coopers

chartered consulting engineers

Our ref: 7896_FCA

Flood Consequences Assessment and Drainage Strategy

for

Land off Wrexham Road

Abermorddu

Flintshire

For : Castle Green Homes Ltd
Unit 20, St Asaph Business Park
St Asaph
Denbighshire
LL17 0LJ

24 August 2022

Park House, Sandpiper Court,
Chester Business Park,
Chester, CH4 9QU

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Document Verification

Project Title	Land Off Wrexham Road, Abermorddu, Flintshire
Project Number	7896
Document Title	Flood Consequences Assessment and Drainage Strategy
Document Number	7896_FCA_Issue 1
This document is not to be used for contractual or engineering purposes unless the document verification sheet is signed where indicated by the approver of the document.	

Prepared by

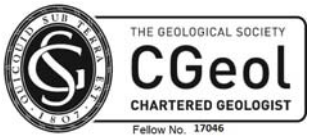
A Jones

Senior Infrastructure Engineer

Checked and Approved

P R Sykes

BSc (Hons), MSc (Eng), CGeol, FGS



Document Revision

Report Reference	Date	Description	Prepared	Checked and Approved
7896_FCA	24/08//2022	Flood Consequences Assessment	A Jones	P R Sykes

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1.0 Introduction

Coopers (Chester) Ltd, (Coopers) have been appointed by Castle Green Homes Ltd to assess the risk of flooding and to provide a Drainage Strategy for a site off Wrexham Road, Abermorddu. Castle Green Homes Ltd are proposing a new housing development, comprising of approximately 70 No. dwellings.

Castle Green Homes Ltd are planning the construction of a mixture of semi-detached and detached residential properties with associated access road, parking, vehicular access and landscaping subject to conditions. It is understood the site does not currently benefit from any planning decision.

This flood consequences assessment (FCA) evaluates the proposals with regard to flood risk, identifying and appraising potential flood risk both to and from the whole site. Coopers have carried out the following:

i. Assessment of the development potential of the site in line with the Welsh Government's Technical Advice Note 15: Development and Flood Risk (TAN15) and;
ii. An assessment of surface water runoff and drainage strategy

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 No. properties or the construction area is more than $100m^2$. The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SuDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

2.0 Site Characteristics

2.1 Site Location

The site is a parcel of agricultural land in Abermorddu. The site is situated off Wrexham Road at approximate grid reference SJ307567.

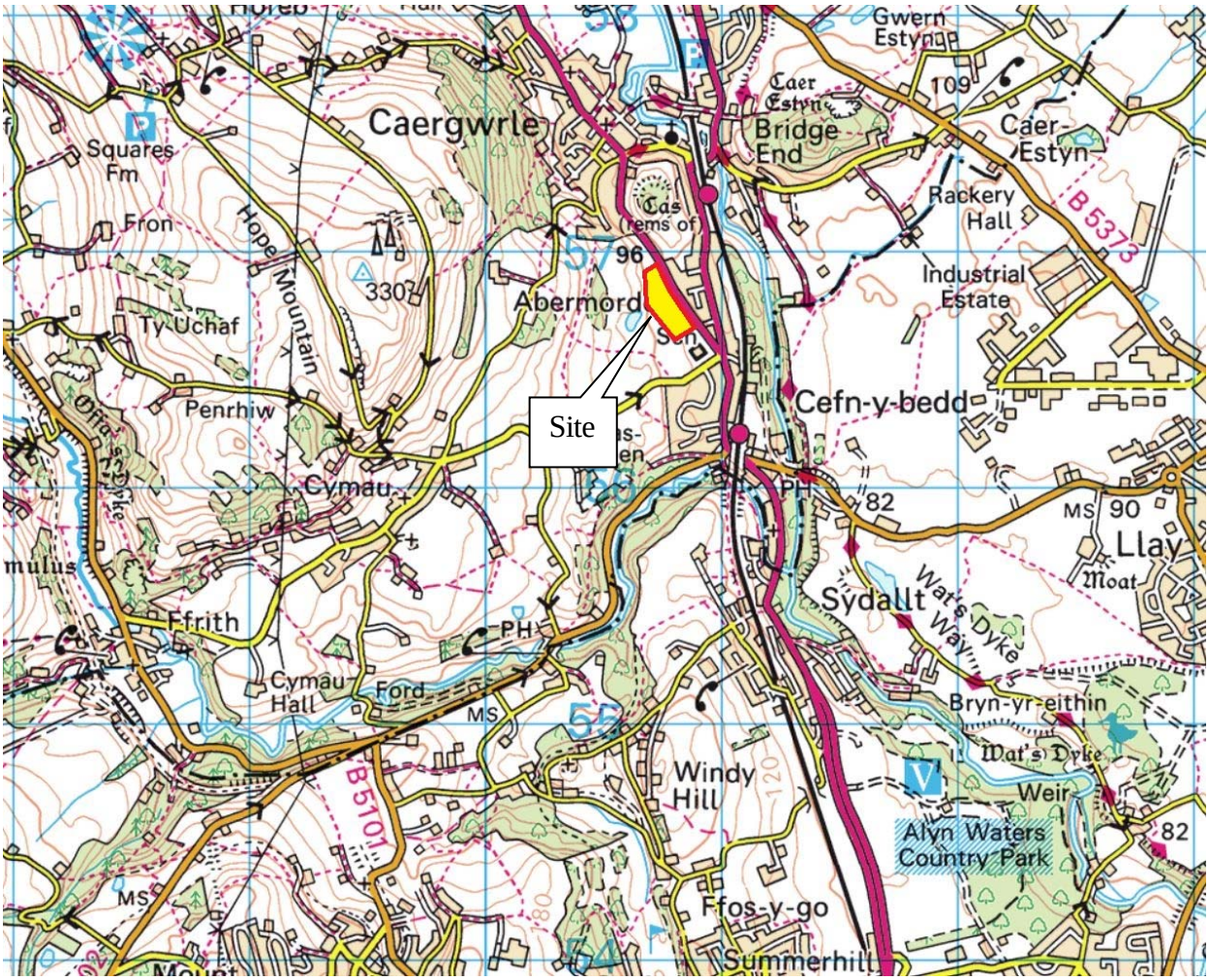


Figure 1 – Site Location

2.2 Site Description

The site covers an area of 3.45 Hectares area of land in Abermorddu approximately 4 miles to the north of Wrexham. The western boundary of the site adjoins woodland and agricultural land and a play area. The southern boundary adjoins a school and the eastern boundary is formed by the A541 (Wrexham Road). The northern boundary adjoins agricultural land.

The topography of site falls from west to east towards Wrexham Road. Levels vary from a highpoint of 96.0m AOD at the west to a lowpoint of 86.0m AOD at the south east corner of the site. Refer to topographical survey in Appendix 1.

3.0 Sources of Flood Risk Information

3.1 The Welsh Government Development Advice Map

The Welsh Government Development Advice Map shows the site is located within Flood Zone A – an area considered to be at little or no risk of fluvial or tidal flooding, with a less than 1 in 1000 (0.1%) annual probability of flooding in any given year.

The proposed residential development is considered to be a 'highly vulnerable' development in accordance with Figure 2 of the Welsh Governments Technical Advice Note 15. Highly vulnerable development is considered to be appropriate within Flood Zone A.

3.2 Natural Resources Wales

The NRW Flood Map shows the site is located within Flood Zone 1 – an area considered to have the lowest probability of fluvial flooding. It is assessed as having a less than 0.1% annual probability of flooding in any given year.

It should be noted that the Flood Map only covers flooding from rivers and the sea. Flooding can occur at any time and in any place from sources such as rising groundwater levels, burst water mains, blocked road drains, run-off from hillsides, sewer overflows, etc.

