



**KINGMOOR**  
CONSULTING

**Report Title**

**Drainage Strategy**

**Property Address**

Plot 5  
Land Adj Beech View  
Gilgarren  
Workington

**Client**

Mr Kevin Wirga

**Our Reference**

20-321r006B

**Date**

OCTOBER 2020

**Prepared by**

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## Introduction

The purpose of this report is to provide support for a planning application associated with the construction of a single residential dwelling on land at Gilgarran, Workington.

Research has been undertaken on the site and observations made regarding the existing site and the drainage servicing the site.

Calculations associated with the drainage have been performed by software packages from a recognised resource. Where appropriate copies of calculations are provided in the Appendices of this report.

## **The Site**

### **Historic Usage**

The proposed residential dwellings are located in a small woodland adjacent to Brandlehow, Gilgarran, Workington. The land has historically been used as scrub woodland.

### **Existing Sewer Network**

The site is serviced by a private foul sewer located adjacent to the site which discharges to the mains system owned and operated by United Utilities.

### **Existing Site Drainage**

The existing drainage across the site has been inspected and principally the site drains to the southern boundary

Drawing 20-321 DWG003 indicates the existing drainage.

## **Development Proposals**

It is proposed to develop the site for a single dwellings and garden.

The development is presented on drawings 20-321 DWG003.

The development also includes :

- Foul water drainage
- Surface water attenuation and discharge from the impermeable surface of the development.

## **Drainage Strategy**

### **Foul Drainage**

It is proposed that a new foul drainage system shall discharge to the adjacent private foul drainage on the northern boundary of the site.

A detailed foul drainage scheme associated with use of the existing outfalls is presented in later sections of this report.

### **Surface Water Drainage**

#### ***Outline Strategy***

It is proposed to discharge the surface water to an onsite soakaway located to the southern boundary of the site.

Following a review of the site conditions and tests undertaken (Percolation Tests), there is suitable drainage present on the site to facilitate natural percolation.

Test results are presented in the Appendices of this report.

#### ***Sustainable Urban Drainage Systems (SUDS)***

A SUDS report has been obtained from UKSUDS. The process evaluates the historic usages on site, the arrangements available for discharge and provides guidance regarding potential solutions. A copy of the report is appended to this report.

The following recommendations are considered appropriate for the site :

**Rainwater Harvesting** - Considered suitable for use on site from rooves. Harvested rainwater may be suitable for use in toilet flushing.

**Permeable Paving** - Suitable for parking areas, and would allow storage within the depth of the

paving prior to discharge to the surface water system.

**Sub Surface Storage** - Suitable on site with appropriate management arrangements for maintenance.

### ***Rooves***

It is proposed that the rooves discharge to the surface water network installed on the site. Calculations for the roof areas of each plot entering the surface water network shall be calculated and used in a detailed model to be produced for the site.

All roof drainage and arrangements shall be constructed in accordance with the Building Regulations.

### ***Parking and Paved Surfaces***

It is proposed that paved surfaces on the site including parking areas, footways and roads shall have formal drainage present and discharge via the surface water network. An overall reduction in the areas of paved surfaces from the present areas of the site shall be achieved with incorporation of amenity areas on the site.

### ***Gardens***

It is proposed that amenity areas on the site shall be created including planting and landscaping.

These areas replace former areas of hardstanding or at locations of buildings. It is proposed that these areas will discharge naturally to the underlying ground conditions.

## Hydraulic Design

### Foul Drainage

A detailed hydraulic design has been conducted utilising the proposed layouts for the development. Loads from the proposed residential dwelling is calculated based on the requirements published in Sewers for Adoption 7th Edition.

A total of 3500 litres per property per day is considered for the dwellings. This is a design peak flow rate not a daily average water usage, and represents the peak flow rate from a number of appliances. Reducing daily water usage does not necessarily reduce the peak flow rate.

The foul drainage has been modelled in Causeway Flow adopting the standards published in Sewers for Adoption 7th Edition.

Drawing 20-321 DWG003 indicates the proposed arrangements for foul water on the site.

### Surface Water Drainage

Principally the surface water drainage has been calculated on the impermeable areas of the site, including roofs, hard surfacing, parking areas and roads. Areas are subdivided into zones and drainage runs, manholes and drains to allow each area to discharge into the system.

Modelling has been conducted on the following rainfall events:

- 1 in 1 year
- 1 in 30 years
- 1 in 100 years plus 40 % increase due to climate change over a 6 hour period

An assessment of the proposed network has been undertaken to identify the requirements of each property and requirements for the soakaway on site to ensure no flooding occurs.

The following parameters were adopted in the analysis.

