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Technical Note: 001
Date: 5th May 2019
Site: Kenworthy Road Barnsley S70 4LW
Reference:2019/2418

Kenworthy Road Barnsley

Surface Water Onsite Runoff

Existing Runoff from the Site

The total site area affected by this development has been estimated at approximately 556m². The buildings within the site have recently been demolished. There was previously 115m² of roofed and paved area within the site.

There is an extensive public sewer system in the area which includes surface water sewers and combined sewers. There is an existing 100mm diameter surface water sewer to the front of the site and a 100mm diameter combined sewer to the rear. The sewer plan is provided at Appendix D which shows the Yorkshire Water public sewers in the area.

Based on an impermeable area of 115m² the 1 in 1 year runoff rate is 1.55l/s. applying a 30% reduction reduces the runoff to 1.085l/s. The remaining 441m² of the site is grass. Therefore, assuming a greenfield runoff rate of 5l/s/ha the discharge from the grassed area is 0.221l/s. Therefore, the total discharge from the site is the combined brownfield and greenfield runoff rates of 1.085l/s and 0.221l/s, hence a total of 1.306l/s. The calculation sheet is provided at Appendix A of this report.

It is considered impractical to restrict to this flow rate. It is therefore recommended that a discharge rate of 2l/s is allowed into the discharge into the surface water sewer which currently flows through the site.

Discharge to surface water sewer

It is proposed that the roofed and paved areas within the site is directed to the surface water sewer which cross the site via a crate tanks located within the site. The discharge into the surface water sewer will be restricted to 2l/s. The impermeable area has been calculated at 253m² (0.025 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 0.025 hectares discharging to the watercourse at a peak rate of 2ls. Using WinDes Source Control software developed by Microdrainage the required attenuation has been calculated for the 1 in 100 year plus climate change (40%) event.

Reference should be made to Appendix B where the calculation sheets are provided. The attenuation size has been tabulated overleaf in Table 1. It is estimated that during the 1 in 100 year plus climate change (40%) event that 8.5m³ of storage will be required. This will be provided within a 0.4m deep crate tank. The drainage strategy drawing provided at Appendix C shows the initial drainage strategy for the site which includes the tank.

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

Return Period	Required Attenuation	Approx Volume (m³)
1 in 100 year + CC	10.5m2 of 0.4m deep crate tank	8.5

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Attachment A – Modified Rational Calculation

Modified Rational Method

Length (m)	32	m
Area (ha)	0.012	Ha
Max Height	167.6	mAOD
Min Height	165.2	mAOD
DeltaH	2.4	
Slope (%)	7.61	
Te (mins)	6.77	mins
ARF	0.999	
SAAR	673.000	mm
UCWI	53	mm
PIMP	100.0	%
SOIL	0.45	
Percentage Runoff PR	77.58	
DEEPSTOR	0.27	
Cv	0.77584	
Cr	1.3	
allowable outflow		
1 year	1.55	l/s

Return Period: flood Rainfall — 1 years / 2 years

Post Development

Rainfall Duration (hours)	Rainfall Duration (days)	Rainfall Depth (mm)	Effective Depth (mm)	Rainfall Intensity (mm/hr)	FLOW (l/s)	FLOW (l/s/ha)
0.11	0.005	5.3	5.3	48.2	1.6	135.1
0.25	0.010	7.1	7.2	28.4	0.9	79.6
0.5	0.021	11.01	11.1	22.0	0.7	61.7
0.75	0.031	12.09	12.2	16.1	0.5	45.2
1	0.042	12.99	13.1	13.0	0.4	36.4
1.25	0.052	13.78	13.9	11.0	0.4	30.9
1.5	0.063	14.48	14.6	9.7	0.3	27.1
1.75	0.073	15.11	15.2	8.6	0.3	24.2
2	0.083	15.69	15.8	7.8	0.3	22.0
2.25	0.094	16.23	16.4	7.2	0.2	20.2
2.5	0.104	16.73	16.9	6.7	0.2	18.8
2.75	0.115	17.2	17.3	6.3	0.2	17.5
3	0.125	17.65	17.8	5.9	0.2	16.5
3.25	0.135	18.07	18.2	5.6	0.2	15.6
3.5	0.146	18.47	18.6	5.3	0.2	14.8
3.75	0.156	18.85	19.0	5.0	0.2	14.1
4	0.167	19.22	19.4	4.8	0.2	13.5
4.25	0.177	19.57	19.7	4.6	0.1	12.9