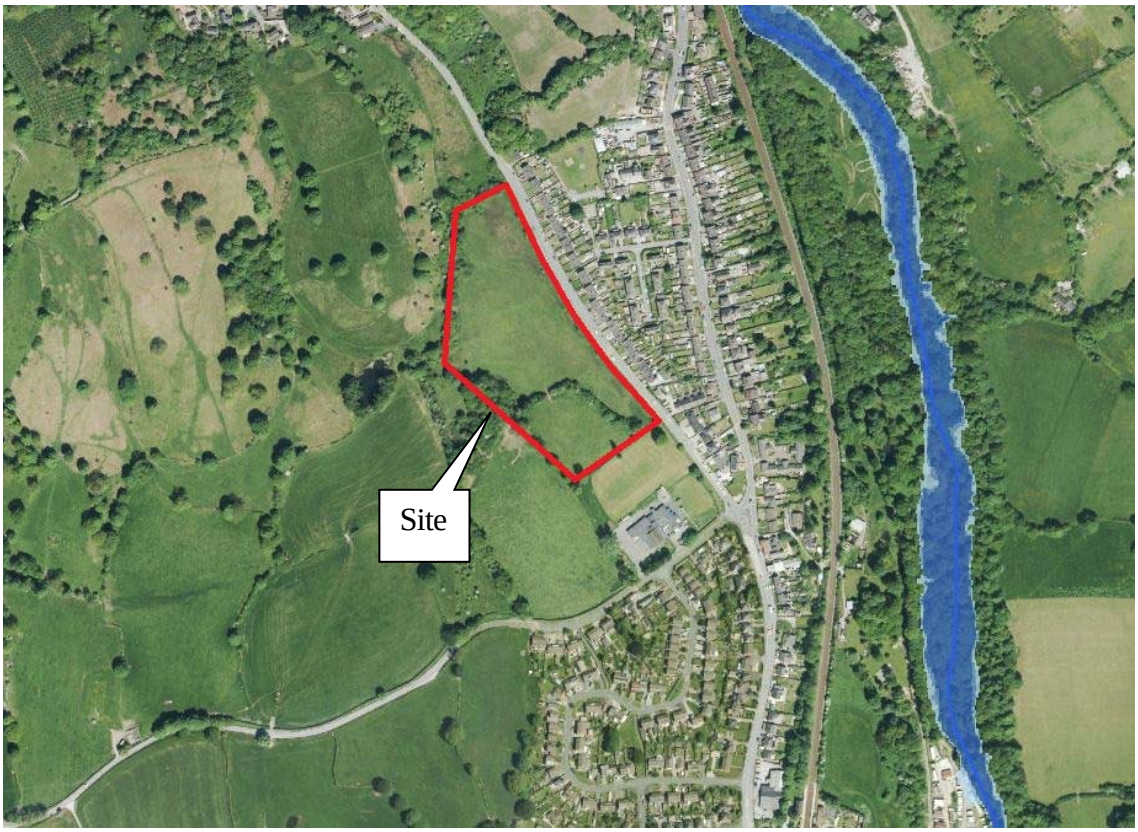


Figure 2 – Natural Resources Wales Flood Map for Planning (River and Sea)

The Natural Resources Wales long term flood risk maps indicate the site has a low risk of flooding from Surface Water with a few localised low spots adjacent to Wrexham Road on the eastern side of the development. Mitigation will not be required as the development will introduce a positive drainage network resulting in a reduction of overland flows.

Figure 3 – Natural Resources Wales Surface Water Flooding Map

3.3 Flintshire LLFA

Both the Flintshire Council Local Flood Risk Management Strategy (December 2013) and the Strategic Flood Consequence Assessment (July 2018) contains no records of any flooding at or near to the site. We have contacted Flintshire Council for confirmation of any known historical flooding within the vicinity of the site and are currently waiting for a response.

4.0 Sources of Flood Risk

4.1 Fluvial

Extreme fluvial flood events have the potential to cause rapid inundation of the site whilst posing a threat to welfare and users. As outlined in Section 3.2; the site is within Flood Zone 1 and is therefore not at risk from extreme fluvial or tidal flooding. Therefore, the risk from extreme fluvial flooding to the site is considered to be low.

4.2 Infrastructure Failure (Existing and Proposed)

The failure of infrastructure such as culverts or bridges could increase the risk of flooding at the site. The risk of flooding is considered as very low.

4.3 Overland Flow

Overland flow occurs when the infiltration capacity of the ground is exceeded in a storm event. This can result in water travelling as a sheet flow overland or excess water being conveyed from location to another via local road networks. Due to the topography of the site sloping to the southern end of the site and the road layout / proposed public open space, overland flow is not considered a significant risk. Overland flows from the site will be significantly reduced post development with the incorporation of positive drainage and an internal road network.

4.4 Sewer Flooding

If the capacity of the sewers is exceeded in an extreme event, or a blockage occurs, surcharging of the network can result in surface flooding. Welsh Water sewer plans which are included in Appendix 1, indicate that there is a 150mm Diameter foul sewer within the southern site boundary. There are also combined sewers and a rising main within Wrexham Road to the east of the site.

We are proposing to discharge all foul flows into the combined sewer subject to Welsh Water Approval.

Welsh Water may have confirmed they have no records or any known flooding within the vicinity of the site. Refer to Appendix 4 for correspondence.

The overall risk from sewer flooding is considered as low.

4.5 Groundwater Flooding

Groundwater flooding occurs as a result of water rising up from the underlying superficial deposits, bedrock or from springs.

The site investigation trial pits have determined the northern and eastern portion of the site in underlain with cohesive clay and the southern and western portion of the site is underlain with permeable sands and gravels. Refer to Appendix 3 for supporting site investigation information.

The overall risk from groundwater flooding is considered as low.

4.6 Coastal Flooding

The site is not located in proximity of any tidal waterway or within close proximity to the sea and is therefore not at risk from tidal inundation.

4.7 Reservoirs

The site is not located in proximity of any reservoirs. Additionally, the NRW maps indicate the site is not at risk of flooding from reservoirs.

5.0 Surface Water Drainage

5.1 General

The design for a surface water drainage system for the proposed development will be guided by the principles set out in the Welsh Government's 'Recommended non-statutory standards for sustainable drainage (SuDS) in Wales – designing, constructing, operating and maintaining surface water drainage systems' (2017)

The SuDS Standards Wales sets out the following hierarchy for 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 the preferred (highest priority) and that 4 and 5 should only be used in exceptional circumstances.

5.2 Existing Surface Water Drainage

The site does not benefit from any existing drainage and will rely on infiltration and surface water run-off to dispose of surface water flows. The flows will follow topography towards the eastern end of the site adjacent to Wrexham Road. Some of the flows will be intercepted by the watercourse in the southern end of the site but there may be some surface water flows onto Wrexham Road / western highway verge at the northern end of the site.

5.3 Existing Site Runoff

The greenfield run-off rates for the site has been calculated using the HR Wallingford Greenfield runoff rate estimation tool. Calculations below are based on a 3.45ha site area.

1-yesr	= 10.45 l/s
30-year	= 21.18 l/s
100-year	= 25.91 l/s
QBAR	**= 11.90 l/s**

Refer to Appendix 5 for surface water run-off calculations.

5.4 Proposed Surface Water Drainage and Runoff Rates

Priority Level 1

Whilst rainwater harvesting has been considered for the proposed development it should be noted that any device enabling water re-use cannot be taken into account when sizing attenuation as the storage facility may be full when a storm event occurs. Therefore, an overflow to an infiltration device (where ground conditions allow) or to a watercourse / sewer will be required.

