiltration

	Cameron Darroch Kestrel Business Ce Private Road 2, Col Nottingham	Associates entre wick	File: H Netwo SEL 15/02	IEXTABLE_ ork: Storm /2024	SYSTEM 2. Network	.pfd	Page 6
<u>Res</u> Node Event	ults for 30 year Critic	al Storm Dur	ration. Depth	Lowest ma	ass balanc Node	<u>e: 99.7</u> Flood	<u>9%</u> d Status

	Node	(mins)	(m)	(m)	(I/s)	Vol (m³)	(m³)	
15 minute winter	S20	10	57.264	0.034	2.4	0.0116	0.0000	ОК
15 minute winter	S21	10	57.104	0.024	3.4	0.0056	0.0000	ОК
15 minute winter	S22	10	56.818	0.068	7.0	0.0473	0.0000	ОК
15 minute winter	S23	10	56.697	0.097	14.6	0.0463	0.0000	ОК
15 minute winter	S24	10	56.524	0.099	17.7	0.0158	0.0000	ОК
15 minute winter	S25	7	55.739	0.379	42.7	0.6602	0.0000	SURCHARGED
720 minute winter	S26	690	55.550	0.250	3.2	43.0771	0.0000	SURCHARGED
15 minute winter	S27	10	55.317	0.057	6.5	0.0746	0.0000	ОК
15 minute winter	S29	10	55.142	0.042	6.4	0.0471	0.0000	ОК
15 minute winter	S31	10	55.014	0.044	8.7	0.0554	0.0000	ОК
15 minute winter	S32	10	54.892	0.092	13.2	0.1189	0.0000	ОК
15 minute winter	S33	13	54.810	0.060	13.1	2.9838	0.0000	ОК
30 minute winter	BHSA03	31	42.685	-12.015	8.2	3.5383	0.0000	ОК
Link Event	US	Li	ink	DS	Outflow	Velocity	Flow/Cap	o Link
(Upstream Dept	n) Node			Node	(I/s)	(m/s)		Vol (m³)
15 minute winter	- S20	20.0	00 9	S21	2.4	1.021	0.094	0.0174
15 minute winter	· S21	20.0	01 9	S24	3.4	0.506	0.053	3 0.0367
15 minute winter	· S22	21.0	00 9	S23	6.9	0.696	0.428	3 0.1792
15 minute winter	· S23	21.0	01 9	S24	14.4	1.180	0.664	0.1442
15 minute winter	· S24	20.0	02 3	S25	17.6	1.178	0.288	3 0.0382
15 minute winter	· S25	20.0	03 .	S26	42.9	1.758	1.222	0.3032
720 minute winte	er S26	Orifi	ce S	S27	0.5			

S29

S31

S32

S33

BHSA03

15 minute winter

30 minute winter

S27

S29

S31

S32

S33

20.005

20.006

20.007

20.008

20.009

BHSA03 Infiltration

0.1055

0.0189

0.0402

0.0873

0.0189

0.124

0.063

0.079

0.320

0.115

0.998

1.198

0.865

1.368

1.119

6.4

6.3

8.7

13.1

8.6

3.3

	Cameron	Darroch A	Associates	File: H	IEX IABLE	_SYSTEM 2 n Network	.ptd Pa	age /
	Drivato Po	and 2 Colu	wick		JIK. Stori	ITINELWOIK		
		Jau Z, CON	WICK		12224			
	Nottingha	am		15/02	/2024			
<u>Results fo</u>	<u>or 100 year</u>	<u>+40% CC</u>	Critical Sto	orm Durat	ion. Low	<u>est mass b</u>	alance: 9	9.79%
<u>Results fo</u> Node Event	US Node	Peak (mins)	<u>Critical Sto</u> Level (m)	<u>orm Durat</u> Depth (m)	<u>ion. Low</u> Inflow (I/s)	v <u>est mass b</u> Node Vol (m³)	<u>alance: 9</u> Flood (m ³)	1 <u>9.79%</u> Status
Node Event	US Node S20	Peak (mins) 10	Level (m) 57.276	Depth Depth (m) 0.046	<u>ion. Low</u> Inflow (I/s) 4.4	vest mass b Node Vol (m³) 0.0160	<u>alance: 9</u> Flood (m ³) 0.0000	19.79% Status OK
Node Event 15 minute winter 15 minute winter	US US Node S20 S21	Peak (mins) 10 10	<u>Critical Sto</u> Level (m) 57.276 57.112	Depth (m) 0.046 0.032	<u>ion. Low</u> Inflow (I/s) 4.4 6.3	vest mass b Node Vol (m ³) 0.0160 0.0076	alance: 9 Flood (m ³) 0.0000 0.0000	<u>9.79%</u> Status OK OK
Node Event 15 minute winter 15 minute winter 15 minute winter	US US Node S20 S21 S22	Peak (mins) 10 10 11	Critical Sto Level (m) 57.276 57.112 56.954	Depth (m) 0.046 0.032 0.204	tion. Low Inflow (I/s) 4.4 6.3 12.7	vest mass b Node Vol (m ³) 0.0160 0.0076 0.1410	alance: 9 Flood (m ³) 0.0000 0.0000 0.0000	<u>9.79%</u> Status OK OK SURCHARGEE

0.139

0.554

0.486

0.077

0.058

0.066

0.126

0.092

30.9

75.6

5.9

11.6

11.5

15.8

23.9

23.8

0.0222 0.0000

0.0000

0.0000

0.0000

0.0000

0.0000

0.0000

0.0000

0.9657

83.6717

0.1012

0.0652

0.0818

0.1630

4.5389

OK

OK

ОК

ОК

ОК

ОК

SURCHARGED

SURCHARGED

11 56.564

55.914

55.786

55.337

55.158

55.036

54.926

13 54.842

10

690

10

10

10

10

15 minute winter

720 minute winter

S24

S25

S26

S27

S29

S31

S32

S33

60 minute winter	BHSA03	57 43.7	94 -10.906	5 11.8	9.8833	0.0000	ОК
Link Event	US	Link	DS	Outflow	Velocity	Flow/Cap	Link
(Upstream Depth) Node		Node	(I/s)	(m/s)		Vol (m³)
15 minute winter	S20	20.000	S21	4.4	1.204	0.172	0.0271
15 minute winter	S21	20.001	S24	6.2	0.614	0.098	0.0513
15 minute winter	S22	21.000	S23	11.8	0.736	0.731	0.3183
15 minute winter	S23	21.001	S24	24.9	1.414	1.150	0.2053
15 minute winter	S24	20.002	S25	30.9	1.353	0.507	0.0583
15 minute winter	S25	20.003	S26	75.8	2.351	2.157	0.4668
720 minute winte	r S26	Orifice	S27	0.7			
15 minute winter	S27	20.005	S29	11.5	1.156	0.224	0.1638
15 minute winter	S29	20.006	S31	11.4	1.300	0.115	0.0315
15 minute winter	S31	20.007	S32	15.7	0.978	0.144	0.0628
15 minute winter	S32	20.008	S33	23.8	1.492	0.580	0.1451
15 minute winter	S33	20.009	BHSA03	17.8	1.336	0.240	0.0329
60 minute winter	BHSA03	Infiltration		3.3			



Page 1

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.411	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	\checkmark
Time of Entry (mins)	5.00	Enforce best practice design rules	\checkmark

<u>Nodes</u>

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
S30	0.012	5.00	55.000	1200	1.260
BHSA09	0.000	5.00	55.700	1350	2.040

<u>Links</u>

Name	US	DS	Length	ks (mm) /	US IL	DS IL	Fall	Slope	Dia	T of C	Rain
	Node	Node	(m)	n	(m)	(m)	(m)	(1:X)	(mm)	(mins)	(mm/hr)
40.000	S30	BHSA09	4.300	0.600	53.740	53.660	0.080	53.8	150	5.05	50.0

Name	Vel (m/s)	Cap (I/s)	Flow (I/s)	US Depth	DS Depth	Σ Area (ha)	Σ Add Inflow	Pro Depth	Pro Velocity
	• • •			(m)	(m)		(I/s)	(mm)	(m/s)
40.000	1.375	24.3	1.6	1.110	1.890	0.012	0.0	26	0.779

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
40.000	4.300	53.8	150	Circular	55.000	53.740	1.110	55.700	53.660	1.890
	Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type	
	40.000	S30	1200	Manhole	Adoptable	BHSAO	9 1350	Manhole	Adoptab	le

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S30	55.000	1.260	1200				
				\bigcirc			
				0	40.000	53.740	150
BHSA09	55.700	2.040	1350	1	40.000	53.660	150
				\bigcirc			

	Cameron Da	rroch Associates	File: HEXTABI	E_SYSTEM 3.pf	Page 2	
CALISEWAY	Kestrel Busii	ness Centre	Network: Sto	rm Network		
	Private Road	l 2, Colwick	SEL			
	Nottingham		15/02/2024			
		<u>Simulatio</u>	n Settings			
Rainfall N	/lethodology	FSR		Analysis Spe	ed Normal	
	FSR Region	England and Wales	S	Skip Steady Sta	te x	
	M5-60 (mm)	20.000	Drain	Down Time (mir	s) 240	
	Ratio-R	0.411	Addition	al Storage (m³∕h	a) 20.0	
	Summer CV	0.750	Check	Discharge Rate	s) x	
	Winter CV	0.840	Check	Discharge Volun	ne x	
		Storm D	urations			
15 30 6	0 120	180 240	360 480	600 72	960 1440	
R	eturn Period	Climate Change	Additional Are	a Additional	Flow	
	(years)	(CC %)	(A %)	(Q %)		
	2	0		0	0	
	30	0		0	0	
	100	40		0	0	
	<u>Node B</u>	HSA09 Deep Bore S	oakaway Stora	ge Structure		
Base Inf Coefficient (m	/hr) 0.93960) Inve	ert Level (m)	40.700 Bc	rehole Diameter 0.200	
Side Inf Coefficient (m	/hr) 0.93960) Time to half e	mpty (mins)	213 Bor	ehole Depth (m) 15.000	
Safety Fac	ctor 2.0	D	iameter (m)	1.350	Inf Depth (m) 10.000	
Doro	city 1.00		Dopth (m)	N	umbor Poquirod 1	

Depth (m)

Safety Factor 2.0 Porosity 1.00

Number Required 1



Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Deptl (m)	n Inflo (I/s	w Noda s) Vol (n	e Flood n³) (m³)	Status
15 minute winter	S30	10	53.772	0.03	2 2	2.2 0.04	26 0.0000	OK
30 minute winter	BHSA09	23	40.800	-12.86	0 1	7 0.61	86 0.0000	ОК
Link Event (Upstream Depth)	US Node	Link	D: No	S C de	utflow (I/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S30	40.000	BHS	A09	2.2	0.819	0.090	0.0114
30 minute winter	BHSA09	Infiltratio	n		0.8			



Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Dept (m)	h Inflo (I/s	w Node) Vol (m	e Flood 1³) (m³)	Status
15 minute winter	S30	10	53.786	0.04	46 4	.2 0.060	0.0000	ОК
30 minute winter	BHSA09	26	41.417	-12.24	43 3	.2 1.502	23 0.0000	ОК
Link Event (Upstream Depth)	US Node	Link	D: No:	S C de	Dutflow (I/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S30	40.000	BHS	A09	4.1	0.970	0.170	0.0184
30 minute winter	BHSA09	Infiltratio	n		0.8			



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Dept (m)	h Inflo (1/s	ow Nod s) Vol (n	e Flood n ³) (m ³)	Status
15 minute winter	S30	10	53.804	0.0	64 7	7.6 0.08	50 0.0000	ОК
60 minute winter	BHSA09	50	42.794	-10.8	66 3	3.9 3.47	25 0.0000	ОК
Link Event (Upstream Depth)	US Node	Link	D: No	S (de	Outflow (I/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S30	40.000	BHS	A09	7.5	1.126	0.310	0.0288
60 minute winter	BHSA09	Infiltratio	n		0.8			

CAMERON DARROCH ASSOCIATES

APPENDIX V

CAMERON DARROCH ASSOCIATES KESTREL BUSINESS CENTRE, PRIVATE ROAD No. 2, COLWICK, NOTTINGHAM, NG4 2JR



PRELIMINARY

	MJC	05.02.24	AMENDED TO SUIT CONTRACTORS PREFERRED A MANUFACTURER.	TTENUATION C	RATE	
P1	MJC	26.06.23	PRELIMINARY			
REV	INITIALS	DATE	DETAIL			
STA	TUS					
C KES TEL E-N	CONS STREL BU : 0115 940 WIL: struct	SULTI SINESS CE 10631 FAX: ures@darro	NG CIVIL AND STRUCTURAL E INTRE, PRIVATE ROAD No. 2, COLWICK, NOTTINGHAM, NG4 2, R :0115 9400645 sch-engineering.co.uk	NGINEE	RS	
CL	ENT			JOB NO		
	BARCHESTER CDA-2601					
	DAI	CHE	SIER	CDA-2	2601	
PR	OJECT		SIEK	CDA-2	2601	
PR	OJECT PRO RO	DPOSI	ED CARE HOME, TOP DARTFORD	CDA-2 DRG NO DD	150	
PR		OPOSI AD, HE	ED CARE HOME, TOP DARTFORD EXTABLE.	CDA-2 DRG NO DD REVISION	2601 150 _{P2}	
PR		DPOSI AD, HI	ED CARE HOME, TOP DARTFORD EXTABLE.	CDA-2 DRG NO DD REVISION SCALE	2601 150 P2 1:125 @ A0	
PR			ED CARE HOME, TOP DARTFORD EXTABLE.	CDA-2 DRG NO DD REVISION SCALE DATE	2601 150 P2 1:125 @ A0 APR 2023	
PR			ED CARE HOME, TOP DARTFORD EXTABLE.	CDA-2 DRG NO DD REVISION SCALE DATE DRAWN BY	2601 150 P2 1:125 @ A0 APR 2023 MJC	

CAMERON DARROCH ASSOCIATES

APPENDIX VI

CAMERON DARROCH ASSOCIATES KESTREL BUSINESS CENTRE, PRIVATE ROAD No. 2, COLWICK, NOTTINGHAM, NG4 2JR



REE	8/2607	Buildings
		Energy
24 Janua	ary 2023	Environment
Seven O	aks District Council	Environment
Argyle R	oad	Infrastructure
Kent		
TN13 1F	IG	19 Upper King Street
For the a	attention of Mrs Anna Horn	Norwich NR3 1RB
Your ref	erence: 22/00459/FUL	
Locatio	n: 57 Top Dartford Road, Hextable, Swanley, Kent. BR8 7SG	t: 01603 305190
Proposa	I: Demolition of the existing house and erection of a 67-bedroom care home	enquiries@clancy.co.uk
including	associated access and landscaping works.	www.clancy.co.uk
Please fi scheme.	nd enclosed updated drainage plans and catchment assessment plans for the above	Offices at:
Drawing	s enclosed:	Birmingham
4400 -P5 4402-P3	– Drainage GA – Catchment Areas Plan	Glasgow
		Leeds
I hese di landscar	rawings have been updated to reflect the minor revisions to the current proposed be and architectural scheme.	Liverpoor
		Manchester
Landsca	pe - DJOGS Drawing 711 rev 1 dated 24/10/22. ts - Harris Irwin Site Plan – 0102 Rev P5 dated 20/10/22	Newcastle
/		Norwich
We can of slightly re	confirm that the catchment area draining to the below ground soakaway network is	Prestwick
designs	provided in the SUDS report remain current.	Reading
Commer	nts were received from the LLFA (SEDC/2022/089508 19/4/22)	

The LLFA were seeking clarification concerning the location of the deep bore soakaways in relation to the proposed foundations for the building structure. It is usual for deep bore soakaways to be sited at least 10m from building foundations. Due to the constraints of the existing trees it is not possible to achieve this distance and the nearest soakaway is approximately 8m to the centre of the BH.

The design of the foundations will take into consideration all the site constraints such as geology, groundwater, geotechnical, trees and drainage. In this instance, the drainage design and location of the borehole soakaways may affect the choice of foundation type and deep foundations or piled foundations may be required where the building is close to the soakaways.

It is standard practice for structural engineers to consider the drainage systems as part of their structural design. However, a note has been provided on the drainage strategy drawing for the designers of the foundations to take into account the location of the soakaways. As a structural engineering practice, we can confirm that a safe foundation solution can be achieved with the soakaways in this location.

Kind regards

Greg Scott CEng MIstructE Director Clancy Consulting Ltd Clancy Consulting Ltd Registered Office Dunham Court 2 Dunham Rd Altrincham Cheshire WA14 4NX Registered in England 3693529





FLOOD RISK AND DRAINAGE STRATEGY REPORT 57 TOP DARTFORD ROAD, HEXTABLE, KENT, BR8 7SG

Report prepared on behalf of HARRIS IRWIN ASSOCIATES for BARCHESTER HEALTHCARE LTD

17 January 2021

enquiries@clancy.co.uk www.clancy.co.uk

Rev. 02

Clancy Consulting Limited 19 Upper King Street Norwich Norfolk NR3 1RB



FLOOD RISK ASSESSMENT & SUDS STRATEGY

Revision List

REVISION	REASON FOR ISSUE	DATE OF ISSUE
01	First Issue - Draft	16 December 2021
02	Second issue	14 January 2022

Prepared by: Richard Hendry Eng. Tech MIHE, Senior Civil Engineer for and on behalf of CLANCY CONSULTING LTD

Checked by: Greg Scott B.Eng. (Hons), C.Eng., M.I.Struct.E Director for and on behalf of CLANCY CONSULTING LTD

CAVEAT

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3.0	Site Description	6
4.0	Proposed Development	9
5.0	Flood Potential	10
6.0	Drainage	16
7.0	Flood Mitigation Measures	23
8.0	Conclusions and Recommendations	23

Appendices

- Appendix A Development Proposals
- Appendix B Ground Investigation
- Appendix C Topo and Utilities
- Appendix D Thames Water utility information
- Appendix E Surface Water Flood Flows
- Appendix F Drainage Layout and Calculations
- Appendix G Kent County Council; LLFA proforma



1.0 Introduction

1.1 General

- **1.1.1** This report relates to a planning application for the development of a brownfield site, north of the B258 Top Dartford Road, Hextable, for a proposed care home.
- **1.1.2** This report sets out the results of a flood risk assessment required in support of a planning application for this development. The assessment has been carried out in accordance with the general principles set out in National Planning Policy Framework, Technical Guidance to the National Planning Policy Framework and Flood Risk and Coastal Change Planning Practice Guidance.
- **1.1.3** This report is prepared solely for the benefit of Harris Irwin Associates for Barchester Healthcare Ltd. This report may not be assigned without prior written permission from Clancy Consulting Ltd.

1.2 Background Information

- **1.2.1** In 2001 the Department for Transport, Local Government and the Regions (DTLR) published Planning Policy Guidance Note 25 (PPG25), which explains how flood risk should be taken into consideration during the planning and development process.
- **1.2.2** PPG25 was replaced by Planning Policy Statement 25: Development and Flood Risk published in March 2010. This Policy Statement was introduced to place more emphasis on the increased flood risk from climate change.
- **1.2.3** In March 2012, the Government released the National Planning Policy Framework (NPPF) aiming to make the planning system less complex and more accessible, to protect the environment and promote sustainable growth.
- **1.2.4** NPPF accompanied with the Technical Guidance superseded PPS25 although the principles set out in the new publication remain similar in terms of the flood risk aspect.
- **1.2.5** The flood risk Practice Guide was published online in March 2014 with the latest update in August 2021.
- **1.2.6** In July 2018 the NPPF was updated. This update has highlighted the need for further awareness of flood risk issues for new developments. This has since been revised in February 2021 to include minor clarifications.



2.0 Structure of the Report

- **2.1** The report has been structured to follow the general principles set out in the Technical Guidance published in March 2014 along with subsequent revisions.
- **2.2** The methodology for this FRA has comprised a desktop study making reference to the Environment Agency (EA) Mapping, Kent Council Flood risk to communities Sevenoaks and Kent Council SFRA with relevant plans including plans showing the location of local sewers.
- **2.3** Sources of information
 - Flood maps from the Environment Agency published online
 - Kent Council SFRA
 - Thames Water utility asset data
 - British Geological Survey / Magic Map
 - Existing site records
 - Dartford Borough Council Level 1 & 2 SFRA
 - Water. People. Places. A guide for master planning sustainable drainage into developments
 - Prepared by the Lead Local Flood Authorities of the South East of England _ AECOM



3.0 Site Description

3.1 Location

3.1.1 The site is located detailed as below.

OS X (Eastings)	-552520
OS Y (Northings)	170870
Nearest Post Code	BR8 7SD

Table 1 – Site Details



Figure 1- Existing Aerial Plan identifying the proposed site in relation to the wider area of Hextable (Extract taken from EA mapping)





Figure 2 - Site Location (OS Maps: https://osmaps.ordnancesurvey.co.uk/51.41599,0.19221,18)

3.2 Existing Site Layout and Topography

- **3.2.1** The Existing site comprises a brownfield site of approximately 0.508 hectares which was formerly used as a single residential dwelling with outbuildings.
- **3.2.2** The site is accessible from the south off the (B258) Top Dartford Road.
- **3.2.3** A topographic survey has been undertaken and is included in Appendix C. The ground levels slope down from the Northern Boundary at approximately 60.5m AOD to 54.2m AO in the Southwest Corner.

3.3 Geology

- **3.3.1** The British Geological Survey's (BGS) online geological maps indicates the site has: *1:50 000 scale bedrock geology description:* Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated) - Chalk. Sedimentary Bedrock formed approximately 72 to 94 million years ago in the Cretaceous Period. Local environment previously dominated by warm chalk seas.
- **3.3.2** A ground investigation has been carried out by Clancy Consulting Geotechnical team in October 2021. Extensive infiltration testing was carried out. The investigations confirmed the presence of soft sand clay with occasional gravel over structureless chalk (Lewes Nodular Chalk Formation) to a depth of 1.45m. These included slightly sandy SILT, clay and subangular flint deposits as well as some areas of made ground. Refer to the report in Appendix B. Further discussion on infiltration results is included in Section 6.



3.4 Hydrology

3.4.1 There are no watercourse or surface drainage features within or in close proximity to the site.

3.5 Hydrogeolology

- **3.5.1** The ground water table was not located during the ground investigation works (noted in 3.3.2 above). Following further deep bore investigations, again, no ground water was encountered to a depth of 30m below nominal ground level.
- **3.5.2** The site is not within an inner or outer ground water source protection zone but is within the total catchment area. Refer to the extract from Magic Map below.



Figure 4 – Ground Water Source Protection. (Magic Maps: https://magic.defra.gov.uk/MagicMap.aspx)



4.0 **Proposed Development**

4.1 Description

4.1.1 The proposed development comprises of a 67 bedroom care home across a new purpose built 3 storey building, located to the north-east of Hextable. The new building has a footprint of approximately 1480m². The Proposed development is serviced by an access road off Top Dartford Road.

A proposed plan of the development can be found in Appendix A.

