



Drainage Statement

Proposed Retail Store, Llay, Clwyd

May 2020

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Client Name: Thistlewood Properties
Document Reference: STR16189
Project Number: STR16189

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001:2018)

Issue	Date	Prepared by	Checked by	Approved by
A01	May 2020	Catherine Spicer	JH	

Comments

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Contents

1. Introduction	2
1.1 Site Description	2
1.2 Development Proposals	2
2. Drainage Assessment	3
2.1 Introduction	3
2.2 Historical investigations	3
2.3 Surface Water Drainage	3
2.4 Foul Drainage.....	4
3. Flood Risk Assessment	5
4. Further Works Required	6

Appendices

- A. Proposed and Existing Site Plans
- B. Dwr Cymru Sewer Map
- C. Soakaway test and calculations
- D. Surface Water and Tidal/Fluvial Flood Map

1. Introduction

Waterman Structures Limited (“Waterman”) was instructed by Thistlewood Properties to prepare a Drainage Statement for the proposed development of land off Llay New Road, Llay, Wrexham (hereafter named “the site”). This Drainage Statement has been prepared to support an outline planning application for the construction of a convenience food retail unit.

1.1 Site Description

1.1.1 Location and Access

The proposed site will be accessed off Llay New Road which bounds the site to the east. The site is located in a predominantly residential area at National Grid reference: 333124E, 355330N. An existing and proposed site layout plan are included in Appendix A.

The land uses immediately surrounding the site are noted as follows:

- North: Watts Dyke (road) borders site, with residential properties located further beyond;
- East: Llay New Road borders site;
- South: wooded area/ public open space;
- West: Llay Royal British Legion.

The site has an elevation of approximately 77 meters above ordnance datum (m AOD) and falls slightly from northwest to southwest. The site is currently grassed and part of the Royal British Legion property.

1.2 Development Proposals

The proposed development comprises a retail unit and associated car parking. The proposed site plan is presented in Appendix A. The proposed site will comprise approximately 73% impermeable area.

2. Drainage Assessment

2.1 Introduction

This section provides outline proposals for feasibility stage for both a surface and foul water drainage strategy for the Site.

2.2 Historical investigations

2.2.1 Historical soakaway testing

Soakaway testing was carried out by Dunelm Geotechnical and Environmental in July 2017. An extract from that report with relevant soakaway results and calculations by Waterman Structures is in Appendix C. The results show that the ground conditions are suitable for infiltration.

2.2.2 Historical borehole investigation

There are no historical borehole records available close to the site. The superficial surface geology is glaciofluvial deposits of sand and gravel over Salop formation bedrock of mudstone, sandstone and conglomerate.

2.3 Surface Water Drainage

Surface water arising from a developed site should, as far as practical, be managed in a sustainable manner to mimic the surface water flows arising from an undeveloped Site. SuDS Manual C753 and Part H of the Building Regulations 2010 recommends that surface water run-off shall discharge to one of the following, listed in order of priority:

- i) an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable
- ii) a watercourse, or, where that is not reasonably practicable
- iii) a sewer

As mentioned in section 2.2, the ground conditions are suitable for infiltration. A soakaway will be installed for drainage of the site surface water. Surface water will be routed through a silt trap before entering the soakaway.

Two options are proposed for the soakaway construction. Option 1 is a plastic crate system soakaway installed in the grassed area to the south of the retail store. Option 2 is a gravel trench to the car park perimeter. The soakaway construction will be finalised at the project tender stage. The preliminary surface water drainage plan shows two soakaways used to dispose of the site surface water. This approach is proposed so that the existing sub surface drainage is not disrupted. Soakaway 1 is an extended gravel trench soakaway and Soakaway 2 is a proprietary plastic crate system used as the available area is limited. Please refer to Appendix A for the proposed site layout.

Please refer to Appendix C for soakaway test results and preliminary sizing calculations.

2.3.1 Exceedance event

Storage will be provided for the 1 in 100 year plus 40% CC event. Storm events in excess of the 1 in 100 year plus 40% CC event should be permitted to produce temporary shallow depth flooding within the car

park, access roads and landscaped areas. Finished floor levels will be set at a minimum of 150mm above surrounding ground levels ensuring exceedance flooding will not affect the buildings.

2.4 Foul Drainage

Dwr Cymru asset location plans document a pumped foul water sewer spur located south of the site. The existing spur enters the main foul sewer network via a manhole on Llay New Road. Please refer to Appendix B.

It is proposed to make a new connection to this manhole. Permission will be required from Dwr Cymru. The proposed discharge will be restricted to 4l/s.

3. Flood Risk Assessment

The proposed site is approximately 0.203ha in area and is located within TAN 15 Flood Zone A. A flood risk assessment is not required for this site.