Castle Green Homes Ltd are not proposing to incorporate rainwater harvesting within the development; however, they are proposing to install a water butt to each dwelling which will allow for water collection for garden re-use.

Priority Level 2

Site investigation has determined the southern and western portion of the site is underlain with sands and gravels. Infiltration tests have confirmed the ground conditions in this area are suitable to dispose of surface water flows direct to the ground.

The northern and eastern portion of the site is underlain with cohesive strata in which the infiltration tests failed, but on review of site levels it is possible to drain the entire site via gravity to a communal soakaway located in the southern portion of the site.

Priority Level 3

The nearest main river is the River Alyn approximately 340m east of the development site.

There is also an ordinary watercourse flowing through the southern portion of the site which discharges into a piped network in the south east corner of the site. It is understood this is then routed through the highway and residential development to the east of the site and ultimately discharges into the River Alyn

Priority Level 4

A highway drain has been identified in the western verge along Wrexham Road to the east of the site. A drainage survey has confirmed this is very shallow and will receive flows from highway gullies along Wrexham Road.

There are no surface water sewers recorded on the Welsh Water sewer maps within the vicinity of the site. Refer to Appendix 1 for Welsh Water sewer map.

Priority Level 5

The Welsh Water sewer maps indicate the presence of a combined sewer and rising main in Wrexham Road.

5.5 SuDS Approval Bodies

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 No. properties or the construction area is more than 100m^2. The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SuDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

Every SuDS application should go to every attempt to satisfy the Principles and Standards of the legislation. When vetting an application, the SAB officer will look at the clear red line boundary area of the site when considering space for SuDS and water management features and not the space that's left on the proposed site layout.

The principles are as follows:

SuDS schemes should aim to:

1. *manage water on or close to the surface and as close to the source of the runoff as possible;*
2. *treat rainfall as a valuable natural resource;*
3. *ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it;*
4. *manage rainfall to help protect people from increased flood risk, and the environment from morphological and associated ecological damage resulting from changes in flow rates, patterns and sediment movement caused by the development;*
5. *take account of likely future pressures on flood risk, the environment and water resources such as climate change and urban creep;*
6. *use the SuDS Management Train, using drainage components in series across a site to achieve a robust surface water management system (rather than using a single "end of pipe" feature, such as a pond, to serve the whole development);*
7. *maximise the delivery of benefits for amenity and biodiversity;*
8. *seek to make the best use of available land through multifunctional usage of public spaces and the public realm;*
9. *perform safely, reliably and effectively over the design life of the development taking into account the need for reasonable levels of maintenance;*
10. *avoid the need for pumping where possible; and*
11. *be affordable, taking into account both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system.*

Applicants seeking SAB Approval must demonstrate how they have complied with these principles or provide justification for any departure.

The surface water strategy presented in Appendix 1 is providing all attenuation within a communal SuDS infiltration basin within the POS at the southern end of the development. Incorporation of additional source control SuDS components such as individual plot soakaways (where ground conditions allow), water butts, permeable paving and bio retention (tree pits and rain gardens) will need to be considered further at detailed design stage to meet the 5mm interception design criteria.

The infiltration basin has been designed for a maximum water depth of 1.0m and will half-drain within 24 hours. The basin side slopes will be a maximum gradient of 1 in 4 with the incorporation of a 1.0m safety bench.

5.6 Foul Drainage

We are proposing to discharge all foul flows into the existing 150mm Diameter combined sewer subject to approval from Welsh Water gravity combined public sewer in Wrexham Road to the east of the development.

Topography and proposed site levels design will allow for a gravity network to serve the entire development without any need for a pumping station.

6.0 Conclusions and Recommendations

The site is located in Flood Zone 1 and has been shown to be at low risk of flooding from rivers, surface water, groundwater, sewers and climate change. Therefore, mitigation measures are not considered necessary for any future development at the site.

All potential sources of flooding have been considered as part of this report. There are no known records of historical flooding at the site.

The infiltration tests undertaken as part of the site investigation report have determined that the underlying soils in the southern portion of the site have good infiltration characteristics. Therefore, surface water run-off from highways, roof and private drives will discharge into the ground via infiltration techniques.

The development will increase the impermeable area of the site. This results in an increase in surface water runoff rates and volumes. In order to ensure the increase in runoff will not have an impact elsewhere all flows will discharge to ground within the site boundary.

All surface water run-off from highways, roof and private drives will be collected into gravity piped networks and discharged into a communal SuDS infiltration basin.

Additional on-site source control components such as permeable paving and bioretention components (tree pits and rain gardens) should be considered further at detailed design stage.

The provision of trapped highway gullies, silt traps, the SuDS infiltration basin and additional source control components will provide adequate treatment to surface water flows prior to discharge to the watercourse.

All foul sewers should be designed in accordance with Sewers for Adoption 7th Edition / Welsh Ministers Standards and will be subject to S104 Agreement.

A SuDS Maintenance and Management Plan should be produced to outline the activity and frequency of inspections and maintenance works required on any SuDS components subject to SAB Approval / Adoption.

This Flood Consequences Assessment and Drainage Strategy should be submitted to the Local Planning Authority in support of the planning application.

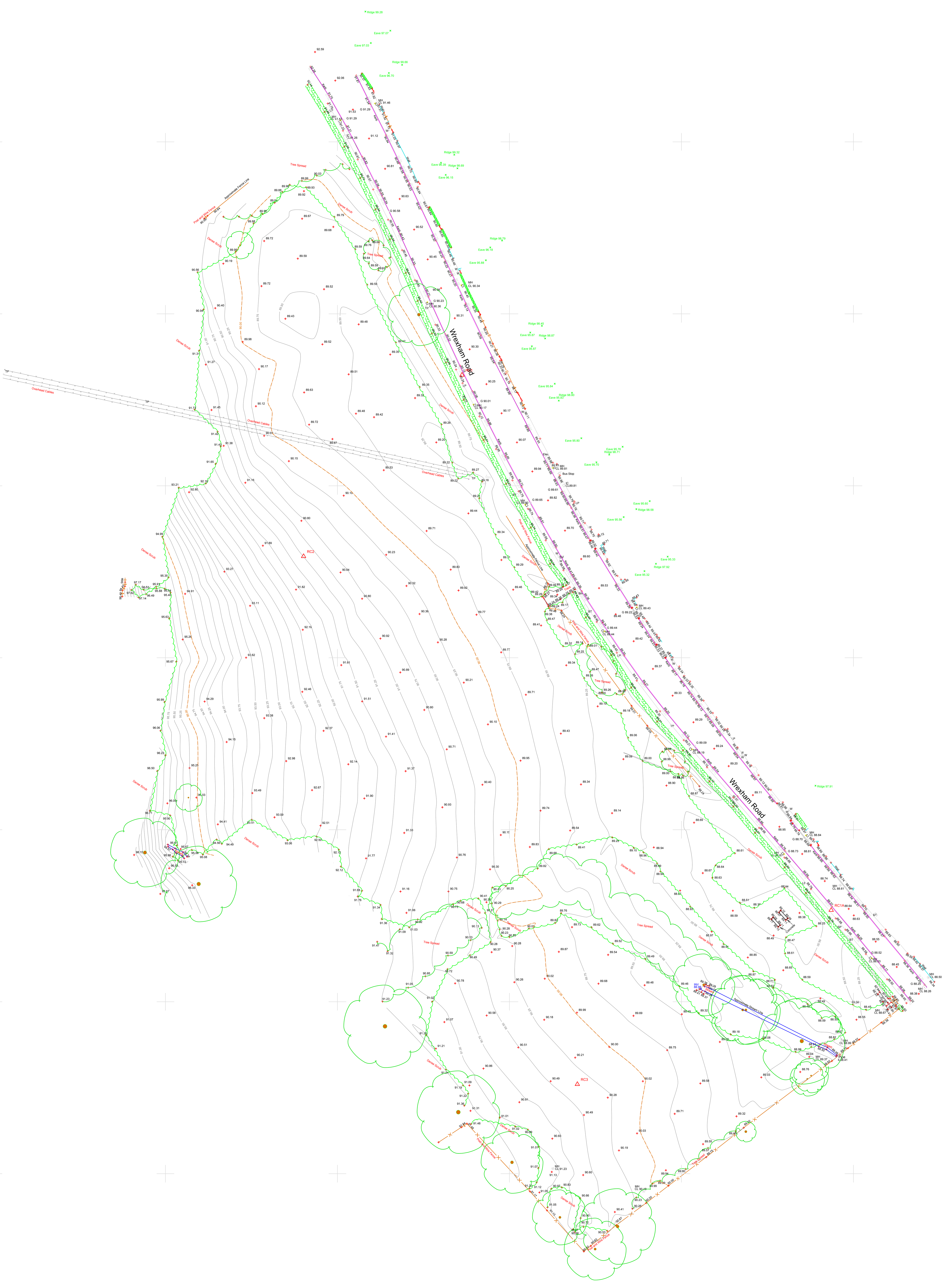
Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 properties or the construction area is more than 100m^2. The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SuDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

