7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT Mobile: 07875 972270 Email:lea.favill@eweassociates.com

Technical Note: 001 Date: 5th July 2019 Site: Howarth Timber Ltd, Chester Road, Broughton, Chester Reference:2019/2418

Commercial Site Chester Road Broughton Surface Water Onsite Runoff

Existing Runoff from the Site

The total site area affected by this development has been estimated at approximately 6654m² (0.665 ha). The site is currently a commercial development which includes several buildings and yard area.

There is surface water drainage system within the site which collects runoff from the buildings, access road and yard areas within the site. During the site visit there was evidence of roof gutters and downpipes to all the buildings and drainage channels and gullies to access road and yard areas. It is therefore considered that the site is positively drained.

The manholes where lifted within the site and it appears that the drainage is directed north via a 100mm diameter surface water sewer. At the northern boundary of the site the sewer is only 1.25m deep. The sewer heads north into the adjacent commercial development where it is believed to turn east to discharge into an open watercourse.

The existing impermeable area within the site has been estimated at 3790m². the remainder of the site is generally compacted stone.

The existing site plan which shows the impermeable area and sewers within the site is provided at Appendix A of this report.

The site is within an area with an SPR value of 39.9% suggesting that the site will not allow adequate infiltration.

Return Period	Flow in litres per second (I/s)
1 in 1 year	32.13
1 in 30 year	99.63
1 in 100 year	139.07

Table 1: Modified Rationa	I Method flows from	existing site 0.379 hectares
---------------------------	---------------------	------------------------------

The Modified Rational Method has been used to calculate the existing runoff from the impermeable part of the site. The calculation sheet is provided at Appendix B of this report. However, the discharge from the site is currently controlled by the final length of 100mm diameter sewer which exits the site to the north. The sewer has a gradient of 1 in 83. Using the pipe table provided at Appendix C the peak pipe capacity has been estimate at 5.72l/s.

Any discharge from the site will require the consent of the appropriate water authority/riparian owner, as such, they will also need to be approached to agree the discharge restriction from the site.

Therefore, a peak discharge rate of 5.72l/s has been adopted for this development.

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Discharge to surface water sewer

It is proposed that the roofed and paved areas within the site is directed to the existing 100mm diameter sewer within the site. The discharge into the sewer will be restricted to 5.72l/s. The impermeable area has been calculated at 6151m² (0.615 hectares). This area will be 100% roofed and paved.

An assessment of the required balance volume has been made using the estimated post development impermeable area of 0.615 hectares discharging to the 100mm diameter sewer at a peak rate of 5.72ls. Using WinDes Source Control software developed by Microdrainage the required attenuation has been calculated for the 1 in 100 year plus climate change (30%) event.

Reference should be made to Appendix D where the calculation sheets are provided. The attenuation size has been tabulated below in Table 2. It is estimated that during the 1 in 100 year plus climate change (30%) event that 327.5m³ of storage will be required. This will be provided within a 0.4m deep crate tank. The drainage strategy drawing provided at Appendix E shows the initial drainage strategy for the site which includes the tank.

Return Period	Required Attenuation	Approx Volume (m ³)
1 in 100 year + CC	715m2 of 0.4m deep crate	327.5
	tank	

Table 2: WinDes 1 in 100 year+CC Storage Volume

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Attachment A – Existing Site Plan



7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT Mobile: 07875 972270 Email:lea.favill@eweassociates.com

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Attachment B – Modified Rational Runoff Calculation