As identified on the NRW 'Risk of Flooding from Surface Water' map the boundary of the site to the north-east corners are shown at low risk of flooding.

No surface water flow routes are identified within the site. A moderate risk of surface water flooding is identified along the existing site access road immediately north of the British Legion Building. The risk of surface water ponding within the site will be mitigated by consideration of site levels and inclusion of a sustainable drainage system.

As confirmed by Wrexham County Borough Council, there are incidents of historic flooding immediately east of the site which involved surface water flooding and sandbag requests in 2012. Council recorded historic surface water flooding events are illustrated on the 'Water Management Query' map provided by Wrexham County Borough Council in Appendix D. There are no records of past flooding affecting the site.

Please refer to Appendix D for Extent of Flooding maps.

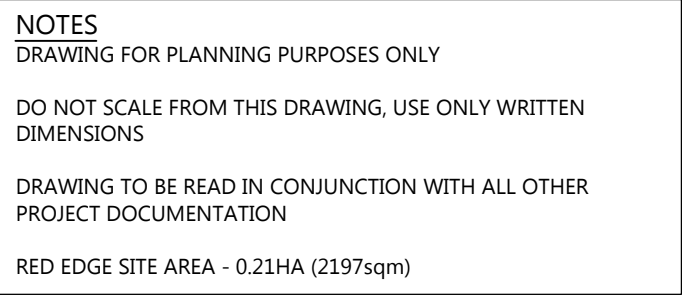
4. Further Works Required

- Detailed drainage design following more in-depth levels and layout review.
- Consents will be required from Dwr Cymru for the new foul connection.
- Preparation of a maintenance schedule for a soakaway
- Investigation of existing inspection chamber manhole on site.
- Verification of soakaway infiltration rate in actual soakaway locations once decided



APPENDICES

A. Proposed and Existing Site Plans



Project
ROYAL BRITISH LEGION,
WATTS DYKE, LLAY, LL12 0RL

Drawing title
EXISTING SITE PLAN

Scale	Drawn	Checked
1:200@A1	PJH	PJH
Date	Drawing status	
14/01/2020	Planning	
Drawing number		Revision
0118(P)122		#

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B. Dwr Cymru Sewer Map



THE ROYAL BRITISH LEGION



LEGEND(Representative of most common features)

- [illegible]

Notes:

While every reasonable effort has been taken to correctly record the pipe material of DOW 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 to excavation.

Dwr Cymru Cyf gives this information as to the position of its underground apparatus by way of general guidance only 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 works of any nature involving the works of the Company's apparatus and any form of flooding the apparatus before carrying out the works with certainty on any. It must be understood that the furnishing of the information is entirely without liability to the provision of the New Roads and Streetworks Act 1991 and of the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

THE LOCATIONS OF ALL APPARATUS
TO BE DETERMINED ON SITE.

