Weetwood Services Ltd (Mold)
t: 01352 700045
e: info@weetwood.net
w: www.weetwood.net

Weetwood
Development • Planning • Environment

Proposed Residential Development
Land off Wrexham Road, Holt

Technical Note to Discharge Condition 5, 6 and 7

Prepared by:	Owen Astbury BSc (Hons) GradCIWEM *Graduate Project Manager, Weetwood Services Ltd.*
Checked by:	Michael Darby MEng (Hons) GradCIWEM GMICE *Assistant Engineer*
Reviewed by:	Geoff Waite BSc CEng C.WEM MICE MCIWEM *Consultant*
Date:	15 November 2019
Version:	Final v1.1

Introduction

1 This Technical Note has been prepared by Weetwood Services Ltd (`Weetwood') on behalf of Macbryde Homes Ltd.

2 An outline planning application for "*residential development including formation of multi-users games area*" was submitted on 22 October 2013 (planning ref: P/2013/0823) and planning permission was granted with conditions by way of a decision letter dated 11 March 2016.

3 The planning permission was conditioned with respect to drainage as follows:

- Planning Condition 5 states: `*No part of the development shall commence until a scheme for the comprehensive and integrated drainage of the site indicating how foul water, surface water and land drainage will be dealt with has been submitted to and approved in writing by the Local Planning Authority. The scheme as approved shall be implemented in accordance with a timescale to be agreed as part of the submitted details and maintained thereafter.'*

- Planning Condition 6 states: `*No land drainage run-off or surface water shall be permitted to discharge or connect to the public sewerage system, either directly or indirectly, and foul and surface water shall be drained separately from the site.'*

- Planning Condition 7 states: `*The development hereby permitted shall not be commenced until such time as a detailed scheme for the provision and implementation of a surface water regulation system has been submitted to and approved, in writing, by the Local Planning Authority. Prior to submission of those details, an assessment shall be carried out into the potential for disposing of surface water by the means of Sustainable Drainage Systems (SUDs) and the results of the assessment provided to the Local Authority.'*

4 This document presents further details of the surface water and foul water drainage schemes and accompanies an application to discharge Planning Condition 5, 6 and 7 associated with the proposed residential development on land off Wrexham Road, Holt.

Site Details

5 The site is approximately 1.20 ha in area and is located off Wrexham Road, Holt at Ordnance Survey National Grid Reference SJ 406 534 as shown in **Figure 1**.

6 The site currently comprises of undeveloped grassland with a small area of hardstanding towards the north-western boundary. The proposals are for the development of 24 residential dwellings, associated infrastructure and the provision of public open space as shown in **Annex A**.

7 A topographic survey of the site has been carried out by CO-Surveys Ltd and is provided in **Annex B**. Site levels generally fall to the south/south-west and range from 18.14 to 20.15 metres Above Ordnance Datum (m AOD).

8 Access and egress to the site is provided via Wrexham Road (B5102) which runs parallel to the north-western boundary of the site. Levels along Wrexham Road (B5102) generally fall to the south-west and range from 18.25 to 19.33 m AOD.

9 Soil conditions are indicated by Soilscapes mapping as 'freely draining slightly acid loamy soils'. According to British Geological Survey mapping, the site is underlain by superficial deposits of Till, Devensian - Diamicton underlain by sandstone, pebbly bedrock (Chester Formation).

10 GroundSolve Ltd has undertaken ground investigation work (**Annex C**) at the site. The site investigation comprised the excavation of eleven trial pits across the site, dug to a maximum depth of 2.6 metres below ground level (m bgl). Trial pit logs indicate strata comprising of 'silty sandy topsoil' between 0.0 m and 0.5 m bgl, 'silty gravelly sand' between 0.5 m and 1.9 m, which is subsequently underlain by layers of 'stiff silty gravelly clay'.

11 Groundwater strike/ingress was encountered in seven of the eleven trial pits at depths varying from 1.3 m to 1.9 m. No standing groundwater was observed in any of trial pits during the investigation.

12 In accordance with the guidelines of BRE365[1], infiltration testing has also been undertaken by GroundSolve Ltd at the site (see **Annex D**) and is summarised as follows:

- Soakaway testing was undertaken in six (TP1, TP2, TPA, TPB, TPC and TPD) of eleven trial pits located across the site;
- The depth of the trial pits varied from 1.6 m to 2.2 m;
- Groundwater strike/ingress was encountered in two of the trial pits (TP1 and TPD) at depths varying from 1.6 m to 1.7 m;
- Groundwater strike/ingress was not encountered within any trial pits located in the south-western corner of the site (TP2, TPA and TPB);
- The testing was repeated three times for each trial pit except one (TPD) where two tests were undertaken and another (TP1) where one test was undertaken;
- The average infiltration rates range from 1.5×10^{-5} m/s (0.05 m/hr) to 4.36×10^{-5} m/s (0.15 m/hr) with the highest rates observed in the south-western corner of the site (TPA) within proposed public open space area.

13 The observed rates are in the typical range for silty clayey sand rates.

[1] BRE Digest 365: Soakaway Design

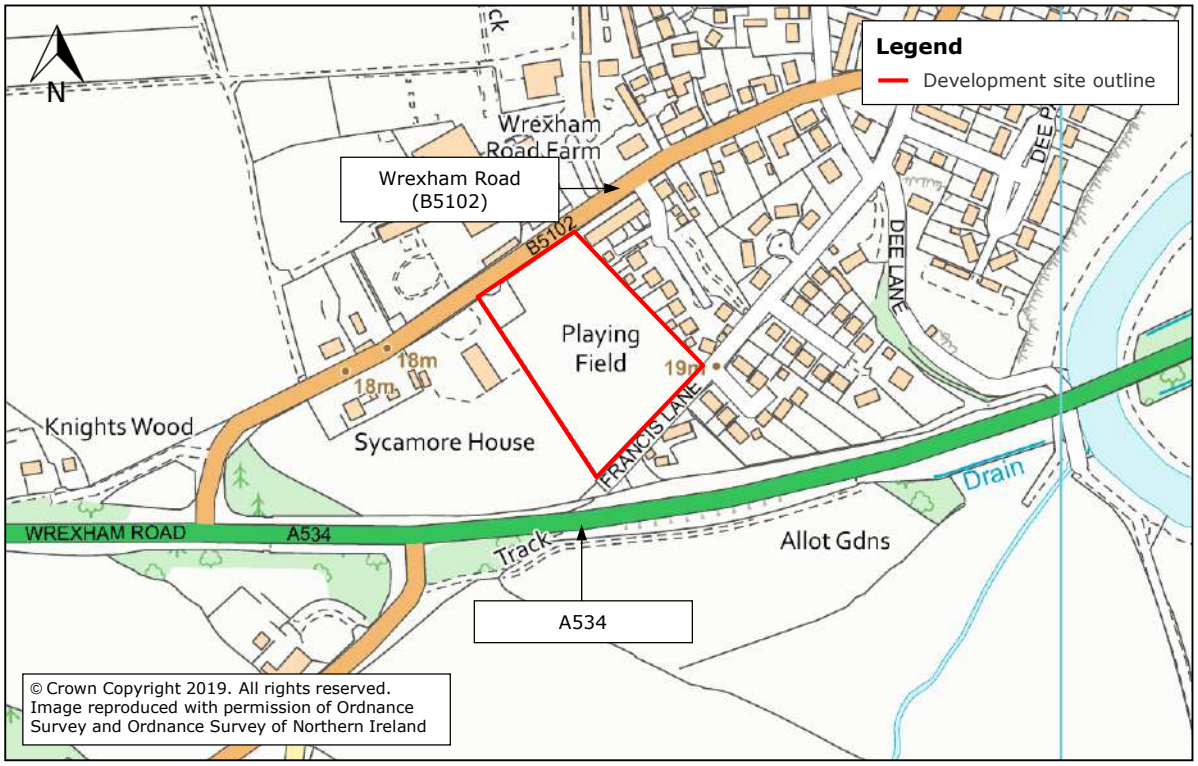


Figure 1: Site Location

Drainage Infrastructure

14 Dŵr Cymru Welsh Water's (DCWW) sewer records are provided in **Annex E**. A drainage survey undertaken by Invek Surveys in July 2019 is provided in **Annex F**.

15 Both the sewer records and drainage survey indicate a 225 mm diameter combined sewer along Wrexham Road (B5102) to the north and a 225 mm diameter combined sewer along Francis Lane to the south of the site.

Proposed Surface Water Runoff Arrangements

16 In accordance with Welsh Government guidance, surface water runoff should be disposed of according to the following hierarchy: Rainwater collected for use; Into the ground (infiltration); To a surface water body; To a surface water sewer or highway drain; To a combined sewer.

17 The infiltration testing (**Annex D**) indicates that the disposal of surface water by infiltration would be feasible towards the south/south-west of the site and the proposed surface water drainage scheme is based on this disposal method potentially supplemented with water reuse, e.g. through the use of water butts.

Managing Surface Water within the Development

18 Due poor infiltration rates to the north/north-west of the site it has not been considered feasible to incorporate individual soakage trenches located within the rear gardens and front curtilage of residential plots.

19 Therefore, it is proposed that both the residential dwellings and highways will drain to an infiltration basin located in the south-western corner of the site within the proposed public open space area.

20 The proposed drainage system has been modelled using the Detailed Design Network module of MicroDrainage (**Annex G**). The required storage volume has been sized to store the 1:100 annual probability rainfall event including a 30% increase in rainfall intensity in order to allow for climate change.

21 To ensure that flooding does not occur for the 1:100 annual probability event plus 30% climate change allowance, a total storage volume of 288.36 m³ would be required based on an infiltration rate of 2.24×10^{-5} (0.08 m/hr) (the lowest infiltration rate observed within the proposed location for the infiltration basin). The required surface water storage volume for the site is provided through Type B or C permeable paving structures, the on-site pipe network system and infiltration basin

22 The basin would have a base area of approximately 468 m² (base invert at 17.10 m AOD), 1 in 3 side slopes and a bank top of 17.82 m AOD. This basin would fill to a depth of 17.504 m AOD providing a minimum 300 mm freeboard. The volume of storage provided in the infiltration basin is approximately 222.50 m³. The maximum capacity of the infiltration basin is 414.9 m^3 to top of bank level.

23 It is proposed to discharge surface water from the Multi Use Games Area (MUGA) via an individual geocellular soakaway. To provide suitable access for maintenance, the soakaway will be positioned to the north-east of the MUGA. Recognising levels, surface water runoff from the MUGA will need to be piped to the soakaway.

24 The size of soakaway for the MUGA to ensure that flooding does not occur for the 1:100 annual probability event plus 30% climate change allowance, is presented in **Table 1**. The calculations are also based on an infiltration rate of 2.24×10^{-5} m/s (0.08 m/hr). The proposed soakaway has been modelled using the Detailed Design module of MicroDrainage Source Control (**Appendix H**).

Table 1: Illustrative Soakaway Requirements

Structure	Area drained (ha)	Soakaway Dimensions (WxLxD)	Soakaway Storage Volume (m³)	Calculations
Individual Soakaway				
MUGA	0.022	2.0 x 7.0 x 0.8	10.6	**Annex H**

25 Specific design principles for the soakaway are to be confirmed by detailed design. The MUGA soakaway is approximately 0.8 m deep and should have a minimum cover of approximately 500 mm.

26 The geocellular units should be wrapped in a geotextile wrap with an equivalent or higher porosity specification so as not to impede the design infiltration rate. The units should be laid flat on a minimum 100 mm bed of coarse compacted sand.

27 All excavations should be backfilled with a suitable permeable aggregate material such as Type B filter material, pea gravel or 4/40 aggregate in accordance with BS 7533-13:2009. A catchpit manhole shall be installed upstream of each soakaway to minimise the risk of siltation.

28 A preliminary surface water drainage layout is provided in **Appendix I**.

29 Residential roofs have a very low pollution hazard level and individual property driveways and low traffic roads have a low pollution hazard level. Table 26.2 of the CIRIA SuDS Manual 2015 indicates that the combined pollution hazard indices associated with residential roofs, individual property driveways and low traffic roads for total suspended solids, hydrocarbons and metals are 0.70, 0.60 and 0.45 respectively. The indices range from 0 (no pollution hazard) to 1 (high pollution hazard).

30 Table 26.3 of the CIRIA SuDS Manual 2015 indicates that the combined SuDS mitigation indices for permeable paving and detention basins for total suspended solids, hydrocarbons and metals are 0.95, 0.85 and 1.0 respectively. As such, the proposed drainage system would incorporate adequate water quality treatment.

31 In terms of amenity and biodiversity the site will maintain infiltration around the site which will help reduce losses of soil moisture content. Furthermore, the provision of a public open space in the south of the site will provide habitat for wildlife and also a functional area for recreational activities.

Maintenance of SUDS

32 SuDS elements within the curtilage of residential dwellings would be the responsibility of the owner of the property.

33 SuDS in open spaces may be maintained by a private management company

An indicative maintenance schedule is presented in **Table 2**.

Table 2: Illustrative Maintenance Schedule

Schedule	Required action	Frequency
Infiltration Basin		
Regular maintenance	Remove litter and debris	Monthly
	Cut grass	Monthly during grow season Or as required)
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly for first year, then annually or as required
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets/outlets	Annually (or as required)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every two years, or as required
	Remove sediments from inlets/outlets and main basin when required	

Schedule	Required action	Frequency
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	
	Repair/rehabilitation of inlets/outlets	
	Relevel uneven surface and reinstate design levels	
Permeable Paving		
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth- if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies accumulation rates and establish appropriate removal frequencies	Annually
	Monitor inspection chambers	
Soakaways		
Regular maintenance	Inspect for sediment and debris in pre-treatment catchpit inspection chamber	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required)
	Trimming any roots that may be causing blockages	Annually (or as required)

Schedule	Required action	Frequency
Occasional maintenance	Remove sediment and debris from pre-treatment catchpit chamber and inside of concrete inspection chambers	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace of clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Managing Foul Water within the Development

34 Both the sewer records (**Annex E**) and drainage survey (**Annex F**) indicate a 225 mm diameter public combined water gravity sewer along Wrexham Road (B5102) to the north of the site and an 225 mm diameter public combined water gravity sewer along Francis Lane to the south of the site.

35 Recognising the fall in ground levels to the south/south-west of the site (see **Annex B**), it is proposed that foul water from the development will be directed to the 225 mm public combined water gravity sewer along Francis Lane to the south of the site.

36 DCWW has confirmed capacity within the local sewer network for the proposed development and has advised (**Annex J**) that foul water flows post-development should be communicated to the 225 mm public combined water gravity sewer along Francis Lane, and that a connection may be made downstream of manhole reference SJ40537304.

Summary

37 This document presents details of the surface water and foul water drainage scheme for the proposed residential development of 24 dwellings on land off Wrexham Road, Holt.

38 Further details will be provided at detailed design stage, but we trust that the information provided is sufficient for Planning Condition 5, 6 and 7 to be discharged.

