



RESIDENTIAL DEVELOPMENT, FORMER VICTORIA GARAGE Ruabon

Drainage Strategy
March 2019

RESIDENTIAL DEVELOPMENT, FORMER VICTORIA GARAGE Ruabon

Drainage Strategy
March 2019

Client: **Brenig Construction**
Brenig House
Parc Busnes Cartrefi Conwy
Station Road
Mochdre,
Conwy

Report Status: **FINAL**

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Date: March 2019





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1. INTRODUCTION

The proposal is contained within a site area of approximately 900 m² upon an existing relatively flat site, located in Ruabon at National Grid Reference SJ 30439 43987 **(Appendix A)**.

The development comprises of the demolition of three existing dwellings and erection of 3 new dwellings with associated access arrangements. The proposed access is located on the North West boundary and connected to the B5605, High Street. Two car parking spaces are to be provided to each dwelling. **(Figure 1)**

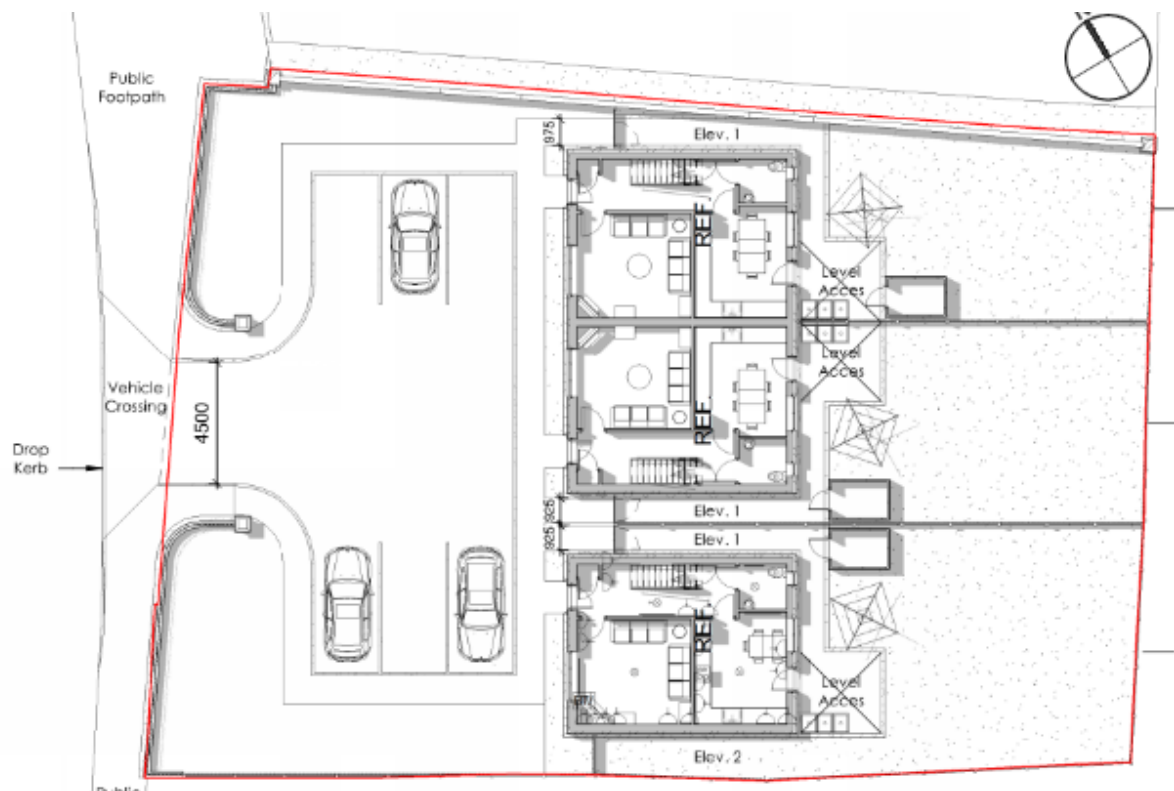


Figure 1. Site plan of the proposed development

The purpose of these calculations and accompanying details are to produce a drainage layout that complies with the relevant legislation of TAN 15, Building Regulations Part H and the Sewers for adoption 7th Edition.

2. DRAINAGE HIERARCHY (SURFACE WATER)

The surface water design was undertaken in accordance with the SUDs drainage hierarchy which has been accepted and adopted by the Lead Local Flood Authority (LLFA) and Dwr Cymru Welsh Water (DCWW). The drainage hierarchy is:

S1 Surface water runoff destination

Priority Level 1: Surface water runoff is collected for use;

Priority Level 2: Surface water runoff is infiltrated to ground;

Priority Level 3: Surface water runoff is discharged to a surface water body;

Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;

Priority Level 5: Surface water runoff is discharged to a combined sewer.