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Map Ref: 333148.1,355347.6

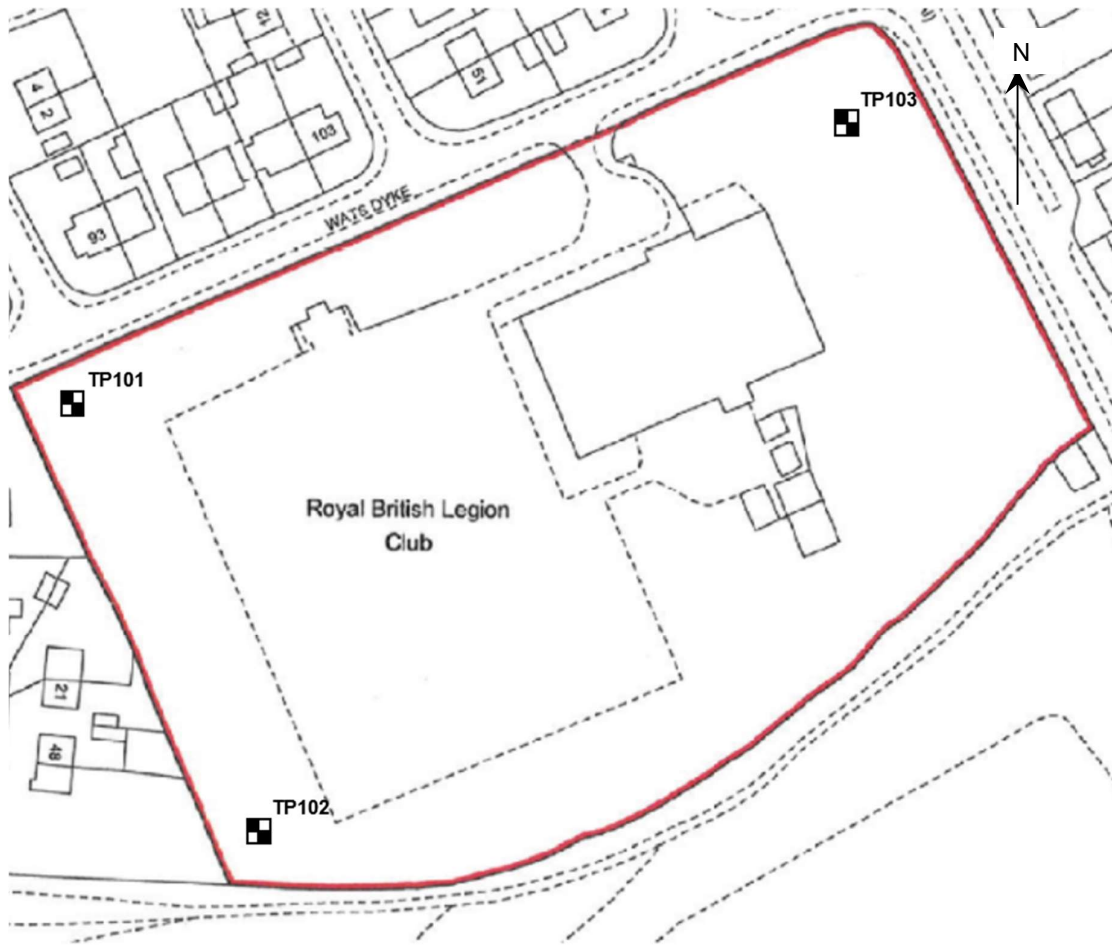
Map scale: 1:1,250

Printed by: CW

Printed on: 28.6.17



C. Soakaway test and calculations



Contract:
Royal British Legion, Llay

Contract No:
M506

Client:
Royal British Legion

TEL: 01477 668142

Drawing Title:
Exploratory Hole location Plan

Drawing No:
M506/02

Date:
June 2017

Scale:
NTS

Status:
Final

Drawn by:
SF

			TRIAL PIT RECORD			TP No. TP103			
Contract No.: M506			Site: Royal British Legion, Llay			Scale 1:25			
Client: Royal British Legion				Logged By: SF		Sheet 1 of 1			
Method: Machine Excavated Trial Pit				Checked By: SF		Dates: 09/06/2017			
SAMPLE DETAILS			Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill	
Type	Depth From-To (m)	Insitu Testing							
B ES	0.20 0.20			MADE GROUND: Brown sandy gravelly topsoil. Gravel is rounded, fine to coarse of sandstone, limestone and slate.	(0.20)				
				MADE GROUND: Dark brown to black sandy gravel with high cobbles content of concrete and masonry. Gravel is fine to coarse of brick and concrete. Occasional fragments of glass and plastic.	0.20				
B ES	1.00 1.00		1		(1.00)				
				End of Trial Pit at 1.20 m	1.20				
			2						
			3						
			4						
			5						
Remarks				Ground Water (m)		Excavation Details		Orientation	
1. No groundwater encountered. 2. Terminated at 1.20m due to instability in trench.				Depth Strike	Remarks	Dimensions: m x m		A C D B °	
						Stability: Unstable			
						Weather: Sunny			
						Remarks: Machine Excavated Trial Pit			

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 2016

BRE Digest 365, Figure 2, Page 5

Client: Royal British Legion

Site: Royal British Legion, Llay

Job No: M506

Pit No: TP103

Test No:

1

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)	Pit Dimensions		Length (m) =	2.40
0	0.77			Width (m) =	0.70
0.5	0.80			Depth (m) =	2.20
1	0.83				
2	0.89	Depth at start of test (m) =			
3	0.96	Depth at end of test (m) =			
4	1.00	75% level (m) =			
5	1.10	50% Effective Depth			
6	1.16	25% level (m) =			
7	1.20				
8	1.23	Base area of pit (m ²) =			
9	1.26	V _{p75-25} (m ³) =			
10	1.29	α_{p50} (m ²) =			
15	1.60				
20		From the graph:			
25		tp 75 (min) =			
30		tp 25 (min) =			
40					
50		Soil infiltration rate, f, (m/s) =		2.30E-04	normal test
		Input by:	CA	Date:	23/06/2017
		Checked by:		Date:	



SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 2016

BRE Digest 365, Figure 2, Page 5

Client: Royal British Legion

Site: Royal British Legion, Llay

Job No: M506

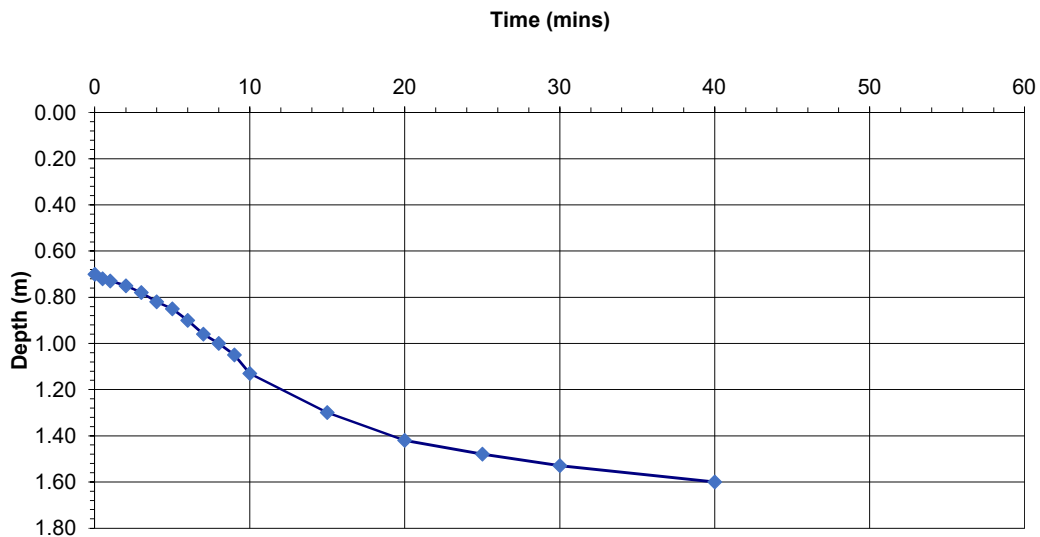
Pit No: TP103

Test No:

2

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)	Pit Dimensions		Length (m) =	2.40
0	0.70			Width (m) =	0.50
0.5	0.72			Depth (m) =	1.60
1	0.73				
2	0.75	Depth at start of test (m) =			
3	0.78	Depth at end of test (m) =			
4	0.82	75% level (m) =			
5	0.85	50% Effective Depth			
6	0.90	25% level (m) =			
7	0.96				
8	1.00	Base area of pit (m ²) =			
9	1.05	V _{p75-25} (m ³) =			
10	1.13	α_{p50} (m ²) =			
15	1.30				
20	1.42	From the graph:			
25	1.48	tp 75 (min) =			
30	1.53	tp 25 (min) =			
40	1.60				
50		Soil infiltration rate, f, (m/s) =		1.99E-04	normal test
		Input by:	CA	Date:	23/06/2017
		Checked by:		Date:	

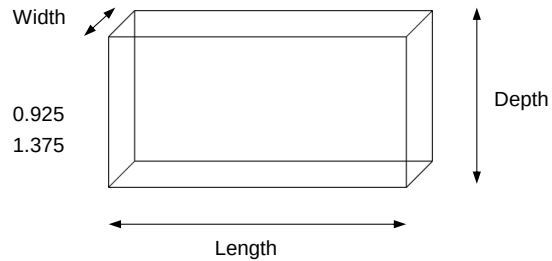


Job	Llay, Nr Wrexham	Job No.	STR16189
Calc	Gravel trench soakaway	Page	
By	CS	Filename	Date
Chkd		Date	14.05.20

Trial Dimensions

Depth of pit (m)	1.6
Depth to start (m)	0.7
Depth to finish (m)	1.6
Length (m)	2.25
Width (m)	0.5
Time for water level to fall between 75% and 25% effective depth. (mins)	40

75% full
25% full



Trial Pit Layout

Calculated Soil Filtration Rate f 0.000199

Manual Soil Filtration Rate 1.99E-04

Soakaway design

r see figure 1 0.2

Dimensions

Width (m)	1.2
Depth (m)	2
Invert Level below ground (m)	1.3
Effective Depth (m)	0.7
Soakaway Fill Free Volume	30%
Area to be drained (m2)	596.3

Results

Storm Duration (D)	Length Required (m)
5 min	12.87
10 min	17.04
15 min	19.26
30 min	19.95
60 min	18.83
120 min	15.07
240 min	10.92
360 min	8.69
600 min	6.43
1440 min	3.58