Appendix 1

Reference Drawings

Drawing No.	Revision	Title
7558/01	-	Topographical Survey
-	-	Welsh Water Sewer Map
7896/SK02	A	Drainage Strategy



Legend

AV	Air valve
BH	Borehole
BOL	Bollard
BT	British Telecom cover
CATV	Cable television cover
CL	Cover level
DPC	Damp proof coarsing level
Earth/ER	Earthing rod
ELEC	Electric cover
EP	Electricity pole
Fence I/R	Iron railing fence
Fence C/B	Closeboard fence
Fence C/P&P	Concrete post & panel fence
Fence Pa	Palisade fence
Fence P/W	Post and wire fence
Fence P/R	Post and rail fence
Fence P/P	Post and panel fence
FFL	Finished floor level
F/B	Flower bed
FH	Fire Hydrant
G	Gulley
GAS	Gas cover
IC	Inspection chamber
IL	Invert level
INV	Invert level
LP	Lamp post
LT	Light
MH	Manhole
Nynex	Telecommunications cover
OSBM	Ordnance Survey Bench Mark
PTM	Parking ticket machine
RE	Rodding eye
RS	Road sign
R/t wall	Retaining wall
SBX	Switch box
SP	Sign post
SPS	Safety playing surface
ST	Stop tap
SV	Service valve
TBM	Temporary Bench Mark
TP	Telegraph pole
TRP	Trial pit
TRL	Traffic light
W	Water cover
WL	Water level
WO	Wash out

SURVEY STATIONS

Name	Easting	Northing	Height
RC1	330786.217	356832.217	90.217
RC1A	330893.525	356676.626	88.693
RC2	330740.157	356779.492	91.243
RC3	330819.736	356626.013	90.420

KEY DIMENSIONS SHOULD BE CHECKED ON SITE
BEFORE COMMENCEMENT OF ANY WORKS

NOTE

Grid and Levels
Related to OS
Via Active GPS Network

Amendments

Date	Surveyor	Description of work

Powers&Tiltman Ltd
Land Surveyors

Meridian House
58/60 Hillside Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473 Fax: 01928 735573
Email: mail@powerstiltman.co.uk
www.powerstiltman.co.uk

Wrexham Road

Abermorddu

Topographical Survey

Client : Fisher German

Surveyed By : RM	Date : 06/07/16	A0 @
Drawn By : RM	Drawing No : 7558/01	1:500
Checked By : MP	Amendment :	

Faes-Y-Gad
92.4m
Works
Alvordor
Crag
Ash
Dale
Play Area
The Wold
Silverdale
Rose Villa
Cae Merfys
Pentwyn
Hillcrest
94.2m
90.2m
89.6m
CROSSWAYS
WREXHAM ROAD
MAES CIBYN
HAWARDEN ROAD
Afon
Meirion Villas
Fair View
The
Rosslyn
Westfield
Cedar Cottage
Awelon
Trefaen
Hafod Alyn
Mountain View
Fernlea
Dronwy
Tegfan
Fernbank
Arosfa
Laurel Grove
Ways
TCB
Gwynllys
Roselea
School
School Villa
A 550
88.4m
Abermorddu
Abermorddu CP School
Play Area
Spreads
Path (um)
Pond
ED Bdy
CS
CW
CH
CF
Und
LLYS
Bryn Ial
Gwern Hywel
Glensid
The
CCS
yn-Yorkin Wood

DO NOT SCALE

NORTH

STORM Network: 2

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	450	399	CONC	19.544	S1	88.369	90.444	S2	88.320	90.203
1.001	450	406	CONC	12.169	S2	88.320	90.203	S3	88.290	90.154
1.002	450	399	CONC	31.927	S3	88.290	90.154	S4	88.211	90.795
1.003	450	393	CONC	11.006	S4	88.211	90.755	S5	88.183	90.989
1.004	450	403	CONC	22.555	S5	88.183	90.989	S6	88.127	91.321
1.005	450	401	CONC	12.429	S6	88.127	91.321	S7	88.096	91.471
1.006	450	401	CONC	28.037	S7	88.096	91.471	S10	88.026	91.669
1.007	450	400	CONC	30.766	S10	88.026	91.669	S11	87.949	91.056
1.008	450	401	CONC	26.462	S11	87.949	91.056	S12	87.883	90.355
1.009	450	400	CONC	33.414	S12	87.883	90.355	S21	87.799	90.000
1.010	450	399	CONC	41.491	S21	87.799	90.000	S22	87.695	90.000
1.011	450	400	CONC	10.000	S22	89.000	90.000	S23	88.975	90.000
2.000	225	169	CLAY	9.954	S8	91.176	93.813	S9	91.117	93.126
2.001	225	20	CLAY	34.346	S9	91.117	93.126	S10	89.400	91.669
3.000	450	404	CONC	14.535	S13	88.319	90.000	S14	88.283	89.812
3.001	450	450	CONC	72.804	S14	88.283	89.812	S15	88.101	89.332
3.002	450	399	CONC	53.010	S15	88.101	89.352	S16	87.968	89.336
3.003	450	403	CONC	9.663	S16	87.968	89.336	S17	87.944	89.895
3.004	450	405	CONC	14.185	S17	87.944	89.995	S18	87.909	90.207
3.005	450	398	CONC	43.740	S18	87.909	90.207	S19	87.799	90.000
4.000	450	396	CONC	13.851	S19	87.980	89.120	S20	87.945	88.820
4.001	450	401	CONC	56.479	S20	87.945	88.820	S21	87.799	90.000

FOUL Network: 2

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	150	80	CLAY	12.543	F1	88.870	90.238	F2	88.713	90.145
1.001	150	150	CLAY	26.495	F2	88.713	90.145	F3	88.537	90.572
1.002	150	150	CLAY	9.753	F3	88.537	90.572	F4	88.472	90.800
1.003	150	150	CLAY	11.964	F4	88.472	90.800	F5	88.392	91.032
1.004	150	150	CLAY	26.264	F5	88.392	91.032	F6	88.217	91.396
1.005	150	150	CLAY	13.708	F6	88.217	91.396	F7	88.125	91.560
1.006	150	150	CLAY	35.708	F7	88.125	91.560	F8	87.887	91.430
1.007	150	150	CLAY	19.014	F8	87.887	91.430	F9	87.760	90.950
1.008	150	150	CLAY	26.951	F9	87.760	90.950	F10	87.580	90.501
1.009	150	150	CLAY	43.060	F10	87.580	90.501	F11	87.293	90.128
1.010	150	150	CLAY	17.745	F11	87.293	90.128	F12	87.175	89.572
1.011	150	150	CLAY	18.674	F12	87.175	89.572	F13	87.051	88.966
1.012	150	150	CLAY	97.634	F13	87.051	88.966	F14	86.400	88.260