Note that Priority Level 1 is preferred (highest priority) and that 4 and 5 should only be used in exceptional circumstances.

Priority Level 1

It is deemed not feasible to utilise the surface water as grey water due to economic factors and site constraints. If surface water could have been re-used it would have a negligible effect on the surface water discharge within a storm event.

Priority Level 2

A feasibility study was undertaken to determine the possibility of utilising soakaways or similar within the site. The study revealed that use of soakaways or similar within the site is considered to be a viable option.

Priority Level 3

There is no known surface water body within the vicinity of the site therefore Priority Level 3 is not considered.

Priority Level 4

There is no known surface water or highway drainage system within the vicinity of the site therefore this Priority Level is not considered viable.

Priority Level 5

A combined sewer is located near the North West boundary in the High street. The sewer is approximately 2.6m deep. DCWW will not permit a connection into their system unless evidence demonstrates that Priority Levels 1-4 cannot be achieved. Discharge into this network would only been considered as a last resort.

3. DESIGN CRITERIA

The system is to be designed to the following criteria:

Scheme 1:

- All soakaways to be designed for a 1 in 100 year event.
- Design to utilise an infiltration rate of $3.321 \times 10^{-5} \text{m/s}$ for the front of the building and for 2 plots on South part of the rear side and $1.190 \times 10^{-4} \text{m/s}$ for the Plot near North boundary of the site, provided by Groundsolve Ltd. following site testing on 12/03/2019.
- The front road access, parking and half the roof catchment (front half) will discharge into soakaways located within the parking area.
- The rear roof catchment for each individual house will discharge into individual Pre-Cast Concrete ring soakaways.

The following design criteria will apply for the surface water runoff and foul discharge design of the site:

- Approved Document H, Building Regulations
- Sewers for Adoption 7th Edition
- TAN 15
- BRE Digest 365
- Statutory SUDS standards in Wales.

4. SURFACE WATER DESIGN

TAN 15 requires the design of surface water to be attenuated and stored below ground to a 1 in 30 year event. In addition, a 1 in 100 year event plus an allowance for climate change (30%) must be contained on site without posing an inherent threat to nearby inhabitants.

The surface water will discharge into a combination of planar soakaways located within the parking at the front of the plots and 3 individual PCC soakaways at the rear of the plot. The proposed surfacing around the building, including the parking spaces will be porous to provide a full infiltration.

Surface water drainage

Enclosed (**APPENDIX D**) are the design calculations for the soakaway systems. In accordance with Natural Resources Wales guidelines, the soakaway calculations have been completed assuming a threshold event of 1 in 100 year + 30% for climate change.

A summary of the calculations is found below:

SOAKAWAY

Area 1 (front half of the roof for the 3 dwellings): Effective Area = 353 m²

Storage Requirement 1 in 100yr event + 30% (CCE) = 10.62 m³

Proposed soakaway method – **Permeable Paving Blankets**

Soakaway size – 2 x 8.375m length x 7.4m width with 0.3m Effective Depth

Storage provided within soakaways = 11.16 m³

Area 2 (rear half of the roof for each dwelling): Effective Area = 166 m² Storage

Requirement 1 in 100yr event + 30% (CCE) = 5.3 m³

Proposed soakaway method – **PCC Chambers**

Soakaway size – 1x Ø 1.5m with 1.0m Effective Depth

– 2x Ø 1.5m with 1.5m Effective Depth

Storage provided within soakaway = 7.0 m³

These proposed drainage layout is illustrated upon drawing 18304/501 (**APPENDIX B**).

Extreme Event

The site is designed to contain a 1 in 100 year (+climate change) storm event within its boundary via below ground soakaways. If an extreme flood event occurred (which may be generated from offsite sources such as watercourse blockages or above 1 in 100 year storm event, etc.) the surface water would flow towards the adjacent road via the proposed junction which would then enter the highway drainage system and follow the flood routing of the existing highway. From this point the flood flow would be towards the watercourse approx. 500m south west of the site.

The onsite soakaways would overflow once the capacity has been used and overflow to the highway as stated above.

Surface Water Discharge Assessment

Pre and post development peak flow run-off rates have been calculated (**APPENDIX C**) for numerous storm events and durations. The below table indicates the site surface water discharge rate for a 30min & 6hr storm duration.