Soil Type	4
SPR	0.3
SAAR (mm)	1241
Hydrological Region	10
M5-60	17

Drawing 20-321 DWG003 indicates the proposed drainage layout for the site, with references made to the manholes and drainage network as modelled. The following summary is offered in relation to the discharge from the site based on the modelled rainfall events.

### ***Detailed Engineering***

The detailed model presented in this report adopts the following engineering aspects specific to the site. All arrangements are presented in drawing 20-321 DWG002.

#### Attenuation

Not considered for the site.

#### Hydrobrakes

Not considered for the site.

#### Outfalls

Not considered for the site

#### Soakways

A soakaway has been designed for the site and considered in the detailed calculations presented in the appendices.



## Appendices

### United Utilities Records

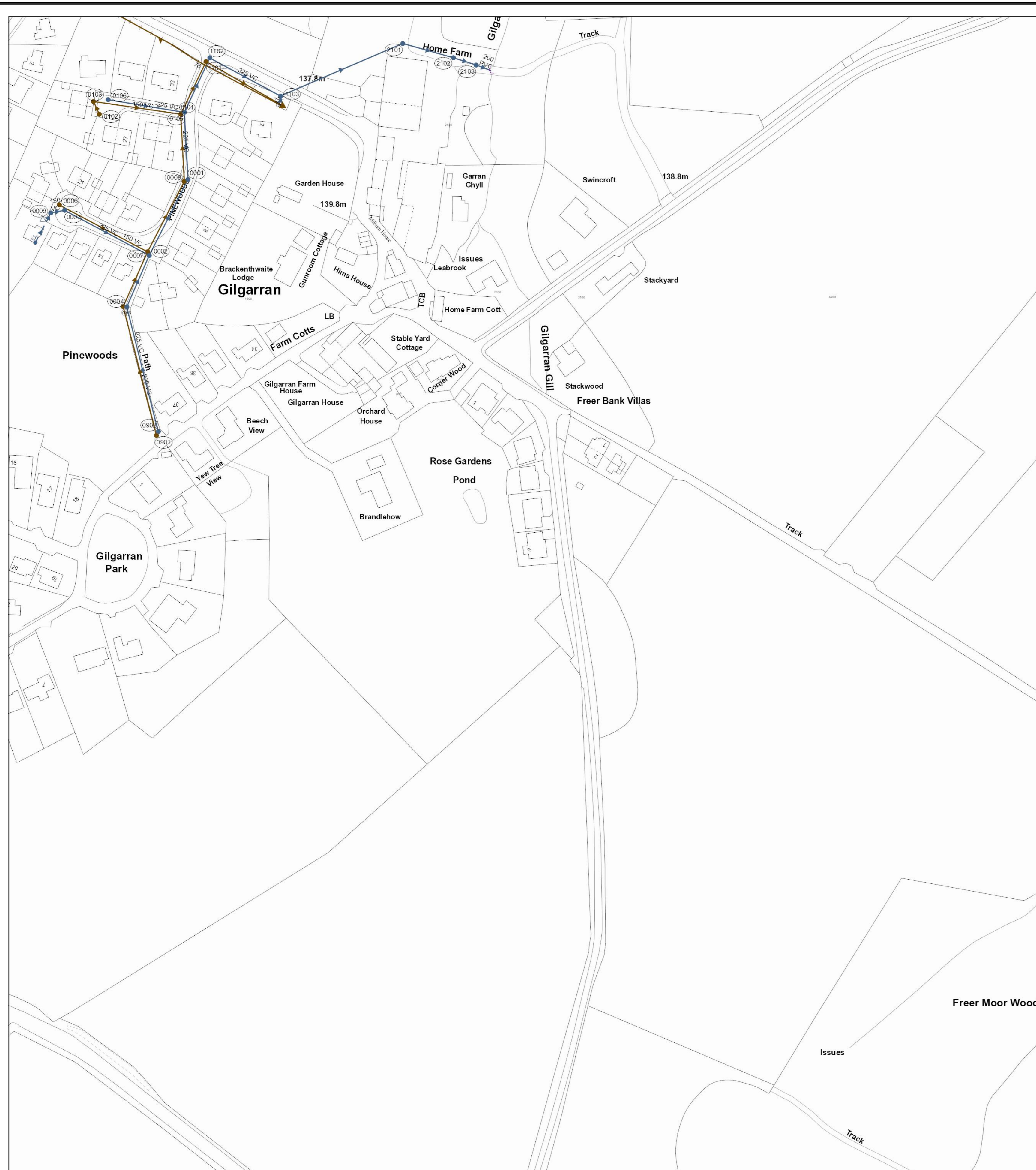
## **TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS**

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

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- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
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- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.





Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0006	146.85	FO	142.53	225		VC	VC	33.00709	1 in 65
0008	143.43	FO	141.18	225		VC	VC	37.05294	1 in 17
0102	143.29	FO	141.24	150		VC	VC	7.038488	
0004	146.84	SW	143.18	225		VC	VC	30.98153	1 in 36
0006		FO	0	150		VC	VC	55.17128	
2101		SW	0	225		VC	VC	29.10401	
1102	138.59	SW	137.59	225		VC	VC	44.27212	1 in 55
1101	138.63	FO	137.21	225		VC	VC	48.53139	
0901	147.69	FO	144.31	225		VC	VC	73.19241	1 in 41
1103	137.89	SW	136.77	225		VC	VC	73.35252	
0007	144.92	FO	142.02	225		VC	VC	43.83315	1 in 52
0106	142.05	SW	140.38	225		VC	VC	42.5892	1 in 38
0103		FO	0	150		VC	VC	48.50773	
0104	141.34	FO	139.02	225		VC	VC	32.19814	1 in 18
0003	144.49	SW	143.07	225		VC	VC	52.84649	1 in 70
2103		SW	0	200		PVC	PVC	8.78857	
0902	147.68	SW	145.07	225		VC	VC	70.86363	1 in 38
0001	143.46	SW	141.46	225		VC	VC	37.05347	1 in 17
2102	131.04	SW	129.8	225		VC	VC	13.02043	
0009		SW		150		VC	VC	7.980142	
0002	144.96	SW	142.31	225		VC	VC	46.96351	1 in 55
0105	141.25	SW	139.25	225		VC	VC	33.09663	1 in 20

### LEGEND

Abandoned Foul Surface Water Combined Public Sewer

Private Sewer Section 104 Rating Main Sludge Main Overflow Water Course Highway Drain

All point assets follow the standard colour convention:  
 red - combined blue - surface water  
 brown - foul purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

**SEWER SHAPE**

- CI Circular
- EG Egg
- OV Oval
- FT Flat Top
- RE Rectangular
- SQ Square
- TR Trapezoidal
- AR Arch
- BA Barrel
- HO HorseShoe
- UN Unspecified

**SEWER MATERIAL**

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforced Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

**Address or Site Reference:**

6 ROSE GARDENS,  
 GILGARRAN,  
 WORKINGTON,  
 CA14 4RB

**Scale:** 1:1250      **Date:** 23/08/2019

**Sheet:** 1 of 1

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities  
 Helping life flow smoothly

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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## Trial Pit Records and Percolation Tests



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6B Clifford Court  
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Cumbria, CA3 0JG

Project		Plots 3 and 4, Gilgarren, Workington		Job no. 20-321	
Calcs for		Trial Pit Records		Start page no./Revision 1	
Calcs by C Aimers	Calcs date 08/10/2020	Checked by	Checked date	Approved by	Approved date

**TRIAL PIT LOG**

Trial pit reference TP5				Sheet 1 of 1
Water	Reduced Level (m)	Legend	Depth (m)	Description
	100.00			
	99.80	X X X X X X X X	(0.20) 0.20	TOPSOIL
	99.55	- - - - - - - - - - - -	(0.25) 0.45	Firm red CLAY
	99.30	- x - x - x - x - x - x - x - x - x - x - x - x -	(0.25) 0.70	Red sandy CLAY/SILT
	98.80	- : - : - : : - : - : - - : - : - : : - : - : - - : - : - : : - : - : - - : - : - : : - : - : - - : - : - : : - : - : - - : - : - : : - : - : -	(0.50) 1.20	Firm to stiff light grey mottled brown sandy CLAY
				Trial pit ends
Not shown to scale				
Additional notes:				