Modified Rational Method

Length (m)	32	m
Area (ha)	0.012	Ha
Max Height	167.6	mAOD
Min Height	165.2	mAOD
DeltaH	2.4	
Slope (%)	7.61	
Te (mins)	6.77	mins
ARF	0.999	
SAAR	673.000	mm
UCWI	53	mm
PIMP	100.0	%
SOIL	0.45	
Percentage Runoff PR	77.58	
DEEPSTOR	0.27	
Cv	0.77584	
Cr	1.3	
allowable outflow		
30 year	5.36	l/s

Return Period: flood Rainfall — 30 years / 50 years

Post Development

Rainfall Duration (hours)	Rainfall Duration (days)	Rainfall Depth (mm)	Effective Depth (mm)	Rainfall Intensity (mm/hr)	FLOW (l/s)	FLOW (l/s/ha)
0.11	0.005	18.3	18.5	166.4	5.4	466.5
0.25	0.010	23	23.2	92.0	3.0	258.0
0.5	0.021	31.55	31.8	63.1	2.0	176.9
0.75	0.031	33.83	34.1	45.1	1.5	126.5
1	0.042	35.7	36.0	35.7	1.2	100.1
1.25	0.052	37.3	37.6	29.8	1.0	83.7
1.5	0.063	38.71	39.0	25.8	0.8	72.4
1.75	0.073	39.96	40.3	22.8	0.7	64.0
2	0.083	41.1	41.5	20.6	0.7	57.6
2.25	0.094	42.15	42.5	18.7	0.6	52.5
2.5	0.104	43.12	43.5	17.2	0.6	48.4
2.75	0.115	44.02	44.4	16.0	0.5	44.9
3	0.125	44.86	45.2	15.0	0.5	41.9
3.25	0.135	45.66	46.1	14.0	0.5	39.4
3.5	0.146	46.41	46.8	13.3	0.4	37.2
3.75	0.156	47.13	47.5	12.6	0.4	35.2
4	0.167	47.81	48.2	12.0	0.4	33.5
4.25	0.177	48.46	48.9	11.4	0.4	32.0

Modified Rational Method

Length (m)	32	m
Area (ha)	0.012	Ha
Max Height	167.6	mAOD
Min Height	165.2	mAOD
DeltaH	2.4	
Slope (%)	7.61	
Te (mins)	6.77	mins
ARF	0.999	
SAAR	673.000	mm
UCWI	53	mm
PIMP	100.0	%
SOIL	0.45	
Percentage Runoff PR	77.58	
DEEPSTOR	0.27	
Cv	0.77584	
Cr	1.3	
allowable outflow		
100 year	7.74	l/s

Return Period: flood Rainfall — 100 years / 140 years

Post Development

Rainfall Duration (hours)	Rainfall Duration (days)	Rainfall Depth (mm)	Effective Depth (mm)	Rainfall Intensity (mm/hr)	FLOW (l/s)	FLOW (l/s/ha)
0.11	0.005	26.4	26.6	240.0	7.7	672.9
0.25	0.010	32.5	32.8	130.0	4.2	364.5
0.5	0.021	42.94	43.3	85.9	2.8	240.8
0.75	0.031	45.73	46.1	61.0	2.0	171.0
1	0.042	48.01	48.4	48.0	1.5	134.8
1.25	0.052	49.94	50.4	40.0	1.3	112.0
1.5	0.063	51.63	52.1	34.4	1.1	96.5
1.75	0.073	53.14	53.6	30.4	1.0	85.1
2	0.083	54.5	55.0	27.3	0.9	76.4
2.25	0.094	55.75	56.2	24.8	0.8	69.5
2.5	0.104	56.9	57.4	22.8	0.7	63.8
2.75	0.115	57.97	58.5	21.1	0.7	59.1
3	0.125	58.97	59.5	19.7	0.6	55.1
3.25	0.135	59.91	60.4	18.4	0.6	51.7
3.5	0.146	60.8	61.3	17.4	0.6	48.7
3.75	0.156	61.64	62.2	16.4	0.5	46.1
4	0.167	62.44	63.0	15.6	0.5	43.8
4.25	0.177	63.21	63.8	14.9	0.5	41.7

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Technical Note: 001
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Site: Kenworthy Road Barnsley S70 4LW
Reference:2019/2418