ANNEX A:	Development Proposals

SCHEDULE OF ACCOMMODATION

HOUSETYPE	DESCRIPTION	SQFT	NUMBER	PERCENTAGE
Banbury	3 Bed, 2 Storey	978 SQFT	4	16.67
Fenwick	3 Bed, 2 Storey	1048 SQFT	1	4.17
Evesham	3 Bed, 2 Storey	1108 SQFT	4	16.67
Heatherington	4 Bed, 2 Storey	1352 SQFT	2	8.33
Chatsworth	4 Bed, 2 Storey	1402 SQFT	1	4.17
Alderton	4 Bed, 2 Storey	1451 SQFT	2	8.33
Salisbury	4 Bed, 2 Storey	1496 SQFT	2	8.33
Marlbury	4 Bed, 2 Storey	1552 SQFT	2	8.33
Wiltshire	4 Bed, 2 Storey	1618 SQFT	3	12.50
Sandringham	4 Bed, 2 Storey	1676 SQFT	3	12.50
TOTAL		32460 SQFT	24	
Gross Site Area		2.97 Acres	1.20 Hectares	
Plot		0.83 Acres	0.34 Hectares	
Single sided Hold & Site Access		0.05 Acres	0.02 Hectares	
NETT SITE AREA:		2.09 ACRES	0.85 HECTARES	
Gross Density		8.08 Units/Acre	19.97 Units/Hectare	
NETT DENSITY:		11.48 UNITS/ACRE	28.38 UNITS/HECTARE	
Gross Footage		10929.28 SQFT/Acre	2505.80 SQM/Hectare	
NETT FOOTAGE:		15531.10 SQFT/ACRE	3566.42 SQM/HECTARE	

Key:

- Site Boundary
- 1.8m high boundary fence
- 1.8m high screen wall / fence
- Private Drive
- Indicative Landscaping
- Number of parking spaces proposed to Dwellings with side parking
- Parking space allocation to Semi Detached Dwellings

Rev A:	Plot subsitutes to plots 8, 14 & 15.	17.07.19
Rev B:	New house types added.	19.07.19
Rev C:	New house types added & upped to 24 Plots	07.08.19
Rev D:	Access amended to match Outline Approval	13.08.19
Rev E:	Amendments in line with Planning Officers comments	28.08.19
Rev F:	Amendments to Mix	30.08.19
Rev G:	Amendments in line with Planning Officers comments	12.09.19

MACBRYDE HOMES

Macbryde Homes Limited,
Macbryde House, Unit 28,
St. Asaph Business Park,
Ffordd Richard Davies, St Asaph,
Denbighshire. LL17 0LJ.
Tel. 01745 536677
Fax. 01745 536688

Site: Wrexham Road, Holt

Title: Proposed Site Plan

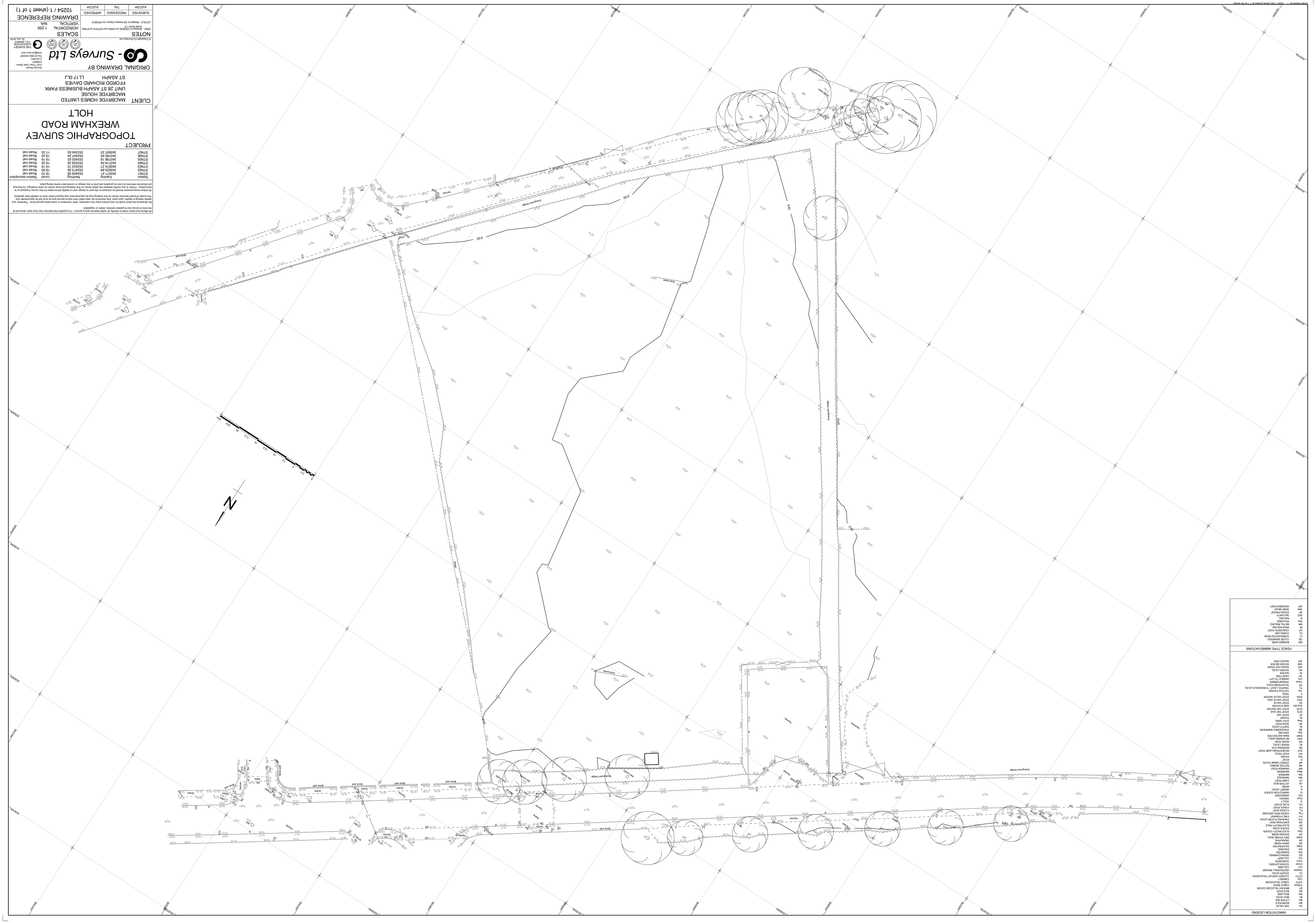
Scale: 1:500@A2

Date: 03.07.19

Ref: WRHLT-SP01

Rev: G

ANNEX B:	Topographic Survey


Overgrown hedge
Brick wall
Fence
Drain
Gate
Stone wall
Grass
Tree
Post
Manhole
Water valve
Gas valve
Telephone pole
Telegraph pole
Lamp post
Bollard
Gate post
Stile
Cattle grid
Sign
Fence post
Hedge
Ditch
Edge of trees
Top of bank
Spot level
Contour
Building
Concrete
Tarmac
Gravel
Grass
Hedge
Trees
Water
Road
Footway
Kerb
Edge of road
Centre of road
Footway
Edge of footway
Edge of road
Centre of road
Footway
Edge of footway
Edge of road
Centre of road
Footway
Edge of footway

ANNEX C:	GroundSolve Ltd Trial Pit Logs

SCALE 1:1000 @ A3

Figure Title

DRAFT TP LOCATION PLAN

FIGURE

TRIAL PIT 1

Depth (m)	Strata
0.0 - 0.5	Loose brown slightly silty SAND (TOPSOIL).
0.5 – 1.7	Medium dense brown slightly silty slightly gravelly SAND. Gravel is fine to coarse, subrounded and subangular sandstone and mudstone. (GLACIAL DEPOSIT)
1.7 – 2.2	Medium dense reddish brown very slightly silty gravelly fine to coarse SAND. Gravel is fine to coarse, subrounded and rounded of mixed lithologies. (GLACIAL DEPOSIT)

Notes

1. Excavation terminated at 1.8m depth for soakaway testing.
2. Groundwater strike at 1.7m causing running sand at base of pit.
3. Excavation locally unstable below 1.7m.
4. Soakaway test carried out.

TP1

TP1 - Spoil

TRIAL PIT 2

Depth (m)	Strata
0.0 – 0.3	Loose brown slightly silty SAND (TOPSOIL).
0.3 – 1.8	Loose becoming medium dense reddish brown slightly gravelly SAND. Gravel is fine to coarse, subrounded, of mixed lithologies. (GLACIAL DEPOSIT) - Gravel medium to coarse below 1.0m depth

Notes

1. Excavation terminated at 1.8m depth for soakaway testing.
2. No groundwater encountered.
3. Excavation becoming unstable at base.
4. Soakaway test carried out.

TP2

TP2 - Spoil

TRIAL PIT 3

Depth (m)	Strata
0.0 – 0.4	Grass over loose dark brown and grey slightly sandy SILT (TOPSOIL).
0.4 – 1.9	Medium dense reddish brown slightly silty gravelly SAND. Gravel is fine to coarse, subrounded, of mixed lithologies. (GLACIAL DEPOSIT)
1.9 – 2.2	Stiff red brown and grey silty slightly gravelly CLAY. Gravel is fine to coarse subangular and subrounded of sandstone, siltstone and mudstone. (GLACIAL TILL)

Notes

1. Groundwater strike at 1.7m with strong inflow and running sand.
2. Excavation unstable in sand strata.
3. Samples – ES @ 0.2m, D @ 2.0m.

TP3

TP3 - Spoil

TRIAL PIT 4

Depth (m)	Strata
0.0 – 0.3	Grass over loose dark brown and grey slightly sandy SILT (TOPSOIL).
0.3 – 1.7	Medium dense dark reddish brown very slightly silty gravelly SAND. Gravel is fine to coarse, subrounded and subangular of mixed lithologies (GLACIAL DEPOSIT).
1.7 – 2.3	Stiff red brown and grey silty slightly gravelly CLAY. Gravel is fine to coarse subangular and subrounded of sandstone, siltstone and mudstone. (GLACIAL TILL)

Notes

1. Excavation terminated at 2.3m depth due to collapses in sand strata.
2. Groundwater strike at 1.7m with moderate inflow.
3. Pit walls unstable and collapsing at 1.7m depth.
4. Samples – ES @ 0.1m, D @ 0.9m.

TP4

TP4 - Spoil

TRIAL PIT 5

Depth (m)	Strata
0 -0.3	Grass over loose dark brown and grey slightly sandy SILT (TOPSOIL).
0.3 – 1.9	Loose becoming medium dense reddish brown very slightly silty gravelly SAND. Gravel is fine to coarse, subrounded, of mixed lithologies. (GLACIAL DEPOSIT)
1.9 – 2.6	Stiff red brown locally grey silty slightly gravelly CLAY. Gravel is fine to coarse subangular and subrounded of sandstone, siltstone and mudstone. (GLACIAL TILL)

Notes

1. Excavation terminated at 2.6m depth due to collapses in sand strata.
2. Groundwater strike at 1.9m depth, with moderate inflow and some running sand.
3. Pit walls unstable and collapsing at around 1.9m depth.
4. Samples – ES @ 0.2m, T @ 1.0m, T @ 2.1m.

TP5

TP5 - Spoil

TRIAL PIT 6

Depth (m)	Strata
0 – 0.4	Grass over loose dark brown and grey slightly sandy SILT (TOPSOIL).
0.4 – 1.7	Loose to medium dense reddish brown very slightly silty gravelly SAND. Gravel is fine to coarse, subrounded, of mixed lithologies. (GLACIAL DEPOSIT) - Wet below 1.3m.
1.7 – 2.0	Stiff red brown locally grey silty slightly gravelly CLAY. Gravel is fine to coarse subangular and subrounded of sandstone, siltstone and mudstone. (GLACIAL TILL)

Notes

1. Excavation terminated at 2.0m depth due to collapses in sand strata.
2. Groundwater strike at 1.3m with moderate inflows and some running sand.
3. Pit walls unstable with collapses in sand strata.

TP6

TP6 - Spoil

TRIAL PIT 7

Depth (m)	Strata
0 – 0.3	Grass over loose dark brown and grey slightly sandy SILT (TOPSOIL).
0.3 – 1.7	Loose to medium dense reddish brown very slightly silty gravelly SAND. Gravel is fine to coarse, subrounded, of mixed lithologies. (GLACIAL DEPOSIT)
1.7 – 2.3	Stiff red brown locally grey silty slightly gravelly CLAY. Gravel is fine to coarse subangular and subrounded of sandstone, siltstone and mudstone. (GLACIAL TILL)

Notes

1. Excavation terminated at 2.3m depth due to collapses in sand strata.
2. Groundwater strike at 1.7m with moderate inflows and some running sand.
3. Pit sides unstable with some collapse in sand strata.
4. Samples – D @ 0.7m.

TP7

TP7 - Spoil

Trial Pit A

Depth (m)	Strata
0-0.3	TOPSOIL. Loose dark brown slightly sandy SILT. Fine to medium grained sub-rounded to rounded gravel with rootlets.
0.3-1.9	Loose light brown sandy sub-rounded fine to coarse GRAVEL. Loose to medium dense with depth. Gravel fine to coarse, angular to sub-angular of sandstone.

Notes

1. Groundwater- N/A.
2. Stability- Pit stable when digging, major collapse during soakaway test 2.
3. Samples – N/A.

Trial Pit B

Depth (m)	Strata
0-0.3	TOPSOIL. Loose dark brown slightly sandy SILT with rootlets. Small amount of medium sub-rounded gravel.
0.3-0.7	Loose to medium dense light brown slightly sandy SILT. Sub-rounded fine to coarse gravel. Gravel content increasing with depth.
0.7-1.7	Loose light brown sandy (fine to coarse) sub-rounded fine to coarse GRAVEL. Sand becomes coarser with depth with increasing gravel content.

Notes

1. Groundwater- N/A.
2. Stability- Pit stable
3. Samples – N/A.

Trial Pit C

Depth (m)	Strata
0-0.3	TOPSOIL- Loose dark brown slightly sandy SILT with rootlets. Small amount of medium sub-rounded gravel.
0.3-0.85	Loose to medium dense light brown slightly sandy SILT. Sub-rounded fine to coarse gravel. Gravel content increasing with depth.
0.85-1.75	Loose becoming loose-medium dense light brown sandy (fine to coarse) sub rounded fine to coarse Gravel. Sand becomes coarser with depth and with increasing gravel content.

Notes

1. Groundwater- N/A.
2. Stability- Pit stable
3. Samples- N/A.

Trial Pit D

Depth (m)	Strata
0-0.4	TOPSOIL. Loose dark brown quite sandy SILT with fine to medium sub-rounded to rounded gravel with rootlets.
0.4-0.6	Loose to medium dense becoming more loose with depth sandy SILT with sub-rounded fine to coarse gravel.
0.6-1.6	Loose light brown sandy (fine to coarse) GRAVEL. Gravel becomes coarser with depth with increasing gravel content.