Modified Rational Met	thod		Return Period	flood	1	years		
		Post Development		Rainfall	2	years		
Length (m)	95 m	Rainfall Duration	Rainfail Duration	Rainfail Depth	Effective	Rainfall Intensity	EL ONLOGA	FLOW
Area (ha)	0.379 Ha	(hours)	(days)	(mm)	Depth (mm)	(mm/hr)	FLOW (INS)	(Vs/ha)
Max Height	7.0 mAOD	0.25	0.010	5.2	5.4	20.8	22.8	60.3
Min Height	6.5 mA00	0.27	0.011	79	8.2	20.3	32.1	54.8
Deltal	0.5	0.5	0.021	0.45	0.0	16.0	10.5	40.0
Deitari	0.5	0.5	0.021	8.45	6.0	10.9	18.5	40.0
Slope (%)	0.00	0.75	0.031	10	10.4	13.3	14.6	38.6
Te (mins)	16.08 mins	1	0.042	11.27	11.7	11.3	12.4	32.6
ARF	0.998	1.25	0.052	12.36	12.9	9.9	10.9	28.6
SAAR	707.000 mm	1.5	0.063	13.32	13.9	8.9	9.7	25.7
LICWI	70 000	1.75	0.073	14.18	14.8	81	8.9	23.5
DIMO	100 0 MM	2	0.099	14.97	45.0	75	0.5	24.2
P IMP	100.0		0.063	14,37	10.0	1.0	0.2	21.1
SOIL	0.50	2.25	0.094	15.7	16.4	7.0	7.7	20.2
Percentage Runoff PR	80.16	2.5	0.104	16.38	17.1	6.6	7.2	19.0
DEEPSTOR	0.95	2.75	0.115	17.02	17.7	6.2	6.8	17.9
		3	0.125	17.63	18.4	59	6.5	17.0
		3.25	0.135	18.21	19.0	56	8.2	16.2
A	0.0016	3.6	0.130	10.21	100	5.0	5.4	10.4
CV	0.0016	3.5	0.146	18.75	19.5	54	5.9	15.5
Cr	1.3	3.75	0.156	19.28	20.1	5.1	5.6	14.9
allowable outflow		4	0.167	19.78	20.6	4.9	5.4	14.3
1 year	32.13 Ma	4.25	0.177	20.27	21.1	48	5.2	13.8
Modified Rational Met	thod	1210.0210.000.000	Return Period	flood	30	years		
	and the second se	Post Development	hand a state of the	Rainfall	50	years		
Length (m)	95 m	Rainfall Duration	Rainfall Duration	Rainfall Depth	Effective	Rainfall Intensity	ELOW/IIM	FLOW
Area (ha)	0.379 Ha	(hours)	(days)	(mm)	Depth (mm)	(mm/hr)	PLOW (I/s)	(Us/ha)
Max Height	7.0 mACD	0.25	0.010	19.5	21.2	78.0	85.6	226.0
Min Malaka	85 m400	0.07	0.011	24.5	16.6	267	00.6	264.0
min reigns	0.5 mAOD	0.27	0.011	24.0	20.0	00.7	00.0	202.9
DeltaH	0.5	0.5	0.021	26.13	21.2	52.3	57,4	151.4
Slope (%)	0.55	0.75	0.031	29.99	31.3	40.0	43.9	115.8
Te (mins)	16.08 mins	1	0.042	33.02	34.4	33.0	36.3	95.7
ARF	0.998	1.25	0.052	35.55	37.0	28.4	31.2	82.4
SAAR	707.000	15	0.063	37.75	90.9	25.2	27.6	72.9
1 17140	70	4.76	0.077	30.00	44.4	20.2	21.0	12.12
UCWI	70 mm	1.75	0.075	33.69	41/4	22.1	24.9	02.7
PIMP	100.0 %	2	0.083	41.45	43,2	20.7	22.8	60.0
SOIL	0.50	2.25	0.094	43.06	44,9	19.1	21.0	55.4
Percentage Runoff PR	80.16	2.5	0.104	44.55	46.4	17.8	19.6	51.6
DEEPSTOR	0.95	2.75	0.115	45.93	47.9	16.7	18.3	48.4
		3	0.125	47.23	40.2	15.7	17.3	15.6
		3.04	0.127	40.40	40.2	14.0	11.3	45.0
		3.25	0.135	90.90	0.00	14.9	10.4	43.2
Cv	0.8016	3.5	0.146	49.62	51,7	14.2	15.6	41.1
Cr	1.3	3.75	0.156	50.72	52.9	13.5	14.9	39.2
allowable cettless		4	0.167	5177	53.9	12.9	14.2	37.5
10 years	- 10 63 M	4.25	0.122	52.78	66.0	12.4	12.6	36.0
av year	39.02 13	4.20	0.177	02.10	33.0	16.4	12.0	20.0
Modified Rational Met	thod		Return Period	flood	100	years		
		Post Development		Rainfall	140	years		
Length (m)	.95 m	Rainfall Duration	Rainfall Duration	Rainfall Depth	Effective	Rainfall Intensity		FLOW
Area (ha)	0.379 Ha	(hours)	(dava)	(mm)	Depth (mm)	(mm/hr)	PLOW (Ins)	(Ve/he)
May blaight	70 000	0.25	0.010	28	29.2	112.0	123.0	324.6
All a Malaka		0.4.0	0.010	24.0	47.4	LIEN I	14,270	0.04.0
Min Height	OOAm C.0	0.27	0011	34.2	35.0	1,29.7	139.1	367.0
DeltaH	0.5	0.5	0.021	36.39	37.9	72.8	79.9	210.8
Slope (%)	0.55	0.75	0.031	41.38	43.1	55.2	60.6	159.8
Te (mins)	16-08 mins	1	0.042	45.25	47.2	45.3	49.7	131.1
ARE	0.998	1.25	0.052	48.46	50.5	38.8	42.6	112.3
SAAP	707.000	15	0.063	51.22	53.4	341	37.6	08.0
	70	4.76	0.005	51.22	00.0	34.1	01/0	30.3
UCWI	no mm	1.75	0.073	33,67	55.9	-30.7	33.7	88.8
PIMP	100.0 %	2	0.083	55.87	58.2	27.9	30.7	80.9
SOIL	0.50	2.25	0.094	57.87	60.3	25.7	28.2	74.5
Percentage Runoff PR	80.16	2.5	0.104	59.72	62.2	23.9	26.2	69.2
DEEPSTOR	0.95	2.75	0.115	61.44	64.0	22.8	24.5	647
	0.00	2.10	0.126	63.05	05.7	210	22.1	80.0
			0.125	63.05	05.7	21.0	23.1	60.9
	Sector Company	3.25	0.135	64.56	67.3	19.9	21.8	57.5
Cv	0.8016	3.5	0.148	65.99	68.8	18.9	20.7	54.6
Cr	13	3.75	0.156	67.34	70.2	18.0	19.7	52.0
allowable or others		4	0.167	68.63	71.5	17.2	18.8	49.7
			0.107	00.00	22.0	11.4	10.0	47.0
100	1 10 0 T							