4.1.2 The development will see a net increase in impermeable surfaces on the site by approximately 15.2%. These impermeable areas can be found on Drawing 01 in Appendix F.

4.2 Vulnerability and Classification

- **4.2.1** The gov.uk website provides information on the flood risk vulnerability for new development.
- 4.2.2 Table 2 of the NPPF indicates the intended Care Home use to be "More Vulnerable".



5.0 Flood Potential

5.1 Rivers and Sea.

5.1.1 The following zones define the levels of flood risk from Rivers and the Sea:

Zone 1: Low Probability

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

Zone 2: Medium Probability

This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability

This zone comprises land assessed as having between 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Zone 3b: Functional Flood Plain

This zone comprises land where water must flow or be stored in times of flood. SFRA should identify this zone.

5.1.2 As part of its general obligations under the Water Resources Act 1991, The Environment Agency has carried out surveys of its existing defences against flooding and has published a series of nationwide 'Indicative Floodplain Maps' based upon information from historic flood events and basic hydraulic modelling. In general terms, these maps give a good indication of the areas likely to be affected by flooding. More recently, the Environment Agency have published the 'Flood Map' on their website which is based on improved hydraulic modelling and detailed local data.

5.1.3



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Figure 5 – EA Flood Map for Planning (Gov.uk)



5.1.4 The site is located within **Flood Zone 1** in terms of flooding from any nearby water course or the sea.

5.1.5 Flood Risk Vulnerability Classification.

	Flood Risk Vulnerability Classification				
Flood Zones	Essential	Highly	More	Less Vulnerable	Water
	Infrastructure	Vulnerable	Vulnerable		Compatible
Zone 1	~	~	~	✓	~
Zone 2	~	Exception Test	~	~	~
		Required			
Zone 3a†	Exception Test	×	Exception Test	~	~
	Required ⁺		Required		
Zone 3b*	Exception Test	×	×	×	~
	Required*				

Table 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' (Gov.uk)

Key:

✓ Development is appropriate

X Development should not be permitted

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

" * " In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and watercompatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.
- **5.1.6** The NPPF (Technical Guidance) Table 3, Flood Risk Vulnerability and Flood Zone Compatibility matrix, indicates that "**More Vulnerable**" development proposals in **Flood Zone 1** are acceptable.



5.2 Surface Water

5.2.1 During extreme rainfall events, or due to poor gully drainage maintenance, there will be times when gully capacity is exceeded which will lead to surface flow within surrounding roads. However, as can be seen from the map below, the proposed site is not affected by these flows Mapping for this form of flooding is shown on the Environment Agency website as below.



Extent of flooding from surface water

High Medium Low () Very low (Location you sele	High	h Medium	Low (Verylow \oplus	Location you select
--	------	----------	-------	------------------	---------------------

Risk Category	Definition
High	Each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
Medium	Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
Low Each year, there is a chance of flooding of between 1 in 100 (1 (0.1%)	
Very Low Each year, there is a chance of flooding of less than 1 in 1000 (0.1%)	

Figure 6 - Flood Risk from Surface Water (Gov.uk)

5.2.2 It can be seen from the flood mapping (Fig 6) that the site is considered to be at "Very low" risk of surface water flooding.


5.3 Ground Water

5.3.1 Reference has been made to the Dartford borough Council level 1 & 2 for flood risk areas. Mapping has been provided for a "cumulative impact assessment" of flood risk. As can be seen below, Hextable sits in an area classified as – Low. scenarios which include areas susceptible to ground water flooding. The development site shown to be at low flood risk.



Figure 9 – SFRA mapping for potential ground water flooding.





Figure 9 – SFRA mapping for Cumulative impact Assessment.

- **5.3.2** A ground investigation was carried out in July 2021. This found that the permeability of the ground across the site were not conducive for shallow infiltration features due to the size of attenuation needed to capture and infiltrate via soakaways. There was insufficient available space, given the dimensions of the proposed building.
- **5.3.3** Further ground investigation was undertaken during October 2021 that included 4 No. trial pits and infiltration tests. Again these determined that shallow infiltration was not a viable option to drain the site.
- **5.3.4** Given the above results, deep bore investigations where carried out early December 2021. The results confirmed that to a depth of 20m; no ground water was encountered to a depth of 30.0m and infiltration rates are acceptable to drain within the development site boundaries. All results of ground investigations can be found in Appendix B.

Permeability rates recorded from the falling head tests are presented in the table below:

Location	Depth (m)	Run	Permeability k (m/s)
	10	1	1.74X10 ⁻⁴
	15	1	5.73X10 ⁻⁴
BH01	15	2	2.61X10 ⁻⁴
	20	1	4.31X10 ⁻⁴
	20	2	3.76X10 ⁻⁴
	10	1	2.46X10-4
	10	2	4.12X10 ⁻⁴
DU02	15	1	1.37X10 ⁻⁴
BH02	15	2	4.03X10 ⁻⁴
	20	1	2.29X10 ⁻⁴
	20	2	4.98X10 ⁻⁴

Figure 10 – extract of tabled permeability results



5.4 Artificial Sources

5.4.1 Artificial sources of flooding are potentially from man-made structures and infrastructure. The Environment Agency have modelled the potential effect of flooding from failures in retaining structures containing reservoirs. As can be seen below in figure 11, there is no risk of flooding from reservoirs.



Maximum extent of flooding from reservoirs:

🔵 when river levels are normal 🯼 🥘 when there is also flooding from rivers 🛛 🕀 Location you selected

5.4.2 The risk of flooding from reservoirs at this site is **low**.

Figure 11 – Extent of Flooding from Reservoirs

(https://check-long-term-floodrisk.service.gov.uk/map?easting=552561&northing=170817&map=SurfaceWater)

5.5 Existing Drainage

5.5.1 Flooding could occur if the on-site drainage system becomes blocked or a rainfall event exceeds the design capacity. See Section 6 for details of the drainage system for the new development.



5.5.2 There are no other sewers known to be present within the site boundaries, therefore, no existing areas of the site are currently drained. It is assumed that rainfall is either discharged into the ground or runs-off site when the ground is saturated.

5.6 Existing Historical Flood Information

- **5.6.1** Reference has been made to the Dartford Borough Council Level 1 & 2 SFRA and also Water. People. Places. A guide for master planning sustainable drainage into developments Prepared by the Lead Local Flood Authorities of the South East of England _ AECOM.
- **5.6.2** There are no specific recorded events of flooding at the development site.
- **5.6.3** For surface water flooding, this site is on a relatively steep slope, however, there are no records identifying any flooding at this location and no flow paths are evident that cross the site.

5.7 Sequential Testing

5.7.1 The site layout has been sequentially tested and the buildings have been located within an area of low flood risk.

6.0 Drainage

6.1 Existing Drainage

6.1.1 Greenfield Run-off rates.

6.1.1.1 The existing site area is brownfield in terms of run-off, however, the following rates were calculated using the HR Walligford UKsuds greenfield run-off tool. Refer to Appendix F for details.

Greenfield runoff rates	Default	Edited
Q _{BAR} (I/s):	0.81	0.81
1 in 1 year (l/s):	0.69	0.69
1 in 30 years (l/s):	1.85	1.85
1 in 100 year (l/s):	2.57	2.57
1 in 200 years (l/s):	3.02	3.02

6.1.2 Thames Water Sewers.

- 6.1.2.1 No public sewers run through the developmentsite.
- 6.1.2.2 There is an existing Thames Water foul sewer south of Top Dartford Road within the junction of Maple Road. See Fig 12 Below.



Fig 12 – Thames Water Asset Plan.

6.1.2.3 The foul water drainage connection point level taken from existing Thames Water data as being 52.43m AOD.

6.2 **Proposed Drainage**

6.2.1 Surface Water Disposal Hierarchy

- 6.2.1.1 The disposal of surface water should be considered in the following order of priority:
 - Infiltration into the subsoil via soakaways or permeable paving. 1.
 - 2. Discharge to a water course or the sea.
 - Discharge to a surface water sewer. 3.
 - Discharge to a combined sewer. 4.
- 6.2.1.2 If it is not possible to discharge to a soakaway, surface water should be controlled with the use of Sustainable Drainage Systems (SuDS) and considered using the SuDS Hierarchy.
- 6.2.1.3 In this instance, it is proposed to use direct infiltration through deep bore soakaways.



6.2.2 Disposal of Surface Water

6.2.2.1 Infiltration

Extensive testing has been carried out to determine the suitability of soakaways for the site. Refer to Appendix B for the full ground investigation report and summary mapping. As can be seen in these reports, while traditional shallow infiltration is not a viable solution for this development, a solution of attenuation, restriction and treatment prior to outfalling to a series of deep bores, has been recommended as a viable solution.

6.2.2.2 Connection to a Watercourse

There are no watercourses close to the proposed site therefore this has not been considered.

6.2.2.3 **Connection to a surface water sewer.** There are no surface water sewers with in close proximity of the site.

6.2.3 SuDS Strategy – Control at Source

- 6.2.3.1 Permeable paving is proposed for all parking bays. Runoff from roof areas are considered to be of a low source of pollution under the indices as set out under the Simple index Guide Section 26 of the CIRIA SuDS Manual 2015 (C753). This is discussed further in section 6.2.8. That said, it is intended to treat flows from that and other sources by the use of proprietary features like vortex separators prior to water entering attenuation tanks. Other measures include the use of orifice flow controls top slow water velocity to help control flows and reduce, run-off volumes and flow rates.
- 6.2.3.2 The above systems will provide adequate water quality improvements and help reduce surface water flows and volumes.

6.2.4 Proposed Surface Water Drainage

6.2.4.1 The proposed surface water strategy will split the site into two separate catchments, east & west.

6.2.4.2 Catchment – West

- 6.2.4.2.1 For this catchment all surface water runoff shall drain to a range of features including permeable parking bays, draining to a piped system through vortex separators before eventual outfall to 4No. deep bore soakaways. Sub-base materials used under the permeable parking bays shall provide necessary filtration and control should a contamination occurrence occur. To aid this, further filtration will be provided by the vortex separator units, thus providing adequate and necessary water quality improvements.
- 6.2.4.2.2 2 No. attenuation tanks with flows restricted by orifice plates to control flow will be used for the final control. This has been designed to cater for the storage of extreme rainfall events up to the 100 year plus 40% climate change events.
- 6.2.4.2.3 At the lowest part of the site is at the entrance off Top Dartford Road. Gullies are located to capture runoff before this can enter the public highway.

6.2.4.3 Catchment – East

- 6.2.4.3.1 Unlike the western catchment area there is no vehicular access. However, 2 attenuation tanks (upper & lower) are again proposed.
- 6.2.4.3.2 The tanks shall receive water via a piped system collecting runoff from all roof and hard paved areas, while passing through a vortex separator to remove any heavy or contaminated particles. This will ensure longevity of the attenuation tanks while reducing maintenance liability to the orifice plates and wider system.



6.2.4.3.3 Refer to Appendix F for all drawings and calculations for the proposed drainage.

6.2.5 Proposed Foul Water Drainage

6.2.5.1 It is proposed for the foul water to be routed around the building as necessary, with the final section of pipe leaving the site in the south-western corner. From there it is intended to cross Top Dartford Road, to the junction with Mable Road, where an existing Thames Water foul chamber (4801) is located. This is currently being negotiated with Thames Water and will be the subject of a Section 106 agreement.

6.2.6 Exceedance

6.2.6.1 During extreme rainfall events over and above those designed for or if blockages occur within the drainage systems, there will be times when there are additional overland flows. The site has been designed with this in mind and overland flows routes have been indicated on the drainage plan. (Appendix F Drg. 4400)

6.2.7 Drainage and SuDS Maintenance

- 6.2.7.1 All of the measures described in this document will form part of the building O&M manual. All of the measures and designs will need to be adhered to in order to maintain the design life and design capacity of the surface and foul water drainage systems. Health and Safety risks have been communicated on design drawings. All responsibility for the on-site surface, foul water drainage and maintenance will lie with the site owner or adopting body.
- 6.2.7.2 The below ground drainage network is to be designed in accordance with Building Regulations Part H 2015, BSEN 752-2008, LASOO Non-Statutory Technical Standards for Sustainable Drainage 2015 and Chapter 32 of CIRIA C753 – The SUDS Manual.

6.2.7.3 General Maintenance

Inspection chambers and access points are to be provided at regular intervals which can be jetted / cleaned. General checking of the below ground drainage systems should be every three (3) months. General maintenance / cleaning of the below ground systems should be after each major storm event and on an annual basis. This applies to all pipes, inspection chambers, manholes, rodding eyes, gullies, channels etc.

6.2.7.4 Drainage Gullies

To be maintained in accordance with the manufacturer's recommendations and the "General" Section above.

6.2.7.5 Foul Systems

To be maintained in accordance with the "General" Section above.



SUDS Maintenance Plan

Permeable paving

To be in accordance with the suppliers requirements otherwise as noted below;

Regular maintenance		Surface brushing for appearance and to reduce silt accumulation		Monthly
	_	Brushing and suction sweep or jet wash and suction sweep particularly for block pavement in autumn after leaf fall		Annually
		Mow grass edges to paving at 35-50mm and remove weeds and leaves		As required
		Check outlets and control structures		Monthly depending on detail
Occasional tasks	\rightarrow	Jetting and suction where silt has accumulated in joints or voids. Replace grit and vibrate surface to lock for permeable block paving	\rightarrow	As required
Remedial work	\rightarrow	Where sinkage or surface damage occurs uplift blocks, remove grit bedding layer, geotextile if present and reinstate to design profile	\rightarrow	As required

Filter Strips – (where feasible)

Maintenance		Action		Frequency
Regular maintenance		Litter and debris removal from site		Monthly
	\rightarrow	Grass cut at 75-100mm not to exceed 150mm leaving cuttings in situ	\rightarrow	Monthly or as required
Occasional tasks		Remove leaves in autumn to prevent damage to grass		As required
		Cut back overhanging branches to allow dense grass growth		
Remedial work		Repair erosion, level uneven surfaces or damage by re-turfing or seeding		As required
	\rightarrow	Remove an oblique divot along the hard edge where silt has accumulated to reinstate flow over the edge	\rightarrow	
		Remove silt and spread locally outside design profile and reinstate surface		



Attenuation (Geocellular) Tanks



Key Responsibilities for SUDS Features.

Deep Bore soakaways, Filter Strips, Vortex control separators, Flow Controls, GeoCellular Storage - Care Home operator/landowner

Permeable Paving - Care Home Operator.

6.2.8 Water Quality

- **6.2.9** All well designed SuDS should manage the quality of runoff so that receiving waters and / or groundwater are protected from pollution hazards. The methods to achieve the required water quality requirements specific to this site have been designed in accordance with The SuDS Manual (CIRIA 2015) using the simple Indices method.
- 6.2.10 The below table defines the pollution hazard indices for varying use classifications.

	Pollution haz	zard indices for differ	ent land use class	ifcations
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro- carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (eg schools, offces) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to	High	0.8 ²	0.8 ²	0.9 ²



industrial estates, waste sites),		
sites where chemicals and fuels		
(other than domestic fuel oil) are		
to be delivered, handled, stored,		
used or manufactured; industrial		
sites; trunk roads and motorways		

Table 3 - Pollution hazard indices for different land use classifications (The SuDS Manual 2015)

Notes

- 1. Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).
- 2. These should only be used if considered appropriate as part of a detailed risk assessment required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for prepermitting advice. This will help determine the most appropriate approach to the development of a design solution.

Where a site land use falls outside the defined categories, the indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

6.2.11 The use classifications for this site have been highlighted green in table 4. The site presents a low risk from runoff generated by roof areas, the access road and parking. However, pollution will be an important factor due to the deep bore soakaway requirements for the site. The ground investigation report confirmed that there was no ground water present within 10.0m of the base of the borehole. This solution is considered acceptable to the Environment Agency as confirmed by them. See Appendix D.

The following table indicates that permeable paving and the proposed vortex separator combinations will provide sufficient mitigation to protect receiving groundwaters.

Mitigation index	TSS	Metals	Hydrocarbons
(Constructed permeable pavements)	0.7	0.6	0.7
(Proprietary features – Vortex separator (Downstream Defender))	0.5	0.4	0.8
Deep Bore soakaway	0.8	0.8	0.8

Mitigation = 0.0

 Table 4 - Proposed pollution mitigation



7.0 Flood Mitigation Measures

7.1 The site is at a low risk of flooding. While every effort has been made to prevent flooding on site during the design process, this is largely dependent upon the future maintenance activities of the site owner/ operator.

8.0 Conclusions and Recommendations

- **8.1** This report gives details of the flood risk assessment and drainage design, which has been carried out in relation to the proposed care home development on land at 57 Top Dartford Road, Hextable.
- **8.2** The site can be considered at low risk from all forms of flooding. The site ground levels, landscaping and floor levels of the building have all been designed to accommodate potential overland flow routes during extreme rainfall events.
- **8.3** The site drainage has been designed in accordance with LLFA guidance and recommendations. SuDS features have been introduced to reduce run-off velocity, flood water volume and to improve water quality before it is discharged to the deep bore sewers.
- **8.4** Allowances have been made for climate increases in rainfall events and systems have been designed for extreme rainfall events.
- **8.5** The Proposed development meets NPPF and Local Policy requirements.



Appendix A – Development Proposals



	NOTES
	All dimensions are in millimetres unless stated otherwise.
	Drawings are not to be scaled for Construction purposes.
	This drawing is to be read in conjunction with all other relevant drawings and specifications.
	The copyright of this drawing is vested in Harris Inwin Associates Ltd. and must not be copied or reproduced without his written consent of a Director.
O1O2 - Pr Site Plan 1 : 200 <u>Om 2m 4m 6m</u> VISUAL SCALE 1:200 @ A1	oposed Ground Floor
	Grass
	Low hedge
	Pathway
	Resin Bond Road surface

Land under first floor garden

P2	11.10.21	Minor changes to plan	MLG	ID
P1	29.09.21	Second Draft Issue	MLG	ID
Rev	Date	Description	Drawn By	Checked By
	ΗΔ	RRIS IRWIN architects		
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Appendix B – Ground Investigation

			Project	Title: 5	7 Top D	artford Road	d, Hextable WS0			01	1		
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W - Water San S - Standard P	nple Penetrati	on Test		backfil comple	led with etion.	arisings upo	on						
C - Cone Pene N - Penetration	etration	Test I' Value											
∇ - Hand Shea	ar Vane	kPa						Daily Log C	Of Depth	s	Chise	lling	
- Groundwa	ater Strik ater Leve	el n						Date	Casing	Water	From	To	Hours
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		Project	Project Title: 57 Top Dartford Road, Hextable					WS01					
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- Groundwa	ater Strik ater Leve	el f	GS	Scale:	1:25			Date	Casing	Water	From	То	Hours

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Depth (m)	Туре	Test Result		Level Legend Depth (m) Description					Wa	ater Sta	ndpipe		
0.20 2.80 - 3.00	GT					0.20 0.50 0.75 1.00 1.16 1.80 2.00 2.10 3.00 3.40	TOPSOIL: Grass or gravelly CLAY, with rootlets. Sand is fir rounded to sub-ang and chalk. Cobble Increasing chalk g (LEWES NODULAF Structureless whith uncompacted sand sub-rounded to sub weak to very weak, flint. (LEWES NODULAF Weak, medium den cobble content. Co flint. No discernible (LEWES NODULAF Structureless whith uncompacted SIL (LEWES NODULAF Structureless whith uncompacted sand cobble content. Gra angular, fine to coa low density white rounded of flint. (LEWES NODULAF Structureless whith uncompacted SIL gravel and occasis (LEWES NODULAF Structureless white uncompacted SIL gravel and occasis (LEWES NODULAF	ver soft da h low cobb le to coarse gular, fine to s are sub-r ravel conte CHALK FC te CHALK FC bobles are se CHALK FC isty white C bobles are se CHALK FC ite CHALK FC	rk brown le cont . Grave o coarse ounded nt with RMATIC compo SILT. G ne to co white ch PRMATIC compo SILT. W RMATIC compo SILT. V rounded k to ver obles a PRMATIC compo SILT, v rounded k to ver obles a PRMATIC	n sandy ent and l is sub- e of flint depth. DN) Desed of fravel is barse of nalk and DN) with low nded of DN) Desed of vith low to sub- ry weak re sub- DN) Desed of led flint s. DN) Desed of tent and re sub- DN) Desed of led flint s. DN)			
KEY D - Disturbed S	Sample			REM No Gr	ARKS oundwat	ter Encounte	ered	Water Strik	es Strike	Level	Minutes	Casing	Sealed
B - Bulk Samp U - Undisturbe W - Water San	le d nple	_		Locati prior to backfi	on scan o excava lled with	ned with CA ation. Boreho arisings upo	I ble bn		-				
S - Standard P C - Cone Pene N - Penetration	enetrati etration	on Test Test J' Value		compl	etion.								
V - Hand Shea	ar Vane	kPa ke						Daily Log C	of Depth	S	Chisell	ing Tr	Heur-
Groundwa	ater Leve	el 🖌	GS	Scale	: 1:25			Date	Casing	vvater	From	10	Hours

			Project	Title: 5	7 Top D	artford Roac	l, Hextable		W	'S (03		
C	lanc	çy	Project	Numbe	r: 10/178	31	Client: Barchester Hea	lthcare Ltd.	Sheet ⁻	1 Of 1			
			GL (mA	AOD):			N Coord: 0.192084		E Coor	d: 51.41	6154		
Date: 07/07/20	21		Method	I: Wind	ow Sam	pler	Driller: CK Drilling Ltd		Loggeo	l By: EB			
Depth (m)	Туре	Test Resul	t	Level	Legend	Depth (m)	Description				W	ater Sta	Indpipe
0.15	GT					0.30 0.43 0.90 1.00 2.00 2.20 2.75 3.00 3.30	TOPSOIL: Grass ov sandy gravelly CLA rootlets and roots Gravel is sub-roun coarse of flint and rounded of flint. Structureless greyis of uncompacted sa cobble content. Gra angular, fine to coa low density chalk. ((LEWES NODULAF Structureless whi uncompacted sandy rounded to sub-ang to very weak, low d (LEWES NODULAF Weak, medium den fragments. No disce (LEWES NODULAF Structureless whi uncompacted SILT Cobbles are sub-ro (LEWES NODULAF Weak, medium den fragments. No disce (LEWES NODULAF Structureless whi uncompacted SILT Cobbles are sub-ro (LEWES NODULAF Meak, medium den focalised iron stain sets. (LEWES NODULAF End Of Borehole At	ver very soft Y, with low S. Sand is ded to sub- d chalk. Co sh white CH ndy gravelly avel is sub- arse of wea Cobbles are CHALK FC ite CHALK FC sity white Cl ensity white Cl ensity white Cl chALK FC ite CHALK FC ite CHALK FC ite CHALK FC ite CHALK FC area of the CHALK FC ite CHALK FC ite CHALK FC ite CHALK FC area of the CHALK FC ite CHALK FC area of the CHALK FC area of the area of the chalk FC area of the area of the	dark bro cobble fine to angular bbles a IALK co / SILT, ' rounded k to ver sub-an <u>PRMATIC</u> compo t. Grave coarse chalk. <u>PRMATIC</u> HALK, w ire sets. <u>PRMATIC</u> cobble filint. <u>PRMATIC</u> cobble cobble cobble filint.	own silty content coarse , fine to re sub- mposed with low to sub- y weak gular of <u>DN)</u> osed of l is sub- of weak <u>DN)</u> rith shell DN) Dosed of content DN) .K, with fracture DN)			
KEY D - Disturbed S B - Bulk Samp U - Undisturbe W - Water Sam S - Standard P C - Cone Pene N - Penetration V - Hand Shea ✓ - Groundwa	KEY D - Disturbed Sample 3 - Bulk Sample J - Undisturbed W - Water Sample S - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value V - Hand Shear Vane kPa Z - Groundwater Strike - Groundwater Level		GS	REM No Gr Locati prior to backfi compl	ARKS oundwat on scan o excava lled with etion.	ter Encounte ned with CA ation. Boreho arisings upo	ered T ble bn	Water Strik Date Daily Log C Date	es Strike Df Depth Casing	Level S Water	Minutes Chise From	Casing	Sealed
	- Groundwater Level				1:25							1	