Design based on Layout:
Wrexham Road, Abermorddu - Site Layout
Dwg No. ABMRD-SP.01, dated 19/02/20
Rev: B
Grid/Level datum based on Topo:
Wrexham Road, Abermorddu - Topo Survey Dwg. No. 7558/01, dated 06/07/16 Rev: -

0 5 10 15 20 25 30 35 40 45 50
SCALEBAR (m)

Legend

- Site Boundary

Existing
- Existing Highway drain
- Existing Rising Main
- Existing Foul Sewer
- Existing Combined

Proposed
- Surface Water Sewer
- Adoptable Foul Sewer
- Silt trap
- FFL 00.00 — Slab Level
- 300 WALL — Retaining Wall
- 300 UB — Underbuild (Retention below 300mm not indicated)
- +0.85 / -0.95 — Depth of fill (Existing levels to proposed)

Services and existing rising main to be surveyed to avoid any potential clashes with proposed foul sewer at site entrance

F15
Foul water sewer to connect to existing foul manhole located in Wrexham Road. Invert level to be confirmed. Should invert level not be suitable we propose to connect to the next manhole down stream.

S21
Catchment Area = 12,800m²
Base Level = 87.500
Invert Level = 87.800
Base Area = 450m²
Side Slopes = 1:4
Infiltration Rate = 3.50E-01 m/hr

Further infiltration testing required at final depth to confirm infiltration rates

Foul MH
CL- 88.67mAOD
(Topo)
IL- 86.97mAOD
(Site Investigation)

Foul MH
CL- 88.99mAOD
(Topo)
IL- 87.13mAOD
(Site Investigation)

STRATEGY

Rev.	Date	Revision	By	Appd.
A	24.08.22	Full redesigned for communal soakaway	JAR	AJ.

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client: Castle Green

Project
WREXHAM ROAD
ABERMORDDU, FLINTSHIRE

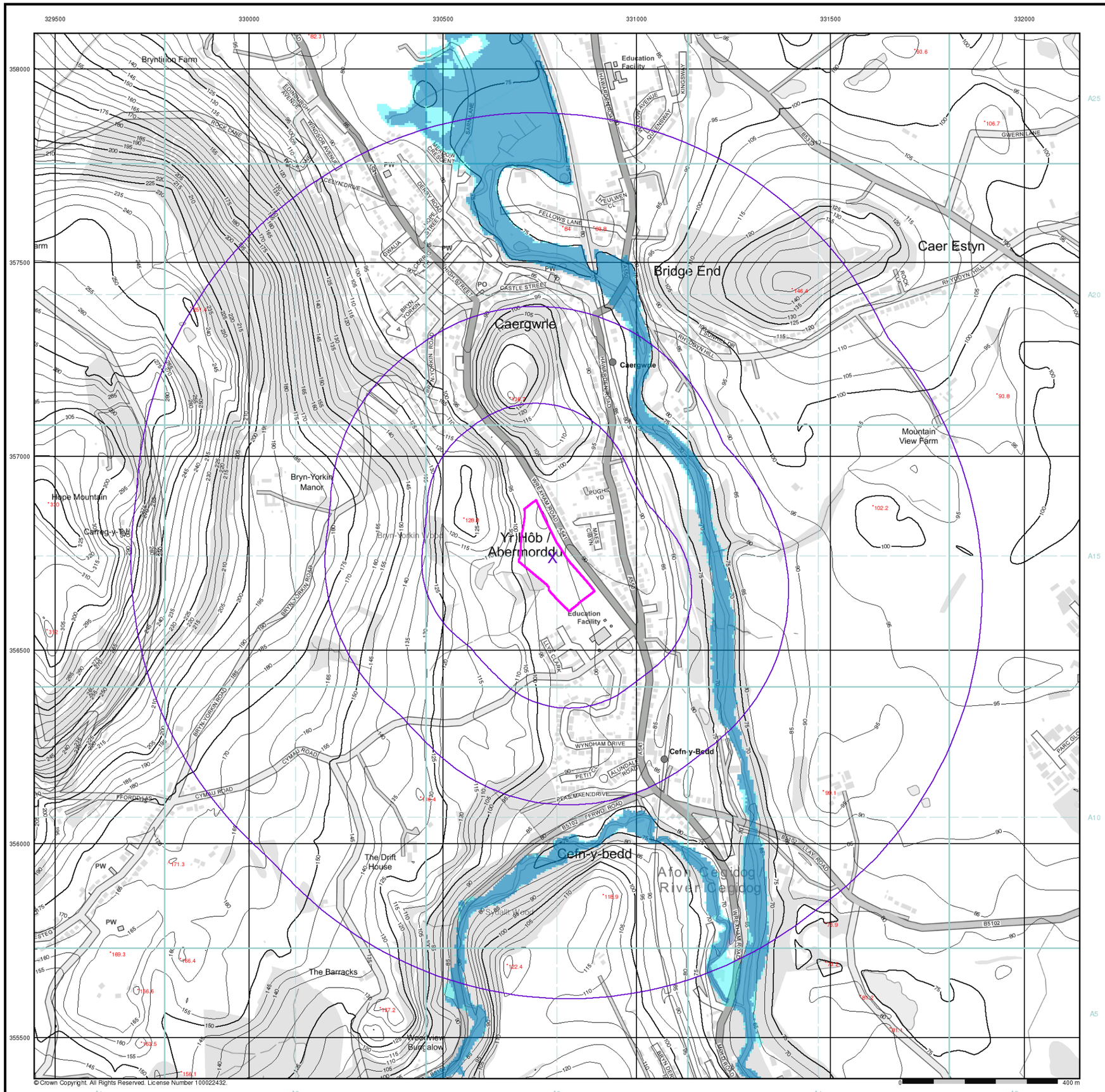
Title
Drainage Strategy

DRAWING NUMBER	SCALE at A1	1:500	
7896 / SK02	DATE	Dec 2021	REVISION
	DRAWN	PW	A
	CHECKED	AJ	

Appendix 2

Envirocheck Flood Screening Report

Order Number: 299240197_1_1



Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Flood Data Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Flood Data

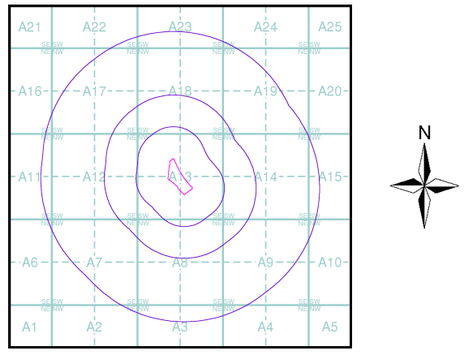
- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Contours (height in metres)