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Attachment C – Pipe Table

7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT Mobile: 07875 972270 Email:lea.favill@eweassociates.com

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		COLEBRO	OK WHITE				
Roughness Diam(mm) Length	1.5 100 20.77	mm mm m	U/S level D/S level Gradient	5.94 5.69 0.01203659	m m	83.08	
PROPOR'N DEPTH	WETTED PERIMETER	AREA OF FLOW	HYDRAULIC MEAN DEPTH	VELOCITY (m/s)	DISCHARGE (I/s)	DEPTH (mm)	SURFACE WIDTH _(mm)
FULL	0.31415927	0.007853982	0.0250000	0.73	5.72	100	
0.01 0.02 0.03 0.04 0.05 0.11 0.15 0.25 0.35 0.35 0.4 0.45	0.02837941 0.0348166 0.04027158 0.04510268 0.06435011 0.07953988 0.09272952 0.10471976 0.11592795 0.12661037 0.13694384 0.14706289 0.15077663	1.32932-05 3.74853E-05 6.86551E-05 0.000105377 0.000146815 0.000488753 0.000738747 0.00118238 0.001353662 0.001981684 0.00243868 0.002933698 0.00392691	0.0016536 0.0013209 0.0026167 0.0032551 0.0063520 0.0092878 0.0120591 0.0146626 0.0170941 0.013492 0.0214226 0.0233086	0.04 0.07 0.11 0.13 0.16 0.27 0.36 0.44 0.50 0.56 0.61 0.65 0.69 0.73	0.00 0.01 0.01 0.27 0.49 0.77 1.11 1.49 1.92 2.38 2.86	1 2 3 4 5 10 15 20 25 30 35 40 45 50	20 28 34 39 44 60 71 80 87 92 95 98 99 99
0.55 0.66 0.65 0.75 0.85 0.85 0.9 0.95 1	0.16709637 0.17721542 0.1875489 0.19823132 0.20943951 0.22142974 0.23461938 0.24980915 0.26905658 0.31415927	0.004420284 0.0054020284 0.005404177 0.005872298 0.00631852 0.006735744 0.007115235 0.007445229 0.007707167 0.007853982	0.0254886 0.0277644 0.0288148 0.0296235 0.0301687 0.0304193 0.0303267 0.0298037 0.0286452 0.0250000	0.76 0.76 0.80 0.82 0.83 0.83 0.83 0.83 0.83 0.83 0.83 0.83	2.86 3.36 4.33 4.80 5.23 5.61 5.91 6.11 6.16 5.72	55 60 65 70 75 80 85 90 95 100	99 98 95 92 87 80 71 60 44 0

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Attachment D – WinDes Calculations discharge to sewer