			Project	Title: 5	7 Top Da	artford Road	l, Hextable		W	\overline{S}	ງ4		
C	lanc	çy	Project	Numbe	r: 10/178	31	Client: Barchester Hea	lthcare Ltd.	Sheet 1	1 Of 1			
			GL (m/	AOD):			N Coord: 0.191532		E Coor	d: 51.41	6099		
Date: 07/07/20	21		Method	d: Wind	ow Sam	pler	Driller: CK Drilling Ltd		Loggeo	l By: EB			
Depth (m)	Туре	Test Result		Level	Legend	Depth (m)	Description				Wa	ater Sta	ndpipe
0.25	GT					0.20 0.50 0.70 1.00 1.10 1.40 1.76 2.00 2.35 2.66 3.00 3.40	MADE GROUND: sandy gravelly clay. rounded to sub-ang MADE GROUND: brown sandy grav content and rootle Sand is fine to coars sub-angular, fine to coars sub-angular, fine to coars of uncompacted sat cobble content. Gra angular, fine to coal low density white of sub-rounded to sub- composed of uncor low cobble content sub-angular, fine to composed of uncor low cobble content sub-angular, fine to weak, low density w rounded of flint. (LEWES NODULAF Structureless brown of uncompacted sat sub-angular, fine to white chalk. (LEWES NODULAF Structureless brown of uncompacted sat sub-angular, fine to white chalk. (LEWES NODULAF Structureless y composed of uncor cobbles are sub-root (LEWES NODULAF Weak, medium den with low cobble cost angular of flint. No (LEWES NODULAF Structureless wh uncompacted SII content and localise rounded to sub-ang (LEWES NODULAF Weak, medium den with low cobble cost angular of flint. No (LEWES NODULAF	Very soft d Sand is fine ular fine to o Grass over elly clay, w ts. Fragmer se. Gravel is to coarse of sub-rounde sh white CH ndy gravelly avel is sub-r arse of wea thalk and fline c-angular of CHALK FO ellowish w npacted gra to coarse o hite chalk. C CHALK FO ellowish w to coarse of wea to coarse o hite chalk. C CHALK FO ellowish w to coarse of wea to coarse of hite chalk. C CHALK FO ellowish w to coarse of wea to coarse of hite chalk. C CHALK FO sity yellowis ontent and are sub-ro o discernible CHALK FO to coarse of the CHALK FO to coarse of the CHALK FO to discernible CHALK FO	ark bro e. Grave coarse o very se vith low hts of cl sub-rou flint, ch d of flir ALK co v SILT, v rounded k to ver nt. Cobb flint. PRMATIC vhite (velly SI sub-rou f weak cobbles a PRMATIC ALK co SILT. Co reak low PRMATIC taLK co SILT. Co reak low PRMATIC h white (compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob PRMATIC compor edium ng. Cob	wn silty I is sub- f flint. oft dark cobble harcoal unded to palk and nt. mposed with low to sub- ry weak oles are <u>DN)</u> CHALK CHALK CON) CHALK medium taining tr of flint DN) CHALK ed iron to sub- re sets DN) CHALK ed iron to sub- re sets DN) CHALK cobble bles are DN) CHALK cobble bles are DN) CHALK cobble bles are DN) CHALK			
KEY D - Disturbed S	KEY D - Disturbed Sample B - Bulk Sample			REM	ARKS	er Encounte	End Of Borehole At ered T	₩ater Strik Date	es Strike	Level	Minutes	Casing	Sealed
U - Undisturbe W - Water San	d nple	on Tost		prior to backfi	o excava lled with	ation. Boreho arisings upo	ble on						
C - Cone Pene N - Penetration	enetration tration Test 'N	on rest Test J' Value		Compl									
V - Hand Shea	ar Vane ater Strik	kPa ke						Daily Log C)f Depth	S Water	Chisell	ing To	Houre
Groundward	ater Lev	el f	GS	Scale:	: 1:25				Jasily	vvale!			
												I	

			Project	Title: 5	7 Top Da	artford Road	I, Hextable		W	<u>'S(</u>)5)	
C	lanc	çу	Project	Numbe	er: 10/178	31	Client: Barchester Health	ncare Ltd.	Sheet 1	I Of 1			
			GL (m/	AOD):			N Coord: 0.191476		E Coor	d: 51.41	6428		
Date: 08/07/20	21		Method	d:			Driller: CK Drilling Ltd		Logged	l By: EB			
Depth (m)	Туре	Test Result	t	Level	Legend	Depth (m)	Description				W	ater Sta	Indpipe
0.50	GT					0.30 0.45 0.73 0.85 1.00 1.15 2.00 2.45 3.00	MADE GROUND: Gr sandy gravelly clay, w wood and charcoal. Gravel is sub-rounded of flint, chalk and brid MADE GROUND: S gravelly clay, with I content and rootlets Gravel is sub-rounded of flint, chalk, brick an MADE GROUND: S sandy gravelly clay, w coarse. Gravel is sub to coarse of chalk, fli Structureless reddish ocompacted grav concent. Gravel is sub "ine to charse of weal Chibles are sub-rour and chalk. Structureless white incompacted SILT, w Structureless yell composed of uncor cobble content. Cob sub-angular of flint. End Of Borehole At 2.	rass over s with rootlet . Sand is d to angula k. Soft brow lenses of s. Sand is d to angula nd glass. Soft reddi. vith rootlets b-rounded int and cen n white CH celly SILT, b-rounded k, low-den nded to sub e CHALK with localis Ilowish v mpacted 3 obles are s	soft darl s. Fragr fine to r, fine to rn very increas fine to r, fine to r, fine to sh brov s. Sand i to angu ramic. ALK co with sub- sity white compo ed iron s vhite (SILT, w sub-rou	k brown nents of coarse sandy ed clay coarse o coarse wn very s fine to ilar, fine mposed cobble angular, te chalk. ar of flint osed of staining. CHALK <i>i</i> th low nded to			
KEY D - Disturbed Sample B - Bulk Sample				REM No Gr	ARKS	er Encounte	ered C	Water Strik Date	es Strike	Level	Minutes	Casing	Sealed
U - Undisturbe	d			prior to	0 excava	ation. Boreho							
S - Standard P	Penetrati	on Test		compl	etion.	anonys upt	_						
C - Cone Pene N - Penetratior	etration n Test 'N	i est I' Value					F						
∇ - Hand Shea	tor Strill	kPa						Daily Log C	of Depth	s	Chisel	ling	
- Groundwa	ater Strik	el a						Date	Casing	Water	From	To	Hours
		4	เนอ	Scale:	: 1:25		F						
												1	

			Project	Title: 5	7 Top Da	artford Roac	I, Hextable		W	['] S(06		
C	lanc	çy	Project	Numbe	er: 10/178	31	Client: Barchester Heal	thcare Ltd.	Sheet 1	Of 1			
			GL (mA	AOD):			N Coord: 0.191582		E Coor	d: 51.41	6552		
Date: 08/07/20	21		Methoo	1:			Driller: CK Drilling Ltd		Loggeo	l By: EB			
Depth (m)	Туре	Test Result	t	Level	Legend	Depth (m)	Description				Wa	ater Sta	ndpipe
0.30	GT					0.20 0.35 0.90 1.00 2.00 2.00 3.00	MADE GROUND: brown silty sandy rootlets. Sand is fin rounded to sub-ang MADE GROUND: A gravelly clay, with I and roots. Sand is rounded to sub-ang flint and brick. Cobb angular of flint. Structureless ye composed of uncer SILT, with low cob rounded to sub-ang to very weak, low d a b-rounded to (LYEN NODULAR Struct_reless ye c. nposed of uncer iron_laining. ''EWES NODULAR End Of Borehole At	Grass over slightly gra e to coarse jular, fine to /ery soft da ow cobble of fine to co ular, fine to les are sub- oble content. ular, fine to ensity white sub-angula CCHALK FC ellowish w pacted SIL CCHALK FC 2.40 m	very si very si very cla . Gravelo coarse rk brow content, arse. G coarse rounded white (sandy g coarse coarse chalk. (r of flint. DRMATIO	oft dark ay, with is sub- of flint. n sandy rootlets ravel is of chalk, i to sub- CHALK gravelly is sub- of weak Cobbles DN) CHALK ocalised DN)			
KEY D - Disturbed Sample				REM No Gr	ARKS	er Encounte	ered	Water Strik	.es Strike	l evel	Minutes	Casing	Sealed
B - Bulk Samp U - Undisturbe W - Water Sar	B - Bulk Sample U - Undisturbed W - Water Sample			Locati prior to backfi	on scanı o excava lled with	ned with CA ation. Boreho arisings upo	T ble bn					9	
S - Standard F C - Cone Pene	enetrati tration	on Test Test		compl	etion.	0 11							
V - Hand Shea	- Penetration Test 'N' Value - Hand Shear Vane kPa							Daily Log C	Of Depth	s	Chisell	ing	
- Groundwa	ater Strik ater Leve	ke el I	68					Date	Casing	Water	From	То	Hours
	- Groundwater Strike - Groundwater Level			Scale	: 1:25								

			Project	Title: 5	7 Top Da	artford Road	I, Hextable		W	'S (7כ		
C	anc	çy	Project	Numbe	r: 10/178	31	Client: Barchester Hea	Ithcare Ltd.	Sheet ⁻	1 Of 1			
			GL (mA	OD):			N Coord: 0.191707		E Coor	d: 51.41	648		
Date: 08/07/20	21		Methoo	I: Wind	ow Sam	oler	Driller: CK Drilling Ltd		Loggeo	l By: EB			
Depth (m)	Туре	Test Result	t	Level	Legend	Depth (m)	Description				Wa	ater Sta	Indpipe
0.10	repth (m) Type Test Result 0.10 ES 0.10 ES 2.80 - 3.00 GT 2.80 - 3.00 GT 2.80 - 3.00 GT V Vater Sample 3 - Bulk Sample 3 - Bulk Sample 3 - Standard Penetration Test 2 - Cone Penetration Test 2 - Cone Penetration Test 2 - Cone Penetration Test 3 - Penetration Test					0.25 0.30 0.90 1.00 1.00 2.48 2.00 2.48 3.00 3.35	MADE GROUND: brown silty sandy Sand is fine to coars sub-angular, fine to MADE GROUND: clay, with low cobble is fine to coarse. angular, fine to coars brick. Cobbles are so of flint. Structureless y composed of unce SILT, with low cob rounded to sub-ang low density white h 1 ded to sub-ang low density white h 1 ded to sub-ang low density white h 1 ded to sub-ang low density white Structureless white composed of unce SILT, with localised rounded to sub-ang low density white ch (LEWES NODULAF Structureless white uncompacted SIL specks and locali (LEWES NODULAF Structureless y composed of uncor localised iron stainin sub-angular, fine to white chalk . (LEWES NODULAF End Of Borehole At	Grass over gravelly cla se. Gravel is coarse of fli Soft brown e content an Gravel is s arse of flint, sub-angular ellowish w ompacted s ble content. ular, fine to chalk. Col ngular of fl CHALK FC ellowish w ompacted s iron staining ular, fine to nalk. CHALK FC ellowish w accHALK FC ellowish w accHALK FC sed iron s CHALK FC ellowish w acchaLK FC scarse of w CHALK FC scarse of w	very s y, with sub-rou nt and c sandy d rootle sub-rou chalk a to sub- white 0 sandy g Gravel coarse bbles a bint. PRMATIC compo casiona taining PRMATIC compo casiona taining PRMATIC vhite 0 sandy g Gravel coarse pRMATIC compo casiona taining PRMATIC	oft dark rootlets unded to halk. gravelly ts. Sand nded to and rare rounded CHALK gravelly is sub- of weak. CN) DSed of staining DN) CHALK gravelly is sub- of weak. DN) CHALK CN) DSed of al black DN) CHALK LT, with unded to a density DN)			
KEY D - Disturbed Sample B - Bulk Sample				REM No Gr	ARKS	er Encounte	ered	Water Strik	es Strike	Level	Minutes	Casing	Sealed
B - Bulk Sample U - Undisturbed W - Water Sample S - Standard Penetration Test				prior to backfi	or scan o excava lled with etion	arisings upo	ble on						
C - Cone Pene N - Penetration	C - Standard Penetration Test C - Cone Penetration Test N - Penetration Test 'N' Value			compr				D			<u> </u>		
V - Hand Shea	- Penetration Test N Value - Hand Shear Vane kPa - Groundwater Strike							Daily Log C Date	of Depth Casing	s Water	Chisell From	ing To	Hours
	 Find all of the set in Value Hand Shear Vane kPa Groundwater Strike Groundwater Level 			Scale:	: 1:25								



			Project	Title: 5	7 Top Da	artford Road	d, Hextable	TP01	
C	lanc	çy	Project	Numbe	r: 10/178	31	Client: Barchester Healthcare Ltd.	Sheet 1 Of 1	
		m 12	GL (m/	AOD):			N Coord: 170880	E Coord: 552534	
Date: 07/10/20	21		Method	d: JCB			Logged By: EB	Scale: 1:10	
Depth (m)	Туре	Test Result	t	Level	Legend	Depth (m)	Description		Water
KEY	Project Title: 57 Top Dartford I Project Number: 10/1781 GL (mAOD): 7/10/2021 Method: JCB m) Type Type Test Result Level Legend 0.40 0.41 0.40 0.41 0.41 0.42 0.43 0.44 0.45 0.45 0.40 0.41 0.42 0.43 0.44 0.45 0.45 0.46 0.47 0.48 0.49 0.41 0.42 0.43 0.44 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45			- 0.40 - 1.00 - 1.30 - 1.50 - 2.00	TOPSOIL: Grass over very soft CLAY, with rootlets. Sand is fine coarse, subrounded to subangu Structureless CHALK, compose sandy gravelly SILT. Gravel is w to coarse and subangular. (LEWES NODULAR CHALK FC Structureless CHALK, compose slightly sandy GRAVEL and C low density white with localised and subangular. Low subangular (LEWES NODULAR CHALK FC 1.10 - 1.30 Increased flint cobble Structureless CHALK, compo GRAVEL and COBBLES. Clast density, white, fine to coar subangular flint cobble con (LEWES NODULAR CHALK FC End Of Trial Pit At 1.50 m	t dark brown sandy gravelly e to coarse. Gravel is fine to lar of flint and chalk. d of brownish white to white yeak, low density, white, fine PRMATION) sed of yellowish white silty OBBLES. Clasts are weak, iron staining, fine to coarse ar flint cobble content. PRMATION) e content. sed of silty slightly sandy ts are weak, low to medium se and subangular. Low tent. PRMATION)			
D - Disturbed B - Bulk Samp W - Water Sar V - Hand Shea	Sample ble mple ar Vane	V kPa ▼	- Grour - Grour	ndwater ndwater	Strike Level	AGS	No Groundwater Encountered Location scanned with CAT prior to arisings upon completion.	excavation. Trial pit backfilled	with

			Project	Title: 5	7 Top Da	artford Road	I, Hextable	TP02	
C	land	çy	Project	Numbe	r: 10/178	1	Client: Barchester Healthcare Ltd.	Sheet 1 Of 1	
			GL (m/	AOD):			N Coord: 170833	E Coord: 552513	
Date: 07/10/20	21		Method	l: JCB			Logged By: EB	Scale: 1:10	
Depth (m)	Туре	Test Result	İ	Level	Legend	Depth (m)	Description		Water
				-		- - -	MADE GROUND: Grass over sandy gravelly CLAY, with roots coarse. Gravel is fine to coarse of flint, chalk, brick and glass.	very soft dark brown silty and rootlets. Sand is fine to , subrounded to subangular	-
				-		0.35 -	Very soft light orangish brown with low cobble content, roots a coarse. Gravel is fine to coarse of flint and chalk. Cobbles are s	very sandy gravelly CLAY, and rootlets. Sand is fine to , subrounded to subangular subangular of flint.	-
				-		0.55 - - 0.75	Structureless CHALK, compose gravelly SILT. Gravel is weak, coarse and subangular. Lov content. (LEWES NODULAR CHALK FC	ed of brownish white sandy low density, white, fine to v subangular flint cobble VRMATION)	-
						1.00	Structureless CHALK, composendy GRAVEL and COBBLE medium density, white with loc coarse and subangular. Mediu content. (LEWES NODULAR CHALK FC 0.90 - 1.00 Increased flint cobble	osed of white silty slightly S. Clasts are weak, low to calised iron staining, fine to um subangular flint cobble ORMATION) e content.	-
						- 1.30 - - 1.50 -	Structureless CHALK, composes sandy GRAVEL and COBBLE medium density, white with loc coarse and subangular. Low content. (LEWES NODULAR CHALK FC) End Of Trial Pit At 1.50 m	sed of yellowish white silty S. Clasts are weak, low to alised iron staining, fine to v subangular flint cobble ORMATION)	-
									-
KEY D - Disturbed 3 B - Bulk Samp W - Water Sar V - Hand Shea	Sample Ile mple ar Vane	V kPa ▼	- Grour - Grour	ndwater ndwater	Strike Level	AGS	REMARKS No Groundwater Encountered Location scanned with CAT prior to arisings upon completion.	excavation. Trial pit backfilled v	with

			Project	Title: 5	7 Top Da	artford Road	d, Hextable	TP03	
C	lanc	çу	Project	Numbe	r: 10/178	31	Client: Barchester Healthcare Ltd.	Sheet 1 Of 1	
		m 11	GL (m/	AOD):			N Coord: 170856	E Coord: 552485	
Date: 07/10/20	21		Method	l: JCB			Logged By: EB	Scale: 1:10	
Depth (m)	Туре	Test Result	t	Level	Legend	Depth (m)	Description		Water
						- 0.36 - 0.50 - 1.00 - 1.35 - 1.45 	MADE GROUND: Grass over CLAY, with roots and rootlet Gravel is fine to coarse, subr chalk, brick, glass and metal. Structureless CHALK, compose gravelly SILT. Gravel is weak, coarse and subangular. (LEWES NODULAR CHALK FC Structureless CHALK, compose gravelly SILT. Gravel is weak, coarse and subangular. (LEWES NODULAR CHALK FC Structureless CHALK, compose gravelly SILT. Gravel is weak, coarse and subangular. (LEWES NODULAR CHALK FC Structureless CHALK, compose sandy GRAVEL and COBBLES density, white, fine to coar subangular flint cobble con (LEWES NODULAR CHALK FC Structureless CHALK, compose slightly sandy GRAVEL and C medium density, white with loc coarse and subangular. Media content. (LEWES NODULAR CHALK FC End Of Trial Pit At 1.45 m	r very soft sandy gravelly s. Sand is fine to coarse. ounded to angular of flint, ed of brownish white sandy low density, white, fine to <u>PRMATION</u> sed of white slightly sandy low density, white, fine to <u>PRMATION</u> osed of white silty slightly S. Clasts are weak, medium se and subangular. Low tent. PRMATION) sed of yellowish white silty OBBLES. Clasts are weak, calised iron staining, fine to um subangular flint cobble <u>PRMATION</u>	
D - Disturbed S B - Bulk Samp W - Water Sar V - Hand Shea	Sample Ile nple ar Vane	kPa ▼	- Grour - Grour	ndwater ndwater	Strike Level	AGS	No Groundwater Encountered Location scanned with CAT prior to arisings upon completion.	excavation. Trial pit backfilled v	with

			Project	Title: 5	7 Top Da	artford Roac	I, Hextable	TP04	
C	lanc	у	Project	Numbe	r: 10/178	1	Client: Barchester Healthcare Ltd.	Sheet 1 Of 1	
		× 11	GL (m/	AOD):			N Coord: 170833	E Coord: 552488	
Date: 07/10/20	21		Method	I: JCB			Logged By:	Scale: 1:10	
Depth (m)	Туре	Test Result	t	Level	Legend	Depth (m)	Description		Water
				-		- - 0.30	TOPSOIL: Grass over very so slightly gravelly CLAY, with roo to medium. Gravel is fine to subangular of flint and chal	oft dark brown silty sandy ts and rootlets. Sand is fine o coarse, subrounded to k.	-
				-		- 0.46	Very soft light orangish brown rootlets. Sand is fine to mediu subrounded to subangular of fl	sandy gravelly CLAY, with m. Gravel is fine to coarse, lint and chalk.	
				-		- 0.60	Structureless CHALK, compose gravelly SILT. Gravel is weak coarse and subangular. (LEWES NODULAR CHALK FO	ed of brownish white sandy , low density, white fine to VRMATION)	
				-		0.90	Structureless chalk compose cobbly SILT. Clasts are weak, coalse and subangular. Media content. (LEWES NODULAR CHALK FO	d of white sandy gravelly low density, white, fine to um subangular flint cobble RMATION)	-
						-	Structureless CHALK, compo GRAVEL and COBBLES. Clasts white with localised iron sta subangular. Medium subang (LEWES NODULAR CHALK FO	osed of white silty sandy s are weak, medium density, ining, fine to coarse and ular flint cobble content. RMATION)	-
				-		-	1.35 - 1.45 Subangular flint boul	der.	-
				-		- 1.60 - - - 2.00	End Of Trial Pit At 1.60 m		-
KEY D - Disturbed 3 B - Bulk Samp W - Water Sar V - Hand Shea	Sample Ile nple ar Vane	V kPa ▼	- Grour - Grour	ndwater	Strike Level	AGS	REMARKS No Groundwater Encountered Location scanned with CAT prior to arisings upon completion.	excavation. Trial pit backfilled	with



			Project	Title: 5	7 Top Da	artford Road	l, Hextable		B	HC)1		
C	lanc	çy	Project	Numbe	r: 10/178	31	Client: Barchester Hea	Ithcare Ltd.	Sheet 1	I Of 5			
			GL (m/	AOD): 5	7.73		N Coord: 170835		E Coor	d: 55251	6		
Date: 06/12/20	21-07/1	2/2021	Method	1: Cable	e Percus	sion	Driller: South-Eastern D	Drilling Servi	c eo ggeo	l By: EB			
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			Project	Title: 5	7 Top D	artford Road	l, Hextable		R)1		
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			GL (m/	AOD): 5	7.73		N Coord: 170835		E Coor	d: 5525	16		
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			GL (m/	AOD): 5	7.73		N Coord: 170835		E Coor	d: 5525 ⁻	16		
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	Project	Title: 5	7 Top D	artford Roac	d, Hextable BHC			01					
			Project	Numbe	r: 10/178	31	Client: Barchester Hea	althcare Ltd. Sheet 4 Of 5					
	GL (m/	AOD): 5	7.73		N Coord: 170835	E Coord: 552516							
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	GL (m/	AOD): 5	7.73		N Coord: 170835	E Coord: 552516								
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			Project	Numbe	r: 10/178	31	Client: Barchester Hea	: Barchester Healthcare Ltd. Sheet 1 Of 4						
			GL (mAOD): 56.98				N Coord: 170843		E Coor	d: 55254	41			
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			Project	Title: 5	7 Top D	artford Road	BH02)2	2		
			Project	Numbe	r: 10/178	31	Client: Barchester Heal	althcare Ltd. Sheet 2 Of 4 E Coord: 552541					
			GL (mA	AOD): 5	6.98		N Coord: 170843						
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Proje			Project	Title: 5	7 Top D	artford Roac	d, Hextable BHO)2				
			Project	Numbe	r: 10/178	31	Client: Barchester Hea	archester Healthcare Ltd. Sheet 3 Of 4							
			GL (m/	AOD): 5	6.98		N Coord: 170843		E Coor	d: 55254	41				
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Project			Project Title: 57 Top Dartford Road, Hextable			I, Hextable	BH02								
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C	lanc	у	Project	Numbe	r: 10/178	31	Client: Barchester Hea	lthcare Ltd.	Sheet 4 Of 4						
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AUD			Scale: 1:40												



Appendix C – Topographical survey and Utilities

57 TOP DARTFORD ROAD:



Oak House, London Road, Sevenoaks, Kent TN13 1AF phone: 01732 452200 fax: 01732 452245 info@bhdarchitects.co.uk www.bhdarchitects.co.uk

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Do Not Scale. Use only figured dimensions. All dimensions to be checked on site prior to con Any discrepancies to be notified to the architect. All Copyright Reserved to **bhd** architects.