Standard Contour
Master Contour
Spot Height 167.8

MLW Mean Low Water
MHW Mean High Water

EA/NRW Flood Data Map - Slice A



Order Details

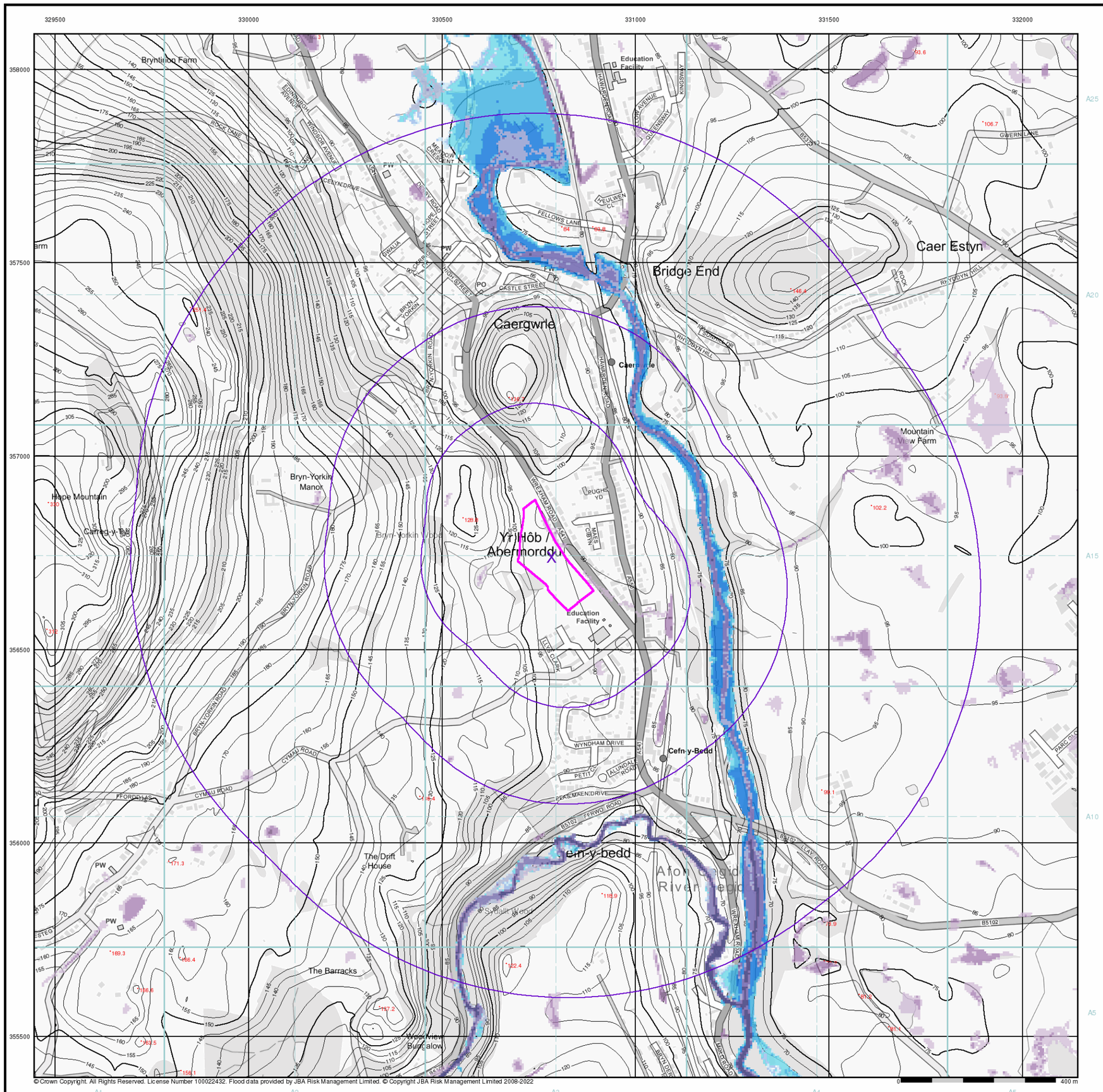
Order Number:	299240197_1_1
Customer Ref:	7896
National Grid Reference:	330780, 356740
Slice:	A
Site Area (Ha):	2.36
Search Buffer (m):	1000

Site Details

Wrexham Road, Abermorddu, LL12 9DG

Landmark® INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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JBA 75 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

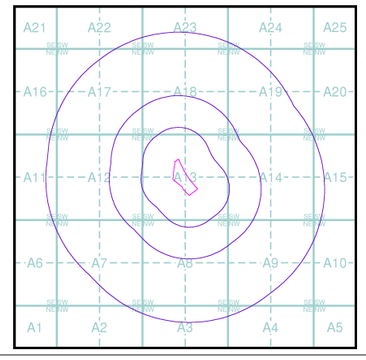
Contours (height in metres)

Standard Contour 105 100 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height 157.8

JBA 75 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number:	299240197_1_1
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National Grid Reference:	330780, 356740
Slice:	A
Site Area (Ha):	2.36
Search Buffer (m):	1000

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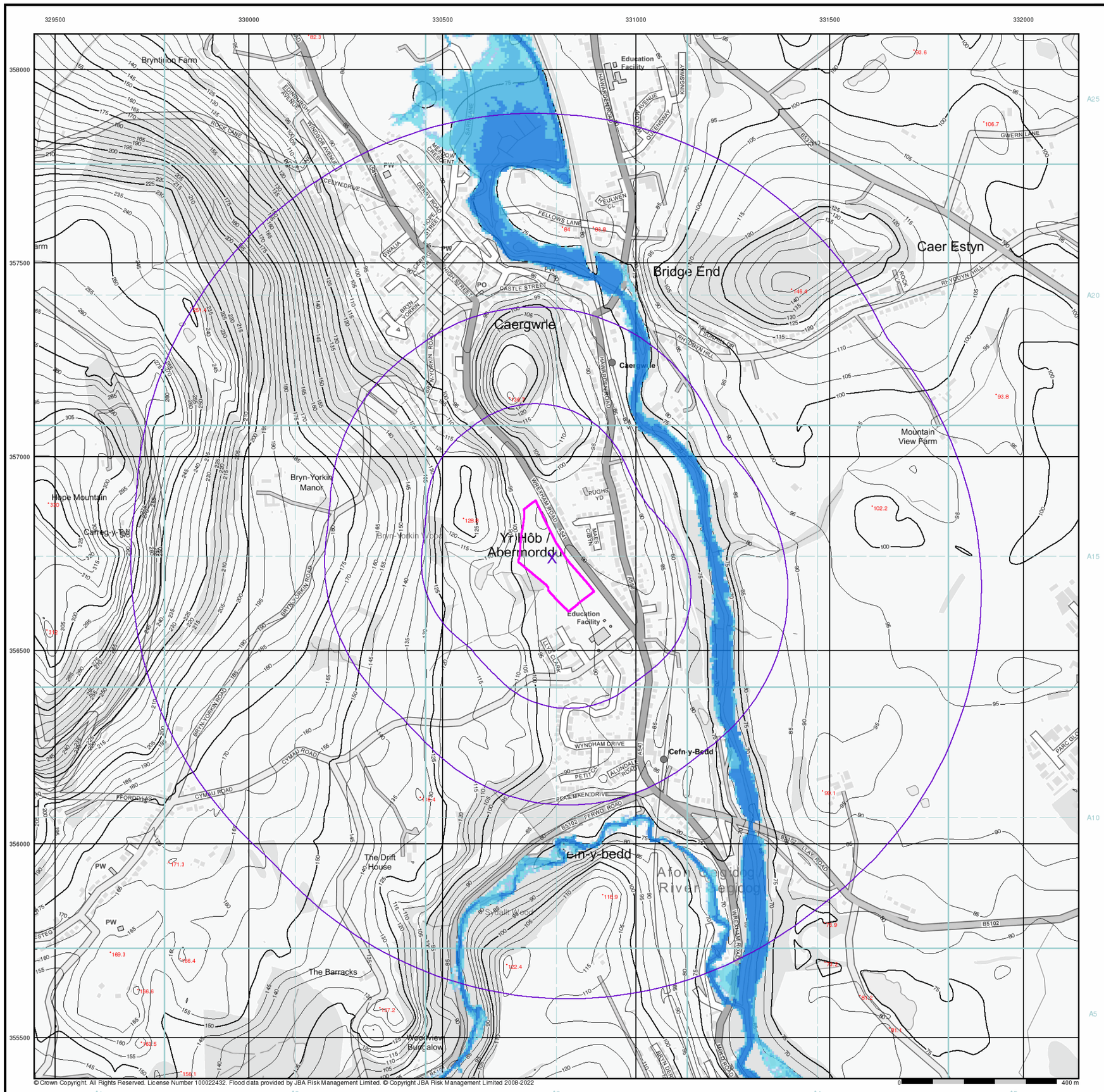