Attachment B – WinDes Calculations discharge to ditch

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 01/05/2019 20:47	Designed By Windows7	
File 100yr+CC40% crate...	Checked By	
Micro Drainage	Source Control W.12.4	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	164.425	0.675	1.5	6.8	O K
30 min Summer	164.481	0.731	1.5	7.3	O K
60 min Summer	164.490	0.740	1.5	7.4	O K
120 min Summer	164.459	0.709	1.5	7.1	O K
180 min Summer	164.416	0.666	1.5	6.7	O K
240 min Summer	164.374	0.624	1.4	6.2	O K
360 min Summer	164.296	0.546	1.3	5.5	O K
480 min Summer	164.227	0.477	1.2	4.8	O K
600 min Summer	164.168	0.418	1.2	4.2	O K
720 min Summer	164.117	0.367	1.1	3.7	O K
960 min Summer	164.042	0.292	1.0	2.9	O K
1440 min Summer	163.881	0.131	1.0	1.3	O K
2160 min Summer	163.825	0.075	0.9	0.7	O K
2880 min Summer	163.813	0.063	0.7	0.6	O K
4320 min Summer	163.800	0.050	0.5	0.5	O K
5760 min Summer	163.793	0.043	0.4	0.4	O K
7200 min Summer	163.789	0.039	0.3	0.4	O K
8640 min Summer	163.786	0.036	0.3	0.4	O K
10080 min Summer	163.783	0.033	0.2	0.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	165.322	17
30 min Summer	98.574	31
60 min Summer	58.775	48
120 min Summer	35.045	82
180 min Summer	25.898	116
240 min Summer	20.896	150
360 min Summer	15.441	218
480 min Summer	12.459	282
600 min Summer	10.548	346
720 min Summer	9.207	410
960 min Summer	7.552	538
1440 min Summer	5.711	766
2160 min Summer	4.319	1100
2880 min Summer	3.542	1456
4320 min Summer	2.484	2144
5760 min Summer	1.932	2936
7200 min Summer	1.589	3648
8640 min Summer	1.355	4344
10080 min Summer	1.184	4968

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EWE Associates Ltd		Page 2
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 01/05/2019 20:47	Designed By Windows7	
File 100yr+CC40% crate...	Checked By	
Micro Drainage	Source Control W.12.4	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	164.514	0.764	1.6	7.6	O K
30 min Winter	164.588	0.838	1.6	8.3	O K
60 min Winter	164.604	0.854	1.7	8.5	O K
120 min Winter	164.551	0.801	1.6	8.0	O K
180 min Winter	164.484	0.734	1.5	7.3	O K
240 min Winter	164.418	0.668	1.5	6.7	O K
360 min Winter	164.302	0.552	1.3	5.5	O K
480 min Winter	164.206	0.456	1.2	4.6	O K
600 min Winter	164.127	0.377	1.1	3.8	O K
720 min Winter	164.059	0.309	1.0	3.1	O K
960 min Winter	163.907	0.157	1.0	1.6	O K
1440 min Winter	163.822	0.072	0.8	0.7	O K
2160 min Winter	163.808	0.058	0.6	0.6	O K
2880 min Winter	163.801	0.051	0.5	0.5	O K
4320 min Winter	163.791	0.041	0.4	0.4	O K
5760 min Winter	163.786	0.036	0.3	0.4	O K
7200 min Winter	163.783	0.033	0.2	0.3	O K
8640 min Winter	163.780	0.030	0.2	0.3	O K
10080 min Winter	163.779	0.029	0.2	0.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	165.322	17
30 min Winter	98.574	30
60 min Winter	58.775	50
120 min Winter	35.045	88
180 min Winter	25.898	126
240 min Winter	20.896	162
360 min Winter	15.441	230
480 min Winter	12.459	298
600 min Winter	10.548	364
720 min Winter	9.207	432
960 min Winter	7.552	568
1440 min Winter	5.711	736
2160 min Winter	4.319	1088
2880 min Winter	3.542	1432
4320 min Winter	2.484	2204
5760 min Winter	1.932	2928
7200 min Winter	1.589	3584
8640 min Winter	1.355	4400
10080 min Winter	1.184	5080

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Site: Kenworthy Road Barnsley S70 4LW
Reference:2019/2418

EWE Associates Ltd		Page 3
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 01/05/2019 20:47	Designed By Windows7	
File 100yr+CC40% crate...	Checked By	
Micro Drainage	Source Control W.12.4	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	434500 404150 SE 34500 04150
C (1km)	-0.025
D1 (1km)	0.369
D2 (1km)	0.426
D3 (1km)	0.240
E (1km)	0.297
F (1km)	2.371
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.025

Time (mins)	Area (ha)
0-4	0.025

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EWE Associates Ltd		Page 4
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 01/05/2019 20:47 File 100yr+CC40% crate...	Designed By Windows7 Checked By	
Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 165.350