Critical Length (m) 19.95

Critical Duration (min) 1440

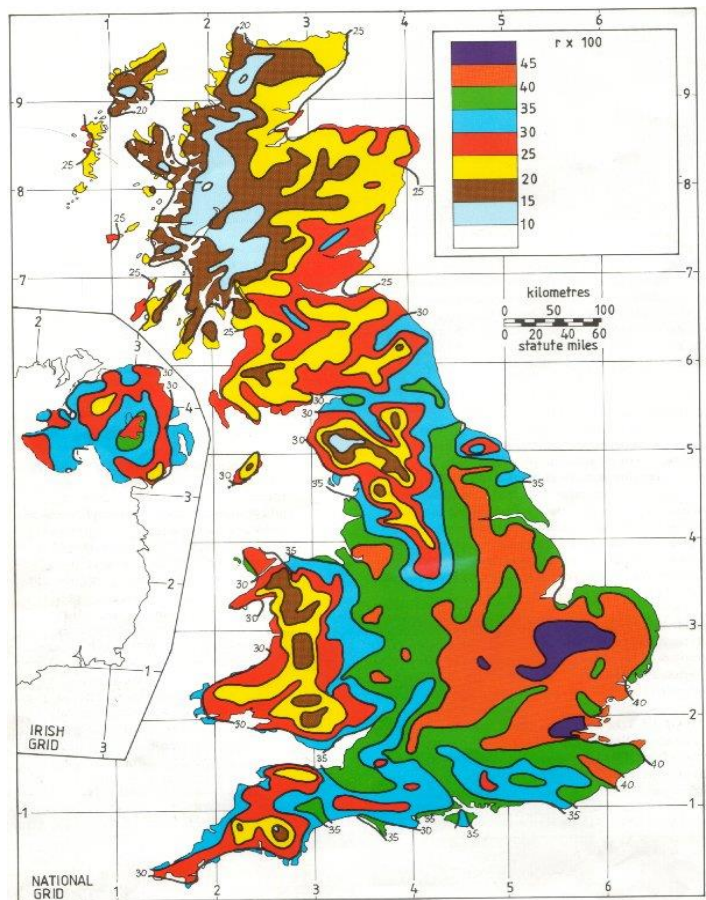


Figure1

Time required to empty half storage volume 1.36 hours less than 24 hrs, so o.k.

Provide a soakaway with the following properties

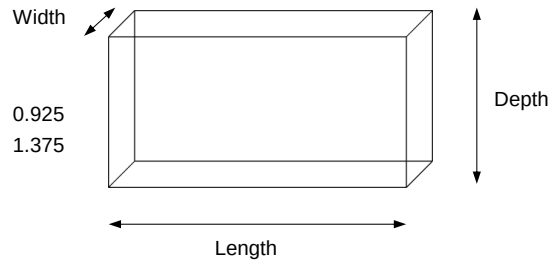
Length	19.9m
Width	1.2m
Depth	2.0m
Pipe Inver	1.3m

Note : this design assumes that the soakaway fill has 30% voids

Trial Dimensions

Depth of pit (m)	1.6
Depth to start (m)	0.7
Depth to finish (m)	1.6
Length (m)	2.25
Width (m)	0.5
Time for water level to fall between 75% and 25% effective depth. (mins)	40

75% full
25% full



Trial Pit Layout

Calculated Soil Filtration Rate f 0.000199

Manual Soil Filtration Rate 1.99E-04

Soakaway design

r see figure 1 0.2

Dimensions

Width (m)	2.8
Depth (m)	1.7
Invert Level below ground (m)	0.7
Effective Depth (m)	1
Soakaway Fill Free Volume	95%
Area to be drained (m2)	892.9

Results

Storm Duration (D)	Length Required (m)
5 min	2.05
10 min	3.01
15 min	3.74
30 min	4.79
60 min	5.96
120 min	6.38
240 min	5.88
360 min	5.14
600 min	4.04
1440 min	1.98