Notes

1. Groundwater- small amount at 1.6m
2. Stability- Pit stable.
3. Samples- N/A.

ANNEX D:	GroundSolve Ltd Soakaway Test Calculations

SCALE 1:1000 @ A3

Figure Title

DRAFT TP LOCATION PLAN

FIGURE

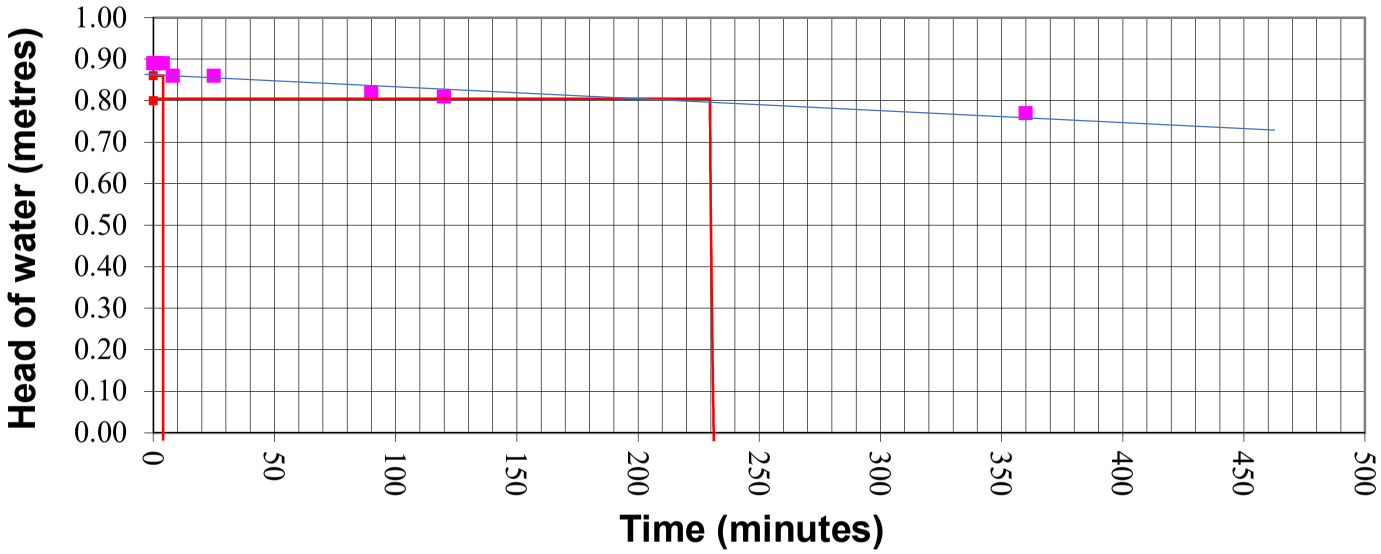
Time (Mins)	Depth of Water	Head of Water
0	1.31	0.89
1	1.31	0.89
4	1.31	0.89
8	1.34	0.86
25	1.34	0.86
90	1.38	0.82
120	1.39	0.81
360	1.43	0.77

GroundSolve Ltd

2254 Wrexham Road, Holt

TP1 Test 1

18/07/19



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
2.20	1.80	0.60	0.668	0.22	0.89	3.216	0.481	1.00	5	230	1.107E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

Note: result calculated based on measured infiltration only, as test cycle did not reach the 25%/75% marker. Result should therefore be used with caution.

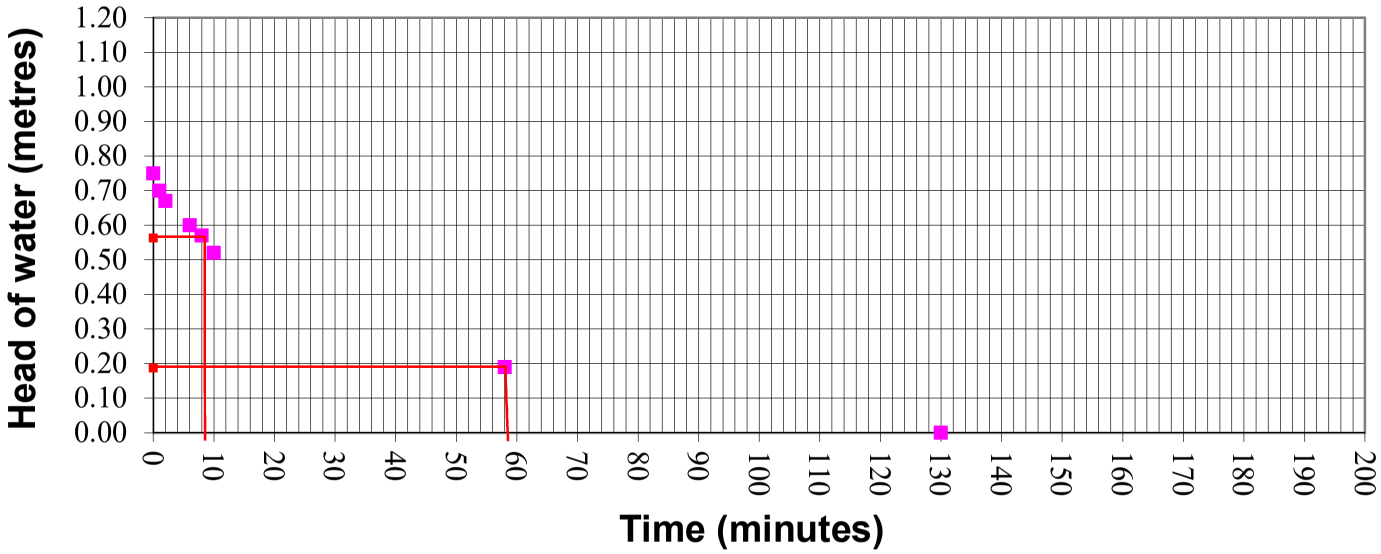
Time (Mins)	Depth of Water	Head of Water
0	0.70	0.75
1	0.75	0.70
2	0.78	0.67
6	0.85	0.60
8	0.88	0.57
10	0.93	0.52
58	1.26	0.19
130	1.45	0.00

GroundSolve Ltd

2254 Wrexham Road, Holt

TP2 Test 1

18/07/19



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.45	1.50	0.60	0.563	0.19	0.75	2.475	0.338	1.00	8	58	4.545E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

Note: base at 1.45m depth at end of test following minor collapses.

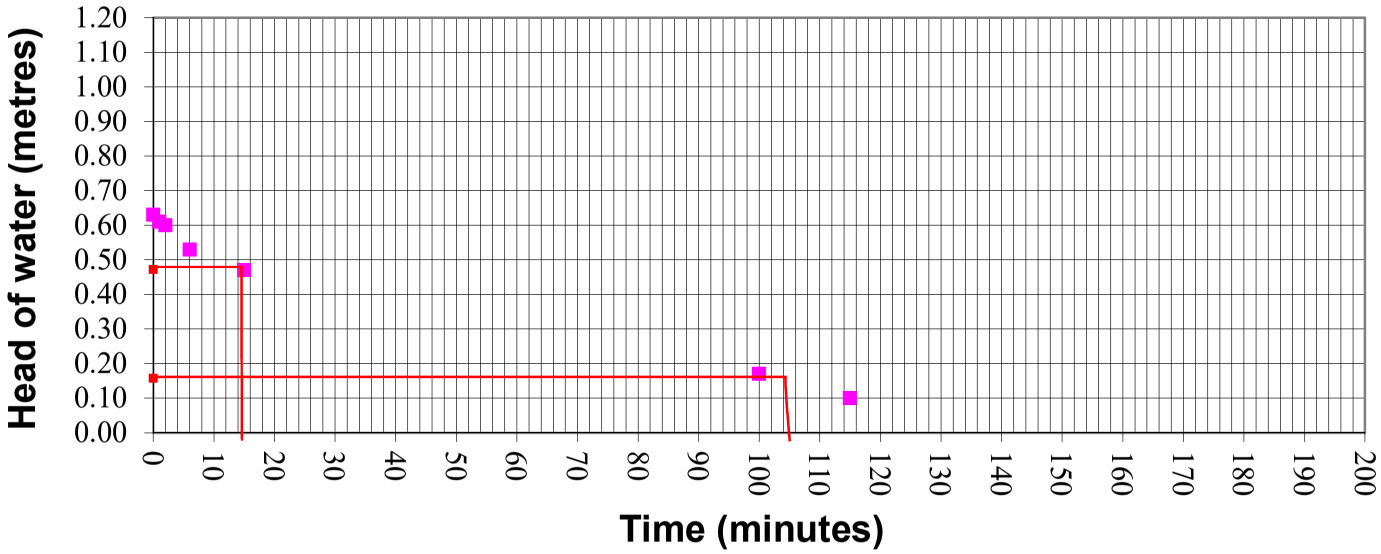
Time (Mins)	Depth of Water	Head of Water
0	0.87	0.63
1	0.89	0.61
2	0.90	0.60
6	0.97	0.53
15	1.03	0.47
100	1.33	0.17
115	1.40	0.10

GroundSolve Ltd

2254 Wrexham Road, Holt

TP2 Test 2

18/07/19



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.50	1.50	0.60	0.473	0.16	0.63	2.223	0.284	1.00	12	104	2.310E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

Note: Pit cleared out to 1.8m depth prior to testing, however base at 1.5m depth at end of test following minor collapses

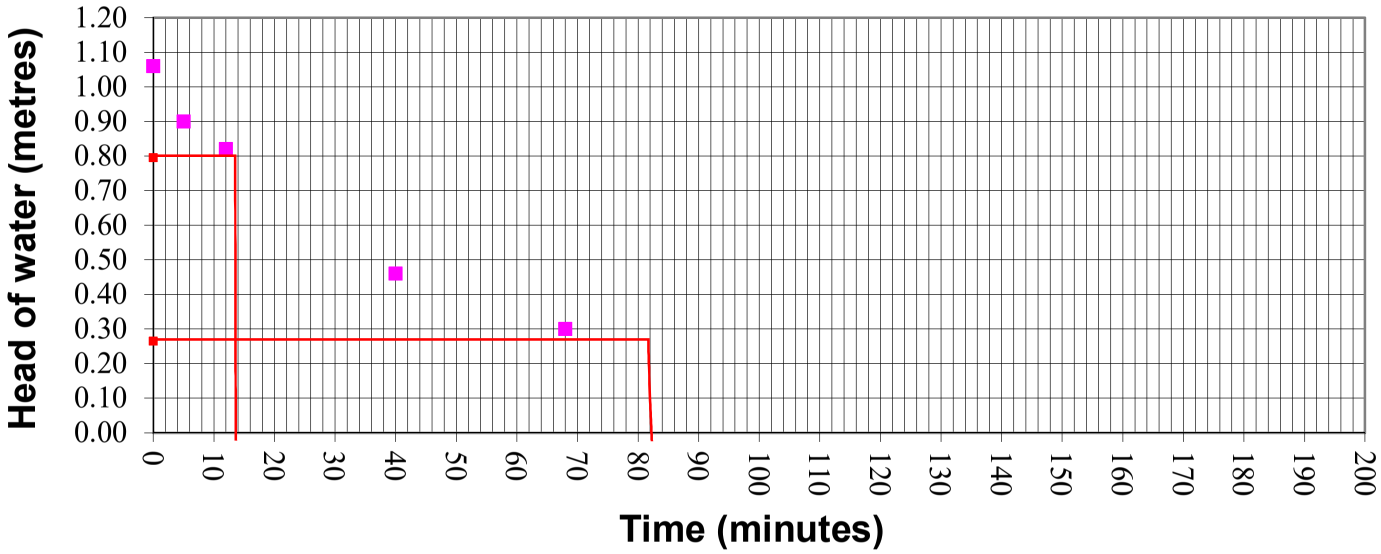
Time (Mins)	Depth of Water	Head of Water
0	0.44	1.06
5	0.60	0.90
12	0.68	0.82
40	1.04	0.46
68	1.20	0.30

GroundSolve Ltd

2254 Wrexham Road, Holt

TP2 Test 3

18/07/19



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.50	1.50	0.60	0.795	0.27	1.06	3.126	0.477	1.00	14	82	3.740E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

Note: result extrapolated as test was not fully completed due to time constraints on site.

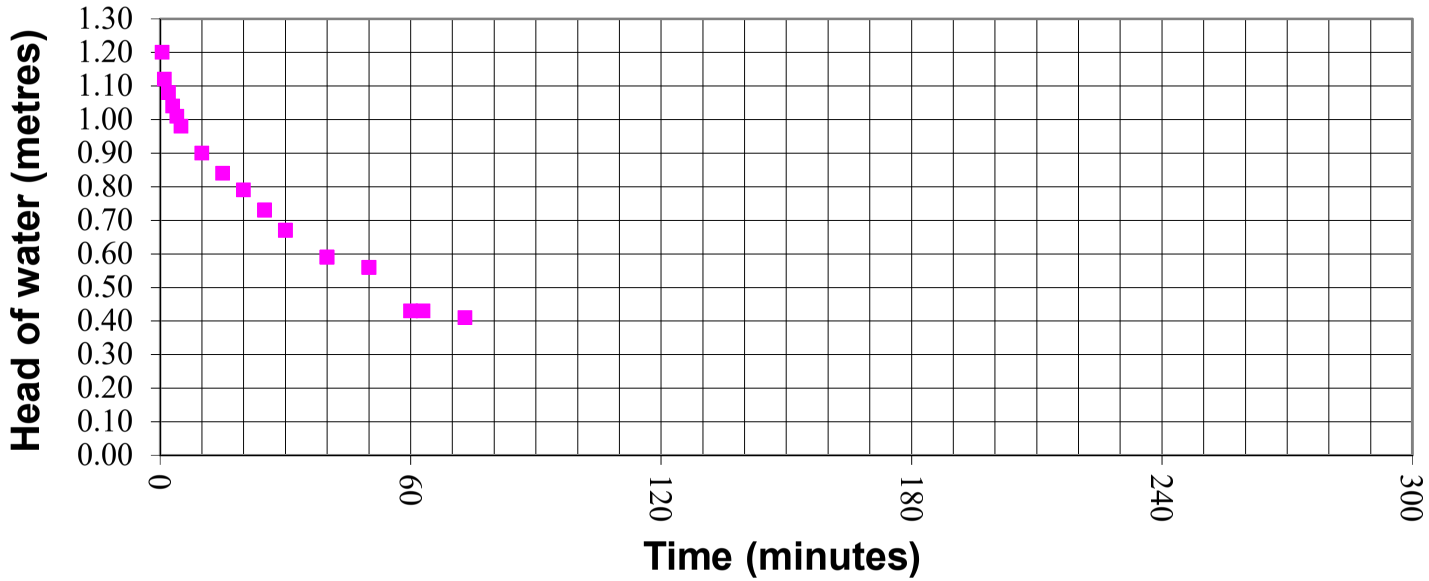
Time (Mins)	Depth of Water	Head of Water
0.5	0.70	1.20
1	0.78	1.12
2	0.82	1.08
3	0.86	1.04
4	0.89	1.01
5	0.92	0.98
10	1.00	0.90
15	1.06	0.84
20	1.11	0.79
25	1.17	0.73
30	1.23	0.67
40	1.31	0.59
50	1.34	0.56
60	1.47	0.43
25	1.17	0.73
30	1.23	0.67
40	1.31	0.59
50	1.34	0.56
63	1.47	0.43
73	1.49	0.41