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JBA 100 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

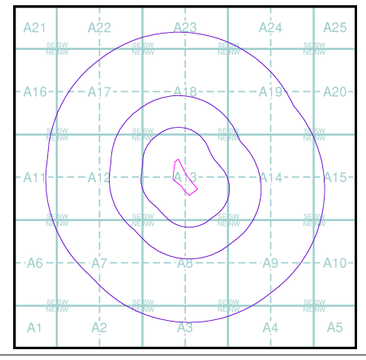
Fluvial Depth	Coastal Depth
0.01m - 0.05m	0.01m - 0.05m
0.05m - 0.1m	0.05m - 0.1m
0.1m - 0.3m	0.1m - 0.3m
0.3m - 1m	0.3m - 1m
>1m	>1m

Contours (height in metres)

Standard Contour 105
Master Contour 100 95
Spot Height 167.8

MLW Mean Low Water
MHW Mean High Water

JBA 100 Year Return Flood Map (Undefended) - Slice A



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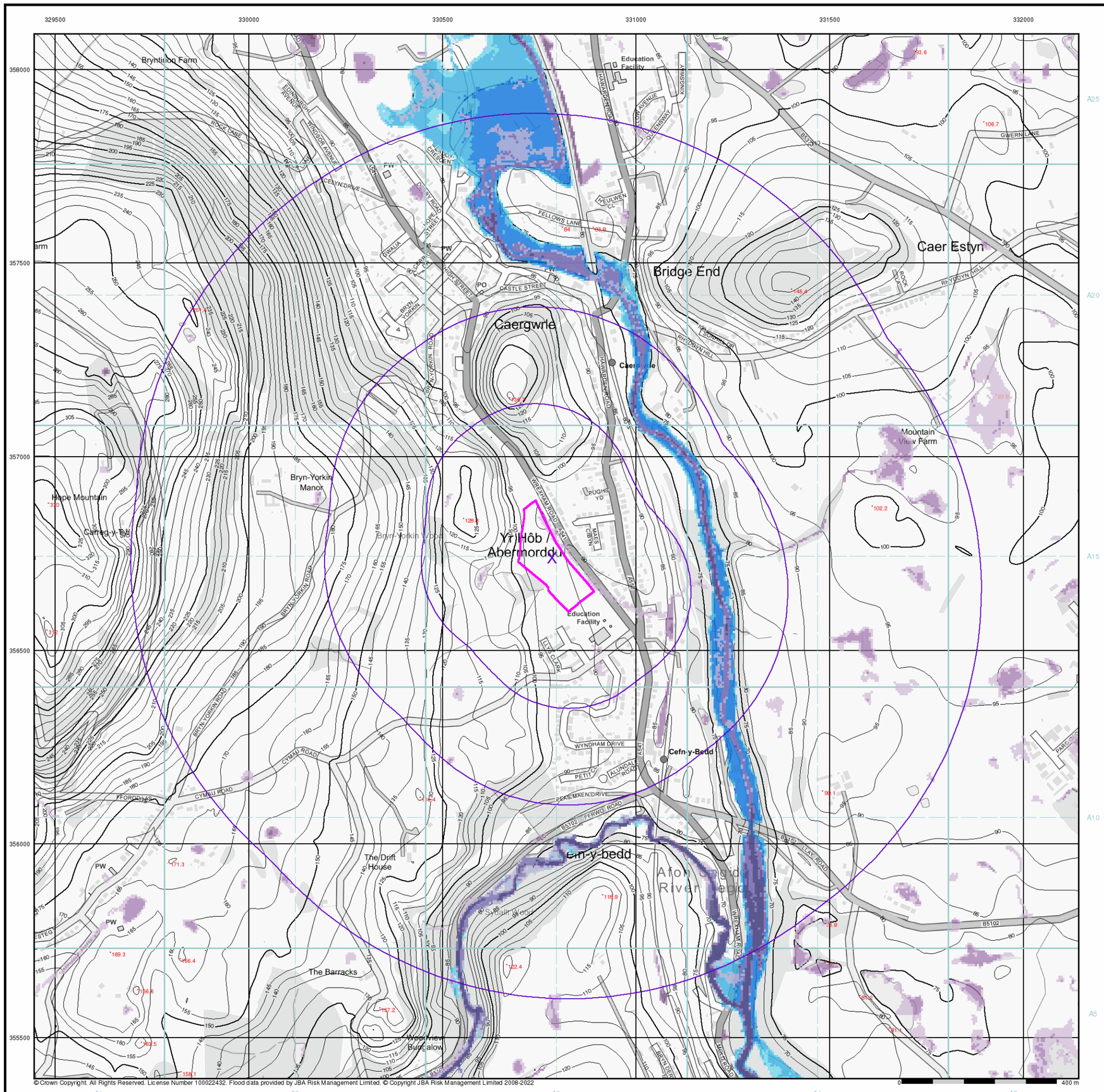

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JBA 200 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

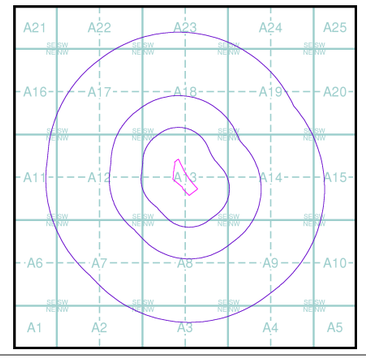
Contours (height in metres)

Standard Contour 105 100 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height 157.8