Critical Length (m) 6.38

Critical Duration (min) 1440

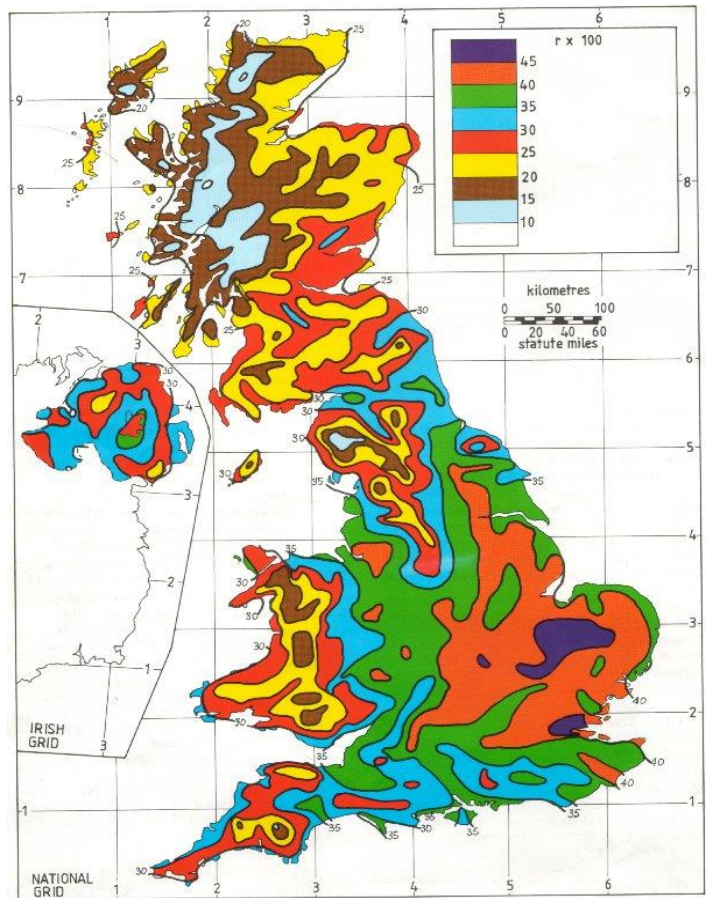


Figure1

Time required to empty half storage volume 7.55 hours less than 24 hrs, so o.k.

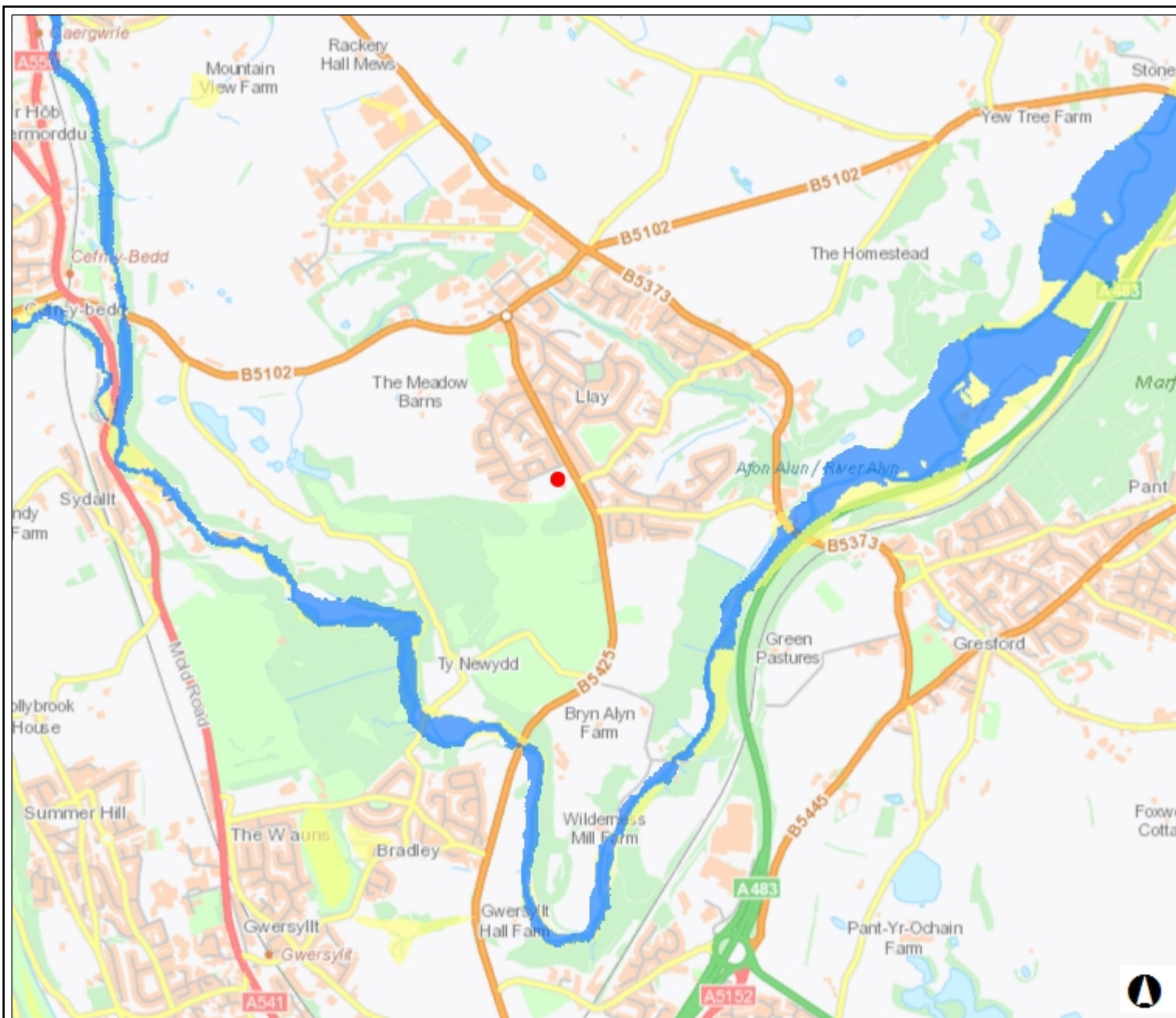
Provide a soakaway with the following properties