Nindy Ridge Barn						P	age 1
						-	
healby Lane						S	Liggo
Vinterton DN15 9T	G						Mache
ate 05/07/2019 18	:22	D	esig	ned By	Windows	7	JEINE
ile 100yr+CC30% t	ank	··· CI	heck	ed By			
licro Drainage		S	ourc	e Cont	rol W.12	. 4	
Summar	y of	f Resu	lts	for 10	0 year R	eturn Pe	riod (+30%)
	Stor	m	Ma	x Ma	x Max	Max	Status
	Even	t	Lev	el Dep	th Contro	1 Volume	
			(11	i) (m) (1/s)	(m ³)	
15	min	Summer	5.0	67 0.2	67 5.	4 190.7	O K
30	min	Summer	6.0	01 0.3	01 5.	4 215.5	O K
60	min	Summer	6.0	38 0.3	38 5.	4 241.4	о к
120	min	Summer	6.0	72 0.3	72 5.	4 266.2	O K
180	min	Summer	6.0	89 0.3	89 5.	4 278.2	O K
240	min	Summer	6.0	98 0.3	98 5.	4 284.6	O K
360	min	Summer	6.1	04 0.4	04 5.	4 288.5	Flood Risk
480	min	Summer	6.0	96 0.3	96 5.	4 282.9	O K
720	min	Summer	6.0	91 0.3	91 5.	4 279.3	ОК
960	min	Summer	6.0	94 0.3	94 5.	4 281.4	O K
1440	min	Summer	6.0	88 0.3	88 5.	4 277.6	O K
2160	min	Summer	6.0	67 0.3	67 5.	4 262.2	O K
2880	min	Summer	6.0	39 0.3	39 5.	4 242.1	O K
4320	min	Summer	5.9	48 0.2	48 5. po 5	4 177.3	OK
7200	min	Summer	5.9	92 U.I 63 0.1	92 D. 63 5	9 137.1 1 116.4	0 6
8640	min	Summer	5.8	45 0.1	45 4.	7 103.8	O K
10080	min	Summer	5.8	33 0.1	33 4.	3 95.1	O K
			Stor	m	Rain	Time-Peak	
			Stor Even	m t	Rain (mm/hr)	Time-Peak (mins)	
		15	Stor Even	m t Summer	Rain (mm/hr) 169.665	Time-Peak (mins) 27	
		15 30	Stor Even min min	m t Summer Summer	Rain (mm/hr) 169.665 96.546	Time-Peak (mins) 27 41	
		15 30 60	Stor Even min min min	m t Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938	Time-Peak (mins) 27 41 70	
		15 30 60 120	stor Even min min min min	n t Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262	Time-Peak (mins) 27 41 70 128	
		15 30 60 120 180	Stor Even min min min min min	t Summer Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262 22.479	Time-Peak (mins) 27 41 70 128 186	
		15 30 60 120 180 240	stor even min min min min min min	t Summer Summer Summer Summer Summer	Rain (nm/hr) 169.665 96.546 54.938 31.262 22.479 17.789 12.792	Time-Peak (mins) 27 41 70 128 186 244 352	
		15 30 60 120 180 240 360 480	stor Even min min min min min min min	t Summer Summer Summer Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123	Time-Peak (mins) 27 41 70 128 186 244 362 458	
		15 30 120 180 240 360 480 600	stor Even min min min min min min min	t Summer Summer Summer Summer Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442	Time-Peak (mins) 27 41 70 128 186 244 362 458 508	
		15 30 120 240 360 480 600 720	stor Even min min min min min min min min min	m t Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279	Time-Peak (mins) 27 41 700 128 186 244 362 458 508 570	
		15 30 120 180 240 360 600 720 960	stor even min min min min min min min min min	m t Summer Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935	Time-Peak (mins) 27 41 70 128 186 244 362 458 508 570 698	
		15 30 120 180 240 360 600 720 960 1440	stor Even min min min min min min min min min	m t Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935 4.452	Time-Peak (mins) 27 41 70 128 186 244 362 458 508 570 698 976	
		15 30 60 120 360 480 600 720 960 1440 2160	stor Even min min min min min min min min min mi	m Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/br) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935 4.452 3.339	Time-Peak (mins) 27 41 70 128 186 244 362 458 508 570 698 976 1388	
		15 30 60 120 360 480 600 720 960 1440 2160 2800	stor Even min min min min min min min min min mi	m Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/br) 169.665 96.546 54.938 31.262 22.479 12.792 10.123 8.442 7.279 5.935 4.452 3.339 2.722 1.937	Time-Peak (mins) 27 41 70 128 166 244 362 448 508 508 500 570 698 976 61 388 976 1388	
		15 30 60 120 180 240 360 480 600 720 960 1440 2160 2880 4320 5760	Stor Even min min min min min min min min min mi	m t Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/hr) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.42 7.279 5.935 4.452 3.359 2.722 1.935	Time-Peak (mins) 27 41 70 128 186 244 362 458 508 570 698 570 698 976 1388 1792 2508 3129	
		15 30 600 240 360 480 600 720 960 1440 2160 2880 4320 5760 7200	stor Even min min min min min min min min min mi	m t Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/bx) 169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.133 8.422 7.279 5.935 4.452 3.339 2.722 1.937 1.552	Timo-Peak (mins) 27 41 70 128 186 244 362 458 508 508 508 509 50 509 659 89 76 1388 1792 2508 3128 3128	
		15 30 60 120 180 240 360 480 600 7200 2480 2480 2480 2480 2480 25760 7200 8640	stor even min min min min min min min min min mi	m t Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Rain (mm/hz) 169.665 96.546 54.938 31.262 22.479 10.123 8.442 7.279 5.935 4.452 3.339 2.722 1.935 1.522 1.262 1.262	Time-Peak (mins) 27 41 70 128 166 244 362 458 5508 5508 5508 5508 5508 550 658 976 1388 1792 25506 3128 3128 3128 3128 324 4504	