Appendix D – Environment Agency correspondence & Thames Water asset plan

From: KSL Groundwater & contaminated land Team <ksl.gwcl@environment-agency.gov.uk>
Sent: 01 November 2021 09:16
To: Greg Scott <greg.scott@clancy.co.uk>
Subject: Re-development of a site for a new care home in Hextable

CAUTION: EXTERNAL EMAIL

Hi Greg.

My name is Matt and I work in the Groundwater and Contaminated Land team at the EA in Kent. I believe you recently emailed John Vincent for a response to a query (I've copied in below). Unfortunately he retired a few months back!

I see John has previously provided our standard guidance on deep borehole soakaways.

In answer to your questions:

- Yes the same guidance applies
- We would advise on the use of pollution prevention measures for car parking areas, as per the guidance.
- You should only sink the boreholes to the minimum depth at which you attain sufficient infiltration (which should be at least 10m from the highest seasonal water table)
- I'm afraid I don't have any further details on the GW depths at this location.

Regards,

Matt

Matthew Holloway

Groundwater and Contaminated Land Technical Officer Kent, South London and East Sussex area Environment Agency, Orchard House, Endeavour Park, London Road, West Malling, Kent, ME19 5SH

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Asset location search



Clancy Consulting Ltd Queens House 19Upper King Street NORWICH NR3 1RB

Search address supplied

57 Top Dartford Road Swanley BR8 7SG

Your reference

Hextable

Our reference

ALS/ALS Standard/2021_4486192

Search date

12 August 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



Thames Water Utilities Ltd Property Searches, PO Box 3189, Slough SL1 4WW DX 151280 Slough 13



searches@thameswater.co.uk www.thameswater-propertysearches.co.uk



0800 009 4540





Search address supplied: 57, Top Dartford Road, Swanley, BR8 7SG

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd Property Searches PO Box 3189 Slough SL1 4WW

Email: <u>searches@thameswater.co.uk</u> Web: <u>www.thameswater-propertysearches.co.uk</u>

Asset location search



Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

<u>Thames Water Utilities Ltd</u>, Property Searches, PO Box 3189, Slough SL1 4WW, DX 151280 Slough 13 T 0800 009 4540 E <u>searches@thameswater.co.uk</u> I <u>www.thameswater-propertysearches.co.uk</u>





For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.





Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water) Thames Water Clearwater Court Vastern Road Reading RG1 8DB

Tel: 0800 009 3921 Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water) Thames Water Clearwater Court Vastern Road Reading RG1 8DB

Tel: 0800 009 3921 Email: developer.services@thameswater.co.uk



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<u>Thames Water Utilities Ltd</u>, Property Searches, PO Box 3189, Slough SL1 4W, DX 151280 Slough 13 T 0800 009 4540 E <u>searches@thameswater.co.uk</u> I <u>www.thameswater-propertysearches.co.uk</u>

Manhole Reference	Manhole Cover Level	Manhole Invert Level
571H	n/a	n/a
571C	n/a	n/a
4701	50.39	48.95
471E	n/a	n/a
471D	n/a	n/a
5701	54.51	52.89
5711	n/a	n/a
471C	n/a	n/a
471B	n/a	n/a
471A	n/a	n/a
4801	54.01	52.43
581A	n/a	n/a
581B	n/a	n/a
4810	n/a	n/a
481B	n/a	n/a
4810	n/a	n/a
5601	17.a 12.08	39.61
5603	A3 A3	<i>A</i> 1 39
571 A	43:45 n/a	n/a
571D	n/a	n/a
471E	n/a	n/a
4/1F 5702	11/a 40 56	11/a 49.26
5702 574E	49.50	40.20
37 TE 4702	11/a 49 07	11/a AE 2E
4702 571D	40.07	45.55
571C	n/a p/a	n/a
5/1G 574E	n/a n/a	n/a n/a
5/1F 9704	11/a	11/a
2701	54.17	52.03
3003	n/a	
3002 27VT	49.57	40.1
3/11	n/a	n/a
38ZX	n/a	n/a
381A	n/a	n/a
381B	n/a	n/a
3701	53.55	51.9
3702	53.46	51.35
3601	48.24	46.51
4/04	52.98	50.87
4/05	48.27	46.91
4703	53.17	51.08
The position of the apparatus shown on this plan	is given without obligation and warranty, and the acc	curacy cannot be guaranteed. Service pipes are not
of mains and services must be verified and establish	ed on site before any works are undertaken.	water for any error or onnestion. The actual position





The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified before any works are undertaken. Crown copyright Reserved

Scale:	1:7158	Comments:
Width:	2000m	
Printed By:	G1KANAGA	
Print Date:	12/08/2021	
Map Centre:	552515,170866	
Grid Reference:	TQ5270NE	



Surface Water Rising Combined Rising Main Main Proposed Thames Water Sludge Rising Main **Rising Main** Vacuum

Sewer Fittings



Other Symbols

Symbols used on maps which do not fall under other general categories Public/Private Pumping Station

- Change of characteristic indicator (C.O.C.I.)
- 6 Invert Level

< Summit

Areas

Lines denoting areas of underground surveys, etc.

Aareement Operational Site Chamber Tunnel Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)



Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.
- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0800 009 4540.





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ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

- Distribution Main: The most common pipe shown on water maps.
 With few exceptions, domestic connections are only made to distribution mains.
- Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
- **Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
- STERE
 Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
- **Metered Pipe:** A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
- Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
- **Proposed Main:** A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND		
Up to 300mm (12")	900mm (3')		
300mm - 600mm (12" - 24")	1100mm (3' 8")		
600mm and bigger (24" plus)	1200mm (4')		

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General PurposeValve Air Valve Pressure ControlValve Customer Valve Single Hydrant Meters Meter End Items

Valves



Operational Sites



Other Symbols

Data Logger

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

- 1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
- 2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
- 3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
- 4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
- 5. In case of dispute TWUL's terms and conditions shall apply.
- 6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
- 7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
- 8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Credit Card	BACS Payment	Telephone Banking	Cheque
Call 0800 009 4540 quoting your invoice number starting CBA or ADS / OSS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater. <u>co.uk</u>	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number	Made payable to ' Thames Water Utilities Ltd' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

Ways to pay your bill

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



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Appendix E – Surface Water Flood Exceedance Flows



	NO	TES:
RISKS TED IN	1.	THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEER'S AND ARCHITECT'S DRAWINGS, DETAILS & SPECIFICATIONS.
AS NOT T HEAVY	2.	THE EXTERNAL WORKS DESIGN IS BASED UPON HARRIS IRWIN ARCHITECTS PLAN 3081-HIA-01-00-DR-A-0102 REV P2 DATED 30.07.21
BEEN	3.	TOPOGRAPHICAL SURVEY DRAWING 4022-PD28 DATED JAN '17 BY bhdARCHITECTS HAS ALSO BEEN USED IN THE DESIGN.
ATE THE A. NO	4.	REFER TO THE ARCHITECT FOR SETTING OUT OF ALL BUILDINGS & INTERNAL DOWN PIPES & RWP'S
TEM D	5.	REFER TO SERVICE ENGINEERS DRAWINGS FOR FINAL SETTING OUT OF RWP AND SVP'S (BASED ON GUTTER SYSTEM).
	6.	REFER TO SERVICE ENGINEERS DRAWINGS FOR ABOVE GROUND PLUMBING ROUTES FROM APPLIANCES TO STUB STACKS ETC.
	7.	ALL EXISTING DRAINAGE THAT IS TO BE ABANDONED TO BE 'PLUGGED' IN WITH MASS CONCRETE (150mm MIN) OR REMOVED ENTIRELY.
	8.	ANY EXISTING SERVICES TO BE LOCATED AND CLEARLY MARKED PRIOR TO EXCAVATIONS BY CONTRACTOR.
	9.	ALL LEVELS ARE TO BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO CONSTRUCTION.
	10.	IT IS ASSUMED THAT ALL SINK AND TOILET DRAINAGE POINTS WILL HAVE RODDING ACCESS AT THE APPLIANCE BASE.
	11.	CONTRACTOR TO AVOID UNDERMINING ANY EXISTING FOOTPATHS/ BUILDINGS DURING WORKS BY ALLOWING ADEQUATE PROTECTION ADJACENT TO THESE AREAS.
	12.	ALL RAINWATER DOWN PIPES TO HAVE RODDABLE ACCESS AT THE BASE OF THE VERTICAL SECTION.
T BY A	13.	ALL BELOW GROUND DRAINAGE PIPES WITH LESS THAN 900mm COVER TO SOFFIT LEVEL IN TRAFFICKED AREAS I.E. CAR PARK AND SERVICE YARD AREA TO HAVE CLASS Z BEDDING SURROUND. REFER TO THE MANHOLE SCHEDULE AND DETAIL SHEETS FOR FURTHER DETAILS.
	14.	ALL BELOW GROUND DRAINAGE WITHIN THE SITE BOUNDARY HAS BEEN DESIGNED TO BSEN 752:2008 AND BUILDING REGULATIONS - PART H:2015. THE OFF SITE DRAINAGE TO THE PUBLIC SEWER ARE DESIGNED TO SEWERS FOR ADOPTION 7th EDITION.

LEGEND: FLOOD FLOW EXCEEDANCE

P2 P1	17.01.22 17.12.21	ARCH LAYOUT A	MENDED SUE	RH RH	GS GS	GS GS		
COP IT SH DO N WOF ALL I DO N DO N	Rev Date Description By Check App. COPYRIGHT: THE COPYRIGHT OF THIS DRAWING IS VESTED IN CLANCY CONSULTING. IT SHALL NOT BE USED WITHOUT PERMISSION BY ANYONE FOR ANY PURPOSE. DO NOT SCALE THIS DRAWING ELECTRONICALLY OR MANUALLY. WORK TO FIGURED DIMENSIONS ONLY. DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE. DO NOT TURN ON LAYERS THAT HAVE BEEN TURNED OFF. DO NOT THAW LAYERS THAT HAVE BEEN FROZEN.							
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Pro	oject 57 H B	7 TOP DARTFC EXTABLE, KEN R8 7SG	RD ROAD T					
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Titl	Title FLOOD FLOW EXCEEDANCE							
Scale @ A1 1:200 Status PRELIM					MINARY			
	Clancy consulting							
	www.clancy.co.uk							
	Driginator	Job Number	Discipline	Bu	uilding/Z	Zone		
	CCL	8/2607	С		HEX			
	Туре	Level	Drawing No.		Revisio	on		
	GA	DRN	4402		P2	2		

PRELIMINARY DRAWING	
THIS DRAWING IS FOR PRELIMINARY INFORMATION	
CONSTRUCTION ISSUE. IT INDICATES DESIGN INTENT	
ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT	
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CONSTRUCTION RISKS MAINTENANCE 1. DUE TO THE STEEP GRADIENT OF 1. ATTENUAT THE SITE CONSIDERATION TO SAFETY GULLIES, CHAN MUST BE GIVEN TO EACH CONSTRUCTION CHAMBERS REC TASK . STANDARD INSPECTION RE

2. REFER TO EXISTING SERVICES CLEANING ROU DRAWING AND TO ARCHITECTS SERVICES ENSURE DRAWINGS FOR DETAILS & LOCATION OF PERFORMANCE. EXTG AND PROPOSED DRAINAGE & SERVICES. 2. CONFINED

3. DRAINAGE CONNECTION REQUIRES DEEP EXCAVATION TEMP WORKS 3. ALL MA REQUIRED.

4. EXISTING DRAINS TO EITHER BE AUTHORITY'S REMOVED OR GRUBBED UP.

5. CONSTRUCTING NEW CONNECTIONS DRAINAGE, POTENTIAL FOR HAZARDOUS GASES. PERMIT TO ENTER EXISTING MANHOLES SHOULD BE OBTAINED FROM THAMES WATER BEFORE UNDERTAKING THE WORK, RELEVANT P.P.E SHOULD BE WORN AT ALL TIMES. IF ANY ASBESTOS CEMENT PIPES ARE FOUND, THEN SAFE SYSTEM OF WORK NEED TO BE PUT IN PLACE WITH ATTENTION DRAWN TO THE CONTROL ASBESTOS AT WORK (AMENDMENT) REGULATIONS 1992.

6. HIGHWAY WORKS REQUIRED

IN ADDITION TO THE HAZARDS & RISKS NORMALLY ASSOCIATI DRAWING, TAKE NOTE OF THE ABOVE. IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEER'S AND ARCHITECT'S DRAWINGS, DETAILS & SPECIFICATIONS.
- THE EXTERNAL WORKS DESIGN IS BASED UPON HARRIS IRWIN ARCHITECTS PLAN 3081-HIA-01-00-DR-A-0102 REV P2 DATED 30.07.21
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- REFER TO THE ARCHITECT FOR SETTING OUT OF ALL BUILDINGS & INTERNAL DOWN PIPES & RWP'S
- REFER TO SERVICE ENGINEERS DRAWINGS FOR FINAL SETTING OUT OF RWP AND SVP'S (BASED ON GUTTER SYSTEM).
- REFER TO SERVICE ENGINEERS DRAWINGS FOR ABOVE GROUND PLUMBING ROUTES FROM APPLIANCES TO STUB STACKS ETC.
- ALL EXISTING DRAINAGE THAT IS TO BE ABANDONED TO BE 'PLUGGED' IN WITH MASS CONCRETE (150mm MIN) OR REMOVED ENTIRELY.
- 8. ANY EXISTING SERVICES TO BE LOCATED AND CLEARLY MARKED PRIOR TO EXCAVATIONS BY CONTRACTOR.
- 9. ALL LEVELS ARE TO BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO CONSTRUCTION.
- 10. IT IS ASSUMED THAT ALL SINK AND TOILET DRAINAGE POINTS WILL HAVE RODDING ACCESS AT THE APPLIANCE BASE.
- 11. CONTRACTOR TO AVOID UNDERMINING ANY EXISTING FOOTPATHS/ BUILDINGS DURING WORKS BY ALLOWING ADEQUATE PROTECTION ADJACENT TO THESE AREAS.
- 12. ALL RAINWATER DOWN PIPES TO HAVE RODDABLE ACCESS AT THE BASE OF THE VERTICAL SECTION.
- 13. ALL BELOW GROUND DRAINAGE PIPES WITH LESS THAN 900mm COVER TO SOFFIT LEVEL IN TRAFFICKED AREAS I.E. CAR PARK AND SERVICE YARD AREA TO HAVE CLASS Z BEDDING SURROUND. REFER TO THE MANHOLE SCHEDULE AND DETAIL SHEETS FOR FURTHER DETAILS.
- 14. ALL BELOW GROUND DRAINAGE WITHIN THE SITE BOUNDARY HAS BEEN DESIGNED TO BSEN 752:2008 AND BUILDING REGULATIONS - PART H:2015. THE OFF SITE DRAINAGE TO THE PUBLIC SEWER ARE DESIGNED TO SEWERS FOR ADOPTION 7th EDITION.

AND ENVIRONMENTAL	RISKS BOX
MAINTENANCE RISKS	DEMOLITION/ ADAPTATION RISKS
 ATTENUATION TANKS, GULLIES, CHANNELS AND CHAMBERS REQUIRE THE STANDARD PERIODIC INSPECTION REGIME AND CLEANING ROUTINE TO ENSURE CONTINUED PERFORMANCE. CONFINED SPACE ENTRY. ALL MAINTENANCE MUST COMPLY WITH THAMES WATER AUTHORITY'S REGULATIONS. 	 APPARATUS LOCATED IN LANDSCAPED AREAS HAS NOT BEEN DESIGNED TO SUPPORT HEAVY VEHICLE LOADING. THE SURFACE WATER DRAINAGE APPARATUS HAS BEEN DESIGNED TO ACCOMMODATE THE DESIGNED CATCHMENT AREA. NO ADDITIONAL AREAS OF HARDSTANDING CAN BE CONNECTION INTO THE SYSTEM WITHOUT RISK OF LOCALIZED FLOODING ON SITE. HAZARDOUS WASTE MATERIALS

PRELIMINARY DRAWING
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PURPOSES ONLY AND MUST NOT BE READ AS A
CONSTRUCTION ISSUE. IT INDICATES DESIGN INTENT
DESIGN DEVELOPMENT
SCALE 1:200m 2m 4m 6m 8m 10m 12m 14m 16m 18m 20m

P1	16 12 21		SUE	34							
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COP ¹ IT SH DO N WOR ALL I DO N DO N	COPYRIGHT: THE COPYRIGHT OF THIS DRAWING IS VESTED IN CLANCY CONSULTING. IT SHALL NOT BE USED WITHOUT PERMISSION BY ANYONE FOR ANY PURPOSE. DO NOT SCALE THIS DRAWING ELECTRONICALLY OR MANUALLY. WORK TO FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE. DO NOT TURN ON LAYERS THAT HAVE BEEN TURNED OFF. DO NOT THAW LAYERS THAT HAVE BEEN FROZEN.										
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Titl	e Gl	ENERAL AREA	S PLAN								
Sca	ale @ A1 1	:200	Status PRELI	MINARY							
	Clancy consulting										
				www.clancy.co.uk							
C	Driginator	Job Number	Discipline	Building/Zone							
	CCL	8/2607	С	HEX							
	Туре	Level	Drawing No.	Revision							
	GA	DRN	4402	P1							



Appendix F – Drainage Layout and Calculation





BH01	Depth (m)	Run	Permeability k (m/s)
	10	1	1.74X10 ⁻⁴
	46	1	5.73X10 ⁻⁴
BH01	10	2	2.61X10 ⁻⁴
	20	1	4.31X10 ⁻⁴
	20	2	3.76X10 ⁻⁴
	40	1	2.46X10 ⁻⁴
	10	2	4.12X10 ⁻⁴
51105	45	1	1.37X10 ⁻⁴
BH02	10	2	4.03X10 ⁻⁴
	20	1	2.29X10 ⁻⁴
	20	2	4.98X10 ⁻⁴

- OF THE PROPOSED SITE. • THE SURFACE WATER DESIGN CATERS FOR ALL STORM EVENTS UP TO AND INCLUDING THE 1 IN 100 YEAR EVENT PLUS 40% CLIMATE
- CHANGE.