Storm Event	Pre Dev Discharge 30min	Post Dev Discharge 30min	Pre Dev Discharge 6hr	Post Dev Discharge 6hr
1 in 30 year	7.99 L/s	7.97 L/s	1.52 L/s	1.77 L/s
1 in 100 year	12.49 L/s	12.43 L/s	2.26 L/s	2.59 L/s

The calculations indicate no noticeable change in runoff associated with the proposed development

5. FOUL DESIGN

The foul drainage will discharge to the combined sewer at High Street via new foul sewers designed for adoption by DCWW in accordance with Sewers for Adoption.

A section 104 adoption agreement of the Water Industries Act 1991 will be sought for the formal adoption of the foul drainage layout within the site including the connection to the existing combined sewer.

The drainage is illustrated on the enclosed drawing 18304/501 (**APPENDIX B**).

Design of the foul sewers included within the proposal from domestic units have been carried out in accordance with BS EN 12056 Part 2.

Please refer to the design calculations (**APPENDIX E**) for illustration.

Domestic Flows

The Peak foul flows for 3 dwellings = 2.6 l/s .

APPENDICES

APPENDIX A – SITE LOCATION PLAN

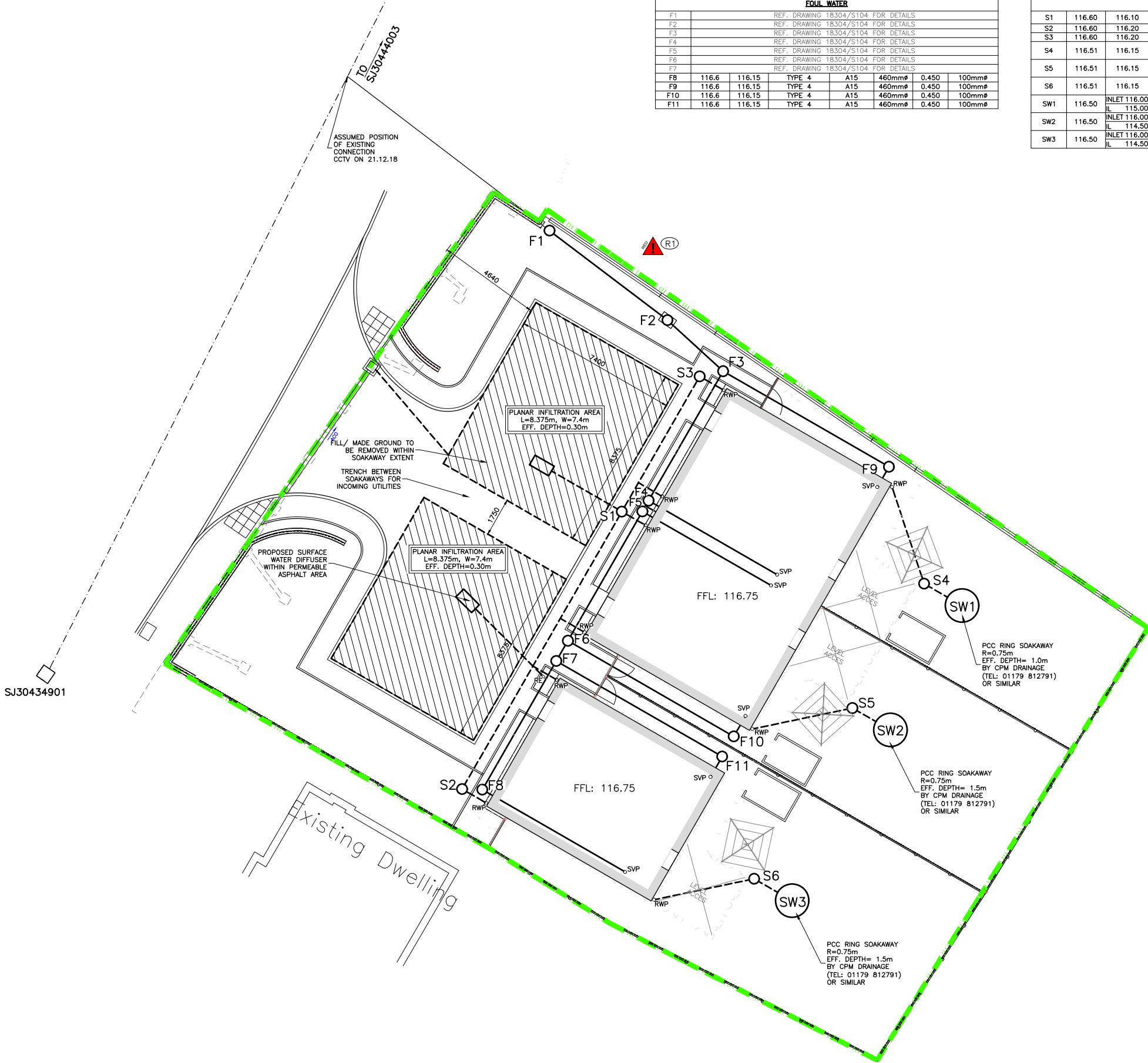
APPENDIX B – SURFACE WATER & FOUL DRAINAGE GENERAL ARRANGEMENT

MANHOLE SCHEDULE							
MANHOLE REF.	COVER LEVEL	INVERT LEVEL	CHAMBER TYPE	COVER TYPE	CHAMBER SIZE	CHAMBER DEPTH	DOWNSTEAM PIPE SIZE
FOUL WATER							
F1			REF. DRAWING 18304/S104 FOR DETAILS				
F2			REF. DRAWING 18304/S104 FOR DETAILS				