## Drawings



9E



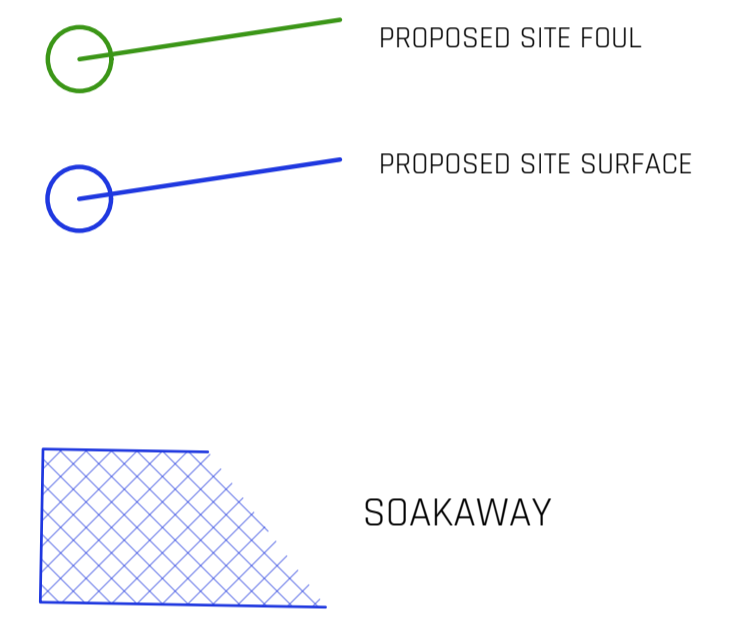
FOUL CONNECTION TO UU NETWORK

EXISTING PRIVATE FOUL DRAINAGE

PLOT 5

SOAKAWAY

KEY



**BASIS OF DESIGN - DRAINAGE**

- DESIGN HAS BEEN CONDUCTED IN CAUSEWAY FLOW AND IS BASED ON THE REQUIREMENTS OF SEWERS FOR ADOPTION 7TH EDITION.
- SITE PARAMETERS GENERATED ON SITE BASIS FROM UKSUDDS.COM
- FOLLOWING DESIGN PARAMETERS ARE CONSIDERED :

SITE AREA	583m <sup>2</sup>
M5-60	17
r	0.3
HYDRO REGION	10
SAAR	1241
SPR	0.47
QBAR	0.6 l/s

PLAN  
SCALE 1:150

<p>6B CLIFFORD COURT, PARKHOUSE, CARLISLE, CUMBRIA, CA3 0JG T: 01228 915900 E: hello@kingmoorconsulting.co.uk</p>		CLIENT
PROJECT <b>NEW DWELLINGS, GILGARREN WORKINGTON, CUMBRIA</b>		
TITLE <b>PLOT 5 DRAINAGE ARRANGEMENTS</b>		
SCALE AS NOTED	STATUS FOR PLANNING CONSENT	
PAPER SIZE A1	DRAWN BY C AIMERS	CHECKED AND APPROVED C AIMERS
PROJECT PHASE PLANNING	DATE OCT 2020	DATE OCT 2020
DRAWING NUMBER 20-321-DWG003		REVISION A

## Calculations

Project Gilgarren, Workington				Job no. 20-321	
Calcs for				Start page no./Revision 1	
Calcs by C Aimers	Calcs date 19/10/2020	Checked by	Checked date	Approved by	Approved date

## SOAKAWAY DESIGN

### In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

#### Design rainfall intensity

Location of catchment area	Carlisle
Impermeable area drained to the system	A = <b>185.0</b> m <sup>2</sup>
Return period	Period = <b>10</b> yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = <b>0.350</b>
5-year return period rainfall of 60 minutes duration	M5_60min = <b>17.0</b> mm
Increase of rainfall intensity due to global warming	p <sub>climate</sub> = <b>40</b> %

#### Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = <b>1200</b> mm
Width of pit	w = <b>4000</b> mm
Length of pit	l = <b>2500</b> mm
Percentage free volume	V <sub>free</sub> = <b>40</b> %
Soil infiltration rate	f = <b>42.1*10<sup>-6</sup></b> m/s
Wetted area of pit 50% full	a <sub>s50</sub> = l * d + w * d = <b>7800000</b> mm <sup>2</sup>

#### Table equations

Inflow (cl.3.3.1)	I = M10 * A
Outflow (cl.3.3.2)	O = a <sub>s50</sub> * f * D
Storage (cl.3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	10 year rainfall, M10 (mm)	Inflow (m <sup>3</sup> )	Outflow (m <sup>3</sup> )	Storage required (m <sup>3</sup> )
5	0.36;	8.5;	1.21;	10.3;	1.90;	0.10;	1.80
10	0.51;	12.1;	1.23;	14.8;	2.74;	0.20;	2.54
15	0.62;	14.7;	1.24;	18.2;	3.36;	0.30;	3.07
30	0.79;	18.7;	1.24;	23.2;	4.29;	0.59;	3.70
60	1.00;	23.8;	1.24;	29.5;	5.46;	1.18;	4.28
120	1.22;	29.1;	1.22;	35.6;	6.59;	2.36;	4.23
240	1.50;	35.6;	1.20;	42.9;	7.93;	4.73;	3.20
360	1.69;	40.2;	1.19;	47.8;	8.85;	7.09;	1.76
600	1.95;	46.3;	1.18;	54.5;	10.09;	11.82;	0.00
1440	2.48;	59.0;	1.16;	68.4;	12.66;	28.37;	0.00

Required storage volume S<sub>req</sub> = **4.28** m<sup>3</sup>

Soakaway storage volume S<sub>act</sub> = l \* d \* w \* V<sub>free</sub> = **4.80** m<sup>3</sup>

#### PASS - Soakaway storage volume

Time for emptying soakaway to half volume t<sub>s50</sub> = S<sub>req</sub> \* 0.5 / (a<sub>s50</sub> \* f) = 1hr 48min 37s

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