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Client

Title

Scale @ A1

BARCHESTER HEALTHCARE LTD

Project	57 TOP DARTFORD ROAD
	HEXTABLE, KENT
	BR8 7SG

Office NORWICH 01603 305190

Discipline CIVIL ENGINEERING

1:200

DRAINAGE STRATEGY GENERAL ARRANGEMENT

Status PRELIMINARY



			www.clancy.co.uk
Originator	Job Number	Discipline	Building/Zone
CCL	8/2607	С	HEX
Туре	Level	Drawing No.	Revision
GA	DRN	4400	P4

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2m	4m	6m	8m	10m	12m	14m	16m	18m	20

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales Return Period (years) 100 PIMP (%) 100 M5-60 (mm) 20.000 Add Flow / Climate Change (%) 0 Ratio R 0.411 Minimum Backdrop Height (m) 0.200 Maximum Rainfall (mm/hr)50Maximum Backdrop Height (m) 1.500e of Concentration (mins)30 Min Design Depth for Optimisation (m) 1.200 Maximum Backdrop Height (m) 1.500 Maximum Time of Concentration (mins) Foul Sewage (1/s/ha) 0.800 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 0.750 500 Min Slope for Optimisation (1:X)

Designed with Level Soffits

Time Area Diagram for Storm at outfall (pipe 1.012)

Time	Area	Time	Area	
(mins)	(ha)	(mins)	(ha)	
0-4	0.052	4-8	0.042	

Total Area Contributing (ha) = 0.094

Total Pipe Volume $(m^3) = 5.745$

Time Area Diagram at outfall (pipe 3.015)

 Time
 Area
 Time
 Area

 (mins)
 (ha)
 (mins)
 (ha)

 0-4
 0.111
 4-8
 0.060

Total Area Contributing (ha) = 0.171

Total Pipe Volume $(m^3) = 6.795$

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length	Fall	Slope	I.Area	T.E.	Ba	se	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow	(l/s)	(mm)	SECT	(mm)		Design
1.000	40.137	0.221	181.9	0.016	5.00		0.0	0.600	0	225	Pipe/Conduit	6
1.001	12.586	0.210	60.0	0.013	0.00		0.0	0.600	0	225	Pipe/Conduit	8
1.002	23.155	0.116	199.9	0.016	0.00		0.0	0.600	0	225	Pipe/Conduit	Ā
1.003	6.622	0.035	186.8	0.019	0.00		0.0	0.600	0	225	Pipe/Conduit	ē

Network Results Table

PN	Rain	T.C.	US/IL	Σ I.Area	ΣВ	ase Foul		Add Flow	Vel	Cap	Flow
	(mm/hr)	(mins)	(m)	(ha)	Flow	(l/s)	(l/s)	(1/s)	(m/s)	(l/s)	(l/s)
1 000	50 00	5 69	58 600	0 016		0 0	0 0	0 0	0 97	30 I	2 2
1.000	50.00	5.69	58.000	0.010		0.0	0.0	0.0	0.97	50.4	2.2
1.001	50.00	5.82	57.300	0.029		0.0	0.0	0.0	1.69	67.3	4.0
1.002	50.00	6.24	57.000	0.046		0.0	0.0	0.0	0.92	36.6	6.2
1.003	50.00	6.35	56.884	0.064		0.0	0.1	0.0	0.95	37.9	8.7

Clancy Consulting Ltd	Page 2	
19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micco
Date 20/12/2021	Designed by RH	Desinado
File 211220_Hextable.MDX	Checked by	Diamage
Innovyze	Network 2020.1	

Network Design Table for Storm

PN	Length	Fall	Slope	I.Area	T.E.	Ba	se	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow	(l/s)	(mm)	SECT	(mm)		Design
1.004	5.686	0.016	350.0	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	8
1.005	22.095	0.110	200.0	0.013	0.00		0.0	0.600	0	225	Pipe/Conduit	ē
2.000	18.773	0.101	185.0	0.008	5.00		0.0	0.600	0	150	Pipe/Conduit	٨
1.006	5.583	0.031	180.0	0.009	0.00		0.0	0.600	0	225	Pipe/Conduit	<u> </u>
1.007	2.365	0.006	395.3	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	ă
1.008	4.156	0.004	943.3	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	- Ā
1.009	3.975	0.004	957.8	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	-
1.010	2.930	0.002	1412.1	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	ē
1.011	1.931	0.001	1860.8	0.000	0.00		0.0	0.600	0	300	Pipe/Conduit	ð
1.012	1.931	0.001	1860.8	0.000	0.00		0.0	0.600	0	300	Pipe/Conduit	ð
3.000	15.189	0.084	180.0	0.003	5.00		0.0	0.600	0	225	Pipe/Conduit	<u> </u>
3.001	8.151	0.041	200.0	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	Ă
3.002	8.582	0.048	180.0	0.012	0.00		0.0	0.600	0	225	Pipe/Conduit	Ā
3.003	20.271	0.113	180.0	0.023	0.00		0.0	0.600	0	225	Pipe/Conduit	Ā
3.004	9.889	0.099	100.0	0.026	0.00		0.0	0.600	0	225	Pipe/Conduit	ē
4.000	12.555	0.121	103.8	0.008	5.00		0.0	0.600	0	150	Pipe/Conduit	A
4.001	1.725	0.005	350.0	0.028	0.00		0.0	0.600	0	225	Pipe/Conduit	ŏ
5.000	13.691	0.064	212.4	0.008	5.00		0.0	0.600	0	150	Pipe/Conduit	۵
3.005	2.524	0.047	53.3	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	8
3.006	16.415	0.047	346.7	0.000	0.00		0.0	0.600	0	225	Pipe/Conduit	ீ

Network Results Table

PN	Rain	T.C.	US/IL	Σ I.Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow
	(mm/hr)	(mins)	(m)	(ha)	Flow (l/s)	(l/s)	(1/s)	(m/s)	(l/s)	(l/s)
1.004	50.00	6.49	56.274	0.064	0.0	0.1	0.0	0.69	27.6	8.7
1.005	50.00	6.89	56.258	0.077	0.0	0.1	0.0	0.92	36.6	10.5
2.000	50.00	5.43	56.548	0.008	0.0	0.0	0.0	0.74	13.0	1.1
1.006	50.00	6.98	56.148	0.094	0.0	0.1	0.0	0.97	38.6	12.8
1.007	50.00	7.04	56.117	0.094	0.0	0.1	0.0	0.65	25.9	12.8
1.008	50.00	7.21	56.111	0.094	0.0	0.1	0.0	0.42	16.6	12.8
1.009	50.00	7.37	56.107	0.094	0.0	0.1	0.0	0.41	16.5	12.8
1.010	50.00	7.51	56.103	0.094	0.0	0.1	0.0	0.34	13.5	12.8
1.011	50.00	7.60	56.026	0.094	0.0	0.1	0.0	0.36	25.1	12.8
1.012	50.00	7.69	56.025	0.094	0.0	0.1	0.0	0.36	25.1	12.8
3.000	50.00	5.26	56.608	0.003	0.0	0.0	0.0	0.97	38.6	0.4
3.001	50.00	5.41	56.524	0.003	0.0	0.0	0.0	0.92	36.6	0.4
3.002	50.00	5.56	56.483	0.015	0.0	0.0	0.0	0.97	38.6	2.0
3.003	50.00	5.90	56.435	0.037	0.0	0.0	0.0	0.97	38.6	5.1
3.004	50.00	6.03	55.322	0.064	0.0	0.1	0.0	1.31	52.0	8.7
4.000	50.00	5.21	55.369	0.008	0.0	0.0	0.0	0.99	17.4	1.1
4.001	50.00	5.25	55.223	0.036	0.0	0.0	0.0	0.69	27.6	5.0
5.000	50.00	5.33	55.361	0.008	0.0	0.0	0.0	0.69	12.1	1.1
3.005	50.00	6.05	54.818	0.108	0.0	0.1	0.0	1.80	71.4	14.7
3.006	50.00	6.45	54.771	0.108	0.0	0.1	0.0	0.70	27.7	14.7

Clancy Consulting Ltd					
19 Upper King Street	8/2607 Hextable				
Norwich	New Care Home				
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro			
Date 20/12/2021	Designed by RH	Drainago			
File 211220_Hextable.MDX	Checked by	Diamage			
Innovyze	Network 2020.1				

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
6.000	20.372	0.204	100.0	0.000	5.00	0.0	0.600	0	100	Pipe/Conduit	8
3.007	4.096	0.075	54.5	0.000	0.00	0.0	0.600	0	225	Pipe/Conduit	₽
7.000	7.319	0.184	39.8	0.014	5.00	0.0	0.600	0	150	Pipe/Conduit	8
3.008	5.014	0.025	200.8	0.005	0.00	0.0	0.600	0	225	Pipe/Conduit	0
8.000	9.671	0.049	198.6	0.010	5.00	0.0	0.600	0	150	Pipe/Conduit	8
9.000	12.016	0.067	180.0	0.011	5.00	0.0	0.600	0	150	Pipe/Conduit	0
8.001 8.002	14.268	0.079	180.0 185.0	0.008	0.00	0.0	0.600	0	225 225	Pipe/Conduit Pipe/Conduit	0
3.009	1.448	0.007	200.0	0.000	0.00	0.0	0.600	0	225	Pipe/Conduit	Ó
3.010	2.597	0.005	499.1 350.0	0.000	0.00	0.0	0.600	0	225	Pipe/Conduit Pipe/Conduit	
3.012	3.734	0.005	717.6	0.000	0.00	0.0	0.600	0	300	Pipe/Conduit	Ä
3.013	2.854	0.003	1097.1	0.000	0.00	0.0	0.600	0	300	Pipe/Conduit	ă
3.014	2.810	0.001	2159.8	0.000	0.00	0.0	0.600	0	375	Pipe/Conduit	Ē
3.015	2.810	0.001	2159.8	0.000	0.00	0.0	0.600	0	375	Pipe/Conduit	ď

Network Results Table

PN	Rain	T.C.	US/IL	Σ I.Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow
	(mm/hr)	(mins)	(m)	(ha)	Flow (l/s)	(1/s)	(l/s)	(m/s)	(l/s)	(l/s)
6.000	50.00	5.44	54.957	0.000	0.0	0.0	0.0	0.77	6.0	0.0
3.007	50.00	6.48	54.628	0.108	0.0	0.1	0.0	1.78	70.6	14.7
7.000	50.00	5.08	54.882	0.014	0.0	0.0	0.0	1.60	28.3	1.9
3.008	50.00	6.57	54.098	0.127	0.0	0.1	0.0	0.92	36.5	17.4
8.000	50.00	5.23	54.216	0.010	0.0	0.0	0.0	0.71	12.5	1.4
9.000	50.00	5.27	54.234	0.011	0.0	0.0	0.0	0.75	13.2	1.5
8.001	50.00	5.51	54.167	0.029	0.0	0.0	0.0	0.97	38.6 38.1	4.0
0.001		0.00	01.000	0.011	0.0	0.0	0.0	0.00	0011	0.0
3.009	50.00	6.60	54.073	0.171	0.0	0.1	0.0	0.92	36.6	23.4
3.010	50.00	6.68	53.891	0.171	0.0	0.1	0.0	0.58	23.0«	23.4
3.011	50.00	6.72	53.886	0.171	0.0	0.1	0.0	0.69	27.6	23.4
3.012	50.00	6.83	53.880	0.171	0.0	0.1	0.0	0.58	41.0	23.4
3.013	50.00	6.93	53.875	0.171	0.0	0.1	0.0	0.47	33.0	23.4
3.014	50.00	7.06	53.797	0.171	0.0	0.1	0.0	0.38	42.1	23.4
3.015	50.00	7.18	53.796	0.171	0.0	0.1	0.0	0.38	42.1	23.4

Clancy Consulting Ltd		Page 4
19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro
Date 20/12/2021	Designed by RH	Desinado
File 211220_Hextable.MDX	Checked by	Diamage
Innovyze	Network 2020.1	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes Inver Level	In t (m)	Diameter (mm)	Backdrop (mm)
1	59.500	0.900	Open Manhole	600	1.000	58.600	225					
2	60.200	2.900	Open Manhole	600	1.001	57.300	225	1.000	58.3	379	225	1079
3	58.000	1.000	Open Manhole	1200	1.002	57.000	225	1.001	57.0	090	225	90
4	58.000	1.116	Open Manhole	1050	1.003	56.884	225	1.002	56.8	884	225	
ATT.TNK. 3	58.100	1.826	Open Manhole	1200	1.004	56.274	225	1.003	56.8	849	225	575
6	58.000	1.742	Open Manhole	1050	1.005	56.258	225	1.004	56.2	258	225	
10	58.000	1.452	Open Manhole	600	2.000	56.548	150					
7	58.000	1.852	Open Manhole	1200	1.006	56.148	225	1.005	56.3	148	225	
								2.000	56.4	447	150	224
ATT. TNK. 4	58.000	1.883	Open Manhole	1800	1.007	56.117	225	1.006	56.3	117	225	
10A	57.975	1.864	Open Manhole	1200	1.008	56.111	225	1.007	56.3	111	225	
10A_BH_13	57.950	1.843	Open Manhole	1200 x 800	1.009	56.107	225	1.008	56.3	107	225	
10B_BH_12	57.925	1.822	Open Manhole	1200 x 800	1.010	56.103	225	1.009	56.3	103	225	
10C_BH_11	57.913	1.887	Open Manhole	1200 x 800	1.011	56.026	300	1.010	56.3	101	225	
10D_BH_10	57.356	1.331	Open Manhole	1200 x 800	1.012	56.025	300	1.011	56.0	025	300	
	56.800	0.776	Open Manhole	0		OUTFALL		1.012	56.0	024	300	
11	58.500	1.892	Open Manhole	600	3.000	56.608	225					
12	58.000	1.476	Open Manhole	600	3.001	56.524	225	3.000	56.	524	225	
13	58.000	1.517	Open Manhole	600	3.002	56.483	225	3.001	56.4	483	225	
14	58.000	1.565	Open Manhole	600	3.003	56.435	225	3.002	56.4	435	225	
15	57.250	1.928	Open Manhole	1050	3.004	55.322	225	3.003	56.3	322	225	1000
22_RE	56.250	0.881	Open Manhole	1200	4.000	55.369	150					
ATT. TNK 1	57.500	2.277	Open Manhole	1800	4.001	55.223	225	4.000	55.2	248	150	
24_RE	57.500	2.139	Open Manhole	1050	5.000	55.361	150					
16	57.400	2.582	Open Manhole	1200	3.005	54.818	225	3.004	55.2	223	225	405
								4.001	55.2	218	225	400
								5.000	55.2	297	150	404
24	57.000	2.229	Open Manhole	1200	3.006	54.771	225	3.005	54.	771	225	
19	58.000	3.043	Open Manhole	1200	6.000	54.957	100					
17	56.600	1.972	Open Manhole	1200	3.007	54.628	225	3.006	54.	723	225	95
								6.000	54.	753	100	
23_RE	56.200	1.318	Open Manhole	1200	7.000	54.882	150					
18	56.200	2.102	Open Manhole	1050	3.008	54.098	225	3.007	54.	553	225	455
								7.000	54.0	698	150	525
21_G1	54.600	0.384	Open Manhole	600	8.000	54.216	150					
23	55.000	0.766	Open Manhole	600	9.000	54.234	150					
22_G2	55.350	1.183	Open Manhole	600	8.001	54.167	225	8.000	54.3	167	150	
								9.000	54.3	167	150	
23_G3	56.100	2.012	Open Manhole	600	8.002	54.088	225	8.001	54.0	088	225	
19	56.300	2.227	Open Manhole	1200	3.009	54.073	225	3.008	54.0	073	225	
								8.002	54.0	073	225	
ATT. TNK. 2	56.400	2.509	Open Manhole	1800	3.010	53.891	225	3.009	54.0	066	225	175
33A	56.500	2.614	Open Manhole	1200	3.011	53.886	225	3.010	53.8	886	225	
33B_BH_03	56.600	2.720	Open Manhole	1200 x 800	3.012	53.880	300	3.011	53.8	880	225	
				©1982-	-2020	Innovyze						

Clancy Cor	nsultir	ng Ltd							Page 5	
19 Upper H	King St	reet		8/	2607 Hexta	ble				
Norwich				Ne	w Care Hom	e				
NR3 1RB				1:	1:30&100yrCriticalEvent+40%CC					
Date 20/12	2/2021			De	signed by	RH			Dcair	
File 21122	20_Hext	able.	MDX	Ch	ecked by				ווסום	lage
Innovyze				Ne	twork 2020	.1				
]	Manhole S	chedules f	or Storm				
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe PN Inv Leve:	Out ert Diameter L (m) (mm)	Pi PN I Le	ipes In Invert vel (m)	Diameter (mm)	Backdro (mm)
33C BH 02	56.700	2.825	Open Manhole	1200 x 800	3.013 5	3.875 300	3.012	53.875	300	
33D BH 01.5	56.750	2.953	Open Manhole	1200×800	3.014 5	3.797 375	3.013	53.872	300	
33 BH 01	56.800	3.004	Open Manhole	1200 x 800	3.015 53	3. 796 375	3.014	53.796	375	
	56.850	3.055	Open Manhole	0	OU	FALL	3.015	53.795	375	
	I				I		I			
		MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersectic Easting (m)	n Intersection Northing (m)	Manhole Access	Layout (North))	
			1 552476.593	170884.207	552476.59	170884.207	Required	1		
			2 552513.446	170900.107	552513.44	6 170900.107	Required	1		
			3 552518.093	170888.411	552518.09	170888.411	Required	ı		
			4 552526.745	170866.933	552526.74	5 170866.933	Required		,	
	AT	T.TNK.	3 552531.688	170871.340	552531.68	170871.340	Required	i ,•		
			6 552537.372	170871.194	552537.37	2 170871.194	Required	i		
		1	0 552528.981	170846.800	552528.98	1 170846.800	Required	1		
			7 552547.183	170851.397	552547.18	3 170851.397	Required	1		
	ATT	. TNK.	4 552548.888	170846.081	552548.88	170846.081	Required	·		
		10)A 552546.523	170846.093	552546.52	3 170846.093	Required	i 		
	1	0A_BH_1	3 552542.451	170845.263	552542.45	1 170845.263	Required	1		
	1	0B_BH_1	2 552538.779	170843.740	552538.77	9 170843.740	Required			
	1	OC_BH_1	1 552536.083	170842.593	552536.08	3 170842.593	Required	1		
	1	0D_BH_1	.0 552534.177	170842.283	552534.17	7 170842.283	Required			

Clancy Consulting Ltd					
19 Upper King Street	8/2607 Hextable				
Norwich	New Care Home				
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro			
Date 20/12/2021	Designed by RH	Desinado			
File 211220_Hextable.MDX	Checked by	Diamage			
Innovyze	Network 2020.1				

Manhole Schedules for Storm											
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)					
	552532.272	170841.973			No Entry	•					
11	552476.177	170880.466	552476.177	170880.466	Required	•					
12	552481.717	170866.324	552481.717	170866.324	Required						
13	552489.847	170866.906	552489.847	170866.906	Required						
14	552497.831	170870.054	552497.831	170870.054	Required						
15	552504.451	170850.895	552504.451	170850.895	Required	7					
22_RE	552482.162	170843.425	552482.162	170843.425	Required						
ATT. TNK 1	552492.887	170849.953	552492.887	170849.953	Required	_					
24_RE	552495.062	170863.594	552495.062	170863.594	Required						
16	552494.611	170849.911	552494.611	170849.911	Required						
24	552496.570	170848.319	552496.570	170848.319	Required						
19	552527.734	170845.826	552527.734	170845.826	Required						
17	552509.065	170837.672	552509.065	170837.672	Required						
23_RE	552503.049	170833.912	552503.049	170833.912	Required	1					
18	552510.367	170833.788	552510.367	170833.788	Required						
21_G1	552496.662	170813.736	552496.662	170813.736	Required						
23	552487.548	170815.767	552487.548	170815.767	Required	2					
22_G2	552496.825	170823.406	552496.825	170823.406	Required						

Clancy Consulting Ltd		Page 7
19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micco
Date 20/12/2021	Designed by RH	Desinado
File 211220_Hextable.MDX	Checked by	Diginarie
Innovyze	Network 2020.1	

Manhole	Schedules	for	Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
23_G3	552509.617	170829.725	552509.617	170829.725	Required	
19	552512.426	170829.217	552512.426	170829.217	Required	
ATT. TNK. 2	552513.780	170829.730	552513.780	170829.730	Required	
33A	552514.528	170832.217	552514.528	170832.217	Required	4
33B_BH_03	552515.205	170834.057	552515.205	170834.057	Required	
33C_BH_02	552518.654	170835.488	552518.654	170835.488	Required	-
33D_BH_01.5	552521.309	170836.535	552521.309	170836.535	Required	
33_BH_01	552523.761	170837.908	552523.761	170837.908	Required	
	552526.212	170839.281			No Entry	

Clancy Consulting Ltd		Page 8
19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro
Date 20/12/2021	Designed by RH	
File 211220_Hextable.MDX	Checked by	Diamage
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
1.000	0	225	1	59.500	58.600	0.675	Open Manhole	600
1.001	0	225	2	60.200	57.300	2.675	Open Manhole	600
1.002	0	225	3	58.000	57.000	0.775	Open Manhole	1200
1.003	0	225	4	58.000	56.884	0.891	Open Manhole	1050
1.004	0	225	ATT.TNK. 3	58.100	56.274	1.601	Open Manhole	1200
1.005	0	225	6	58.000	56.258	1.517	Open Manhole	1050
2.000	0	150	10	58.000	56.548	1.302	Open Manhole	600
1.006	0	225	7	58.000	56.148	1.627	Open Manhole	1200
1.007	0	225	ATT. TNK. 4	58.000	56.117	1.658	Open Manhole	1800
1.008	0	225	10A	57.975	56.111	1.639	Open Manhole	1200
1.009	0	225	10A_BH_13	57.950	56.107	1.618	Open Manhole	1200 x 800
1.010	0	225	10B_BH_12	57.925	56.103	1.597	Open Manhole	1200 x 800
1.011	0	300	10C_BH_11	57.913	56.026	1.587	Open Manhole	1200 x 800
1.012	0	300	10D_BH_10	57.356	56.025	1.031	Open Manhole	1200 x 800
3.000	0	225	11	58.500	56.608	1.667	Open Manhole	600
3.001	0	225	12	58.000	56.524	1.251	Open Manhole	600
3.002	0	225	13	58.000	56.483	1.292	Open Manhole	600
3.003	0	225	14	58.000	56.435	1.340	Open Manhole	600
3.004	0	225	15	57.250	55.322	1.703	Open Manhole	1050
4.000	0	150	22_RE	56.250	55.369	0.731	Open Manhole	1200
4.001	0	225	ATT. TNK 1	57.500	55.223	2.052	Open Manhole	1800

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
1.000	40.137	181.9	2	60.200	58.379	1.596	Open Manhole	600
1.001	12.586	60.0	3	58.000	57.090	0.685	Open Manhole	1200
1.002	23.155	199.9	4	58.000	56.884	0.891	Open Manhole	1050
1.003	6.622	186.8	ATT.TNK. 3	58.100	56.849	1.026	Open Manhole	1200
1.004	5.686	350.0	6	58.000	56.258	1.517	Open Manhole	1050
1.005	22.095	200.0	7	58.000	56.148	1.627	Open Manhole	1200
2.000	18.773	185.0	7	58.000	56.447	1.403	Open Manhole	1200
1.006	5.583	180.0	ATT. TNK. 4	58.000	56.117	1.658	Open Manhole	1800
1.007	2.365	395.3	10A	57.975	56.111	1.639	Open Manhole	1200
1.008	4.156	943.3	10A_BH_13	57.950	56.107	1.618	Open Manhole	1200 x 800
1.009	3.975	957.8	10B_BH_12	57.925	56.103	1.597	Open Manhole	1200 x 800
1.010	2.930	1412.1	10C_BH_11	57.913	56.101	1.587	Open Manhole	1200 x 800
1.011	1.931	1860.8	10D_BH_10	57.356	56.025	1.031	Open Manhole	1200 x 800
1.012	1.931	1860.8		56.800	56.024	0.476	Open Manhole	0
3.000	15.189	180.0	12	58.000	56.524	1.251	Open Manhole	600
3.001	8.151	200.0	13	58.000	56.483	1.292	Open Manhole	600
3.002	8.582	180.0	14	58.000	56.435	1.340	Open Manhole	600
3.003	20.271	180.0	15	57.250	56.322	0.703	Open Manhole	1050
3.004	9.889	100.0	16	57.400	55.223	1.952	Open Manhole	1200
4.000	12.555	103.8	ATT. TNK 1	57.500	55.248	2.102	Open Manhole	1800
4.001	1.725	350.0	16	57.400	55.218	1.957	Open Manhole	1200