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU

TPA Test 1

02/08/2019

GroundSolve Ltd



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.90	1.65	0.60	0.900	0.30	1.20	3.690	0.594	1.00	10	100	2.981E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

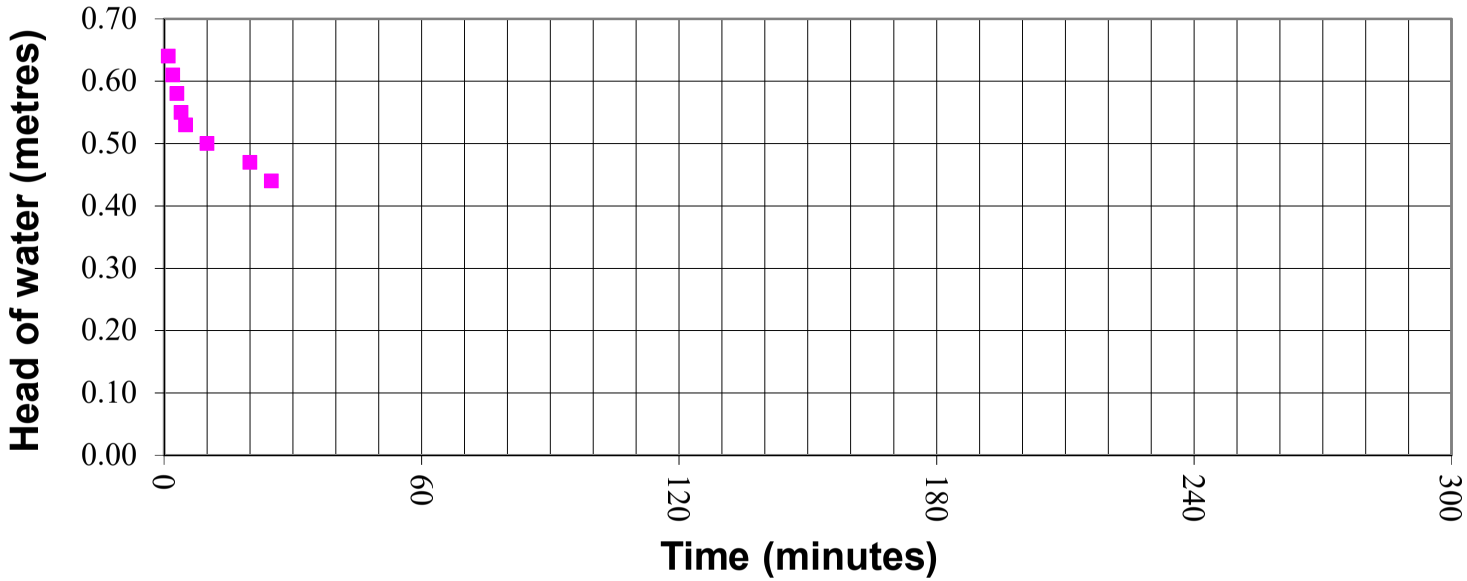
Time (Mins)	Depth of Water	Head of Water
1	0.92	0.64
2	0.95	0.61
3	0.98	0.58
4	1.01	0.55
5	1.03	0.53
10	1.06	0.50
20	1.09	0.47
25	1.12	0.44

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU

TPA Test 2

02/08/2019

GroundSolve Ltd



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.56	1.65	0.60	0.480	0.16	0.64	2.430	0.317	1.00	18	100	2.650E-05

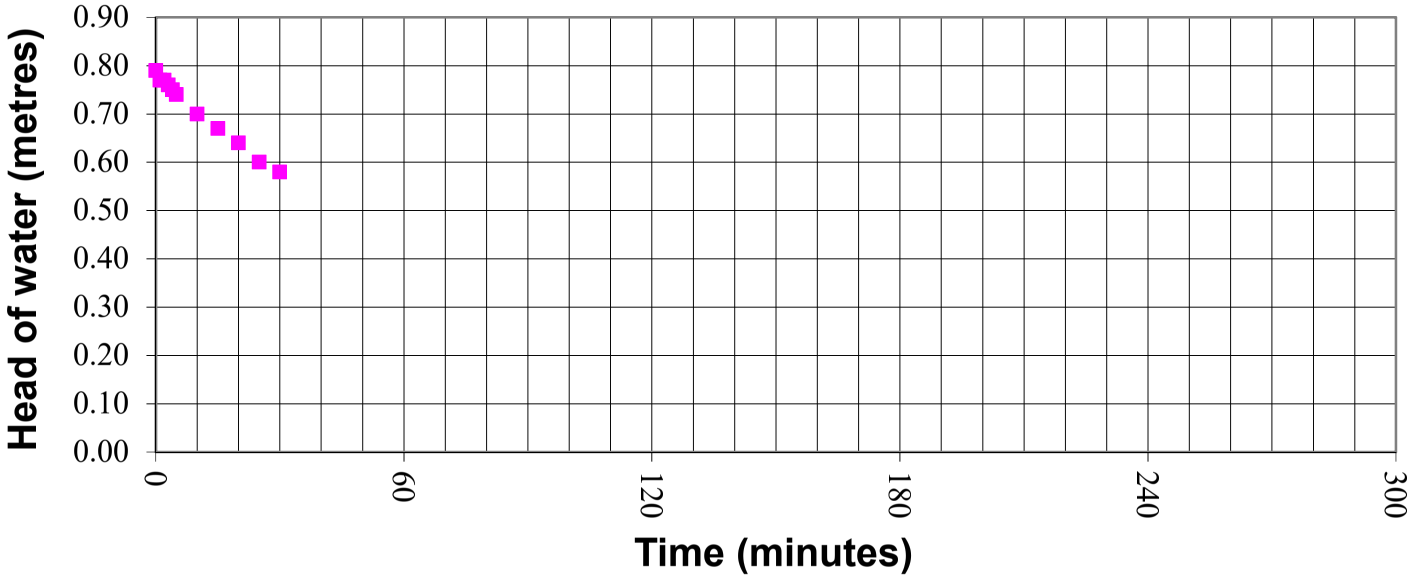
Time (Mins)	Depth of Water	Head of Water
0	1.01	0.79
1	1.03	0.77
2	1.03	0.77
3	1.04	0.76
4	1.05	0.75
5	1.06	0.74
10	1.10	0.70
15	1.13	0.67
20	1.16	0.64
25	1.20	0.60
30	1.22	0.58

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU

TPA Test 3

02/08/2019

GroundSolve Ltd



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.80	1.65	0.60	0.593	0.20	0.79	2.768	0.391	1.00	28	82	4.361E-05

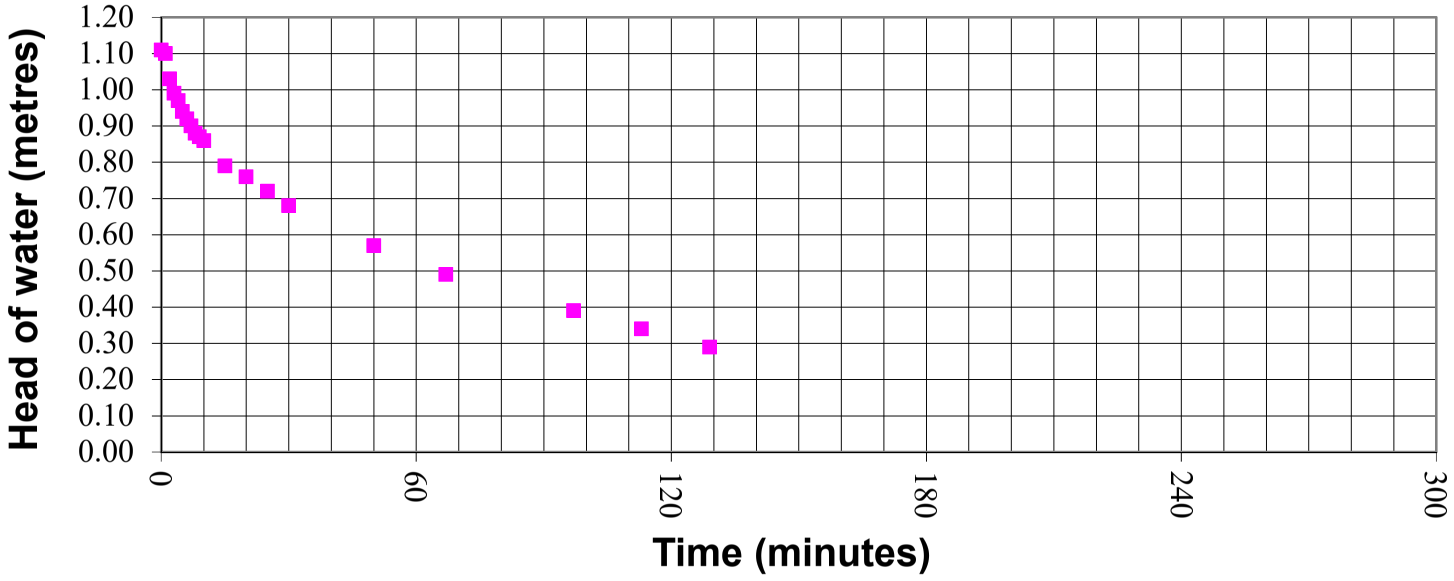
Time (Mins)	Depth of Water	Head of Water
0	0.59	1.11
1	0.60	1.10
2	0.67	1.03
3	0.71	0.99
4	0.73	0.97
5	0.76	0.94
6	0.78	0.92
7	0.80	0.90
8	0.82	0.88
9	0.83	0.87
10	0.84	0.86
15	0.91	0.79
20	0.94	0.76
25	0.98	0.72
30	1.02	0.68
50	1.13	0.57
67	1.21	0.49
97	1.31	0.39
113	1.36	0.34
129	1.41	0.29

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU

TPB Test 1

02/08/2019

GroundSolve Ltd



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.70	1.70	0.60	0.833	0.28	1.11	3.573	0.566	1.00	13	131	2.238E-05

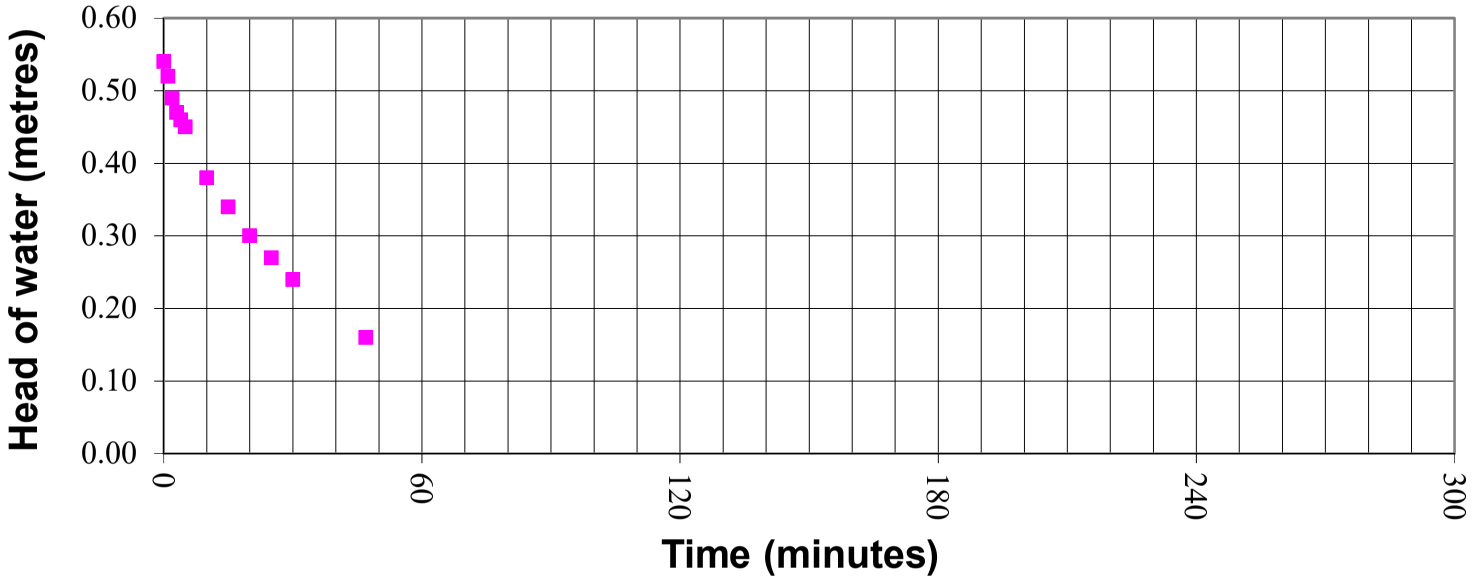
Time (Mins)	Depth of Water	Head of Water
0	0.94	0.54
1	0.96	0.52
2	0.99	0.49
3	1.01	0.47
4	1.02	0.46
5	1.03	0.45
10	1.10	0.38
15	1.14	0.34
20	1.18	0.30
25	1.21	0.27
30	1.24	0.24
47	1.32	0.16

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU

TPB Test 2

02/08/2019

GroundSolve Ltd

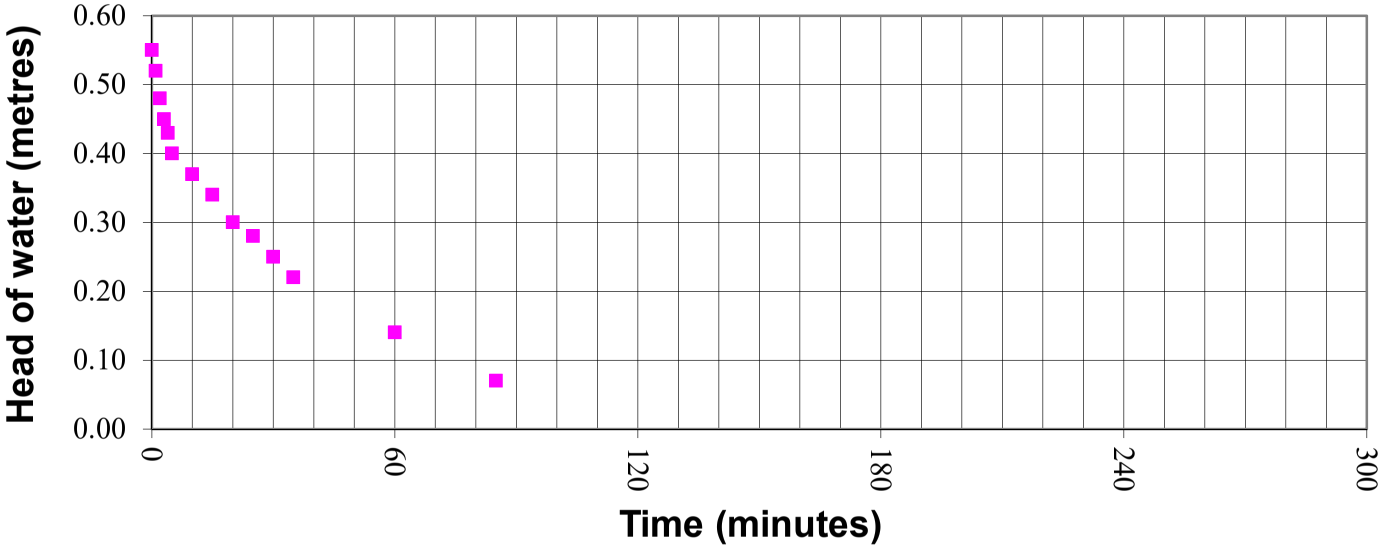


Depth (m)	Length (m)	Width (m)	Head at 75% Vol (m)	Head at 25% Vol (m)	Water depth(t=0) (m)	Effective Area Ap50 m2	Vp75-Vp25 Volume of water m3	Adjustment Factor *	t75 (mins)	t25 (mins)	Infiltration rate m/s
1.48	1.70	0.60	0.405	0.14	0.54	2.262	0.275	1.00	8	50	4.831E-05