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Minterton DN15 97 Date 05/07/2019 18 Mile 100vr+CC30% t	G 1:22 1 ank 0	Designe Checked	ed By I d By	Windows7		Drenne
icro Drainage		Source	Contr	ol W.12.	4	
					21443	
Summa	y of Rest	ilts fo	or 100	year Re	eturn Pe	riod (+30%)
	-					
	Event	Max	Max Denti	Control	Wolume	Status
	aven c	(m)	(m)	(1/s)	(m ³)	
15	min Winte	5.999	9 0.299	5.4	214.1	O K
30	min Winte	6.039	0.335	5.0	242.2	OK
120) min Winte	6.121	0.421	5.4	299.9	Flood Risk
180	min Winte	6.144	0.444	5.4	314.0	Flood Risk
240	min Winte	6.159	9 0.459	5.4	321.8	Flood Risk
360	min Winte	6.170	0.470	5.4	327.5	Flood Risk
480	min Winte	6.168	0.468	5.4	326.3	Flood Risk
600	min Winte	6.158	0.458	5.4	321.7	Flood Risk
720	min winte	c 0.140	0 448	5.4	315.3	Flood Risk
1440	min Winte	6.131	0.431	5.4	306.6	Flood Risk
2160	min Winte	6.091	0.391	5.4	279.5	O K
2880	min Winte	6.043	0.343	5.4	244.9	о к
4320	min Winte	5.909	0.209	5.4	149.4	O K
5760) min Winte	5.858	0.158	5.0	113.0	ОК
7200) min Winte	£ 5.835	0.135	4.3	96.7	O K
8640	min Winte	5.821	0.121	3.6	86.7	O K
10080	min winte	5.811	0.111	3.4	/9.0	O K
		Storm		Rain	Time-Peak	
		Event		(mm/hr)	(mins)	
		The Area of				
		avene				
	1	5 min W	inter	169.665	27	
	1	5 min W 0 min W	inter inter	169.665 96.546	27 41	
	1 3 6	5 min W 0 min W 0 min W 0 min W	inter inter inter inter	169.665 96.546 54.938 31.262	27 41 70	
	1 3 6 12 18	5 min W 0 min W 0 min W 0 min W 0 min W	inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479	27 41 70 126 184	
	1 3 6 12 18 24	5 min W 0 min W 0 min W 0 min W 0 min W 0 min W	inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789	27 41 70 126 184 240	
	1 3 6 12 18 24 36	5 min W 0 min W 0 min W 0 min W 0 min W 0 min W 0 min W	inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792	27 41 70 126 184 240 354	
	1 3 6 12 18 24 36 48	5 min W 0 min W 0 min W 0 min W 0 min W 0 min W 0 min W	inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123	27 41 70 126 184 240 354 464	
	1 3 6 12 18 24 36 48 60	5 min W 0 min W	inter inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442	27 41 70 126 184 240 354 464 568	
	1 3 6 12 18 24 36 60 72 2 7	5 min W 0 min W	inter inter inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935	27 41 70 126 184 240 354 464 568 608	
	1 3 6 12 18 24 36 60 72 96 60 72	5 min W 0 min W	inter inter inter inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935 4.452	27 41 70 126 184 240 354 464 568 608 746 1058	
	1 3 6 12 18 24 36 48 60 72 96 144 216	5 min W. 0 min W.	inter inter inter inter inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935 4.452 3.339	27 41 70 126 184 240 354 464 568 608 746 1058 1516	
	1 3 6 12 18 24 36 60 72 96 144 216 288	5 min W. 0 min W.	inter inter inter inter inter inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935 4.452 3.339 2.722	27 41 70 126 184 240 354 464 568 608 746 1058 1516 1936	
	1 3 6 12 18 24 36 60 72 96 144 216 288 432	5 min W. 0 min	inter inter inter inter inter inter inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935 4.452 3.339 2.722 1.937	27 41 70 1266 240 354 464 568 608 746 1058 1516 1936 2552	
	1 3 6 12 18 24 36 48 60 72 96 6 144 216 288 432 576	5 min W. 0 min W.	inter inter inter inter inter inter inter inter inter inter inter inter inter	169.665 96.546 54.938 31.262 22.479 12.792 10.123 8.442 7.279 5.935 4.452 3.339 2.722 1.937 1.522	27 41 70 126 184 240 354 464 568 608 746 1058 1516 1936 2552 3176	
	1 3 6 12 18 24 36 48 60 72 96 144 216 208 432 576 208 432 576 7200	5 min W. 0 min W.	inter inter inter inter inter inter inter inter inter inter inter inter inter	169.665 96.546 54.938 11.262 22.479 17.789 12.792 10.123 8.442 7.279 5.935 4.452 3.339 2.722 1.522 1.522 1.522	27 41 70 126 240 354 464 668 746 1058 1516 1936 2552 3176 3832	
	1 3 6 12 18 36 40 50 72 96 144 216 288 432 576 720 864	5 min W. 0 min W.	inter inter inter inter inter inter inter inter inter inter inter inter inter inter inter inter	169.665 96.546 54.936 22.479 17.789 10.123 8.442 7.279 5.935 4.452 3.339 2.722 1.937 1.522 1.262 1.083 0.051	27 41 70 1266 184 464 464 568 568 568 568 568 568 568 568 552 2152 3176 3332 4576	

