HWA (Structural Engineers) Ltd 64 Yoxall Road, Shirley, Solihull B90 3RP Tel: 0121 745 7600	Project: The Green, Holt Road, Rossett		19994
	Section: Drainage Statement		Sheet no./rev.: 01
	Calc. by: RS	Date: Sept 2024	App'd by:	Date:

This statement discusses the drainage approach proposed for the above address. This is not a detailed design.

Foul Drainage:

There is an existing foul drain run from the building to be demolished which has been identified by survey and CCTV. Its exact connection point to the public sewer is unknown but from the direction of the pipe it would appear to either connect to the combined sewer in Alyn Drive or possibly the rear of Park Court properties.

As this is an existing connection it is proposed to provide new drainage which connects into this existing onsite pipe. If possible, this will be connected by gravity. If the existing pipe is too shallow, then a pump maybe required.



Job	19994
Sheet	2
By	RS
Date	Sept 2024

Storm Drainage:

A geotechnical report has undertaken infiltration testing and provided the following values (for further information please refer to the report):

Test	Infiltration Rate (m/s)
TP2, test 1	$1.81x10^{-4}$
TP2, test 2	$1.87x10^{-4}$
TP2, test 3	$1.95x10^{-4}$
TP4, test 1	$3.81x10^{-4}$
TP4, test 2	$5.55x10^{-4}$
TP4, test 3	$5.41x10^{-4}$

Propose design based on $1.8x10^{-4}$m/s (0.00018m/s)

$x10^{-4}$ is generally considered very good for infiltration so the hardstanding access way and drives will be permeable construction Type A. The hardstanding off the buildings is proposed to be to separate soakaways for each property. All storm drainage is proposed to be kept onsite which is considered the best possible option by SUD's train.

Soakaway is sized using BRE Digest 365 for 1:100 storm with 40% climate change factor.
Building roof area = $126m^2$
Assumed soakaway crates with minimum 95% void ratio

Soakaway sizes based on 1.2m x 0.6m x 0.61m crates Calculation shown for this option as less volume
Use 4.8m x 1.8m x 0.61m (volume = $5.01m^3$)

Alternative, soakaway size based on 1.0m x 0.5m x 0.4m crates
5.0m x 3.0m x 0.4m (volume = $5.70m^3$)

Job	19994
Sheet	2
By	RS
Date	Sept 2024

Soakaway design

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area; Liverpool

Impermeable area drained to the system; A = **126.0** m^2

Return period; Period = **100** yr

Ratio 60 min to 2 day rainfall of 5 yr return period; r = **0.360**

5-year return period rainfall of 60 minutes duration; M5_60min = **19.0** mm

Increase of rainfall intensity due to global warming; $p_{climate}$ = **40** %

Soakaway / infiltration trench details

Soakaway type; Rectangular

Minimum depth of pit (below incoming invert); d = **610** mm

Width of pit; w = **1800** mm

Length of pit; l = **4800** mm

Percentage free volume; V_{free} = **95** %

Soil infiltration rate; f = **180.´10^{-6}** m/s

Wetted area of pit 50% full; a_{s50} = l ´ d + w ´ d = **4026000** mm^2

Table equations

Inflow (cl.3.3.1); I = M100 ´ A

Outflow (cl.3.3.2); O = a_{s50} ´ f ´ D

Storage (cl.3.3.3); S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5;	0.36;	9.6;	1.90;	18.2;	2.29;	0.22;	2.07
10;	0.51;	13.6;	1.97;	26.7;	3.36;	0.43;	2.93
15;	0.62;	16.5;	2.00;	33.0;	4.16;	0.65;	3.51
30;	0.79;	21.0;	2.03;	42.6;	5.36;	1.30;	4.06
60;	1.00;	26.6;	2.00;	53.1;	6.69;	2.61;	4.08
120;	1.22;	32.5;	1.95;	63.3;	7.98;	5.22;	2.76
240;	1.48;	39.4;	1.90;	74.6;	9.40;	10.44;	0.00
360;	1.67;	44.4;	1.85;	82.4;	10.38;	15.65;	0.00
600;	1.90;	50.5;	1.81;	91.3;	11.50;	26.09;	0.00
1440;	2.42;	64.4;	1.71;	110.2;	13.89;	62.61;	0.00

Required storage volume; S_{req} = **4.08** m^3

Soakaway storage volume; S_{act} = l ´ d ´ w ´ V_{free} = **5.01** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume; t_{s50} = S_{req} ´ 0.5 / (a_{s50} ´ f); = 46min 56s

PASS - Soakaway discharge time less than or equal to 24 hours