Length	6.4m
Width	2.8m
Depth	1.7m
Pipe Inver	0.7m

Note : this design assumes that the soakaway fill has 95% voids



D. Surface Water and Tidal/Fluvial Flood Map



1

Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key

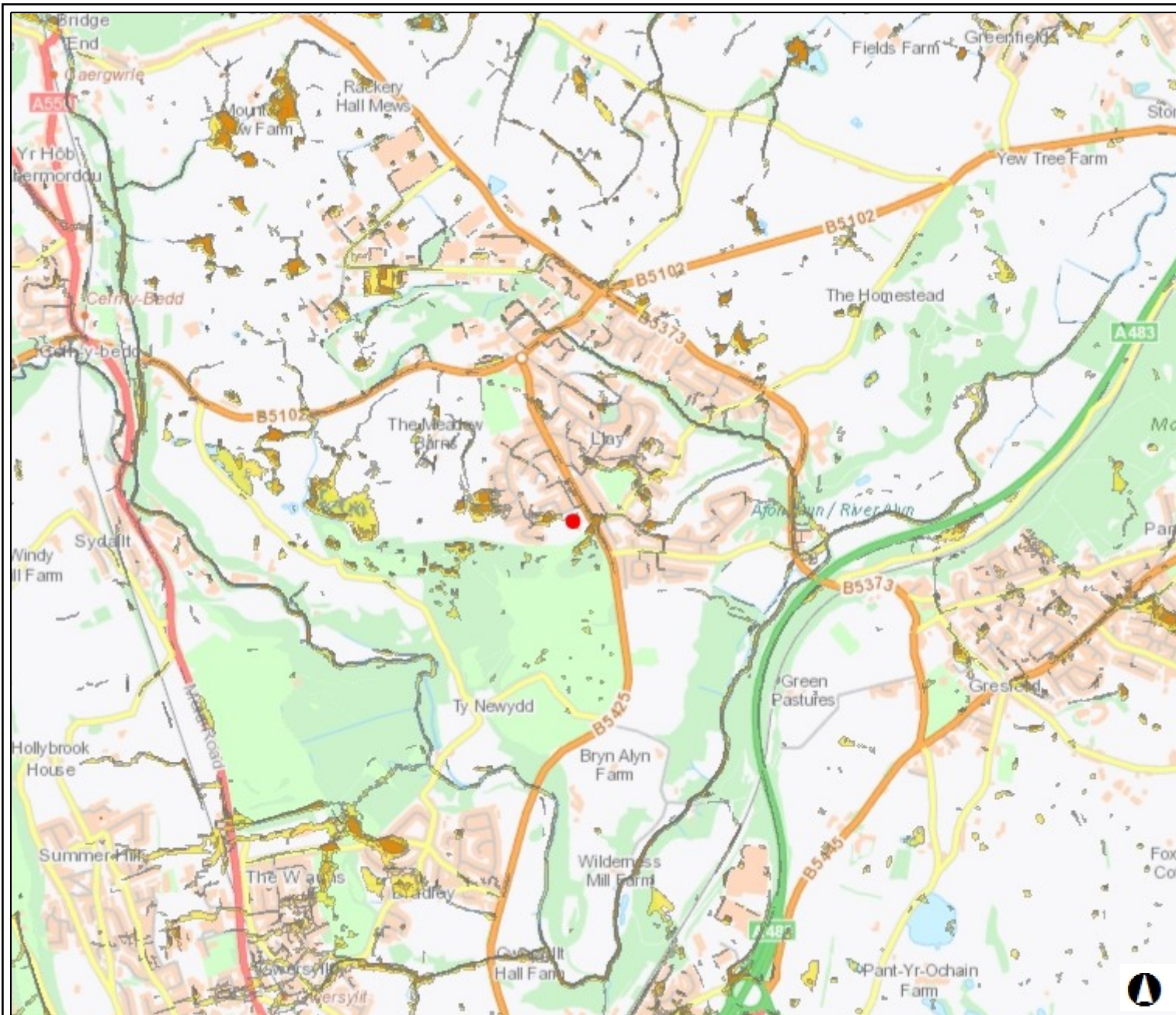
- Zone C1
- Zone C2
- Zone B
- Zone A

Graddfa / Scale 1: 25,000

Dyddiad / Date
14/05/2020



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Cyfoeth Naturiol Cymru
Natural Resources Wales