7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT Mobile: 07875 972270 Email:lea.favill@eweassociates.com

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EWE Associates Ltd			Page 3	1
Windy Ridge Barn				
Thealby Lane			5V79	
Winterton DN15 9TG			Treaso	- Cm
Date 05/07/2019 18:22	Designed By	Windows7	Draffas	200
File 100yr+CC30% tank	Checked By		Court	-2-30
Micro Drainage	Source Conti	ol W.12.4		
3				
	Rainfall	Details		
Rai Paturn Par	nfall Model		FEH 100	
Si Si	te Location 33	4950 364300 SJ	34950 64300	
	C (1km)		-0.024	
	D1 (1km)		0.297	
	D3 (1km)		0.271	
	E (1km)		0.288	
	F (1km)		2.419	
SU Wi	nter Storms		Yes	
	Cv (Summer)		0.750	
	Cv (Winter)		0.840	
Shortest S Longest S	torm (mins)		10080	
Clima	te Change %		+3.0	
Sangar mara a				
	Time / Ar	<u>ea Diagram</u>		
	Total Area	(ha) 0.615		
Time Area	Time Area	Time Area	Time Area	
(mins) (na)	(mins) (ha)	(mins) (na)	(mins) (na)	
0-4 0.200	4-8 0.200	8-12 0.200	12-16 0.015	
0	982-2010 Mic	ro Drainage I	.td	

7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT Mobile: 07875 972270 Email:lea.favill@eweassociates.com