F3			REF. DRAWING 18304/S104 FOR DETAILS				
F4			REF. DRAWING 18304/S104 FOR DETAILS				
F5			REF. DRAWING 18304/S104 FOR DETAILS				
F6			REF. DRAWING 18304/S104 FOR DETAILS				
F7			REF. DRAWING 18304/S104 FOR DETAILS				
F8	116.6	116.15	TYPE 4	A15	460mmø	0.450	100mmø
F9	116.6	116.15	TYPE 4	A15	460mmø	0.450	100mmø
F10	116.6	116.15	TYPE 4	A15	460mmø	0.450	100mmø
F11	116.6	116.15	TYPE 4	A15	460mmø	0.450	100mmø

MANHOLE SCHEDULE							
MANHOLE REF.	COVER LEVEL	INVERT LEVEL	CHAMBER TYPE	COVER TYPE	CHAMBER SIZE	CHAMBER DEPTH	DOWNSTEAM PIPE SIZE
SURFACE WATER							
S1	116.60	116.10	TYPE 4 W/ CATCHPIT	A15	460mmø	0.800	150mmø
S2	116.60	116.20	TYPE 4	A15	460mmø	0.400	150mmø
S3	116.60	116.20	TYPE 4	A15	460mmø	0.400	150mmø
S4	116.51	116.15	TYPE 4 W/ CATCHPIT	A15	460mmø	0.660	150mmø
S5	116.51	116.15	TYPE 4 W/ CATCHPIT	A15	460mmø	0.660	150mmø
S6	116.51	116.15	TYPE 4 W/ CATCHPIT	C250	460mmø	0.660	150mmø
SW1	116.50	INLET 116.00 IL 115.00	SOAKAWAY	C250	1500mmø	1.500	150mmø
SW2	116.50	INLET 116.00 IL 114.50	SOAKAWAY	C250	1500mmø	2.000	150mmø
SW3	116.50	INLET 116.00 IL 114.50	SOAKAWAY	C250	1500mmø	2.000	150mmø

SPECIFIC RISKS (CDM 2015)
SPECIFIC RESIDUAL RISKS HAVE BEEN IDENTIFIED ON THE DRAWING WITH THE FOLLOWING SYMBOLS:
KEY:
HIGH RISK  (R*)
MEDIUM RISK  (A*)
LOW RISK  (C*)

DETAILS:
(R1) EXCAVATION WORKS ADJACENT TO RETAINING WALL - INSTABILITY DUE TO UNDERMINING ; RISK TO SITE OPERATIVES & GENERAL PUBLIC