Time (Mins)	Depth of Water	Head of Water
0	0.85	0.55
1	0.88	0.52
2	0.92	0.48
3	0.95	0.45
4	0.97	0.43
5	1.00	0.40
10	1.03	0.37
15	1.06	0.34
20	1.10	0.30
25	1.12	0.28
30	1.15	0.25
35	1.18	0.22
60	1.26	0.14
85	1.33	0.07

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU
TPB Test 3
02/08/2019

GroundSolve Ltd

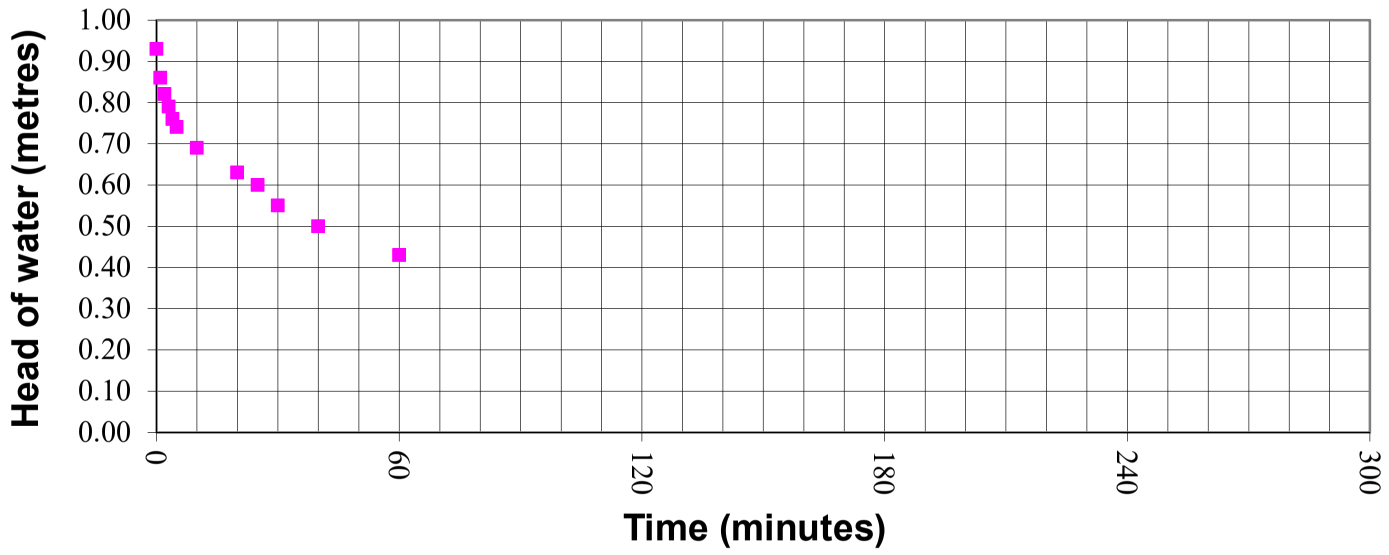


Depth (m)	Length (m)	Width (m)	Head at 75% Vol (m)	Head at 25% Vol (m)	Water depth(t=0) (m)	Effective Area Ap50 m2	Vp75-Vp25 Volume of water m3	Adjustment Factor *	t75 (mins)	t25 (mins)	Infiltration rate m/s
1.40	1.70	0.60	0.413	0.14	0.55	2.285	0.281	1.00	4.5	60	3.686E-05

Time (Mins)	Depth of Water	Head of Water
0	0.82	0.93
1	0.89	0.86
2	0.93	0.82
3	0.96	0.79
4	0.99	0.76
5	1.01	0.74
10	1.06	0.69
20	1.12	0.63
25	1.15	0.60
30	1.20	0.55
40	1.25	0.50
60	1.32	0.43

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU
TPC Test 1
02/08/2019

GroundSolve Ltd

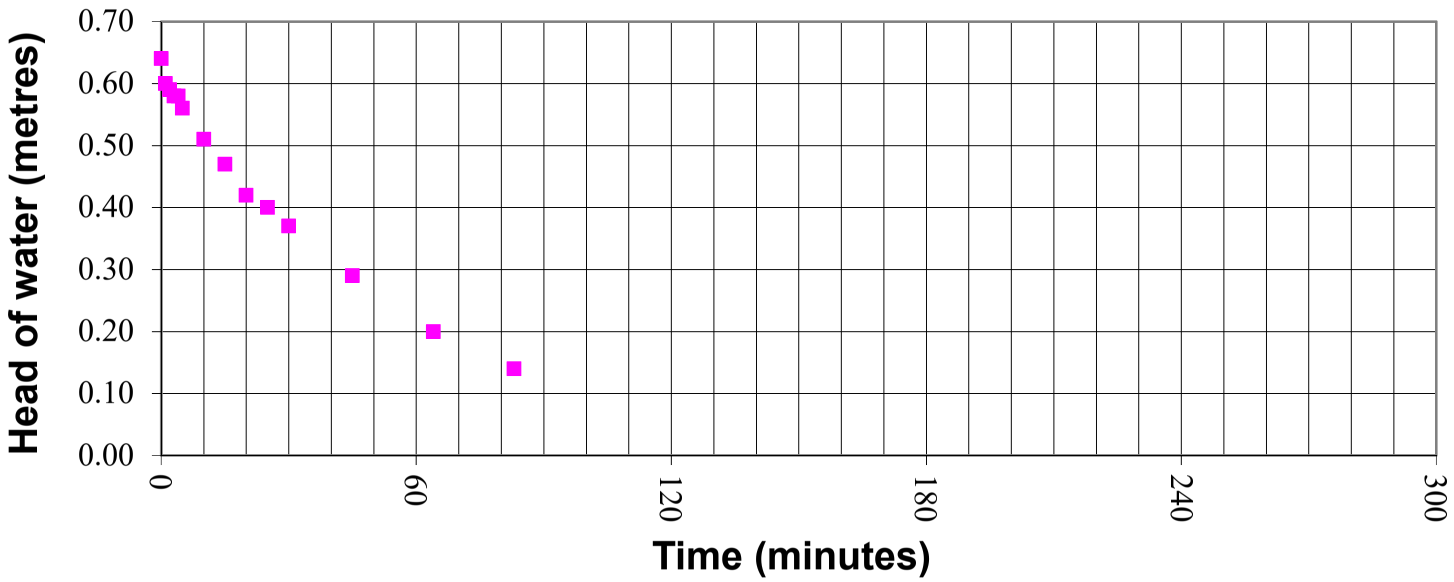


Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.75	1.60	0.60	0.698	0.23	0.93	3.006	0.446	1.00	10	110	2.475E-05

Time (Mins)	Depth of Water	Head of Water
0	0.92	0.64
1	0.96	0.60
2	0.97	0.59
3	0.98	0.58
4	0.98	0.58
5	1.00	0.56
10	1.05	0.51
15	1.09	0.47
20	1.14	0.42
25	1.16	0.40
30	1.19	0.37
45	1.27	0.29
64	1.36	0.20
83	1.42	0.14

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU
TPC Test 2
02/08/2019

GroundSolve Ltd



Depth (m)	Length (m)	Width (m)	Head at 75% Vol (m)	Head at 25% Vol (m)	Water depth(t=0) (m)	Effective Area Ap50 m2	Vp75-Vp25 Volume of water m3	Adjustment Factor *	t75 (mins)	t25 (mins)	Infiltration rate m/s
1.56	1.60	0.60	0.480	0.16	0.64	2.368	0.307	1.00	14	79	3.326E-05

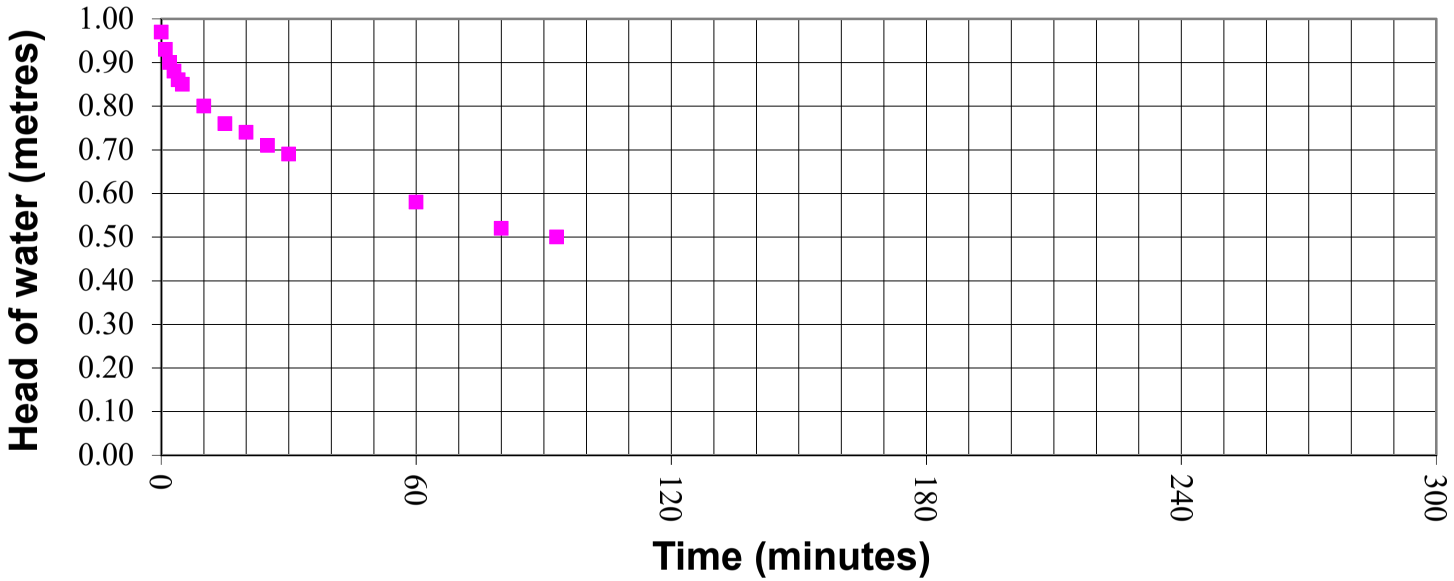
Time (Mins)	Depth of Water	Head of Water
0	0.79	0.97
1	0.83	0.93
2	0.86	0.90
3	0.88	0.88
4	0.90	0.86
5	0.91	0.85
10	0.96	0.80
15	1.00	0.76
20	1.02	0.74
25	1.05	0.71
30	1.07	0.69
60	1.18	0.58
80	1.24	0.52
93	1.26	0.50

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU

TPC Test 3

02/08/2019

GroundSolve Ltd



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.76	1.60	0.60	0.728	0.24	0.97	3.094	0.466	1.00	23	190	1.502E-05

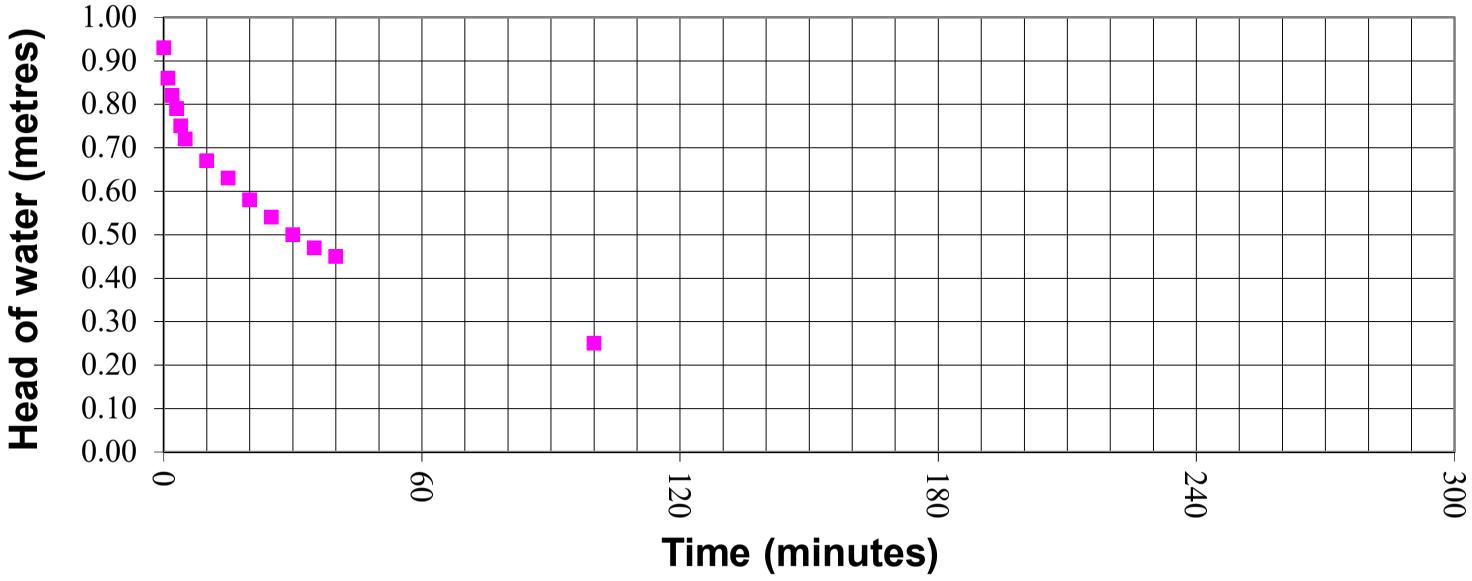
Time (Mins)	Depth of Water	Head of Water
0	0.67	0.93
1	0.74	0.86
2	0.78	0.82
3	0.81	0.79
4	0.85	0.75
5	0.88	0.72
10	0.93	0.67
15	0.97	0.63
20	1.02	0.58
25	1.06	0.54
30	1.10	0.50
35	1.13	0.47
40	1.15	0.45
100	1.35	0.25