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THE LOCOTOPAC	s Ltd				Page 4		
Windy Ridge B	arn						
Thealby Lane					5778	ama	
Winterton DN	15 9TG				2MB	TELO	- Com
Date 05/07/20	19 18:22	Desig	ned By Wi	ndows7		entra	mon al
File 100vr+CC	30% tank	Checke	ed By		20	Contra	15130
Micro Drainag	e	Source	e Control	W.12.4			
-							
			Model De	tails			
	S	Storage is C	online Cov	er Level (m)	6.400		
		Tank	or Pond	Structure			
		Inv	ert Level	(m) 5.700			
Depth (m) Ar	ea (m ²)	epth (m) Ar	ea (m ²) D	epth (m) Au	cea (m²) D	epth (m) Ar	ea (m²)
0.000	715.0	1.400	0.0	2.800	0.0	4.200	0.0
0.200	715.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	715.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	0.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	0.0	2.200	0.0	3.600	0.0	5.000	0.0
1.200	0.0	2.400	0.0	4.000	0.0		
		Hydro-B	rake® Out	flow Cont	rol		
Dani	om Haad Im	1 0 700 Hu	dro-Prake®	Thme Mdd	Truest Low	1 (m) 5 700	
Design	Flow (1/s) 0.700 Hy	Diameter	(mm) 94	THAGEC PEAK	in (m) 0.700	
10000000		/	Promo der				
Depth (m) Flow	(1/s) De	pth (m) Flo	w (1/s) D	epth (m) Fl	Low (1/s)	Depth (m) F	low (1/s)
Depth (m) Flow	2.8	pth (m) Plo	w (1/s) D	epth (m) Fl 3.000	Low (1/s)	Depth (m) F	low (1/s) 18.2
Depth (m) Flow 0.100 0.200	2.8 5.4	pth (m) Plo 1.200 1.400	w (1/s) D 7.5 8.1	epth (m) F 3.000 3.500	11.9 12.9	Depth (m) P 7.000 7.500	10w (1/s) 18.2 18.9
Depth (m) Plow 0.100 0.200 0.300	2.8 5.4 4.6	pth (m) Flo 1.200 1.400 1.600	w (1/s) D 7.5 8.1 8.7	epth (m) F 3.000 3.500 4.000	Low (1/s) 11.9 12.9 13.8	Depth (m) P 7.000 7.500 8.000	18.2 18.9 19.5
Depth (m) Plow 0.100 0.200 0.300 0.400	r (1/s) De 2.8 5.4 4.6 4.5	<pre>pth (m) Flo 1.200 1.400 1.600 1.800</pre>	w (1/s) D 7.5 8.1 8.7 9.2	epth (m) F 3.000 3.500 4.000 4.500	Low (1/s) 11.9 12.9 13.8 14.6	Depth (m) P 7.000 7.500 8.000 8.500	18.2 18.9 19.5 20.1
Depth (m) Plow 0.100 0.200 0.300 0.400 0.500	r (1/s) De 2.8 5.4 4.6 4.5 4.9	epth (m) Flo 1.200 1.400 1.600 1.800 2.000	w (1/s) D 7.5 8.1 8.7 9.2 9.7	epth (m) F1 3.000 3.500 4.000 4.500 5.000	Low (1/s) 11.9 12.9 13.8 14.6 15.4	Depth (m) P 7.000 7.500 8.000 8.500 9.000	18.2 18.9 19.5 20.1 20.7
Depth (m) Plow 0.100 0.200 0.300 0.400 0.500 0.600	<pre>/ (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3</pre>	<pre>pth (m) Flo 1.200 1.400 1.600 1.600 2.000 2.200</pre>	w (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2	epth (m) F1 3.000 3.500 4.000 4.500 5.000 5.500	Low (1/s) 11.9 12.9 13.8 14.6 15.4 16.1	Depth (m) P 7.000 7.500 8.000 8.500 9.000 9.500	18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Plow 0.100 0.200 0.300 0.400 0.500 0.600 0.800 1.000	r (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.9	<pre>pth (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	w (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) F1 3.000 3.500 4.000 4.500 5.000 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	7.000 7.500 8.000 8.500 9.000 9.500	18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow 0.100 0.200 0.300 0.400 0.500 0.600 0.800 1.000	r (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>pth (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	w (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) P3 3.000 3.500 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) P 7.000 7.500 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow 0.100 0.200 0.300 0.400 0.500 0.600 0.800 1.000	r (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>pth (m) Flo 1.200 1.400 1.600 1.600 2.000 2.200 2.400 2.600</pre>	W (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) P 3.000 3.500 4.000 4.000 5.000 5.500 6.000 6.500	Low (1/s) 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow 0.100 0.200 0.300 0.400 0.500 0.600 0.600 1.000	(1/s) De 2.8 5.4 5.4 4.6 4.5 4.9 5.3 6.2 6.9 6.9	<pre>prh (m) Flo 1.200 1.400 1.600 1.600 2.000 2.000 2.400 2.600</pre>	<pre>vv (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) P3 3.000 3.500 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) : 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.000 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow 0.100 0.200 0.300 0.400 0.500 0.600 0.800 1.000	r (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>prh (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	w (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) P3 3.500 3.500 4.500 5.000 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.000 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow 0.100 0.200 0.300 0.400 0.500 0.500 0.800 1.000	(1/a) Detection 2.8 5.4 5.4 4.6 4.5 4.9 5.3 6.2 6.9 6.9	<pre>prh (m) Flo 1.200 1.400 1.600 1.600 2.000 2.200 2.400 2.600</pre>	<pre>% (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) F 3.000 3.500 4.000 4.