- NOTES**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, ENGINEER'S AND OTHER SPECIALISTS' DRAWINGS.
 - PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION
 - REFER TO DATRYS DRAWING 18304/502 AND 503 FOR DRAINAGE DETAILS.
 - ALL DRAINAGE COMPONENTS ARE TO COMPLY WITH CURRENT BRITISH STANDARDS & BUILDING REGULATIONS REQUIREMENTS
 - AT ALL OUTFALL POINTS TO AN EXISTING NETWORK, THE POSITION AND INVERT LEVEL OF EXISTING DRAINS MUST BE CONFIRMED WELL IN ADVANCE OF THE PROGRAMMED DATE FOR INSTALLING ANY OF THE UPSTREAM DRAINAGE, OR ORDERING ANY MATERIALS IN ORDER TO ALLOW TIME FOR ANY NECESSARY REVISIONS TO THE HYDRAULIC DESIGN.
 - ALL GRAVITY PVC-U PIPEWORK TO BE TO BS 4660:2000 OR BS EN 1401-1:2009 WHERE RELEVANT UNLESS NOTED OTHERWISE
 - FINAL LOCATIONS AND DETAILS OF SOIL VENT PIPE, STUB STACKS, RAINWATER DOWN PIPES, GULLYS etc. TO BE CONFIRMED BY REFERENCE TO ARCHITECTS' DRAWINGS
 - ALL PIPES INTO MH's TO BE SOFFIT TO SOFFIT LVL U.N.O.
 - ALL NON ADOPTABLE DOMESTIC FOUL AND SURFACE WATER PIPE RUNS SHALL CONSIST OF 100mm ø PIPES LAID AT A MINIMUM FALL OF 1 IN 80 U.N.O
 - ALL CONNECTIONS FROM HIGHWAY GULLIES TO BE 150mmø LAID AT FALLS OF BETWEEN 1:20 & 1:100 WITH TYPE S BED & SURROUND TO ALL CONNECTIONS WHERE MIN 1.2m COVER IS ACHIEVED, TYPE Z BED & SURROUND TO ALL OTHER CONNECTIONS.
 - COVER LEVELS ARE APPROXIMATE AND SHOULD MATCH PROPOSED SURROUNDING LEVELS. CONTRACTOR TO USE OFFICIAL TBM'S FOR SETTING OUT.

KEY

-  SITE BOUNDARY
-  ASSUMED LINE OF EXISTING COMBINED SEWER
-  PROPOSED FOUL DRAIN RUN AND INSPECTION CHAMBERS/MANHOLES
-  PROPOSED SOIL AND VENT PIPE
-  SURFACE WATER INSPECTION CHAMBER AND DRAIN
-  DENOTES PROPOSED RAIN WATER PIPE
-  PROPOSED ACO DRAIN

A	28.03.19	SERVICE CROSSOVER ADDED, SOAKAWAY AT FRONT AMENDED	LI	AC	AC
REV	DATE	DESCRIPTION	BY	CHK	APP

CLIENT



PROJECT

Former Victoria Garage Ruabon

TITLE

Drainage Layout

 **DATRYS**
Carmarthen
Unit 6 Block A, Old Victoria
Carmarthen, LL55 1TH
Tel: 01296 670027
St Andrews Business Centre,
Queens Lane, H&S, C&P 308
Tel: 01352 706205
info@datrys.co.uk | www.datrys.net

DRAWN	LI	CHECKED	AC	PASSED	AC
DATE	19.03.19		CLIENT'S REF.		
SCALE AT A1		1:100	AUTOCAD REF. 18304/501		
DRAWING No.					REVISION
18304/501					A

APPENDIX C – RUN-OFF CALCULATIONS



CALCULATION SHEET

Project Former Victoria Garage, Ruabon
 Project No 18304
 Sheet No 2
 Description Existing flow rates

STORAGE VOLUME 100 Year Return Period

30% Climate Change Allowance

Return Period	100	years
M5-60min	17	mm
M5-60min	22.1	mm
r	0.3	

Permissible outflow unrestricted

PROPOSED NEW DEVELOPMENT	soft	roads	roofs
Volumetric run-off coefficient	0.35	0.75	1
Permeable area	193.46 sqm		
Road & fpath	501 sqm		
Roofs and Hardstanding	205.54 sqm		

TOTAL EFFECTIVE AREA 649.001 sqm

Duration min	Z1	M5-D mm	Z2	M100-D mm	Total Vol cu m	Qmax l/s
5	0.34	7.51	1.85	13.90	9.02	30.07
10	0.495	10.94	1.93	21.11	13.70	22.84
15	0.59	13.04	1.96	25.56	16.59	18.43
30	0.78	17.24	2.01	34.65	22.49	12.49
60	1	22.10	2.02	44.64	28.97	8.05
120	1.24	27.40	1.99	54.53	35.39	4.92
240	1.55	34.26	1.94	66.45	43.13	3.00
360	1.8	39.78	1.89	75.18	48.79	2.26
600	2.13	47.07	1.83	86.14	55.91	1.55
1440	2.79	61.66	1.73	106.67	69.23	0.80
2880	3.5	77.35	1.63	126.08	81.83	0.47



CALCULATION SHEET

Project Former Victoria Garage, Ruabon
 Project No 18304
 Sheet No 4
 Description Proposed flow rates

STORAGE VOLUME 100 Year Return Period

30% Climate Change Allowance
 Return Period 100 years
 M5-60min 17 mm
 M5-60min 22.1 mm
 r 0.3