Clancy Consulting Ltd		Page 9
19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro
Date 20/12/2021	Designed by RH	Desinado
File 211220_Hextable.MDX	Checked by	Diamage
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
5.000	0	150	24_RE	57.500	55.361	1.989	Open Manhole	1050
3.005	0	225	16	57.400	54.818	2.357	Open Manhole	1200
3.006	0	225	24	57.000	54.771	2.004	Open Manhole	1200
6.000	0	100	19	58.000	54.957	2.943	Open Manhole	1200
3.007	0	225	17	56.600	54.628	1.747	Open Manhole	1200
7.000	0	150	23_RE	56.200	54.882	1.168	Open Manhole	1200
3.008	0	225	18	56.200	54.098	1.877	Open Manhole	1050
8.000	0	150	21_G1	54.600	54.216	0.234	Open Manhole	600
9.000	0	150	23	55.000	54.234	0.616	Open Manhole	600
8.001	0	225	22 G2	55.350	54.167	0.958	Open Manhole	600
8.002	0	225		56.100	54.088	1.787	Open Manhole	600
2 000		0.05	1.0	F.C. 200	E4 030	0.000	Oran Maria 1	1000
3.009	0	225	19	56.300	54.0/3	2.002	upen Mannole	1200
3.010	0	225	ATT. TNK. 2	56.400	53.891	2.284	Upen Manhole	1800
3.011	0	225	33A	56.500	53.886	2.389	Upen Manhole	1200
3.012	0	300	33B_BH_03	56.600	53.880	2.420	Open Manhole	1200 x 800

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
5.000	13.691	212.4	16	57.400	55.297	1.953	Open Manhole	1200
3.005	2.524	53.3	24	57.000	54.771	2.004	Open Manhole	1200
3.006	16.415	346.7	17	56.600	54.723	1.652	Open Manhole	1200
6.000	20.372	100.0	17	56.600	54.753	1.747	Open Manhole	1200
3.007	4.096	54.5	18	56.200	54.553	1.422	Open Manhole	1050
7.000	7.319	39.8	18	56.200	54.698	1.352	Open Manhole	1050
3.008	5.014	200.8	19	56.300	54.073	2.002	Open Manhole	1200
8.000	9.671	198.6	22_G2	55.350	54.167	1.033	Open Manhole	600
9.000	12.016	180.0	22_G2	55.350	54.167	1.033	Open Manhole	600
8.001	14.268	180.0	23_G3	56.100	54.088	1.787	Open Manhole	600
8.002	2.854	185.0	19	56.300	54.073	2.002	Open Manhole	1200
3 009	1 448	200 0	ΔΤΤ ΤΝΚ 2	56 400	54 066	2 109	Open Manhole	1800
3.010	2.597	499.1	33A	56.500	53.886	2.389	Open Manhole	1200
3.011	1.960	350.0	33B BH 03	56.600	53.880	2.495	Open Manhole	1200 x 800
3.012	3.734	717.6	33C_BH_02	56.700	53.875	2.525	Open Manhole	1200 x 800

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19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Mirro
Date 20/12/2021	Designed by RH	Drainago
File 211220_Hextable.MDX	Checked by	Diamage
Innovyze	Network 2020.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
3.013	0	300	33C_BH_02	56.700	53.875	2.525	Open Manhole	1200 x 800
3.014	0	375	33D_BH_01.5	56.750	53.797	2.578	Open Manhole	1200 x 800
3.015	0	375	33_BH_01	56.800	53.796	2.629	Open Manhole	1200 x 800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH	DIAM., (mm)	L*W
3.013	2.854	1097.1	33D_BH_01.5	56.750	53.872	2.578	Open Manhole		1200 x	800
3.014	2.810	2159.8	33_BH_01	56.800	53.796	2.629	Open Manhole		1200 x	800
3.015	2.810	2159.8		56.850	53.795	2.680	Open Manhole			0

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19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micco
Date 20/12/2021	Designed by RH	
File 211220_Hextable.MDX	Checked by	Drainage
Innovyze	Network 2020.1	

Area Summary for Storm

Pipe	PIMP	PIMP	PIMP	Gross	5	Imr	».	Pipe Total	
Number	Tvpe	Name	(%)	Area (h	na)	Area	(ha)	(ha)	
	-11		(-)	、-	,		(/	()	
1.000	User	-	100	0.0)16	0	.016	0.016	;
1.001	User	-	100	0.0)13	0	.013	0.013	;
1.002	User	-	100	0.0	013	0	.013	0.013	;
	User	-	100	0.0	03	0	.003	0.016	; ;
1.003	User	-	100	0.0)19	0	.019	0.019)
1.004	-	-	100	0.0	000	0	.000	0.000)
1.005	User	-	100	0.0	013	0	.013	0.013	;
2.000	User	-	100	0.0	800	0	.008	0.008	;
1.006	User	-	100	0.0	09	0	.009	0.009)
1.007	-	-	100	0.0	000	0	.000	0.000)
1.008	-	-	100	0.0	000	0	.000	0.000)
1.009	-	-	100	0.0	000	0	.000	0.000)
1.010	-	-	100	0.0	000	0	.000	0.000)
1.011	-	-	100	0.0	000	0	.000	0.000)
1.012	-	-	100	0.0	000	0	.000	0.000)
3.000	User	-	100	0.0	03	0	.003	0.003	;
3.001	-	-	100	0.0	000	0	.000	0.000)
3.002	User	-	100	0.0	800	0	.008	0.008	;
	User	-	100	0.0	03	0	.003	0.012	
3.003	User	-	100	0.0)12	0	.012	0.012	2
	User	-	100	0.0)11	0	.011	0.023	;
3.004	User	-	100	0.0	03	0	.003	0.003	;
	User	-	100	0.0)16	0	.016	0.019)
	User	-	100	0.0	800	0	.008	0.026	;
4.000	User	-	100	0.0	800	0	.008	0.008	;
4.001	User	-	100	0.0	28	0	.028	0.028	;
5.000	User	-	100	0.0	800	0	.008	0.008	;
3.005	-	-	100	0.0	000	0	.000	0.000)
3.006	-	-	100	0.0	000	0	.000	0.000)
6.000	-	-	100	0.0	000	0	.000	0.000)
3.007	-	-	100	0.0	000	0	.000	0.000)
7.000	User	-	100	0.0)14	0	.014	0.014	
3.008	User	-	100	0.0	05	0	.005	0.005)
8.000	User	-	100	0.0	010	0	.010	0.010)
9.000	User	-	100	0.0)11	0	.011	0.011	
8.001	User	-	100	0.0	800	0	.008	0.008	;
8.002	User	-	100	0.0)15	0	.015	0.015)
3.009	-	-	100	0.0	000	0	.000	0.000)
3.010	-	-	100	0.0	000	0	.000	0.000)
3.011	-	-	100	0.0	000	0	.000	0.000)
3.012	-	-	100	0.0	000	0	.000	0.000)
3.013	-	-	100	0.0	000	0	.000	0.000)
3.014	-	-	100	0.0	000	0	.000	0.000)
3.015	-	-	100	0.0	000	0	.000	0.000)
				Tot	al	Т	otal	Total	
				0.2	265	0	.265	0.265	j

Clancy Consulting Ltd		Page 12
19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micco
Date 20/12/2021	Designed by RH	
File 211220_Hextable.MDX	Checked by	Diginada
Innovyze	Network 2020.1	

Network Classifications for Storm

PN	USMH	Pipe	Min Cover	Max Cover	Pipe Type	MH	MH	MH Ring	МН Туре
	Name	Dia	Depth	Depth		Dia	Width	Depth	
		(mm)	(m)	(m)		(mm)	(mm)	(m)	
1.000	1	225	0.675	1.596	Unclassified	600	0	0.675	Unclassified
1.001	2	225	0.685	2.675	Unclassified	600	0	2.675	Unclassified
1.002	3	225	0.775	0.891	Unclassified	1200	0	0.775	Unclassified
1.003	4	225	0.891	1.026	Unclassified	1050	0	0.891	Unclassified
1.004	ATT.TNK. 3	225	1.517	1.601	Unclassified	1200	0	1.601	Unclassified
1.005	6	225	1.517	1.627	Unclassified	1050	0	1.517	Unclassified
2.000	10	150	1.302	1.403	Unclassified	600	0	1.302	Unclassified
1.006	7	225	1.627	1.658	Unclassified	1200	0	1.627	Unclassified
1.007	ATT. TNK. 4	225	1.639	1.658	Unclassified	1800	0	1.658	Unclassified
1.008	10A	225	1.618	1.639	Unclassified	1200	0	1.639	Unclassified
1.009	10A_BH_13	225	1.597	1.618	Unclassified	1200	800	1.618	Unclassified
1.010	10B_BH_12	225	1.587	1.597	Unclassified	1200	800	1.597	Unclassified
1.011	10C_BH_11	300	1.031	1.587	Unclassified	1200	800	1.587	Unclassified
1.012	10D_BH_10	300	0.476	1.031	Unclassified	1200	800	1.031	Unclassified
3.000	11	225	1.251	1.667	Unclassified	600	0	1.667	Unclassified
3.001	12	225	1.251	1.292	Unclassified	600	0	1.251	Unclassified
3.002	13	225	1.292	1.340	Unclassified	600	0	1.292	Unclassified
3.003	14	225	0.703	1.340	Unclassified	600	0	1.340	Unclassified
3.004	15	225	1.703	1.952	Unclassified	1050	0	1.703	Unclassified
4.000	22_RE	150	0.731	2.102	Unclassified	1200	0	0.731	Unclassified
4.001	ATT. TNK 1	225	1.957	2.052	Unclassified	1800	0	2.052	Unclassified
5.000	24_RE	150	1.953	1.989	Unclassified	1050	0	1.989	Unclassified
3.005	16	225	2.004	2.357	Unclassified	1200	0	2.357	Unclassified
3.006	24	225	1.652	2.004	Unclassified	1200	0	2.004	Unclassified
6.000	19	100	1.747	2.943	Unclassified	1200	0	2.943	Unclassified
3.007	17	225	1.422	1.747	Unclassified	1200	0	1.747	Unclassified
7.000	23_RE	150	1.168	1.352	Unclassified	1200	0	1.168	Unclassified
3.008	18	225	1.877	2.002	Unclassified	1050	0	1.877	Unclassified
8.000	21_G1	150	0.234	1.033	Unclassified	600	0	0.234	Unclassified
9.000	23	150	0.616	1.033	Unclassified	600	0	0.616	Unclassified
8.001	22_G2	225	0.958	1.787	Unclassified	600	0	0.958	Unclassified
8.002	23_G3	225	1.787	2.002	Unclassified	600	0	1.787	Unclassified
3.009	19	225	2.002	2.109	Unclassified	1200	0	2.002	Unclassified
3.010	ATT. TNK. 2	225	2.284	2.389	Unclassified	1800	0	2.284	Unclassified
3.011	33A	225	2.389	2.495	Unclassified	1200	0	2.389	Unclassified
3.012	33B_BH_03	300	2.420	2.525	Unclassified	1200	800	2.420	Unclassified
3.013	33C_BH_02	300	2.525	2.578	Unclassified	1200	800	2.525	Unclassified
3.014	33D_BH_01.5	375	2.578	2.629	Unclassified	1200	800	2.578	Unclassified
3.015	33_BH_01	375	2.629	2.680	Unclassified	1200	800	2.629	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.012		56.800	56.024	0.000	0	0
Free	Flowing	Outfal	l Detail	s for St	orm	
Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
3.015		56.850	53.795	0.000	0	0

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19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micco
Date 20/12/2021	Designed by RH	Desinado
File 211220_Hextable.MDX	Checked by	Diamage
Innovyze	Network 2020.1	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow 0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins)	0	Inlet Coeffiecient 0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day) 0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins) 60
Foul Sewage per hectare (l/s)	0.800	Output Interval (mins) 10

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 4 Number of Storage Structures 15 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type Summer
Return Period (years)	100	Cv (Summer) 0.750
Region	England and Wales	Cv (Winter) 0.840
M5-60 (mm)	20.000 Stor	m Duration (mins) 30
Ratio R	0.405	
Online Controls for Storm

Orifice Manhole: 6, DS/PN: 1.005, Volume (m³): 1.7

Diameter (m) 0.013 Discharge Coefficient 0.600 Invert Level (m) 56.258

Orifice Manhole: 10A, DS/PN: 1.008, Volume (m³): 2.1

Diameter (m) 0.031 Discharge Coefficient 0.600 Invert Level (m) 56.111

Orifice Manhole: 24, DS/PN: 3.006, Volume (m³): 2.6

Diameter (m) 0.009 Discharge Coefficient 0.600 Invert Level (m) 54.771

Orifice Manhole: 33A, DS/PN: 3.011, Volume (m³): 3.0

Diameter (m) 0.026 Discharge Coefficient 0.600 Invert Level (m) 53.886

Clancy Consulting Ltd					Page 15					
19 Upper King Street		8/260	8/2607 Hextable							
Norwich		New C	are Home							
NR3 1RB		1:30&	100yrCritica	Micro						
Date 20/12/2021		Desig	ned by RH		Dcainago					
File 211220_Hextable.MDX		Check	ed by		Diamage					
Innovyze		Netwo	rk 2020.1							
	Stor	rage Struc	tures for St	orm						
Cellular Storage Manhole: ATT.TNK. 3, DS/PN: 1.004										
Infilt: Infilt:	ation Coeffi ation Coeffi	Invert Lev cient Base cient Side	el (m) 56.274 (m/hr) 0.00000 (m/hr) 0.00000	Safety Factor 2.0 Porosity 0.95						
Depth (m) Area (m ²) Inf. Are	ea (m²) Depth	n (m) Area	(m²) Inf. Area	(m ²) Depth (m) Are	a (m²) Inf. Area (m²)					
0.000 84.0	0.0	0.800	34.0	0.0 0.801	0.0 0.0					
Cellu	ılar Storag	e Manhole	: ATT. TNK.	4, DS/PN: 1.007						
Infilt	ation Coeffi ation Coeffi	Invert Lev cient Base cient Side	el (m) 56.117 (m/hr) 0.00000 (m/hr) 0.00000	Safety Factor 2.0 Porosity 0.95						
Depth (m) Area (m ²) Inf. Are	ea (m²) Depth	n (m) Area	(m²) Inf. Area	(m ²) Depth (m) Are	a (m²) Inf. Area (m²)					
0.000 84.0	0.0	0.800	34.0	0.0 0.801	0.0 0.0					
Deve		Marchar		' 2 DG (DN 1 000						
	Bore Soaka	way Manno	1e: IUA_BH_1	3, DS/PN: 1.009						
Chamber Inve Chamber Diamete Chamb Borehole	ert Level (m) er/Length (m) ber Width (m) Diameter (m)	41.405 1.200 Inf 0.800 0.200	iltration Coef	Borehole Depth (m) ficient Base (m/hr) Safety Factor	15.000 0.93600 2.0					
Dept (m)	Side h Infil. De Coef. ((m/hr)	Side pth Infil. (m) Coef. (m/hr)	Side Depth Infil (m) Coef. (m/hr)	Side Depth Infil. (m) Coef. (m/hr)						
0.00	0 0.00000 5.	000 0.00000	10.000 0.5000	0 15.000 0.93600						
Deep	Bore Soaka	way Manho	le: 10B_BH_1	2, DS/PN: 1.010						
Chamber Inve Chamber Diamete Chamb Borehole	ert Level (m) er/Length (m) ber Width (m) Diameter (m)	40.799 1.200 Inf 0.800 0.200	iltration Coef	Borehole Depth (m) ficient Base (m/hr) Safety Factor	15.000 0.93600 2.0					
Dept (m)	Side h Infil. De Coef. (m/hr)	Side pth Infil. (m) Coef. (m/hr)	Side Depth Infil (m) Coef. (m/hr)	Side Depth Infil. (m) Coef. (m/hr)						
0.00	0 0.00000 5.	000 0.00000	10.000 0.5000	0 15.000 0.93600						
Deep	Bore Soaka	way Manho	le: 10C_BH_1	1, DS/PN: 1.011						
Chamber Inve Chamber Diamete Chamb Borehole	ert Level (m) er/Length (m) ber Width (m) Diameter (m)	41.101 1.200 Inf 0.800 0.200	iltration Coef	Borehole Depth (m) ficient Base (m/hr) Safety Factor	15.000 0.93600 2.0					

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19 Upper King Street	87	8/2607 Hextable					
Norwich	Ne	w Care Ho	me				
NR3 1RB	1:	30&100yrC		Micco			
Date 20/12/2021	De	signed by	RH				
File 211220_Hextable.MDX	Cł	necked by					Digiliga
Innovyze	Ne	etwork 202	0.1				
- 1 -							
Deep Bore So	bakaway Ma	nhole: 100	С_ВН_11	, DS/PN	N: 1.011		
Side Depth Infil (m) Coef. (m/hr)	Si Depth Ind (m) Co (m/	ide fil. Depth ef. (m) /hr)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)		
0.000 0.0000	0 5.000 0.0	0000 10.000	0.50000	15.000	0.93600		
Deep Bore S	bakaway Ma	nhole: 101	D_BH_10	, DS/PN	N: 1.012		
Chamber Invert Level Chamber Diameter/Length Chamber Width Borehole Diameter	(m) 41.025 (m) 1.200 (m) 0.800 (m) 0.200	Infiltratio	I on Coeff:	Borehole icient B Saf	Depth (m) ase (m/hr) ety Factor	15.000 0.93600 2.0	
Side Depth Infil (m) Coef. (m/hr)	Si Depth Ini (m) Co (m)	ide fil. Depth ef. (m) /hr)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)		
0.000 0.0000	0 5.000 0.0	0000 10.000	0.50000	15.000	0.93600		
Porous	Car Park	Manhole: 1	15, DS/3	PN: 3.(004		
	int Deer (··· (1-···) 0.000				F 0	
Infiltration Coeffic Membrane Per	colation (m	m/hr) 0.0000 m/hr) 100	00		Length (m)	5.0 6.0	
Max E	ercolation	(1/s) 8	.3	S	lope (1:X)	50.0	
	Safety F	actor 2	.0 Depres	ssion St	orage (mm)	5	
	Invert Leve	osity 0.3 1 (m) 56.10	30 EVa 20 Me	aporatio embrane	n (mm/day) Depth (mm)	3	
Cellular St	orage Manl	hole: ATT.	TNK 1,	DS/PN	: 4.001		
	Invert	Level (m)	55.218	Safetv F	actor 2.0		
Infiltration Co Infiltration Co	efficient B efficient S	ase (m/hr) (ide (m/hr) (0.00000	Por	osity 0.95		
Depth (m) Area (m ²) Inf. Area (m ²)	Depth (m) A	rea (m²) Inf	. Area ((m²) Dep	th (m) Area	a (m²) I	nf. Area (m²)
0.000 175.0 0.0	0.800	175.0		0.0	0.801	0.0	0.0
Porous C	ar Park Ma	anhole: 24	_RE, DS	S/PN: 5	.000		
Infiltration Coeffic	ient Base (m	n/hr) 0.0000	0		Width (m)	5.0	
Membrane Per	colation (mn	n/hr) 100	0	I	Length (m)	5.5	
Max P	ercolation	(1/s) 7.	6	SI	Lope (1:X)	350.0	
	Safety Fa	actor 2.	0 Depres	sion Sto	orage (mm)	5	
	Invert Level	(m) 55.36	1 Me	mbrane I	Depth (mm)	0	
Porous C	ar Park Ma	anhole: 23	_RE, DS	5/PN: 7	.000		
	dent De l'		20			E O	
Infiltration Coeffic Membrane Per	colation (m	m/nr) U.UUO(m/hr) 100	00		Width (m) Length (m)	5.U 10.8	
Max E	ercolation	(1/s) 15	.0	S	lope (1:X)	50.0	
	Safety F	actor 2	.0 Depres	ssion St	orage (mm)	5	
	Por Invert Levo	osity 0.3	30 Eva >0 ™	aporatio	n (mm/day) Depth (mm)	3	
	TUACTO TEAG	- (m) JJ.00	50 M	Subralle		U	

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Clancy Consulting Ltd										17
19 Upper King Street			8/260	7 Hexta	able					
Norwich			New C	are Hor	ne					
NR3 1RB			1:30&	100yrC:	ritical	Event+	-40%CC		Mic	TO TO
Date 20/12/2021			Desig	ned by	RH				Dra	inago
File 211220_Hextable.MDX			Check	ed by					DIC	mage
Innovyze			Netwo	rk 2020	0.1					
Cellul	ar Sto	rage M	anhole	: ATT.	TNK. 2	, DS/P	N: 3.010			
Infiltra Infiltra	tion Coe tion Coe	Inv fficien fficien	vert Lev nt Base nt Side	el (m) (m/hr) ((m/hr) (53.891 s 0.00000 0.00000	Safety 1 Po:	Factor 2.0 rosity 0.95			
Depth (m) Area (m²) Inf. Area	(m²) De	epth (m)) Area	(m²) Inf	. Area ((m²) Dep	oth (m) Area	a (m²)	Inf. 2	Area (m²)
0.000 84.0	0.0	0.40	0 8	34.0		0.0	0.401	0.0		0.0
Deep E	ore Soa	akaway	Manho	le: 33E	3_ВН_03	, DS/P	N: 3.012			
Chamber Inver Chamber Diameter Chambe Borehole D	t Level /Length r Width iameter	(m) 38. (m) 1. (m) 0. (m) 0.	.806 .200 Inf .800 .300	iltratio) on Coeff:	Borehol icient 1 Sa	e Depth (m) Base (m/hr) fety Factor	15.00 0.9360 2.	0 0 0	
Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)			
0.000	0.00000	5.000	0.00000	10.000	0.50000	15.000	0.93600			
Deep B	Sore Soa	akaway	Manho	le: 330	С_ВН_02	, DS/P	N: 3.013			
Chamber Inver Chamber Diameter Chambe Borehole D	t Level /Length r Width iameter	(m) 38. (m) 1. (m) 0. (m) 0.	.552 .200 Inf .800 .200	iltratio	I on Coeff:	Borehol icient 1 Sa	e Depth (m) Base (m/hr) fety Factor	15.00 0.9360 2.	0 0 0	
Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)			
0.000	0.00000	5.000	0.00000	10.000	0.50000	15.000	0.93600			
Deep Bo	ore Soal	kaway	Manhol	e: 33D_	_BH_01.	5, DS/	PN: 3.014			
Chamber Inver Chamber Diameter Chambe Borehole D	t Level /Length r Width iameter	(m) 38. (m) 1. (m) 0. (m) 0.	.872 .200 Inf .800 .200	iltratio	I on Coeff:	Borehol icient 1 Sa	e Depth (m) Base (m/hr) fety Factor	15.00 0.9360 2.	0 0 0	
Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)	Depth (m)	Side Infil. Coef. (m/hr)			
0.000	0.00000	5.000	0.00000	10.000	0.50000	15.000	0.93600			
Deep	Bore Sc	akaway	y Manho	ole: 33	_BH_01,	DS/PI	N: 3.015			
Chamber Inver Chamber Diameter Chambe Borehole D	t Level /Length r Width iameter	<pre>(m) 38. (m) 1. (m) 0. (m) 0.</pre>	.796 .200 Inf .800 .200	iltratio	I on Coeff:	Borehol icient i Sa	e Depth (m) Base (m/hr) fety Factor	15.00 0.9360 2.	0 0 0	