Tank or Pond Structure

Invert Level (m) 163.750

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	10.0	1.400	0.0	2.800	0.0	4.200	0.0
0.200	10.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	10.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	10.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	10.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	0.0	2.400	0.0	3.800	0.0		
1.200	0.0	2.600	0.0	4.000	0.0		

Hydro-Brake® Outflow Control

Design Head (m) 1.300 Hydro-Brake® Type Md4 Invert Level (m) 163.750
Design Flow (l/s) 2.0 Diameter (mm) 48

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	2.0	3.000	3.1	7.000	4.7
0.200	0.8	1.400	2.1	3.500	3.4	7.500	4.9
0.300	1.0	1.600	2.3	4.000	3.6	8.000	5.1
0.400	1.1	1.800	2.4	4.500	3.8	8.500	5.2
0.500	1.3	2.000	2.5	5.000	4.0	9.000	5.4
0.600	1.4	2.200	2.7	5.500	4.2	9.500	5.5
0.800	1.6	2.400	2.8	6.000	4.4		
1.000	1.8	2.600	2.9	6.500	4.6		

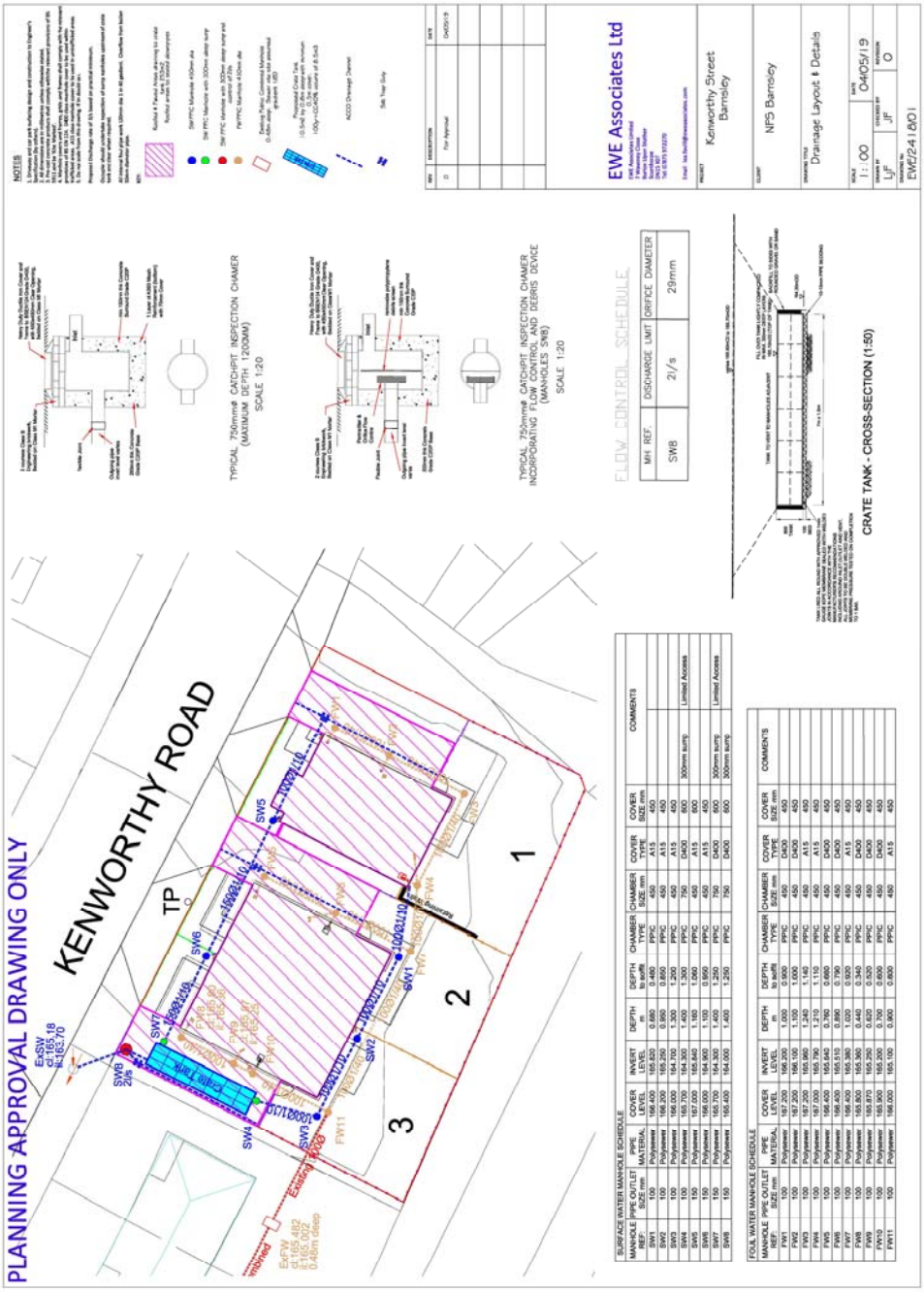
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Attachment C – Drainage Drawing