Permissible outflow unrestricted

PROPOSED NEW DEVELOPMENT
 Volumetric run-off coefficient soft roads roofs
 0.35 0.75 1
 Permeable area 277.1 sqm
 Road & fpath 166 sqm
 Roofs and Hardstanding 456 sqm

TOTAL EFFECTIVE AREA 677.485 sqm

Duration min	Z1	M5-D mm	Z2	M100-D mm	Total Vol cu m	Qmax l/s
5	0.29	6.41	1.85	11.86	8.03	26.78
10	0.43	9.50	1.93	18.34	12.43	20.71
15	0.53	11.71	1.97	23.07	15.63	17.37
30	0.74	16.35	2.02	33.04	22.38	12.43
60	1.00	22.10	2	44.20	29.94	8.32
120	1.32	29.17	1.94	56.59	38.34	5.33
240	1.75	38.68	1.85	71.55	48.47	3.37
360	2.10	46.41	1.78	82.61	55.97	2.59
600	2.60	57.46	1.69	97.11	65.79	1.83
1440	3.85	85.09	1.4	119.12	80.70	0.93
2880	5.00	110.50	1.36	150.28	101.81	0.59

APPENDIX D – SURFACE WATER DESIGN CALCULATIONS



Soakaway calculations to BRE Digest 365

Calculation Sheet 02 RevA 1 in 100 year return period design

Project Former Victoria Garage, Ruabon

Ref 18304

Description Front roof & parking soakaway

30% allowance for climate change	M5-60min	17							
	M5-60min	22.1	PROPOSED NEW DEVELOPMENT	Roads	Roofs	Lawns	P. Paving		
	r	0.3	Volumetric Runoff Coefficient	0.75	1	0.2	0.35		

Roads / Parking	31
Hardstanding / roofs	278
Permeable Paving	139
Lawns	14.2
Total Effective Area	352.74

Duration (min)	Z1	M5-D (mm)	Z2	M100-D (mm)	I (mm/hr)	Area (sq m)	Inflow (cu m)	Outflow (cu m)	Storage (cu m)
5.0	0.34	7.51	1.85	13.9	166.8	352.7	4.9	0.4	4.48
10.0	0.495	10.94	1.93	21.1	126.4	352.7	7.4	0.9	6.57
15.0	0.59	13.04	1.96	25.5	102.2	352.7	9.0	1.3	7.72
30.0	0.78	17.24	2.01	34.6	69.2	352.7	12.2	2.6	9.64
60.0	1	22.10	2.02	44.7	44.7	352.7	15.8	5.1	10.62
120.0	1.24	27.40	1.99	54.6	27.3	352.7	19.2	10.3	8.97
240.0	1.55	34.26	1.94	66.3	16.6	352.7	23.4	20.6	2.84
360.0	1.8	39.78	1.89	75.3	12.5	352.7	26.5	30.8	-4.29
600.0	2.13	47.07	1.83	86.3	8.6	352.7	30.4	51.4	-20.95
1440.0	2.79	61.66	1.73	106.7	4.4	352.7	37.6	123.3	-85.70
2880.0	3.5	77.35	1.63	126.1	2.6	352.7	44.5	246.7	-202.19

Percolation factor (at Tp A)	3.21E-05	(m/s)	
Percolation factor with FOS	1.07E-05	(m/s)	Factor of Safety (Ciria 156) 3

Blanket Storage: Outflow and storage based on:

No of trenches	(nr)	2.0
Length of soakaway	(m)	8.4
Width of soakaway	(m)	7.4
Effective depth	(m)	0.3
Eff Area of soakaways at 50%	(sq m)	133.4
Storage per soakaway	(cu m)	5.57775
Total Storage provided	(cu m)	11.16



Soakaway calculations to BRE Digest 365

Calculation Sheet 01 1 in 100 year return period design

Project Former Victoria Garage, Ruabon

Ref 18304

Description Highways

30% allowance for climate change

M5-60min	17				
M5-60min	22.1	PROPOSED NEW DEVELOPMENT	Roads	Roofs	Lawns
r	0.3	Volumetric Runoff Coefficient	0.75	1	0.2
					Paving 0.35

Roads / Parking	0
Hardstanding / roofs	27.5
Permeable Paving	28.1
Lawns	105.3
Total Effective Area	58.40