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Clancy Consulting Ltd				
19 Upper King Street	8/2607 Hextable			
Norwich	New Care Home			
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro		
Date 20/12/2021	Designed by RH	Dcainago		
File 211220_Hextable.MDX	Checked by	Drainage		
Innovyze	Network 2020.1			

Deep Bore Soakaway Manhole: 33_BH_01, DS/PN: 3.015

	Side		Side		Side		Side
Depth	Infil.	Depth	Infil.	Depth	Infil.	Depth	Infil.
(m)	Coef.	(m)	Coef.	(m)	Coef.	(m)	Coef.
	(m/hr)		(m/hr)		(m/hr)		(m/hr)

0.000 0.00000 5.000 0.00000 10.000 0.50000 15.000 0.93600

Manhole Headloss for Storm

PN	US/MH Name	US/MH Headloss
1 000	1	0 500
1 001	1	0.500
1 002	2	0.500
1 003	4	0.500
1.004	ATT.TNK. 3	0.500
1 005	6	0 500
2.000	10	0.500
1.006		0.500
1.007	ATT. TNK. 4	0.500
1.008	10A	0.500
1.009	10A_BH_13	0.500
1.010	10B_BH_12	0.500
1.011	10C_BH_11	0.500
1.012	10D_BH_10	0.500
3.000	11	0.500
3.001	12	0.500
3.002	13	0.500
3.003	14	0.500
3.004	15	0.500
4.000	22_RE	0.500
4.001	ATT. TNK 1	0.500
5.000	24_RE	0.500
3.005	16	0.500
3.006	24	0.500
6.000	19	0.500
3.007	17	0.500
7.000	23_RE	0.500
3.008	18	0.500
8.000	21_G1	0.500
9.000	23	0.500
8.001	22_G2	0.500
8.002	23_G3	0.500
3.009	19	0.500
3.010	ATT. TNK. 2	0.500
3.011	33A	0.500
3.012	33B_BH_03	0.500
3.013	33C_BH_02	0.500
3.014	33D_RH_01.5	0.500
3.015	33 BH 01	0.500

10 IIm	cy Consulti	ng Ltd							Page	19
119 00	oper King S	treet			8/2607 Hexta	able				
Norwi	.ch				New Care Hor	ne				
NR3 1	RB				1:30&100yrC:	riticalEv	ent+40%CC	;	Mi	
Date	20/12/2021				Designed by	RH			Dc	ainago
File	211220_Hex	table.MDX			Checked by					inage
Innov	vyze				Network 202	0.1				
	<u>Si</u> Manh Fc Number of Number o	ummary of Areal Hot hole Headlos bul Sewage p Input Hydrog f Online Cor Rainfall M Re Margin fo	Critica Reductic Hot Star Start Le s Coeff er hecta raphs 0 trols 4 dodel gion End or Flood	al Resu. S n Factor t (mins) vel (mm) (Global) re (1/s) Number Syntl gland and Risk War Analysis I I I I I I I I I I I I I	<pre>invertwork 2024 its by Maximu imulation Crite 1.000 Addit: 0 Mi 0 0.500 Flow pe: 0.800 r of Offline Co of Storage Stru hetic Rainfall FSR M5-60 (d Wales Rati rning (mm) s Timestep 2.5 DTS Status DVD Status ria Status</pre>	um Level eria ional Flow ADD Factor r Person pe ntrols 0 ctures 15 <u>Details</u> mm) 20.000 o R 0.411 Second Inc	(Rank 1) - % of Tot. * 10m³/ha Inlet Coeff er Day (1/p Number of T Number of F Cv (Summer Cv (Winter rement (Ext	for Stor al Flow 0 Storage 2 iecient 0 er/day) 0 Cime/Area Real Time c) 0.750 c) 0.840 300.0 cended) ON OFF	.000 .000 .800 .000 Diagram: Control:	s 0 s 0
	US/MH	Du: Return Pe Cl:	cation(s eriod(s) imate Ch	(years) (years) ange (%)	15, 30, 60, 12	0, 240, 36	0, 480, 960 1, 3 0,	0, 1440 30, 100 0, 40	Water	Surcharged
PN	Name					F + + AL. 1 + 1	First (Z)	Overiiow	Level	Depth
		Storm	Period	Change	Surcharge	Flood	First (Z) Overflow	Act.	Level (m)	Depth (m)
1 000	1	Storm	Period	Change	Surcharge	Flood	First (Z) Overflow	Act.	Level (m)	Depth (m)
1.000	1	Storm 15 Winter 15 Winter	Period 100 100	Change +40% +40%	Surcharge	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389	Depth (m) -0.144 -0.136
1.000 1.001 1.002	1 2 3	Storm 15 Winter 15 Winter 15 Winter	Period 100 100 100	Change +40% +40% +40%	Surcharge	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231	Depth (m) -0.144 -0.136 0.006
1.000 1.001 1.002 1.003	1 2 3 4	Storm 15 Winter 15 Winter 15 Winter 15 Winter	Period 100 100 100 100	Change +40% +40% +40% +40%	100/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145	Depth (m) -0.144 -0.136 0.006 0.036
1.000 1.001 1.002 1.003 1.004	1 2 3 4 ATT.TNK. 3	Storm 15 Winter 15 Winter 15 Winter 1440 Winter	Period 100 100 100 100 100	Change +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020	Depth (m) -0.144 -0.136 0.006 0.036 0.526
1.000 1.001 1.002 1.003 1.004 1.005 2.000	1 2 3 4 ATT.TNK. 3 6 10	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter	Period 100 100 100 100 100 100 100	Change +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615	Depth (m) -0.144 -0.136 0.006 0.036 0.520 0.537 -0.083
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006	1 2 3 4 ATT.TNK. 3 6 10 7	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 15 Winter	Period 100 100 100 100 100 100 100	Change +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245	Depth (m) -0.144 -0.136 0.006 0.520 0.535 -0.083 -0.128
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007	1 2 3 4 ATT.TNK. 3 6 10 7 ATT. TNK. 4	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 15 Winter 480 Winter	Period 100 100 100 100 100 100 100 100	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230	Depth (m) -0.144 -0.136 0.006 0.036 0.526 0.53 -0.083 -0.083 -0.128 -0.112
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008	1 2 3 4 ATT.TNK. 3 6 10 7 ATT. TNK. 4 10A	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 15 Winter 480 Winter	Period 100 100 100 100 100 100 100 100 100	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232	Depth (m) -0.144 -0.136 0.006 0.036 0.526 0.537 -0.083 -0.128 -0.112 -0.112
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009	1 2 3 4 ATT.TNK. 3 6 10 7 ATT. TNK. 4 10A 10A_BH_13 10B_PU 12	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 60 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121	Depth (m) -0.144 -0.136 0.006 0.036 0.526 0.537 -0.083 -0.128 -0.112 -0.112 -0.112
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555	Depth (m) -0.144 -0.136 0.006 0.520 0.537 -0.083 -0.128 -0.128 -0.112 -0.104 -0.212 -0.221 -0.221 -0.221
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH 10	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 5 Summer	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	Surcharge 100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.232 56.232 56.121 56.107 52.555 41.025	Depth (m) -0.144 -0.136 0.000 0.030 0.520 0.537 -0.083 -0.122 -0.112 -0.104 -0.211 -0.221 -0.221 -3.777 -15.300
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Summer 15 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.232 56.232 56.121 56.107 52.555 41.025 56.643	Depth (m) -0.144 -0.130 0.000 0.520 0.537 -0.085 -0.122 -0.112 -0.104 -0.215 -0.225 -3.775 -15.300 -0.190
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Summer 15 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592	Depth (m) -0.144 -0.136 0.004 0.526 0.537 -0.085 -0.125 -0.125 -0.126 -0.126 -0.127 -0.126 -0.127 -0.126 -0.127 -0.127 -0.227 -3.777 -15.300 -0.196 -0.157
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.002	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Summer 15 Winter 15 Winter 15 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589	Depth (m) -0.144 -0.136 0.000 0.036 0.520 0.53 -0.083 -0.128 -0.128 -0.128 -0.129 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.221 -0.190 -0.1
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.002 3.003	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 2 3 3 4	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Summer 15 Winter 15 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	Surcharge 100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589 56.575	Depth (m) -0.144 -0.136 0.000 0.036 0.520 0.53 ² -0.083 -0.128 -0.128 -0.128 -0.122 -0.104 -0.212 -0.222 -3.777 -15.300 -0.190 -0.15 ² -0.088
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.002 3.003 3.004 4.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Summer 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 30/60 Winter 30/60 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.581 55.813	Depth (m) -0.144 -0.136 0.006 0.036 0.526 0.537 -0.083 -0.128 -0.112 -0.104 -0.212 -0.222 -3.777 -15.306 -0.196 -0.157 -0.188 0.266
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.002 3.003 3.004 4.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT TNK.	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 1440 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/15 Summer 100/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589 56.575 55.813 55.759	Depth (m) -0.144 -0.136 0.006 0.036 0.526 0.537 -0.083 -0.128 -0.112 -0.104 -0.212 -0.222 -3.777 -15.306 -0.195 -0.195 -0.198 0.266 0.246
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.001 3.002 3.003 3.004 4.000 4.001 5.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24 RE	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/15 Summer 100/12 Winter 30/360 Winter 30/360 Winter	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589 56.575 55.813 55.759 55.759 55.759	Depth (m) -0.144 -0.136 0.000 0.520 0.537 -0.083 -0.128 -0.112 -0.104 -0.211 -0.211 -0.211 -0.211 -0.211 -0.211 -0.211 -0.211 -0.211 -0.211 -0.215 -0.155 -0.155 -0.155 -0.155 -0.266 0.246 0.246
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.001 3.002 3.003 3.004 4.000 4.001 5.000 3.005	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24_RE 16	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/15 Summer 100/120 Winter 30/360 Winter 30/1440 Winter 1/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589 56.575 55.813 55.759 55.759 55.759	Depth (m) -0.144 -0.136 0.006 0.526 0.537 -0.083 -0.122 -0.112 -0.104 -0.211 -0.221 -3.771 -15.300 -0.196 -0.157 -0.199 -0.157 -0.199 -0.157 -0.199 -0.248 0.246 0.246 0.246 0.246
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1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.002 3.003 3.004 4.000 4.001 5.000 3.005 3.006 6.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24_RE 16 24 19	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 1440 Winter 15 Winter 15 Winter 480 Winter 480 Winter 480 Winter 15 Summer 15 Winter 15 Winter 15 Winter 140 Winter 1440 Winter 15 Summer	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/15 Summer 100/120 Winter 30/360 Winter 30/360 Winter 1/15 Summer 1/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589 56.575 55.813 55.759 55.759 55.759 55.759 55.820 55.820 55.825	Depth (m) -0.144 -0.136 0.006 0.526 0.537 -0.083 -0.128 -0.112 -0.104 -0.211 -0.221 -3.771 -15.300 -0.196 -0.196 -0.196 0.246 0.246 0.246 0.246 0.246 0.246 0.246 0.246 0.246 0.246 0.246
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.002 3.003 3.004 4.000 4.001 5.000 3.005 3.006 6.000 3.007	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24_RE 16 24 19 17	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 15 Summer 1440 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/15 Summer 100/120 Winter 30/360 Winter 30/360 Winter 1/15 Summer 1/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.643 56.592 56.643 55.759 55.759 55.759 55.759 55.759 55.759 55.820 55.820 55.862 54.957 54.633	Depth (m) -0.144 -0.136 0.006 0.036 0.520 0.537 -0.083 -0.128 -0.112 -0.104 -0.211 -0.221 -3.771 -15.300 -0.190 -0.157 -0.199 0.266 0.246 0.246 0.777 0.866 -0.100 -0.220
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.001 3.002 3.003 3.004 4.000 4.001 5.000 3.005 3.005 3.006 6.000 3.007 7.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24_RE 16 24 19 17 23_RE	Storm 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 15 Summer 1440 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/15 Summer 100/12 Winter 100/120 Winter 30/360 Winter 1/15 Summer 1/15 Summer 1/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.643 56.592 56.589 55.759 55.759 55.759 55.759 55.759 55.759 55.759 55.759 55.820 55.820 55.820 55.820 55.820	Depth (m) -0.144 -0.136 0.006 0.036 0.520 0.537 -0.083 -0.128 -0.112 -0.104 -0.211 -0.221 -3.771 -15.300 -0.190 -0.157 -0.199 0.266 0.246 0.311 0.248 0.777 0.866 -0.100 -0.220 -0.100 -0.220 -0.100 -0.220 -0.100 -0.220 -0.120 -0.120 -0.120 -0.120 -0.120 -0.120 -0.120 -0.200 -0.120 -0.200 -0.120 -0.120 -0.200 -0.120 -0.200 -0.120 -0.120 -0.200 -0.120 -0.200 -0.120 -0.200 -0.120 -0.100 -0.200 -0.120 -0.100 -0.200 -0.100 -0.200 -0.100 -0.2000 -0.20000 -0.20000 -0.2000 -0.20000 -0.2000 -0.2000 -0.2000 -0.20
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.001 3.002 3.003 3.004 4.000 4.001 5.000 3.005 3.006 6.000 3.007 7.000 3.008 8.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24_RE 6 24 19 17 23_RE 18 21 G1	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 1440 Winter 15 Summer 1440 Winter 140 Winter 15 Winter 140 Winter 15 Winter 140 Winter 140 Winter 15 Winter 140 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/15 Summer 100/120 Winter 30/360 Winter 30/360 Winter 1/15 Summer 1/15 Summer 100/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589 55.759 55.862 54.633 54.957 54.597 54.597 54.597	Depth (m) -0.144 -0.136 0.006 0.527 0.083 -0.128 -0.112 -0.104 -0.211 -0.221 -3.771 -15.300 -0.195 -0.195 0.266 0.246 0.311 0.248 0.777 0.866 -0.100 -0.221 -0.248 0.777 0.866 -0.100 -0.226 -0.100 -0.226 -0.100 -0.226 -0.227 -0.227 -0.221 -0.227 -0.221 -0.227 -0.221 -0.227 -0.221 -0.227 -0.221 -0.227 -0.221 -0.227 -0.221 -0.227 -0.221 -0.227 -0.128 -0.248 -0.247 -0.248 -0.247 -0.248 -0.247 -0.248 -0.247 -0.248 -0.248 -0.247 -0.248 -0.248 -0.248 -0.248 -0.248 -0.248 -0.248 -0.248 -0.2480.248 -0.2480
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.001 3.002 3.003 3.004 4.000 4.001 5.000 3.005 3.005 3.006 6.000 3.007 7.000 3.008 8.000 9.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24_RE 16 24 19 17 23_RE 18 21_G1 23	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 30/60 Summer 100/120 Winter 30/360 Winter 30/360 Winter 30/140 Winter 1/15 Summer 1/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.589 55.759 55.759 55.759 55.759 55.759 55.820 55.820 55.862 54.957 54.633 54.945 54.597 54.597	Depth (m) -0.144 -0.136 0.006 0.526 0.537 -0.083 -0.128 -0.128 -0.112 -0.104 -0.212 -0.222 -3.777 -15.300 -0.199 -0.157 -0.119 0.266 0.246 0.246 0.246 0.246 0.246 0.777 0.866 -0.100 -0.222 -0.087 0.226
1.000 1.001 1.002 1.003 1.004 1.005 2.000 1.006 1.007 1.008 1.009 1.010 1.011 1.012 3.000 3.001 3.001 3.002 3.003 3.004 4.000 4.001 5.000 3.005 3.006 6.000 3.007 7.000 3.008 8.000 9.000	1 2 3 4 ATT.TNK. 3 6 10 7 ATT.TNK. 4 10A_BH_13 10B_BH_12 10C_BH_11 10D_BH_10 11 12 13 14 15 22_RE ATT.TNK 1 24_RE 16 24 17 23_RE 18 21_G1 23	Storm 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter 1440 Winter 15 Winter 480 Winter 480 Winter 480 Winter 480 Winter 15 Winter 15 Winter 15 Winter 15 Winter 1440 Winter	Period 100 100 100 100 100 100 100 10	Change +40% +40% +40% +40% +40% +40% +40% +40%	100/15 Summer 100/15 Summer 30/60 Winter 30/60 Summer 100/120 Winter 30/360 Winter 30/360 Winter 30/140 Winter 1/15 Summer 1/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer	Flood	First (Z) Overflow	Act.	Level (m) 58.681 57.389 57.231 57.145 57.019 57.020 56.615 56.245 56.230 56.232 56.121 56.107 52.555 41.025 56.643 56.592 56.643 56.592 55.813 55.759 55.759 55.759 55.759 55.759 55.820 55.820 55.820 55.820 55.820 55.821 55.820 55.820 55.825 55.8200 55.8200 55.8200 55.8200 55	Depth (m) -0.144 -0.136 0.006 0.520 0.537 -0.083 -0.128 -0.112 -0.104 -0.211 -0.221 -3.771 -15.300 -0.190 -0.157 -0.190 -0.157 -0.085 0.266 0.246 0.311 0.248 0.777 0.866 -0.100 -0.220 -0.087 0.274 0.231 0.214

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Clancy Consulting Ltd		Page 20			
19 Upper King Street	8/2607 Hextable				
Norwich	New Care Home				
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro			
Date 20/12/2021	Designed by RH	Desinado			
File 211220_Hextable.MDX	Checked by	Drainage			
Innovyze	Network 2020.1				

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

PN	US/MH Name	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.000	0.28			10.2	OK	
1.001	2	0.000	0.32			18.5	OK	
1.002	3	0.000	0.85			28.4	SURCHARGED	
1.003	4	0.000	1.35			39.7	SURCHARGED	
1.004	ATT.TNK. 3	0.000	0.01			0.3	SURCHARGED	
1.005	6	0.000	0.01			0.3	SURCHARGED	
2.000	10	0.000	0.40			4.9	OK	
1.006	7	0.000	0.38			11.0	OK	
1.007	ATT. TNK. 4	0.000	0.02			0.6	OK	
1.008	10A	0.000	0.02			0.5	OK	
1.009	10A_BH_13	0.000	0.01			0.2	OK	
1.010	10B_BH_12	0.000	0.00			0.1	OK	
1.011	10C_BH_11	0.000	0.00			0.0	OK	
1.012	10D_BH_10	0.000	0.00			0.0	OK	
3.000	11	0.000	0.06			2.0	OK	
3.001	12	0.000	0.07			2.2	OK	
3.002	13	0.000	0.31			9.6	OK	
3.003	14	0.000	0.70			24.4	OK	
3.004	15	0.000	0.05			2.3	SURCHARGED	
4.000	22_RE	0.000	0.01			0.2	SURCHARGED	
4.001	ATT. TNK 1	0.000	0.12			3.6	SURCHARGED	
5.000	24_RE	0.000	0.07			0.8	SURCHARGED	
3.005	16	0.000	0.09			2.8	SURCHARGED	
3.006	24	0.000	0.01			0.2	SURCHARGED	
6.000	19	0.000	0.00			0.0	OK	
3.007	17	0.000	0.00			0.2	OK	
7.000	23_RE	0.000	0.36		6	8.8	OK	
3.008	18	0.000	0.05			1.4	SURCHARGED	
8.000	21_G1	0.000	0.06			0.7	FLOOD RISK	
9.000	23	0.000	0.06			0.8	SURCHARGED	

Clancy Consulting Ltd		Page 21
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19 Upper King Street	8/2607 Hextable	
Norwich	New Care Home	
NR3 1RB	1:30&100yrCriticalEvent+40%CC	Micro
Date 20/12/2021	Designed by RH	Dcainago
File 211220_Hextable.MDX	Checked by	Diamage
Innovyze	Network 2020.1	

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

	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water Level	Surcharged Depth
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)
8.001	22_G2	480 Winter	100	+40%	100/15 Summer				54.597	0.205
8.002	23_G3	480 Winter	100	+40%	100/15 Summer				54.597	0.284
3.009	19	480 Winter	100	+40%	100/15 Summer				54.597	0.299
3.010	ATT. TNK. 2	480 Winter	100	+40%	30/240 Winter				54.596	0.480
3.011	33A	480 Winter	100	+40%	30/120 Winter				54.596	0.485
3.012	33B_BH_03	480 Winter	100	+40%					53.899	-0.281
3.013	33C_BH_02	480 Winter	100	+40%					53.886	-0.289
3.014	33D_BH_01.5	480 Winter	100	+40%					53.804	-0.369
3.015	33_BH_01	480 Winter	100	+40%					53.046	-1.124

		Flooded			Half Drain	Pipe		
	US/MH	Volume	Flow /	Overflow	Time	Flow		Level
PN	Name	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
8.001	22_G2	0.000	0.06			2.0	SURCHARGED	
8.002	23_G3	0.000	0.11			3.0	SURCHARGED	
3.009	19	0.000	0.15			4.4	SURCHARGED	
3.010	ATT. TNK. 2	0.000	0.04			1.2	SURCHARGED	
3.011	33A	0.000	0.03			1.0	SURCHARGED	
3.012	33B_BH_03	0.000	0.01			0.7	OK	
3.013	33C_BH_02	0.000	0.01			0.4	OK	
3.014	33D_BH_01.5	0.000	0.00			0.2	OK	
3.015	33_BH_01	0.000	0.00		447	0.0	OK	

	Project				Job no.	
Clancy	Hextable				8/2607	
consulting	Calcs for				Start page no./Re	vision
Clancy Consulting Ltd	Top Dartford Road			1		
19 Upper King Street, Norwich,	Calcs by RH	Calcs date 21/12/2021	Checked by	Checked date	Approved by	Approved date

DESIGN RAINFALL		
In accordance with the Wallingford Procedure		
		Tedds calculation version 2.0.0
Design rainfall intensity		
Location of catchment area	London	
Storm duration	D = 5 min	
Return period	Period = 1 yr	
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.440	
5-year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm	
Increase of rainfall intensity due to global warming	pclimate = 0 %	
Factor Z1 (Wallingford procedure)	Z1 = 0.39	
Rainfall for 5min storm with 5 year return period	$M5_5min_i = Z1 \times M5_60min = \textbf{7.7} mm$	
Factor Z2 (Wallingford procedure)	Z2 = 0.61	
Rainfall for 5min storm with 1 year return period	$M1_5min = Z2 \times M5_5min_i = \textbf{4.8} mm$	
Design rainfall intensity	$I_{max} = M1_5min / D = 57.0 mm/hr$	
Maximum surface water runoff		
Catchment area	A _{catch} = 5080 m ²	
Percentage of area that is impermeable	p = 46 %	
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max} = \textbf{37.0 I/s}$	

	Project				Job no.	
Clancy	Hextable				8/2607	
consulting	Calcs for				Start page no./Re	vision
Clancy Consulting Ltd	Top Dartford Road			1		
19 Upper King Street, Norwich,	Calcs by RH	Calcs date 21/12/2021	Checked by	Checked date	Approved by	Approved date