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.000 5.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Plow 0.100 0.200 0.300 0.400 0.500 0.600 0.600 1.000	(1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>prh (m) Flo 1.200 1.400 1.600 1.600 2.000 2.200 2.400 2.600</pre>	(1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) P3 3.000 3.500 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) : 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.000 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>,, Flo , Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	<pre>w (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) F1 3.000 3.500 4.000 4.500 5.500 6.000 6.500	<pre>Low (1/s) 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6</pre>	Depth (m) F 7.000 7.500 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow 0.100 0.200 0.300 0.500 0.600 0.800 1.000	7 (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>pth (m) Flo 1.200 1.400 1.600 1.600 2.000 2.200 2.400 2.600</pre>	vv (1/s) D 7.5 8.1 8.7 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) #3 3.000 3.500 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) 11.9 11.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	7 (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>prh (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	<pre>vv (1/s) D 7.5 8.1 7.5 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) F 3.000 3.500 4.500 4.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.000 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	(1/s) De 2.8 5.4 5.4 4.6 4.5 4.9 5.3 6.2 6.9 6.9	<pre>, prime (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	<pre>vv (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) F1 3.000 3.500 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.500 9.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	7 (1/s) De 2.8 5.4 4.6 4.5 5.3 6.2 6.9	<pre>,, Flo , Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	<pre>vv (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) F1 3.000 3.500 4.000 4.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	7 (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	, Fin (m) Flo 1.200 1.400 1.600 1.600 2.000 2.200 2.400 2.600	vv (1/s) D 7.5 8.1 8.7 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) #3 3.000 3.500 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) 11.9 11.9 12.9 13.6 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	7 (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>prth (m) Flo 1.200 1.400 1.600 1.800 2.200 2.400 2.600</pre>	w (1/s) D 7.5 8.1 7 8.7 9.2 10.2 10.7 11.1 1	epth (m) F 3.000 3.500 4.000 4.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.000 9.500	lov (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	(1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>prh (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	<pre>vv (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) F1 3.000 3.500 4.000 4.500 5.500 6.000 6.500	Low (1/s) 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.500 9.000 8.500 9.500 9.500	lov (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	7 (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>pth (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600</pre>	<pre>vv (1/s) D 7.5 8.1 8.7 9.2 9.7 10.2 10.7 11.1</pre>	epth (m) F1 3.000 3.500 4.000 4.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	7 (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	, Fin (m) Flo 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600	w (1/s) D 7.5 8.1 8.7 8.7 9.2 9.7 10.2 10.7 11.1	epth (m) #3 3.000 3.500 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.6 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	7 (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	, pth (m) Flo 1.200 1.400 1.600 2.000 2.200 2.400 2.600	w (1/s) D 7.5 8.1 8.7 8.7 9.2 10.7 10.2 10.7 11.1	epth (m) #3 3.000 4.000 4.500 5.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.000 7.500 8.000 8.500 9.500 9.500	low (1/s) 18.2 18.9 19.5 20.1 20.7 21.2
Depth (m) Flow	r (1/s) De 2.8 5.4 4.6 4.5 4.9 5.3 6.2 6.9	<pre>pth (m) Flo 1.200 1.400 1.600 1.800 2.200 2.400 2.600</pre>	w (1/s) D 7.5 8.1 9.7 9.7 10.2 10.7 11.1	epth (m) F1 3.000 3.500 4.000 4.500 5.500 6.000 6.500	Low (1/s) 1 11.9 12.9 13.8 14.6 15.4 16.1 16.9 17.6	Depth (m) F 7.500 8.000 8.500 9.000 9.500	lov (1/s) 18.2 18.9 19.5 20.1 20.7 21.2

7 Waveney Close, Burton Upon Stather, Scunthorpe, DN15 9DT Mobile: 07875 972270 Email:lea.favill@eweassociates.com

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Attachment E – Drainage Strategy Drawing