Duration (min)	Z1	M5-D (mm)	Z2	M100-D (mm)	I (mm/hr)	Area (sq m)	Inflow (cu m)	Outflow (cu m)	Storage (cu m)
5.0	0.34	7.51	1.85	13.9	166.8	58.4	0.8	0.0	0.78
10.0	0.495	10.94	1.93	21.1	126.7	58.4	1.2	0.1	1.16
15.0	0.59	13.04	1.96	25.6	102.2	58.4	1.5	0.1	1.39
30.0	0.78	17.24	2.01	34.6	69.3	58.4	2.0	0.2	1.82
60.0	1	22.10	2.02	44.6	44.6	58.4	2.6	0.4	2.20
120.0	1.24	27.40	1.99	54.5	27.3	58.4	3.2	0.8	2.37
240.0	1.55	34.26	1.94	66.5	16.6	58.4	3.9	1.6	2.25
360.0	1.8	39.78	1.89	75.2	12.5	58.4	4.4	2.4	1.94
600.0	2.13	47.07	1.83	86.1	8.6	58.4	5.0	4.1	0.95
1440.0	2.79	61.66	1.73	106.7	4.4	58.4	6.2	9.8	-3.57
2880.0	3.5	77.35	1.63	126.1	2.6	58.4	7.4	19.6	-12.23

Percolation factor (m/s) 3.21E-05

PCC outflow and storage based on:

No. of chambers	(nr)	1.00
Radius	(m)	0.75
Effective depth	(m)	1.50
Eff Area of soakaways at 50%	(sq m)	3.53
Storage per soakaway	(cu m)	2.65
Total Storage	(cu m)	2.65

Base not included in calcs



Soakaway calculations to BRE Digest 365

Calculation Sheet 01 1 in 100 year return period design

Project Former Victoria Garage, Ruabon

Ref 18304

Description Highways

30% allowance for climate change

M5-60min	17				
M5-60min	22.1	PROPOSED NEW DEVELOPMENT	Roads	Roofs	Lawns
r	0.3	Volumetric Runoff Coefficient	0.75	1	0.2
					Paving 0.35

Roads / Parking	0
Hardstanding / roofs	28.5
Permeable Paving	26.65
Lawns	78.1
Total Effective Area	53.45

Duration (min)	Z1	M5-D (mm)	Z2	M100-D (mm)	I (mm/hr)	Area (sq m)	Inflow (cu m)	Outflow (cu m)	Storage (cu m)
5.0	0.34	7.51	1.85	13.9	166.8	53.4	0.7	0.0	0.71
10.0	0.495	10.94	1.93	21.1	126.7	53.4	1.1	0.1	1.06
15.0	0.59	13.04	1.96	25.6	102.2	53.4	1.4	0.1	1.26
30.0	0.78	17.24	2.01	34.6	69.3	53.4	1.9	0.2	1.65
60.0	1	22.10	2.02	44.6	44.6	53.4	2.4	0.4	1.98
120.0	1.24	27.40	1.99	54.5	27.3	53.4	2.9	0.8	2.10
240.0	1.55	34.26	1.94	66.5	16.6	53.4	3.6	1.6	1.92
360.0	1.8	39.78	1.89	75.2	12.5	53.4	4.0	2.4	1.57
600.0	2.13	47.07	1.83	86.1	8.6	53.4	4.6	4.1	0.52
1440.0	2.79	61.66	1.73	106.7	4.4	53.4	5.7	9.8	-4.10
2880.0	3.5	77.35	1.63	126.1	2.6	53.4	6.7	19.6	-12.86

Percolation factor (m/s) 3.21E-05

PCC outflow and storage based on:

No. of chambers	(nr)	1.00
Radius	(m)	0.75
Effective depth	(m)	1.50
Eff Area of soakaways at 50%	(sq m)	3.53
Storage per soakaway	(cu m)	2.65
Total Storage	(cu m)	2.65

Base not included in calcs



Soakaway calculations to BRE Digest 365

Calculation Sheet 01 1 in 100 year return period design

Project Former Victoria Garage, Ruabon

Ref 18304

Description Highways

30% allowance for climate change

M5-60min	17				
M5-60min	22.1	PROPOSED NEW DEVELOPMENT	Roads	Roofs	Lawns
r	0.3	Volumetric Runoff Coefficient	0.75	1	0.2
					Paving 0.35

Roads / Parking	0
Hardstanding / roofs	28.5
Permeable Paving	27.5
Lawns	72.5
Total Effective Area	52.63