DESIGN RAINFALL		
In accordance with the Wallingford Procedure		
		Tedds calculation version 2.0.01
Design rainfall intensity		
Location of catchment area	London	
Storm duration	D = 5 min	
Return period	Period = 30 yr	
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.440	
5-year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm	
Increase of rainfall intensity due to global warming	pclimate = 0 %	
Factor Z1 (Wallingford procedure)	Z1 = 0.39	
Rainfall for 5min storm with 5 year return period	M5_5min _i = Z1 \times M5_60min = 7.7 mm	
Factor Z2 (Wallingford procedure)	Z2 = 1.46	
Rainfall for 5min storm with 30 year return period	$M30_5min = Z2 \times M5_5min_i = \textbf{11.3} mm$	
Design rainfall intensity	I _{max} = M30_5min / D = 135.6 mm/hr	
Maximum surface water runoff		
Catchment area	$A_{catch} = 5080 \text{ m}^2$	
Percentage of area that is impermeable	p = 46 %	
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max} = \textbf{88.0 I/s}$	

	Project				Job no.	
Clancy	Hextable				8/2607	
consulting	Calcs for				Start page no./Re	vision
Clancy Consulting Ltd	Top Dartford Road			1		
19 Upper King Street, Norwich,	Calcs by RH	Calcs date 21/12/2021	Checked by	Checked date	Approved by	Approved date

DESIGN RAINFALL		
In accordance with the Wallingford Procedure		
-		Tedds calculation version 2.0.01
Design rainfall intensity		
Location of catchment area	London	
Storm duration	D = 5 min	
Return period	Period = 100 yr	
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.440	
5-year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm	
Increase of rainfall intensity due to global warming	pclimate = 0 %	
Factor Z1 (Wallingford procedure)	Z1 = 0.39	
Rainfall for 5min storm with 5 year return period	$M5_5min_i = Z1 \times M5_60min = 7.7 mm$	
Factor Z2 (Wallingford procedure)	Z2 = 1.86	
Rainfall for 5min storm with 100 year return period	$M100_5min = Z2 \times M5_5min_i = \textbf{14.3} mm$	
Design rainfall intensity	$I_{max} = M100_5min / D = 172.2 mm/hr$	
Maximum surface water runoff		
Catchment area	$A_{catch} = 5080 \text{ m}^2$	
Percentage of area that is impermeable	p = 46 %	
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max} = \textbf{111.8} \text{ I/s}$	

	Project				Job no.	
Clancy	Hextable				8/2607	
consulting	Calcs for				Start page no./Re	vision
Clancy Consulting Ltd	Top Dartford Road			1		
19 Upper King Street, Norwich,	Calcs by RH	Calcs date 21/12/2021	Checked by	Checked date	Approved by	Approved date

DESIGN RAINFALL		
In accordance with the Wallingford Procedure		
		Tedds calculation version 2.0.0
Design rainfall intensity		
Location of catchment area	London	
Storm duration	D = 5 min	
Return period	Period = 1 yr	
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.440	
5-year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm	
Increase of rainfall intensity due to global warming	pclimate = 0 %	
Factor Z1 (Wallingford procedure)	Z1 = 0.39	
Rainfall for 5min storm with 5 year return period	$M5_5min_i = Z1 \times M5_60min = 7.7 mm$	
Factor Z2 (Wallingford procedure)	Z2 = 0.61	
Rainfall for 5min storm with 1 year return period	$M1_5min = Z2 \times M5_5min_i = \textbf{4.8} mm$	
Design rainfall intensity	$I_{max} = M1_5min / D = 57.0 mm/hr$	
Maximum surface water runoff		
Catchment area	A _{catch} = 5080 m ²	
Percentage of area that is impermeable	p = 52 %	
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max} = \textbf{41.8} \text{ I/s}$	

	Project				Job no.	
Clancy	Hextable				8/2607	
consulting	Calcs for				Start page no./Re	vision
Clancy Consulting Ltd	Top Dartford Road			1		
19 Upper King Street, Norwich,	Calcs by RH	Calcs date 21/12/2021	Checked by	Checked date	Approved by	Approved date

DESIGN RAINFALL		
In accordance with the Wallingford Procedure		
		Tedds calculation version 2.0.01
Design rainfall intensity		
Location of catchment area	London	
Storm duration	D = 5 min	
Return period	Period = 30 yr	
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.440	
5-year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm	
Increase of rainfall intensity due to global warming	pclimate = 0 %	
Factor Z1 (Wallingford procedure)	Z1 = 0.39	
Rainfall for 5min storm with 5 year return period	$M5_5min_i = Z1 \times M5_60min = 7.7 mm$	
Factor Z2 (Wallingford procedure)	Z2 = 1.46	
Rainfall for 5min storm with 30 year return period	$M30_5min = Z2 \times M5_5min_i = \textbf{11.3} mm$	
Design rainfall intensity	$I_{max} = M30_5min / D = 135.6 mm/hr$	
Maximum surface water runoff		
Catchment area	A _{catch} = 5080 m ²	
Percentage of area that is impermeable	p = 52 %	
Maximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max} = \textbf{99.5} \text{ I/s}$	

	Project				Job no.	
Clancy	Hextable				8/2607	
consulting	Calcs for				Start page no./Re	vision
Clancy Consulting Ltd	ulting Ltd Top Dartford Road				1	
19 Upper King Street, Norwich,	Calcs by RH	Calcs date 21/12/2021	Checked by	Checked date	Approved by	Approved date

	Tedds calculation version 2.0.01
London	
D = 5 min	
Period = 100 yr	
r = 0.440	
M5_60min = 20.0 mm	
p _{climate} = 0 %	
Z1 = 0.39	
M5_5min _i = Z1 × M5_60min = 7.7 mm	
Z2 = 1.86	
$M100_5min = Z2 \times M5_5min_i = \textbf{14.3} mm$	
$I_{max} = M100_5min / D = 172.2 mm/hr$	
$A_{catch} = 5080 \text{ m}^2$	
p = 52 %	
$Q_{max} = A_{catch} \times p \times I_{max} = \textbf{126.4 l/s}$	
	London D = 5 min Period = 100 yr r = 0.440 M5_60min = 20.0 mm pclimate = 0 % Z1 = 0.39 M5_5min; = Z1 × M5_60min = 7.7 mm Z2 = 1.86 M100_5min = Z2 × M5_5min; = 14.3 mm Imax = M100_5min / D = 172.2 mm/hr Acatch = 5080 m ² p = 52 % Qmax = Acatch × p × Imax = 126.4 I/s

	Project				Job no.	
Clancy		Hex	table		8/2	607
consulting	Calcs for				Start page no./Re	vision
Clancy Consulting Ltd		Top Dartf	ord Road			1
19 Upper King Street, Norwich,	Calcs by RH	Calcs date 21/12/2021	Checked by	Checked date	Approved by	Approved date

D	ESIGN RAINFALL	
In	accordance with the Wallingford Procedure	
		Tedds calculation version 2.0.0
D	esign rainfall intensity	
Lo	ocation of catchment area	London
S	torm duration	D = 5 min
R	eturn period	Period = 100 yr
R	atio 60 min to 2 day rainfall of 5 yr return period	r = 0.440
5-	year return period rainfall of 60 minutes duration	M5_60min = 20.0 mm
In	crease of rainfall intensity due to global warming	p _{climate} = 40 %
Fa	actor Z1 (Wallingford procedure)	Z1 = 0.39
R	ainfall for 5min storm with 5 year return period	$M5_5min_i = Z1 \times M5_60min \times (1 + p_{climate}) = \textbf{10.8} mm$
Fa	actor Z2 (Wallingford procedure)	Z2 = 1.92
R	ainfall for 5min storm with 100 year return period	M100_5min = Z2 × M5_5min _i = 20.8 mm
D	esign rainfall intensity	I _{max} = M100_5min / D = 249.9 mm/hr
М	aximum surface water runoff	
С	atchment area	A _{catch} = 5080 m ²
Ρ	ercentage of area that is impermeable	p = 52 %
Μ	aximum surface water runoff	$Q_{max} = A_{catch} \times p \times I_{max} = 183.3 \text{ I/s}$



Appendix G – Kent County council; LLFA Proforma

Appendix C. Drainage Strategy Summary



1. Site details	
Site/development name	57 Top Dartford Rd, Hextable
Address including post code	57 Top Dartford Rd, Hextable, Swanley, Seven Oaks, Kent BR8 7SD
Grid reference	E 552510 N 170851
LPA reference	
Type of application	Outline 🛛 Full 🛛
	Discharge of Conditions \Box Other \Box
Site condition	Greenfield 🛛 Brownfield 🛛

2. Existing drainage		Document/Plan w	where information is stated:
Total site area (ha)	5080m^2 (0.508 H		
Impermeable area (ha)	1380m^2 (1.38 Hee		
Final discharge location	Infiltration	\mathbf{X}	
	Watercourse		
	Sewer		
	Tidal reach/sea		
Greenfield discharge rate	QBAR (I/s)	0.81	Brownfield rates as
(l/s)	1 in 1 year (l/s)	0.69	existing =; $1.1.1$
for existing site area	1 in 30 year (l/s)	1.85	$1.1y_1 = 37 \frac{1}{5}$ $1.30y_r = 88 \frac{1}{5}$
	1 in 100 year (l/s)	3.02	1:100 yr = 112 l/s
3. Proposed drainage areas	S	Document/Plan w	where information is stated:
Impermeable area	Roof	0.1483	Refer to drawing:
(ha)	Highway/road	.087	CCL-C-HEX-GA-DRN
	Other paved areas	.0301	-4400 & 4402
	Total	0.2654	
Permeable area	Open space	0.2426	
(ha)	Other permeable	NI/A	
	areas		
	Total	0.2426	
Final discharge location	Infiltration		Refer to drawing:
	Infiltration rate	e <u>0.000261</u> m/s	CCL-C-HEX-GA-DRN
	Watercourse	□N/A	-4400
	Sewer	□ N/A	
	Tidal reach/sea	□ N/A	
Climate change allowance	20% 🛛 30% [□ 40% 🛛	
included in design			

4. Post-Development Discharge rates, Document/Plan where information					
without mitigation					
Developed discharge rates	1 in 1 year	41.8			
(l/s)	1 in 30 year	99.5			
	1 in 100 year	183.3			
	1 in 100 year + CC	126.4			
5. Post-Development Discharge rates, Document/Plan where information is stated					
with mitigation					
Describe development drain	age strategy in genera	ll terms:			
Drainage proposed is to capture, attenuate in tanks each side of building at high & low levels, restrict flow before final discharge to multiple deep bore soakaways. Majority of SW runoff will be of low contamination sources ie. roof, therefore treatment is proposed via tanked permeable pavement and proprietary features like vortex separators.					
(a) No control required, all f	lows infiltrating				
(b) Controlled developed	1 in 1 year		Refer to drawing:		
discharge rates (I/s)	1 in 30 year		CCL-C-HEX-GA-DRN		
	1 in 100 year				
	1 in 100 year + CC				
6. Discharge Volumes		Document/Plan w	where information is stated:		
	Existing volume	Proposed volume			
	(m³)	(m ³)			
1 in 1 year					
1 in 30 year					
1 in 100 year					
1 in 100 year + CC					

All information presented above should be contained within the attached Flood Risk Assessment, Drainage Strategy or Statement and be substantiated through plans and appropriate calculations.

Form completed by	Richard Hendry
Qualifications	Senior engineer - Eng.Tech.MIHE
Company	Clancy Consulting
Telephone	01603 305 190
Email	Richard.Hendry@clancy.co.uk
On behalf of (client's details)	Barchester Healthcare
Date	22/12/2021

	Type of Structure or Feature	
NO		
CATI		
NTIFI	Location Name	
DE		
	Drawing Identifier	
	Owners Name / Company	
₫	Address of owner	
NERSH		
MMO,		
ENT/	Owners Contact Number	
ANAGEM	Maintained By	
	Adoption proposed	YES NO
Z	Name of Adopting Authority	
	Estimated Date of Adoption	
	National Grid Reference (NGR)	
	Cover Level	
	Invert Level	
LS	Max volume	
DETAI	Height	
ASSET [Diameter/Width	
	Length	
	Depth	
	Designed Flow Rate	
	Any Additional Uses	

Appendix D. Drainage Asset Record Sheet for Verification Report



CONSTRUCTION RISKSMAINTENANCE RISKSDEMOLITION/ ADAPTATION RISK1. DUE TO THE STEEP GRADIENT OF THE SITE CONSIDERATION TO SAFETY MUST BE GIVEN TO EACH CONSTRUCTION TASK.1. ATTENUATION TANKS, GULLIES, CHANNELS AND CHAMBERS REQUIRE THE STANDARD PERIODIC INSPECTION REGIME AND CLEANING ROUTINE TO ENSURE CONTINUED DRAWINGS FOR DETAILS & LOCATION OF EXTG AND PROPOSED DRAINAGE & SERVICES.1. ATTENUATION TANKS, GULLIES, CHANNELS AND CHAMBERS REQUIRE THE SIGNED TO ARCHITECTS SERVICES DRAWINGS FOR DETAILS & LOCATION OF EXTG AND PROPOSED DRAINAGE & SERVICES.1. ATTENUATION TANKS, GULLIES, CHANNELS AND CLEANING ROUTINE TO ENSURE CONTINUED DERFORMANCE.1. APPARATUS LOCATED LANDSCAPED AREAS HAS N BEEN DESIGNED TO SUPPORT HEA VEHICLE LOADING.3. DRAINAGE CONNECTION REQUIRES DEEP EXCAVATION TEMP WORKS REQUIRED.2. CONFINED SPACE ENTRY.2. THE SURFACE WATER DRAINAGE APPARATUS HAS BEEN DESIGNED CATCHMENT AREA. NO ADDITIONAL AREAS OF HARDSTANDING CAN BE CONNECTION INTO THE SYSTEM WITH THENDUR RISK OF LOCALIZED FLOODING ON SITE.4. EXISTING DRAINS TO EITHER BE REMOVED OR GRUBBED UP.8. ALL MAINTENANCE MUST COMPLY WITH THAMES WATER BEFORE UNDERTAKING MANHOLES SHOULD BE OBTAINED FROM THAMES WATER BEFORE UNDERTAKING MANHOLES SHOULD BE OBTAINED FROM THAMES WATER BEFORE UNDERTAKING MANHOLES SHOULD BE OBTAINED FROM THAMES WATER DEFORE UNDERTAKING SCREMENT PIPES ARE FOUND, THEN SAFE SYSTEM OF WORK NEED TO BE PUT IN PLACE WITH ATTENTION DRAWN TO THE		AND ENVIRONMENTAI	L RISKS BOX
 DUE TO THE STEEP GRADIENT OF THE SITE CONSIDERATION TO SAFETY MUST BE GIVEN TO EACH CONSTRUCTION TASK. REFER TO EXISTING SERVICES DRAWING AND TO ARCHITECTS SERVICES DRAWINGS FOR DETAILS & LOCATION OF EXTG AND PROPOSED DRAINAGE & SERVICES. DRAINAGE CONNECTION REQUIRES DEEP EXCAVATION TEMP WORKS REQUIRED. ARL MAINTENANCE MUST COMPLY WITH THAMES WATER BEFORE UNDERTAINS TO EITHER BE REMOVED OR GRUBBED UP. CONSTRUCTING NEW CONNECTIONS DRAINAGE, POTENTIAL FOR HAZARDOUS GASES. PERMIT TO ENTER EXISTING MANHOLES SHOULD BE OBTAINED FROM THAMES WATER BEFORE UNDERTAKING THE WORK, RELEVANT P.P.E SHOULD BE WORN AT ALL TIMES. IF ANY ASBESTOS CEMENT PIPES ARE FOUND, THEN SAFE SYSTEM OF WORK NEED TO BE PUT IN PLACE WITH ATTENTION DRAWN TO THE ATTENUATION TANKS, GUILLIES, CHANNELS. AND CLANDBERS REQUIRE THE SUBJECTION REGUIRES GUILLIES, CHANNELS. AND CLANDBERS REQUIRE THE SYSTEM OF WORK NEED TO BE PUT IN PLACE WATER MINING CAN BE CONSTRUCTING NEW CONNECTIONS CEMENT PIPES ARE FOUND, THEN SAFE SYSTEM OF WORK NEED TO BE PUT IN PLACE WITH ATTENTION DRAWN TO THE ATTENTION TANKS, CLANDSCAPE AREAS HAS N CHAMBERS REQUIRE THE SYSTEM OF WORK NEED TO BE PUT IN PLACE WITH ATTENTION DRAWN TO THE ATTENTION TAKEN AND AND AND AND AND AND AND AND AND AN	CONSTRUCTION RISKS	MAINTENANCE RISKS	DEMOLITION/ ADAPTATION RISKS
CONTROL ASBESTOS AT WORK (AMENDMENT) REGULATIONS 1992.	 DUE TO THE STEEP GRADIENT OF THE SITE CONSIDERATION TO SAFETY MUST BE GIVEN TO EACH CONSTRUCTION TASK. REFER TO EXISTING SERVICES DRAWING AND TO ARCHITECTS SERVICES DRAWINGS FOR DETAILS & LOCATION OF EXTG AND PROPOSED DRAINAGE & SERVICES. DRAINAGE CONNECTION REQUIRES DEEP EXCAVATION TEMP WORKS REQUIRED. EXISTING DRAINS TO EITHER BE REMOVED OR GRUBBED UP. CONSTRUCTING NEW CONNECTIONS DRAINAGE, POTENTIAL FOR HAZARDOUS GASES. PERMIT TO ENTER EXISTING MANHOLES SHOULD BE OBTAINED FROM THAMES WATER BEFORE UNDERTAKING THE WORK, RELEVANT P.P.E SHOULD BE WORN AT ALL TIMES. IF ANY ASBESTOS CEMENT PIPES ARE FOUND, THEN SAFE SYSTEM OF WORK NEED TO BE PUT IN PLACE WITH ATTENTION DRAWN TO THE CONTROL ASBESTOS AT WORK (AMENDMENT) REGULATIONS 1992. 	 ATTENUATION TANKS, GULLIES, CHANNELS AND CHAMBERS REQUIRE THE STANDARD PERIODIC INSPECTION REGIME AND CLEANING ROUTINE TO ENSURE CONTINUED PERFORMANCE. CONFINED SPACE ENTRY. ALL MAINTENANCE MUST COMPLY WITH THAMES WATER AUTHORITY'S REGULATIONS. 	 APPARATUS LOCATED I LANDSCAPED AREAS HAS NO BEEN DESIGNED TO SUPPORT HEAV VEHICLE LOADING. THE SURFACE WATER DRAINAGE APPARATUS HAS BEEN DESIGNED TO ACCOMMODATE THI DESIGNED CATCHMENT AREA. NO ADDITIONAL AREAS OF HARDSTANDING CAN BE CONNECTION INTO THE SYSTEM WITHOUT RISK OF LOCALIZED FLOODING ON SITE. HAZARDOUS WASTE MATERIALS

DRAINAGE STRATEGY

THE FOLLOWING TEXT DESCRIBES THE SURFACE WATER DRAINAGE DISPOSAL STRATEGY FOR THIS DEVELOPMENT.

THE SITE IS CLASSIFIED AS BROWNFIELD (BEING PREVIOUSLY USED FOR RESIDENTIAL PURPOSES.) KEY POINTS FOR THE STRATEGY ARE AS FOLLOWS:

- THE FIRST CHOICE FOR SURFACE WATER IS ATTENUATION WITH DIRECT INFILTRATION, HOWEVER SITE INVESTIGATIONS IDENTIFIED THAT SHALLOW INFILTRATION WAS NOT FEASIBLE DUE TO POOR
- INFILTRATION RATES ACHEIVED. • THERE ARE NO WATERCOURSES WITHIN CLOSE PROXIMITY OF THE SITE. NEITHER IS THERE A SURFACE WATER SEWER.
- FURTHER DEEP BORE INVESTIGATION FOUND GOOD INFILTRATION RATES AS INDICATED BELOW. DRILLING CONTINUED TO 30.0M AND NO GROUND WATER WAS ENCOUNTERED;

Location	Depth (m)	Run	Permeability k (m/s)
BH01	10	1	1.74X10-4
	15	1	5.73X10 ⁻⁴
		2	2.61X10 ⁻⁴
	20	1	4.31X10 ⁻⁴
	20	2	3.76X10-4
	10	1	2.46X10-4
	10	2	4.12X10 ⁻⁴
BH02	15	1	1.37X10 ⁻⁴
		2	4.03X10 ⁻⁴
	20	1	2.29X10 ⁻⁴
		2	4.98X10 ⁻⁴

- FOR THIS DESIGN, DISCHARGE HAS BEEN USED IN TWO LOCATIONS (BH1 & BH2) WITH THE HIGHLIGHTED VALUES (ABOVE) USED FOR THE CALCULATIONS.
- THE PROPOSED DEVELOPMENT HAS AN IMPERMEABLE AREA OF APPROXIMATELY 2653m2 (0.265ha) AND HAS A LEVEL DIFFERENCE,
- FALLING FROM NORTH TO SOUTH BY APPROXIMATELY 6.5M. • THE SURFACE WATER FLOW HAS BEEN DESIGNED TO CAPTURE AND
- ATTENUATE RUNOFF IN 4No. CRATED TANKS WITH FLOW RESTRICTED TO 1.2L/S FROM THE UPPER LEVEL TANKS. • DUE TO THE SITE TOPOGRAPHY AND PROPOSED LAYOUT THERE IS
- NO SPACE FOR ANY OTHER SUDS FEATURES SUCH AS SWALES AND PONDS ETC.
- FOUL WATER FLOW ASSUMED TO BE UNRESTRICTED INTO THE PUBLIC SEWER WHICH THE NEAREST POINT IS FOUND IN THE JUNCTION OF MABLE ROAD JUST OFF THE SOUTH-WESTERN CORNER OF THE PROPOSED SITE.
- THE SURFACE WATER DESIGN CATERS FOR ALL STORM EVENTS UP TO AND INCLUDING THE 1 IN 100 YEAR EVENT PLUS 40% CLIMATE CHANGE.

ATTENUATION TANK 3 6.5 X 23.0M X 0.8M DEEP) $\cdot 58.00$

VORTEX SEPARATOR CHAMBER

ORIFICE PLATE Ø21mm (1.2 l/s) TO QUTLET

VORTEX SEPARATOR

CHAMBER

INo: Ø200mm DEEP BORE SOAKAWAY TO 15.0M DEPTH

V20 - Ø1200 PC0

NOTE

(BH02)

FW 05

Ø600 PP

.: 58.00

 \sim

FOUNDATION DESIGNS ARE TO CONSIDER THE PROXIMITY OF THE DEEP BORE SOAKAWAYS WHICH ARE WITHIN 10m OF THE BUILDING FOOTPRINT. AND CONSIDERATION MAY BE NEEDED FOR DEEP FOUNDATIONS

FOUNDATION DESIGNERS SHOULD REFER TO THE GEOTECHNICAL REPORT FOR DETAILED **GEOLOGICAL AND GEOTECHNICAL** CONSTRAINTS AND ADVISE

THERE MAY BE A REQUIREMENT FOR SPECIALIST DEEP FOUNDATIONS IN THE AREA CLOSE TO THE BOREHOLES