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU

TPD Test 1

02/08/2019

GroundSolve Ltd

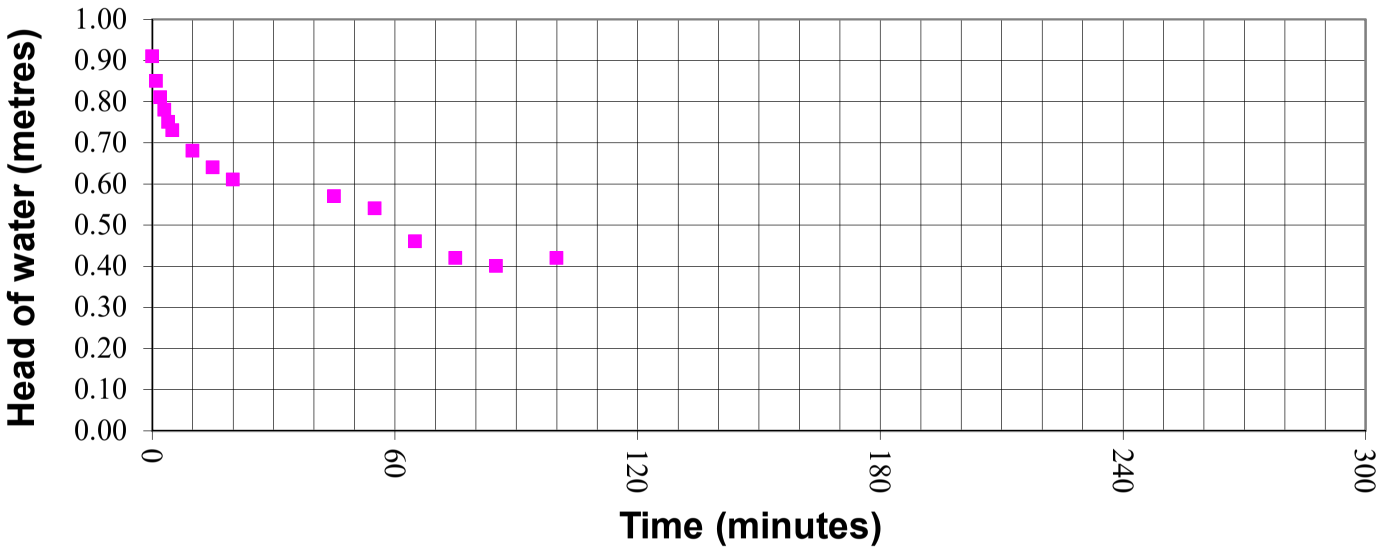


Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.60	1.60	0.60	0.698	0.23	0.93	3.006	0.446	1.00	7.5	106	2.513E-05

Time (Mins)	Depth of Water	Head of Water
0	0.63	0.91
1	0.69	0.85
2	0.73	0.81
3	0.76	0.78
4	0.79	0.75
5	0.81	0.73
10	0.86	0.68
15	0.90	0.64
20	0.93	0.61
45	0.97	0.57
55	1.00	0.54
65	1.08	0.46
75	1.12	0.42
85	1.14	0.40
100	1.12	0.42

Site opposite Bellis Brothers,
Wrexham Road, Holt, LL13 9YU
TPD Test 2
02/08/2019

GroundSolve Ltd



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.54	1.60	0.60	0.683	0.23	0.91	2.962	0.437	1.00	10	150	1.756E-05

ANNEX E:	Dŵr Cymru Welsh Water Sewer Records

Dŵr Cymru
Welsh Water

25/07/2019

N
W E
S

Scale: 1: 500

LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon In the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby the company, is done so in accordance with statutory requirements of sections 198 and 199 f the water industry Act 1991 based upon the best Information available and in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclosure the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information us entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damage to its apparatus.

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

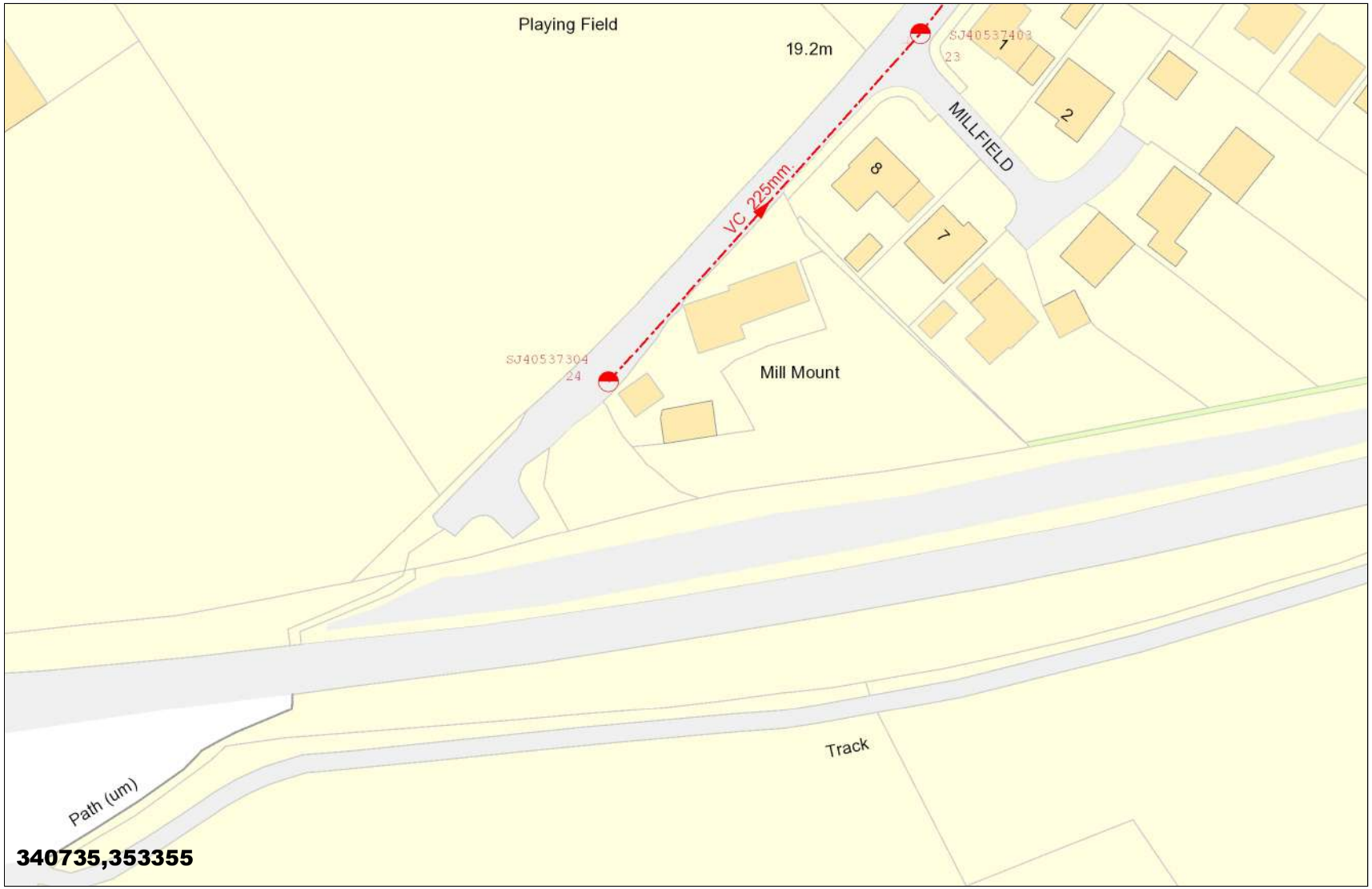
Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright. Licence No: WU298565.

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru
Welsh Water

25/07/2019

Scale: 1: 1000



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon In the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby the company, is done so in accordance with statutory requirements of sections 198 and 199 f the water industry Act 1991 based upon the best Information available and in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclosure the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information us entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damage to its apparatus.

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

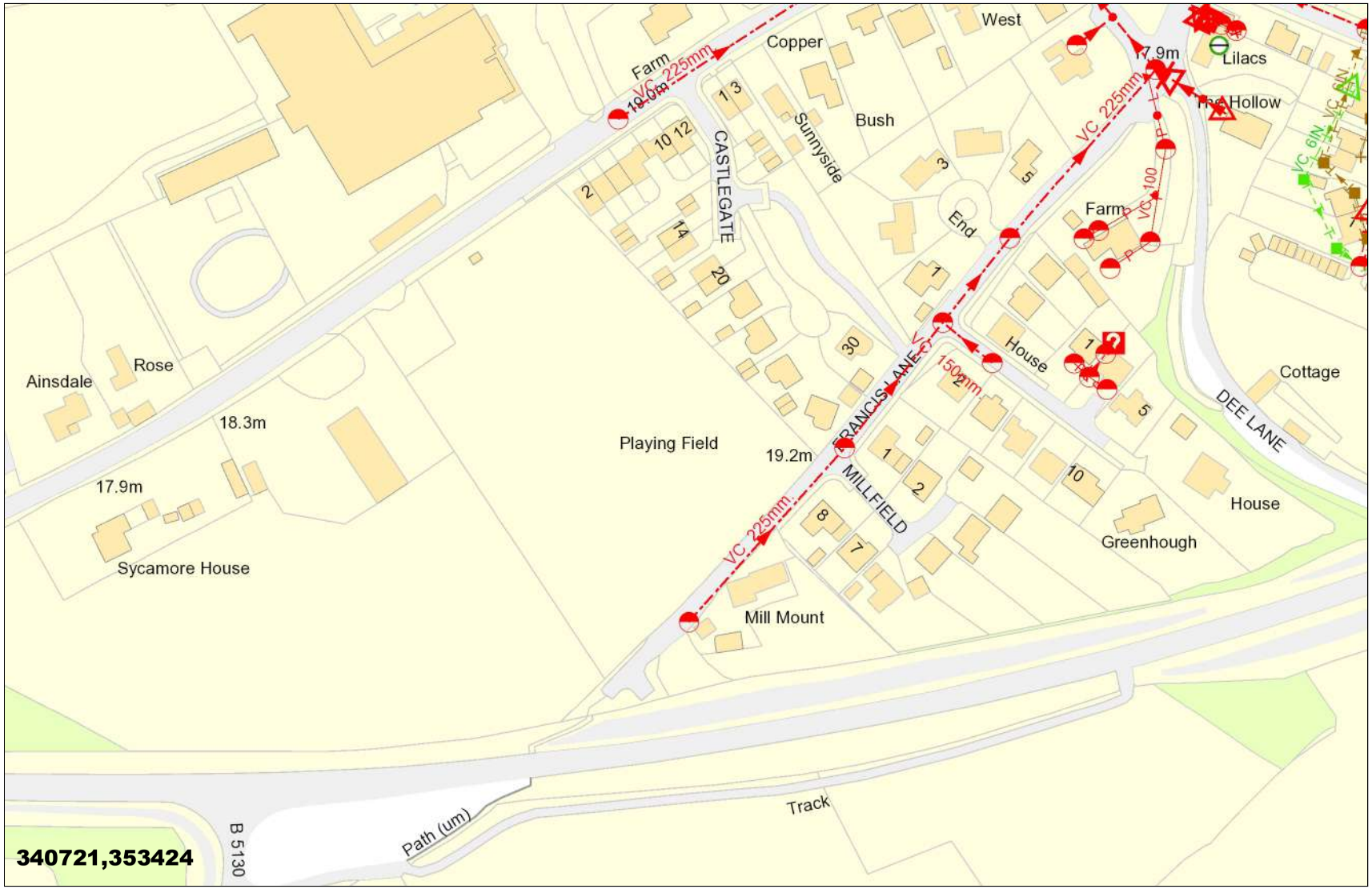
Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright. Licence No: WU298565.

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru
Welsh Water

25/07/2019

Scale: 1: 2000



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

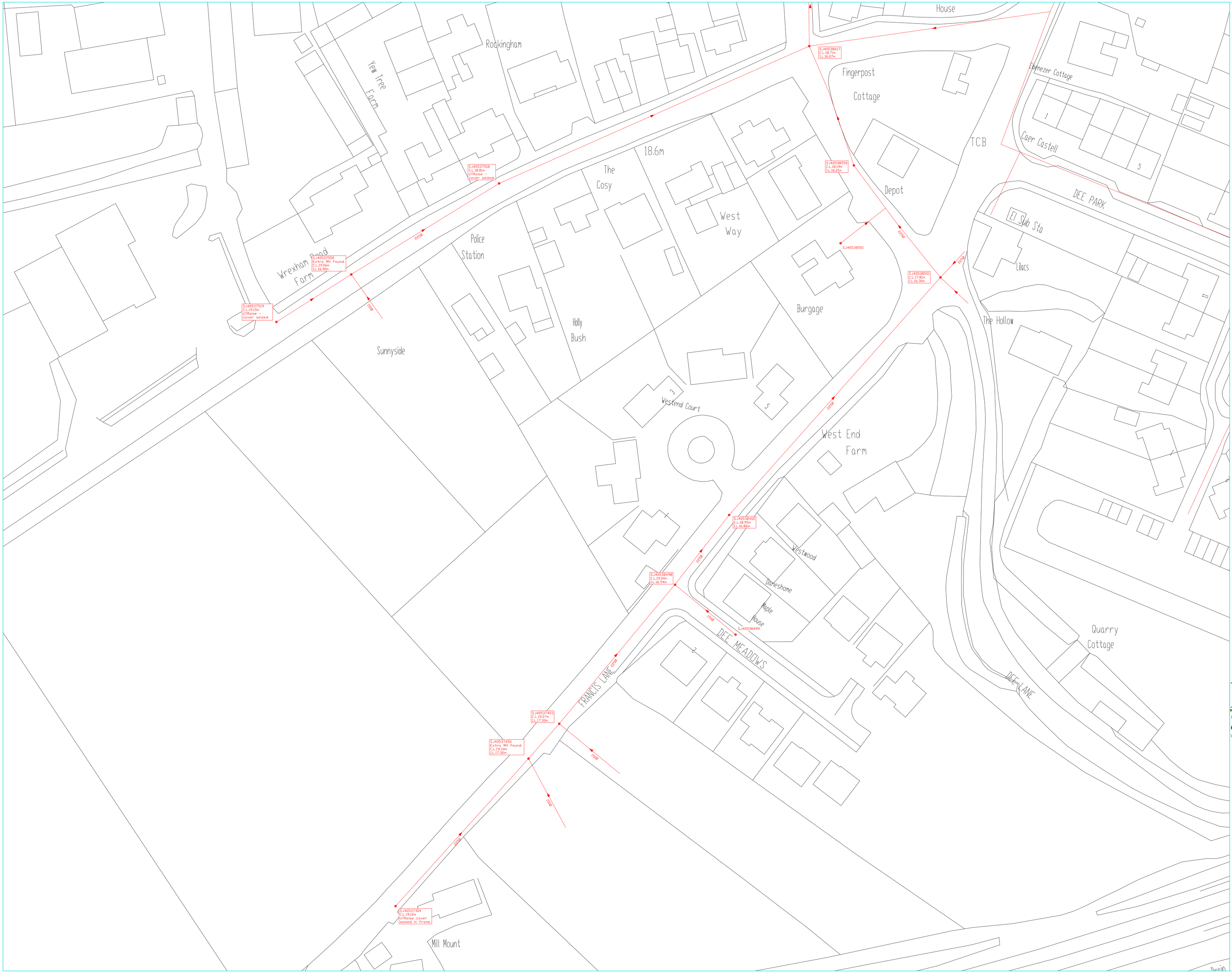
Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon In the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby the company, is done so in accordance with statutory requirements of sections 198 and 199 f the water industry Act 1991 based upon the best Information available and in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclosure the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information us entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damage to its apparatus.

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright. Licence No: WU298565.