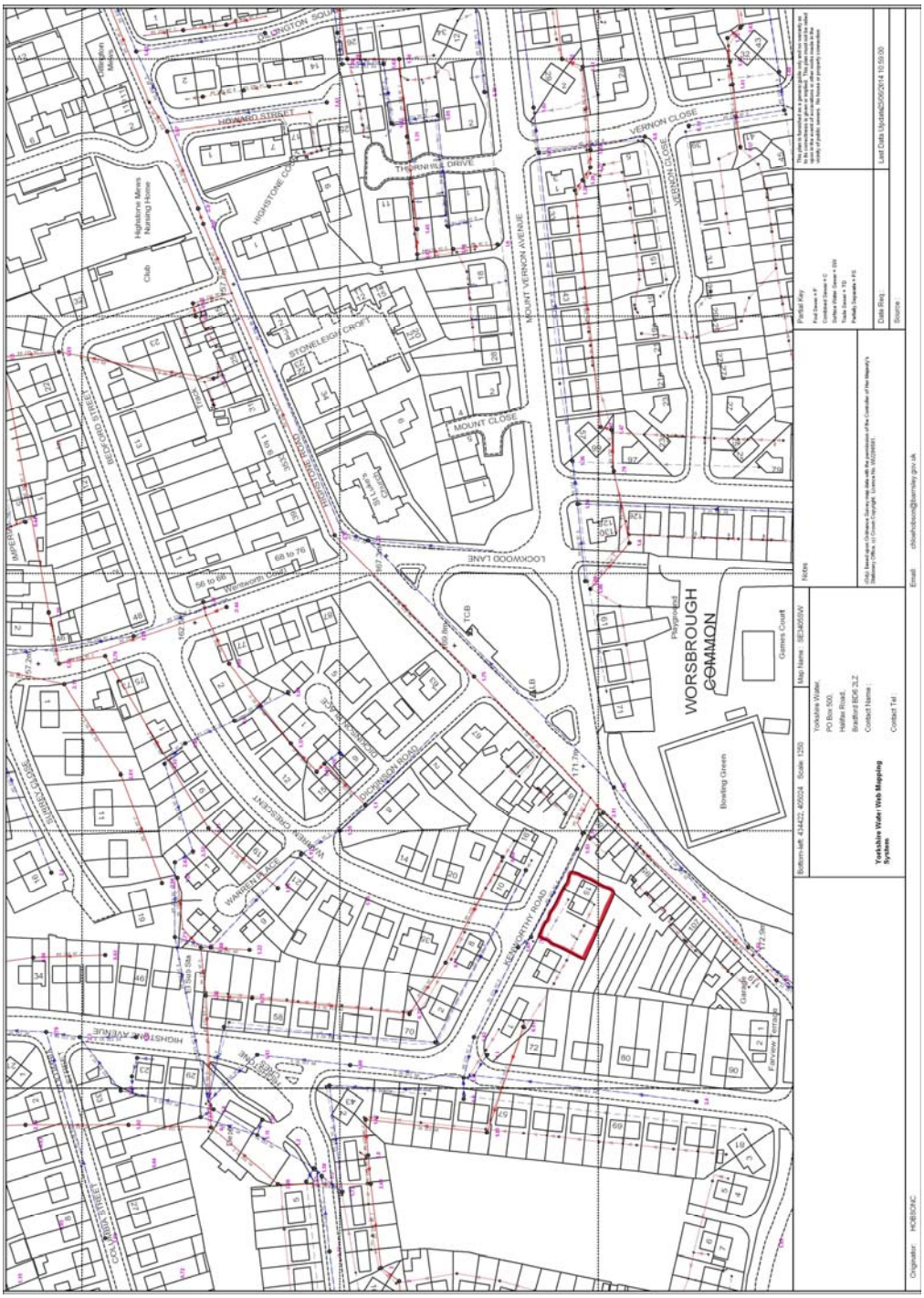


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Attachment D – Yorkshire Water Sewer Plan



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