Map Title

Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key

- High Surface Water Flood Risk - Extent
- Medium Surface Water Flood Risk - Extent
- Low Surface Water Flood Risk - Extent

Graddfa / Scale 1: 25,000

Dyddiad / Date
15/05/2020

1.3 0 0.64 1.3



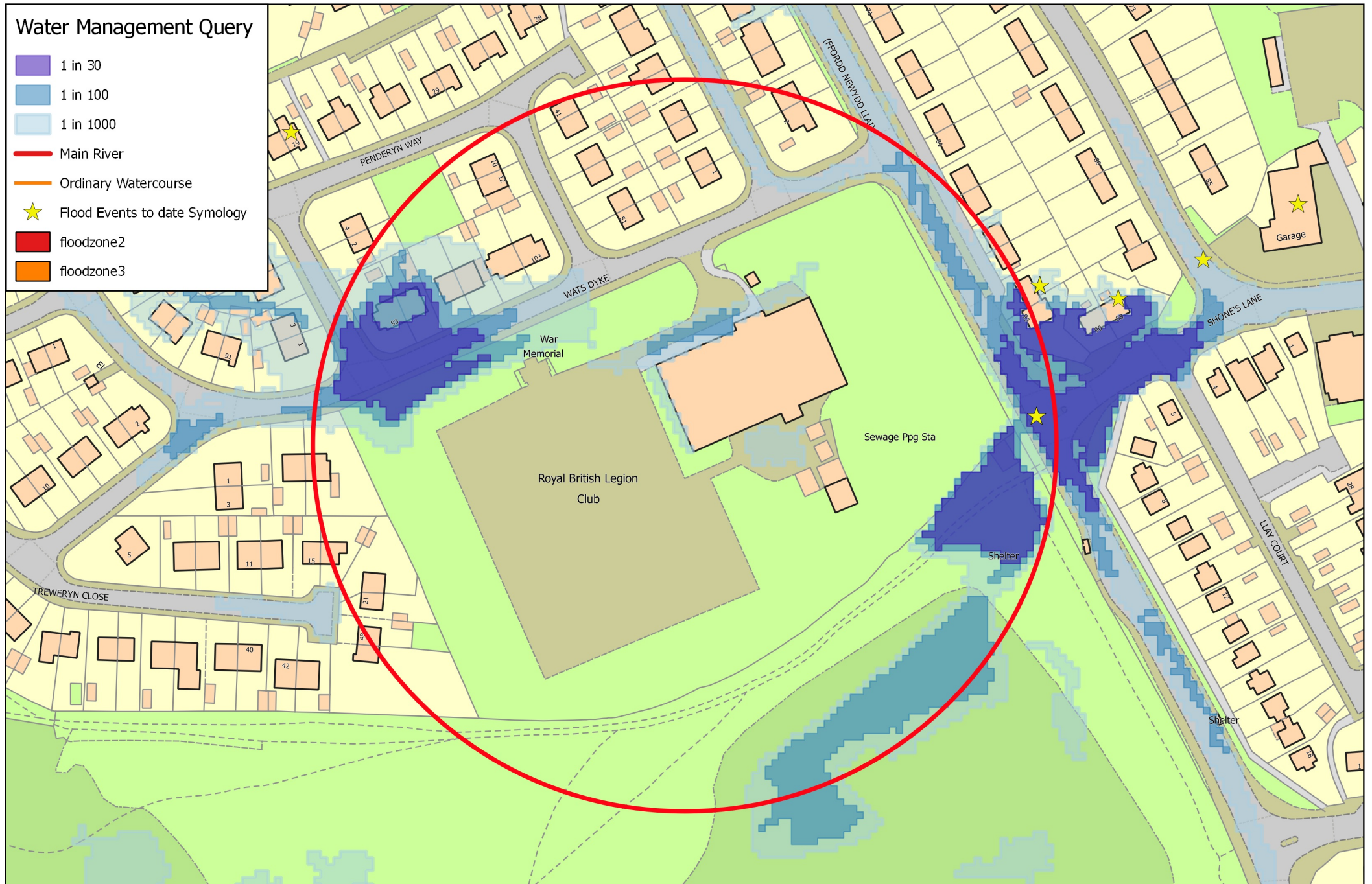
British_National_Grid

Kilometers

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Water Management Query

- 1 in 30
- 1 in 100
- 1 in 1000
- Main River
- Ordinary Watercourse
- Flood Events to date Symology
- floodzone2
- floodzone3



Llay British Legion

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