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

ANNEX F:	Invek Surveys - Drainage Survey, July 2019



Legend/Notes:

- Combined Sewer
- Foul Sewer
- SW Sewer
- Assumed Sewer (Not Proven)
- Rising Main
- Highway Drainage
- Culvert Sewer
- Open Water Course
- RWD Rain Water Down Pipe
- FDP Foul Down Pipe
- CDP Combined Down Pipe
- GDP Grey Water Down Pipe
- Highway Gully
- Septic Tanks

INVEK SURVEYS LTD.
Warrington Business Park, Long Lane, Warrington, Cheshire, WA2 8TX
Tel: 01925 244376 Fax: 01925 241517
Email: kevin@invek.com – www.invek.com

Client
Macbryde Homes Ltd

Drawing Title
Wrexham Rd, Holt
Drainage Layout

Scale(s)	N.T.S	Drawn	PW
Date	11.07.19	Checked	RD
Job Number	1502	Approved	KN

Sheet Size, Drawing Number & Revision
A1_1502/01_Rev_00

ANNEX G:	MicroDrainage Calculations – Pipe Network, Permeable Paving and Infiltration Basin

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 In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S6	19.500	1.500	Open Manhole	1200	S1.000	18.000	300				
S5	19.470	1.570	Open Manhole	1200	S1.001	17.900	300	S1.000	17.900	300	
S4	19.440	1.620	Open Manhole	1200	S1.002	17.820	300	S1.001	17.820	300	
S3	19.410	1.690	Open Manhole	1200	S1.003	17.720	300	S1.002	17.720	300	
S2	19.380	1.770	Open Manhole	1200	S1.004	17.610	300	S1.003	17.610	300	
S1	19.360	1.790	Open Manhole	1200	S1.005	17.570	300	S1.004	17.570	300	
SHW	17.820	0.300	Junction		S1.006	17.520	300	S1.005	17.520	300	
SDM1	19.360	2.260	Junction		S1.007	17.100	300	S1.006	17.100	300	
S	19.360	2.260	Open Manhole	0		OUTFALL		S1.007	17.100	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S6	340665.951	353484.995	340665.951	353484.995	Required	
S5	340676.288	353469.280	340676.288	353469.280	Required	
S4	340688.112	353457.840	340688.112	353457.840	Required	
S3	340698.551	353437.983	340698.551	353437.983	Required	
S2	340712.717	353417.066	340712.717	353417.066	Required	
S1	340708.448	353410.700	340708.448	353410.700	Required	
SHW	340706.354	353399.899			No Entry	
SDM1	340711.529	353392.495			No Entry	
S	340716.504	353384.137			No Entry	

©1982-2019 Innovyze

PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S6	19.500	18.000	1.200	Open Manhole	1200
S1.001	o	300	S5	19.470	17.900	1.270	Open Manhole	1200
S1.002	o	300	S4	19.440	17.820	1.320	Open Manhole	1200
S1.003	o	300	S3	19.410	17.720	1.390	Open Manhole	1200
S1.004	o	300	S2	19.380	17.610	1.470	Open Manhole	1200
S1.005	o	300	S1	19.360	17.570	1.490	Open Manhole	1200
S1.006	o	300	SHW	17.820	17.520	0.000	Junction	
S1.007	o	300	SDM1	19.360	17.100	1.960	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	18.810	188.1	S5	19.470	17.900	1.270	Open Manhole	1200
S1.001	16.452	205.7	S4	19.440	17.820	1.320	Open Manhole	1200
S1.002	22.434	224.3	S3	19.410	17.720	1.390	Open Manhole	1200
S1.003	25.263	229.7	S2	19.380	17.610	1.470	Open Manhole	1200
S1.004	7.700	192.5	S1	19.360	17.570	1.490	Open Manhole	1200
S1.005	11.002	220.0	SHW	17.820	17.520	0.000	Junction	
S1.006	1.000#	2.4	SDM1	19.360	17.100	1.960	Junction	
S1.007	1.000#	0.0	S	19.360	17.100	1.960	Open Manhole	0

©1982-2019 Innovyze

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.066	0.066	0.066
1.001	-	-	100	0.213	0.213	0.213
1.002	-	-	100	0.071	0.071	0.071
1.003	-	-	100	0.038	0.038	0.038
1.004	-	-	100	0.063	0.063	0.063
1.005	-	-	100	0.050	0.050	0.050
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.501	0.501	0.501

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)
S1.007	S	19.360	17.100	0.000	0	0

©1982-2019 Innovyze

Online Controls for Storm

Pump Manhole: SDM1, DS/PN: S1.007, Volume (m³): 0.1

Invert Level (m) 17.100

Depth (m)	Flow (l/s)
0.720	5.0000

©1982-2019 Innovyze

Storage Structures for Storm

Porous Car Park Manhole: S5, DS/PN: S1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	23.1
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	64.2	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	19.020	Cap Volume Depth (m)	0.320

Porous Car Park Manhole: S2, DS/PN: S1.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.9
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	24.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	18.930	Cap Volume Depth (m)	0.320

Porous Car Park Manhole: S1, DS/PN: S1.005

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	14.7
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	40.8	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	18.910	Cap Volume Depth (m)	0.320

Infiltration Basin Manhole: SHW, DS/PN: S1.006

Invert Level (m)	17.100	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.08000	Porosity	1.00
Infiltration Coefficient Side (m/hr)	0.08000		

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	468.0	0.420	594.0	0.720	690.0

©1982-2019 Innovyze

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
S1.000	S6	1.696	1.245	0.000	2.941
S1.001	S5	1.776	1.078	22.176	25.030
S1.002	S4	1.832	1.501	0.000	3.333
S1.003	S3	1.911	1.701	0.000	3.612
S1.004	S2	2.002	0.459	8.544	11.005
S1.005	S1	2.024	0.735	14.112	16.872
S1.006	SHW	0.000	0.071	414.915	414.986
S1.007	SDM1	0.000	0.071	0.000	0.071
Total		11.242	6.861	459.747	477.850

©1982-2019 Innovyze

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.355
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 150.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S6	15 Winter	1	+0%	30/15 Summer				18.077
S1.001	S5	15 Winter	1	+0%	30/15 Summer				18.041
S1.002	S4	15 Winter	1	+0%	30/15 Summer				17.980
S1.003	S3	15 Winter	1	+0%	30/15 Summer				17.889
S1.004	S2	15 Winter	1	+0%	30/15 Summer				17.807
S1.005	S1	15 Winter	1	+0%	30/15 Summer				17.779
S1.006	SHW	180 Winter	1	+0%					17.176
S1.007	SDM1	120 Winter	1	+0%					17.100

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S6	-0.223	0.000	0.11		7.7	OK	
S1.001	S5	-0.159	0.000	0.45		29.3	OK	
S1.002	S4	-0.140	0.000	0.55		35.7	OK	
S1.003	S3	-0.131	0.000	0.60		39.2	OK	
S1.004	S2	-0.103	0.000	0.75		44.4	OK	
S1.005	S1	-0.091	0.000	0.82		48.8	OK	
S1.006	SHW	-0.644	0.000	0.00		0.0	OK*	

©1982-2019 Innovyze

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.007	SDM1	-0.300	0.000	0.00		0.0	OK*	

©1982-2019 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.355
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 150.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S6	15 Winter	30	+0%	30/15 Summer				18.695
S1.001	S5	15 Winter	30	+0%	30/15 Summer				18.679
S1.002	S4	15 Winter	30	+0%	30/15 Summer				18.594
S1.003	S3	15 Winter	30	+0%	30/15 Summer				18.427
S1.004	S2	15 Winter	30	+0%	30/15 Summer				18.208
S1.005	S1	15 Winter	30	+0%	30/15 Summer				18.028
S1.006	SHW	180 Winter	30	+0%					17.319
S1.007	SDM1	120 Winter	30	+0%					17.100

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S6	0.395	0.000	0.25		17.5	SURCHARGED	
S1.001	S5	0.479	0.000	1.02		66.6	SURCHARGED	
S1.002	S4	0.474	0.000	1.27		82.8	SURCHARGED	
S1.003	S3	0.407	0.000	1.40		91.3	SURCHARGED	
S1.004	S2	0.298	0.000	1.77		104.8	SURCHARGED	
S1.005	S1	0.158	0.000	1.94		115.6	SURCHARGED	
S1.006	SHW	-0.501	0.000	0.00		0.0	OK*	

©1982-2019 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.007	SDM1	-0.300	0.000	0.00		0.0	OK*	

©1982-2019 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.355
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 150.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S6	15 Winter	100	+30%	30/15 Summer				19.209
S1.001	S5	15 Winter	100	+30%	30/15 Summer				19.184
S1.002	S4	15 Winter	100	+30%	30/15 Summer				19.082
S1.003	S3	15 Winter	100	+30%	30/15 Summer				18.876
S1.004	S2	15 Winter	100	+30%	30/15 Summer				18.575
S1.005	S1	15 Winter	100	+30%	30/15 Summer				18.255
S1.006	SHW	240 Winter	100	+30%					17.504
S1.007	SDM1	120 Winter	100	+30%					17.100

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S6	0.909	0.000	0.42		29.5	SURCHARGED	
S1.001	S5	0.984	0.000	1.52		99.4	SURCHARGED	
S1.002	S4	0.962	0.000	1.66		108.4	SURCHARGED	
S1.003	S3	0.856	0.000	1.77		115.6	SURCHARGED	
S1.004	S2	0.665	0.000	2.36		139.7	SURCHARGED	
S1.005	S1	0.385	0.000	2.76		164.2	SURCHARGED	
S1.006	SHW	-0.316	0.000	0.00		0.0	OK*	

©1982-2019 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.007	SDM1	-0.300	0.000	0.00		0.0	OK*	

©1982-2019 Innovyze

ANNEX H:	MicroDrainage Calculations – Storage Volume Calculations (MUGA Soakaway Trench)

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 312 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	-1.273	0.327	0.2	4.3	O K
30 min Summer	-1.169	0.431	0.2	5.7	O K
60 min Summer	-1.068	0.532	0.3	7.1	O K
120 min Summer	-0.984	0.616	0.3	8.2	O K
180 min Summer	-0.955	0.645	0.3	8.6	O K
240 min Summer	-0.949	0.651	0.3	8.7	O K
360 min Summer	-0.955	0.645	0.3	8.6	O K
480 min Summer	-0.966	0.634	0.3	8.4	O K
600 min Summer	-0.980	0.620	0.3	8.3	O K
720 min Summer	-0.995	0.605	0.3	8.0	O K
960 min Summer	-1.026	0.574	0.3	7.6	O K
1440 min Summer	-1.085	0.515	0.3	6.8	O K
2160 min Summer	-1.166	0.434	0.2	5.8	O K
2880 min Summer	-1.235	0.365	0.2	4.9	O K
4320 min Summer	-1.345	0.255	0.2	3.4	O K
5760 min Summer	-1.426	0.174	0.2	2.3	O K
7200 min Summer	-1.483	0.117	0.2	1.5	O K
8640 min Summer	-1.523	0.077	0.2	1.0	O K
10080 min Summer	-1.546	0.054	0.2	0.7	O K
15 min Winter	-1.232	0.368	0.2	4.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	109.602	0.0	18
30 min Summer	73.555	0.0	33
60 min Summer	47.182	0.0	62
120 min Summer	29.291	0.0	122
180 min Summer	21.868	0.0	180
240 min Summer	17.663	0.0	226
360 min Summer	12.962	0.0	284
480 min Summer	10.413	0.0	348
600 min Summer	8.779	0.0	416
720 min Summer	7.632	0.0	486
960 min Summer	6.114	0.0	626
1440 min Summer	4.465	0.0	896
2160 min Summer	3.254	0.0	1296
2880 min Summer	2.597	0.0	1676
4320 min Summer	1.886	0.0	2420
5760 min Summer	1.501	0.0	3120
7200 min Summer	1.257	0.0	3824
8640 min Summer	1.086	0.0	4496
10080 min Summer	0.960	0.0	5144
15 min Winter	109.602	0.0	18

©1982-2019 Innovyze

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	-1.115	0.485	0.3	6.4	O K
60 min Winter	-0.999	0.601	0.3	8.0	O K
120 min Winter	-0.899	0.701	0.3	9.3	O K
180 min Winter	-0.861	0.739	0.3	9.8	O K
240 min Winter	-0.849	0.751	0.3	10.0	O K
360 min Winter	-0.860	0.740	0.3	9.8	O K
480 min Winter	-0.872	0.728	0.3	9.7	O K
600 min Winter	-0.890	0.710	0.3	9.4	O K
720 min Winter	-0.912	0.688	0.3	9.2	O K
960 min Winter	-0.958	0.642	0.3	8.5	O K
1440 min Winter	-1.047	0.553	0.3	7.4	O K
2160 min Winter	-1.164	0.436	0.2	5.8	O K
2880 min Winter	-1.261	0.339	0.2	4.5	O K
4320 min Winter	-1.407	0.193	0.2	2.6	O K
5760 min Winter	-1.505	0.095	0.2	1.3	O K
7200 min Winter	-1.551	0.049	0.2	0.7	O K
8640 min Winter	-1.557	0.043	0.1	0.6	O K
10080 min Winter	-1.562	0.038	0.1	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	73.555	0.0	33
60 min Winter	47.182	0.0	62
120 min Winter	29.291	0.0	118
180 min Winter	21.868	0.0	176
240 min Winter	17.663	0.0	230
360 min Winter	12.962	0.0	296
480 min Winter	10.413	0.0	370
600 min Winter	8.779	0.0	448
720 min Winter	7.632	0.0	526
960 min Winter	6.114	0.0	674
1440 min Winter	4.465	0.0	966
2160 min Winter	3.254	0.0	1384
2880 min Winter	2.597	0.0	1784
4320 min Winter	1.886	0.0	2508
5760 min Winter	1.501	0.0	3176
7200 min Winter	1.257	0.0	3672
8640 min Winter	1.086	0.0	4392
10080 min Winter	0.960	0.0	5112

©1982-2019 Innovyze

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.355	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.022