Duration (min)	Z1	M5-D (mm)	Z2	M100-D (mm)	I (mm/hr)	Area (sq m)	Inflow (cu m)	Outflow (cu m)	Storage (cu m)
5.0	0.34	7.51	1.85	13.9	166.8	52.6	0.7	0.1	0.65
10.0	0.495	10.94	1.93	21.1	126.7	52.6	1.1	0.2	0.94
15.0	0.59	13.04	1.96	25.6	102.2	52.6	1.3	0.3	1.09
30.0	0.78	17.24	2.01	34.6	69.3	52.6	1.8	0.5	1.32
60.0	1	22.10	2.02	44.6	44.6	52.6	2.3	1.0	1.34
120.0	1.24	27.40	1.99	54.5	27.3	52.6	2.9	2.0	0.85
240.0	1.55	34.26	1.94	66.5	16.6	52.6	3.5	4.0	-0.54
360.0	1.8	39.78	1.89	75.2	12.5	52.6	4.0	6.1	-2.10
600.0	2.13	47.07	1.83	86.1	8.6	52.6	4.5	10.1	-5.56
1440.0	2.79	61.66	1.73	106.7	4.4	52.6	5.6	24.2	-18.60
2880.0	3.5	77.35	1.63	126.1	2.6	52.6	6.6	48.4	-41.79

Percolation factor (m/s) 1.19E-04

PCC outflow and storage based on:

No. of chambers	(nr)	1.00
Radius	(m)	0.75
Effective depth	(m)	1.00
Eff Area of soakaways at 50%	(sq m)	2.36
Storage per soakaway	(cu m)	1.77
Total Storage	(cu m)	1.77

Base not included in calcs

APPENDIX E – FOUL DRAINAGE DESIGN CALCULATIONS

 DATRYS www.datrys.net ☐ Caernarfon: 01286 671 027 ☐ Mold: 01352 706 205	CALCULATIONS	Job No. 18304	Sheet No.	Rev																																	
	Project: Former Victoria Garage, Ruabon																																				
	Subject FOUL CALCULATIONS		Prepared By LI	Date Dec-18																																	
			Checked By	Date																																	
The proposal involves the followings: - Development of a new site - Construction of 3 Dwellings The following design calculations apply to domestic foul discharge only. <u>Domestic Flows:</u> Calculations are complied in accordance with BS EN12056 PT2 and assume that the development will contain the following: <table> <tr> <td>3 KITCHEN SINKS</td> <td>-</td> <td>1.3</td> </tr> <tr> <td>WASHING</td> <td></td> <td></td> </tr> <tr> <td>3 MACHINE (<12L)</td> <td>-</td> <td>1.2</td> </tr> <tr> <td>3 DISHWASHER</td> <td>-</td> <td>0.2</td> </tr> <tr> <td>6 TOILET SINK</td> <td>-</td> <td>0.3</td> </tr> <tr> <td>6 TOILET 6L</td> <td>-</td> <td>1.7</td> </tr> <tr> <td>6 BATH</td> <td>-</td> <td>1.3</td> </tr> <tr> <td>TOTAL</td> <td>$\Sigma DU =$</td> <td>27.9 L/S</td> </tr> </table> Frequency Factor K=0.5 Waste Water Flow rate $Q = K\sqrt{\Sigma DU} = 0.5\sqrt{27.9} = 2.6 \text{ L/S}$ Pipe Flow Capacity <table> <tr> <td>100mm @</td> <td>1:80</td> <td>5.8 L/S</td> </tr> <tr> <td>150mm @</td> <td>1:120</td> <td>14 L/S</td> </tr> <tr> <td></td> <td>1:150</td> <td>12.61 L/S</td> </tr> </table> Suggested pipes to use: 100mm ϕ					3 KITCHEN SINKS	-	1.3	WASHING			3 MACHINE (<12L)	-	1.2	3 DISHWASHER	-	0.2	6 TOILET SINK	-	0.3	6 TOILET 6L	-	1.7	6 BATH	-	1.3	TOTAL	$\Sigma DU =$	27.9 L/S	100mm @	1:80	5.8 L/S	150mm @	1:120	14 L/S		1:150	12.61 L/S
3 KITCHEN SINKS	-	1.3																																			
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3 DISHWASHER	-	0.2																																			
6 TOILET SINK	-	0.3																																			
6 TOILET 6L	-	1.7																																			
6 BATH	-	1.3																																			
TOTAL	$\Sigma DU =$	27.9 L/S																																			
100mm @	1:80	5.8 L/S																																			
150mm @	1:120	14 L/S																																			
	1:150	12.61 L/S																																			

APPENDIX F – DCWW UTILITY MAP



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 of 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 disclose 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 is 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**

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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