Time (mins) From:	To:	Area (ha)
0	4	0.022

©1982-2019 Innovyze

Model Details

Storage is Online Cover Level (m) 0.000

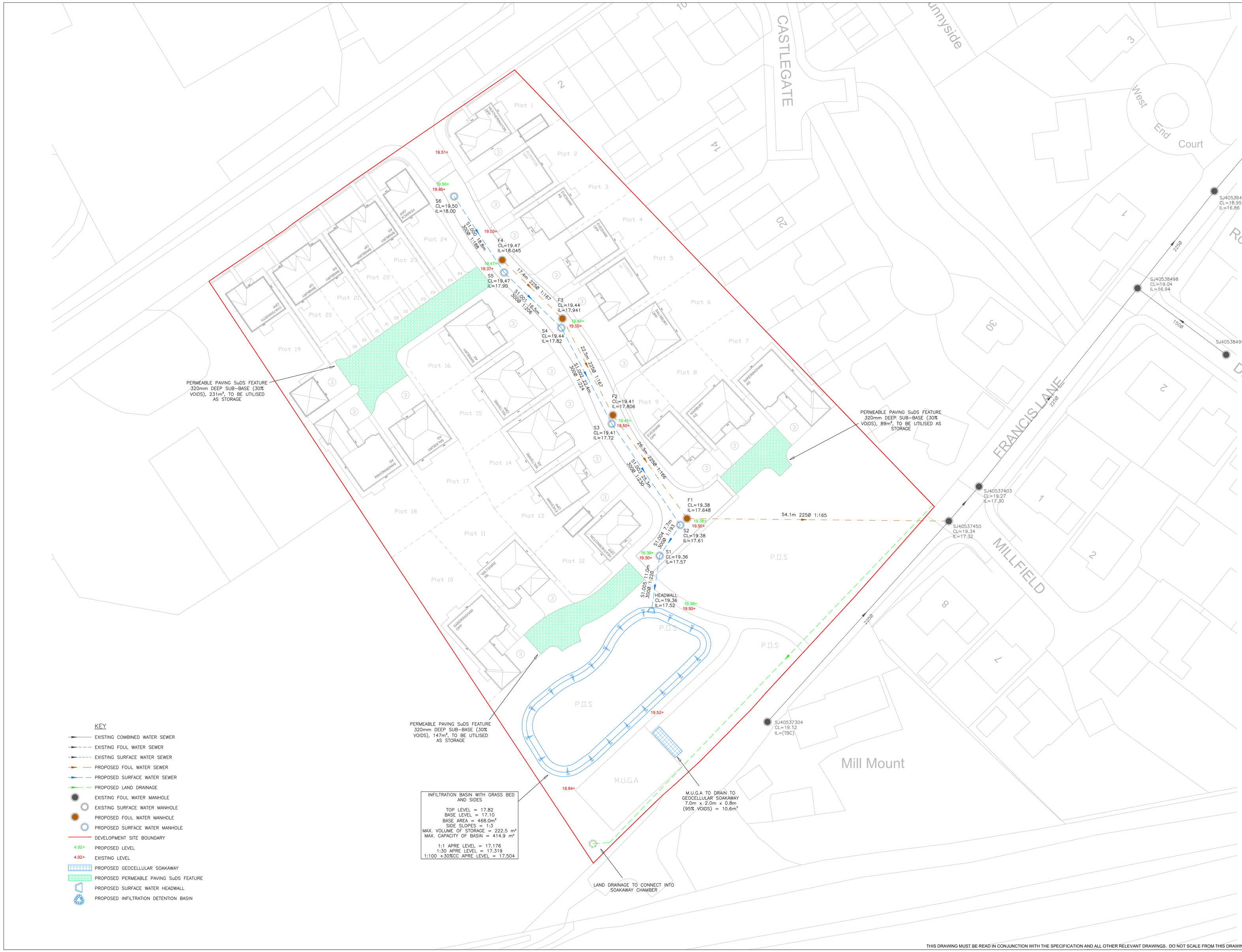
Cellular Storage Structure

Invert Level (m) -1.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.08000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.08000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	14.0	14.0	0.801	0.0	28.4
0.800	14.0	28.4			

©1982-2019 Innovyze

ANNEX I:	Preliminary Drainage Layout



NOTES

1. This drawing to be read in conjunction with all relevant Weetwood drawings.

LEGEND

1. ALL DIMENSIONS IN mm UNLESS NOTED OTHERWISE.
2. ALL LEVELS IN METRES.
3. ALL PROPOSED DRAINAGE TO BE MINIMUM 100Ø UNLESS NOTED OTHERWISE.
4. MINIMUM GRADIENTS:
   4.1. 150Ø FOUL WATER = 1:100
   4.2. 150Ø SURFACE WATER = 1:100
5. ALL CONNECTING PIPES TO ADOPTABLE DRAINAGE TO BE MINIMUM 150Ø.
6. ALL RAINWATER PIPES MUST BE FITTED WITH A RODDABLE ACCESS ABOVE GROUND.
7. ALL PRIVATE DRAINAGE TO BE INSTALLED IN ACCORDANCE WITH PART H OF THE BUILDING REGULATIONS AND BS EN 752 & 12056.
8. PRIVATE DRAINAGE TO BE 150Ø UPVC PIPES WITH GRP OR UPVC INSPECTION CHAMBERS. SYSTEM DESIGN & CONSTRUCTION TO CONFORM WITH MANUFACTURER'S INSTRUCTIONS & "GOOD PRACTICE GUIDE".
9. PROPOSED SITE LAYOUT TAKEN FROM MACBRYDE HOMES LIMITED 'PROPOSED SITE PLAN' (REF: WRHLT-SP01, REV G, SEP 2019).
10. EXISTING LEVEL INFORMATION TAKEN FROM CO - SURVEYS LTD TOPOGRAPHICAL SURVEY DRAWING (REF: 10254 / 1).
11. EXISTING DRAINAGE INFORMATION TAKEN FROM INVEK SURVEYS LTD DRAINAGE SURVEY DRAWING (REF: A1_1518/01_REV_00, JUL 2019)

KEY

- EXISTING COMBINED WATER SEWER
- EXISTING FOUL WATER SEWER
- EXISTING SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER SEWER
- PROPOSED LAND DRAINAGE
- EXISTING FOUL WATER MANHOLE
- EXISTING SURFACE WATER MANHOLE
- PROPOSED FOUL WATER MANHOLE
- PROPOSED SURFACE WATER MANHOLE
- DEVELOPMENT SITE BOUNDARY
- 4.92+ PROPOSED LEVEL
- 4.92+ EXISTING LEVEL
- PROPOSED GEOCELLULAR SOAKAWAY
- PROPOSED PERMEABLE PAVING SuDS FEATURE
- PROPOSED SURFACE WATER HEADWALL
- PROPOSED INFILTRATION DETENTION BASIN

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.

Rev	Date	Description	Drawn	Check
P1	14.11.19	Issued for Information	OA	GW

Weetwood
Development • Planning • Environment
Park House, Ffordd Byrnwr Gwair, Mold CH7 1FQ
Tel 01352 700045
info@weetwood.net
www.weetwood.net

Client
MACBRYDE HOMES LTD

Drawing Status
PRELIMINARY

Project
LAND OFF WREXHAM ROAD, HOLT

Title
PROPOSED DRAINAGE LAYOUT

Date	NOV 2019
Scale (A0)	1:250
Drawn	OA
Checked	GW
Project No	4638
Drawing No	100
Revision	P1

ANNEX J:	Dŵr Cymru Welsh Water Response

Macbryde Homes Limited
Unit 28, St Asaph Business Park, St Asaph, Denbighshire, LL17 OLJ
t: 01745 536677
w: macbryde-homes.co.uk

Macbryde Homes Limited (Reg No 1932141) is Registered in England & Wales. Registered offices at Macbryde House, Unit 28, St Asaph Business Park, St Asaph, Denbighshire, LL17 OLJ.
This email and any attached file are confidential and may be legally privileged. If you are not the addressee, any disclosure, reproduction, copying, distribution or other dissemination or use of this communication is strictly prohibited. If you have received this transmission in error, please notify the sender immediately and then delete this email. Email transmission including any attachments cannot be guaranteed to be secure or error free as information could be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. The recipient must check emails including attachment for viruses and Macbryde Homes Ltd cannot accept responsibility if the recipient fails to do so. The sender therefore does not accept liability for any errors or omissions in the contents of this message which arise as a result of email transmission. If verification is required, please request a hard copy version.

From: Perry Rhodri <Rhodri.Perry@dwrcymru.com>
Sent: 25 July 2019 13:46
To: Mathew Davies <mathew.davies@macbryde-homes.co.uk>
Cc: Stuart Andrew <Stuart.Andrew@macbryde-homes.co.uk>; Paul Hayes <paul.hayes@macbryde-homes.co.uk>; Simon Finlay <simon.finlay@macbryde-homes.co.uk>
Subject: RE: Land off Wrexham Road, Holt

Hi Mathew,

There is suitable connection points to the North and South of the site,

In the North a connection downstream of manhole chamber SJ40537519 and to the South of the site connection downstream of manhole chamber SJ40537304.

Have you got asset plans for this area?

Kind regards,

Rhodri

Rhodri Perry
Development Control Officer | Developer Services | Dwr Cymru Welsh Water
Linea | Cardiff | CF3 0LT | T: 0800 917 2652| www.dwrcymru.com

We will respond to your email as soon as possible but you should allow up to 10 working days to receive a response. For most of the services we offer we set out the timescales that we work to on our Developer Services section of our website. Just follow this link http://www.dwrcymru.com/en/Developer-Services.aspx and select the service you require where you will find more information and guidance notes which should assist you. If you cannot find the

information you are looking for then please call us on 0800 917 2652 as we can normally deal with any questions you have during the call.
If we've gone the extra mile to provide you with excellent service, let us know. You can nominate an individual or team for a Diolch award through our website.

From: Mathew Davies [mailto:mathew.davies@macbryde-homes.co.uk]
Sent: 25 July 2019 12:13
To: Perry Rhodri <Rhodri.Perry@dwrcymru.com>
Cc: Stuart Andrew <Stuart.Andrew@macbryde-homes.co.uk>; Paul Hayes <paul.hayes@macbryde-homes.co.uk>; Simon Finlay <simon.finlay@macbryde-homes.co.uk>
Subject: RE: Land off Wrexham Road, Holt

******** External Mail ********
Rhodri

Yes if we could have the original POC or can I send you our preferred POC?

Many Thanks

Mathew

Mathew Davies | Development Engineer | m: 07841 015 311

MACBRYDE HOMES

Macbryde Homes Limited
Unit 28, St Asaph Business Park, St Asaph, Denbighshire, LL17 OLJ
t: 01745 536677
w: macbryde-homes.co.uk

Macbryde Homes Limited (Reg No 1932141) is Registered in England & Wales. Registered offices at Macbryde House, Unit 28, St Asaph Business Park, St Asaph, Denbighshire, LL17 OLJ.
This email and any attached file are confidential and may be legally privileged. If you are not the addressee, any disclosure, reproduction, copying, distribution or other dissemination or use of this communication is strictly prohibited. If you have received this transmission in error, please notify the sender immediately and then delete this email. Email transmission including any attachments cannot be guaranteed to be secure or error free as information could be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. The recipient must check emails including attachment for viruses and Macbryde Homes Ltd cannot accept responsibility if the recipient fails to do so. The sender therefore does not accept liability for any errors or omissions in the contents of this message which arise as a result of email transmission. If verification is required, please request a hard copy version.

From: Perry Rhodri <Rhodri.Perry@dwrcymru.com>
Sent: 25 July 2019 11:26

To: Mathew Davies <mathew.davies@macbryde-homes.co.uk>
Cc: Stuart Andrew <Stuart.Andrew@macbryde-homes.co.uk>; Paul Hayes <paul.hayes@macbryde-homes.co.uk>; Simon Finlay <simon.finlay@macbryde-homes.co.uk>
Subject: RE: Land off Wrexham Road, Holt

Hi Mathew,

Yes this would still apply, as its already got planning we have already accounted for this site. Are you happy for me to arrange refund on this basis?

I will go through past documents and get point of connection confirmed to you as soon as possible.

Kind regards,

Rhodri

Rhodri Perry
Development Control Officer | Developer Services | Dwr Cymru Welsh Water
Linea | Cardiff | CF3 0LT | T: 0800 917 2652| www.dwrcymru.com
We will respond to your email as soon as possible but you should allow up to 10 working days to receive a response. For most of the services we offer we set out the timescales that we work to on our Developer Services section of our website. Just follow this link http://www.dwrcymru.com/en/Developer-Services.aspx and select the service you require where you will find more information and guidance notes which should assist you. If you cannot find the information you are looking for then please call us on 0800 917 2652 as we can normally deal with any questions you have during the call.
If we've gone the extra mile to provide you with excellent service, let us know. You can nominate an individual or team for a Diolch award through our website.

From: Mathew Davies [mailto:mathew.davies@macbryde-homes.co.uk]
Sent: 25 July 2019 10:47
To: Perry Rhodri <Rhodri.Perry@dwrcymru.com>
Cc: Stuart Andrew <Stuart.Andrew@macbryde-homes.co.uk>; Paul Hayes <paul.hayes@macbryde-homes.co.uk>; Simon Finlay <simon.finlay@macbryde-homes.co.uk>
Subject: RE: Land off Wrexham Road, Holt

******** External Mail ********
Morning Rhodri

Thanks for the below confirmation.

I have attached the response Henry sent on the 12th January 2018 and was wondering if you could confirm that it is this letter that you refer to below and its content will apply to our development?

I look forward to hearing from you by return shortly

Kind Regards

Mathew

Mathew Davies | Development Engineer | m: 07841 015 311

Macbryde Homes Limited
Unit 28, St Asaph Business Park, St Asaph, Denbighshire, LL17 OLJ
t: 01745 536677
w: macbryde-homes.co.uk

Macbryde Homes Limited (Reg No 1932141) is Registered in England & Wales. Registered offices at Macbryde House, Unit 28, St Asaph Business Park, St Asaph, Denbighshire, LL17 OLJ.
This email and any attached file are confidential and may be legally privileged. If you are not the addressee, any disclosure, reproduction, copying, distribution or other dissemination or use of this communication is strictly prohibited. If you have received this transmission in error, please notify the sender immediately and then delete this email. Email transmission including any attachments cannot be guaranteed to be secure or error free as information could be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. The recipient must check emails including attachment for viruses and Macbryde Homes Ltd cannot accept responsibility if the recipient fails to do so. The sender therefore does not accept liability for any errors or omissions in the contents of this message which arise as a result of email transmission. If verification is required, please request a hard copy version.

From: Perry Rhodri <Rhodri.Perry@dwrcymru.com>
Sent: 25 July 2019 10:12
To: Mathew Davies <mathew.davies@macbryde-homes.co.uk>
Subject: Land off Wrexham Road, Holt

Hi Mathew,

I hope you are well,

Just a note in regards to your pre planning advice application for development site off Wrexham Road, Holt, I note this site already had planning granted a few years ago under reference P/2013/0823 for 24 dwellings, and a subsequent reserved matters application under P/2018/0009 (pending). If this consent is still valid and as the development proposals are the same I don't see any value in completing the pre planning advice application for you and would be happy to refund you. Please let me know your thoughts on this?

Kind regards,

Rhodri

Rhodri Perry
Development Control Officer | Developer Services | Dwr Cymru Welsh Water
Linea | Cardiff | CF3 0LT | T: 0800 917 2652| www.dwrcymru.com

We will respond to your email as soon as possible but you should allow up to 10 working days to receive a response. For most of the services we offer we set out the timescales that we work to on our Developer Services section of our website. Just follow this link http://www.dwrcymru.com/en/Developer-Services.aspx and select the service you require where you will find more information and guidance notes which should assist you. If you cannot find the

Weetwood

Development • Planning • Environment

Delivering client focussed services from offices in London, Leeds and Mold

Flood Risk Assessments
Flood Consequences Assessments
Surface Water Drainage
Foul Water Drainage
Environmental Impact Assessments
River Realignment and Restoration
Water Framework Directive Assessments
Environmental Permit and Land Drainage Applications
Sequential, Justification and Exception Tests
Utility Assessments
Expert Witness and Planning Appeals
Discharge of Planning Conditions

www.weetwood.net