JBA 200 Year Return Flood Map (Undefended) - Slice A



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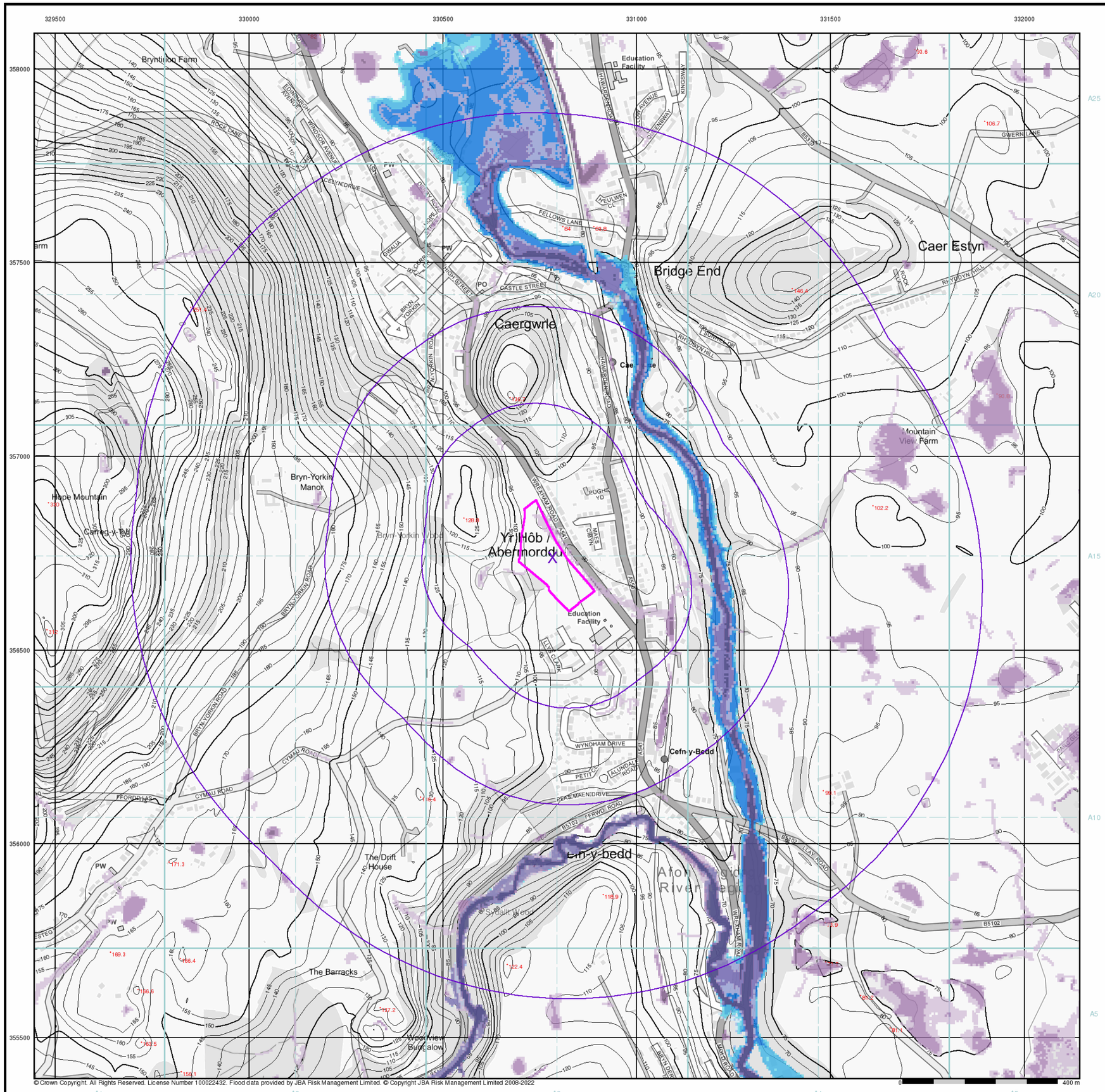

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LANDMARK INFORMATION GROUP®

JBA 1000 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

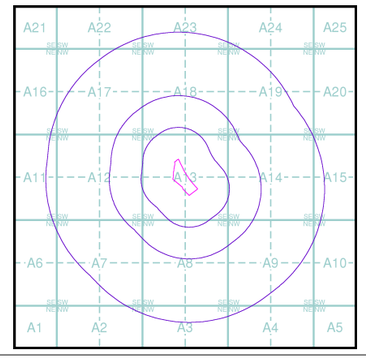
Contours (height in metres)

Standard Contour 105 100 95 — MLW Mean Low Water

Master Contour — MHW Mean High Water

Spot Height 157.8

JBA 1000 Year Return Flood Map (Undefended) - Slice A



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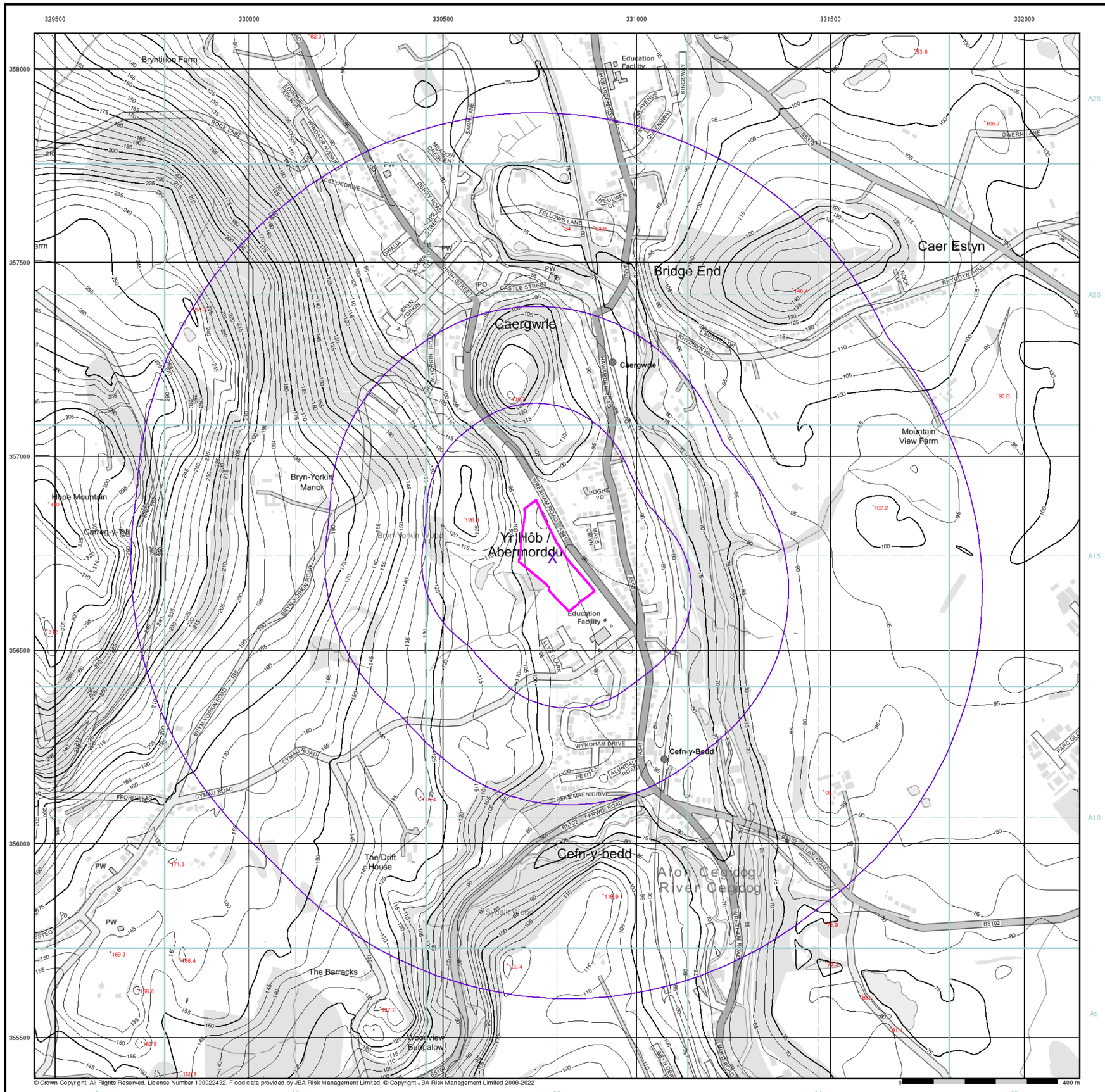

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JBA Canal Failure Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

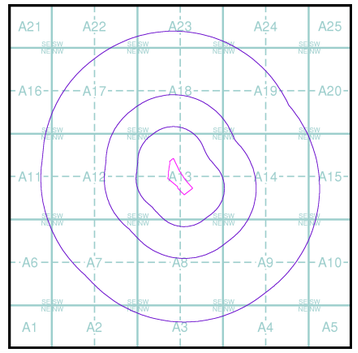
Flood Data

- Canal Failure
- Coverage

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height 167.8
- MLW Mean Low Water
- MHW Mean High Water

JBA Canal Failure Flood Map - Slice A



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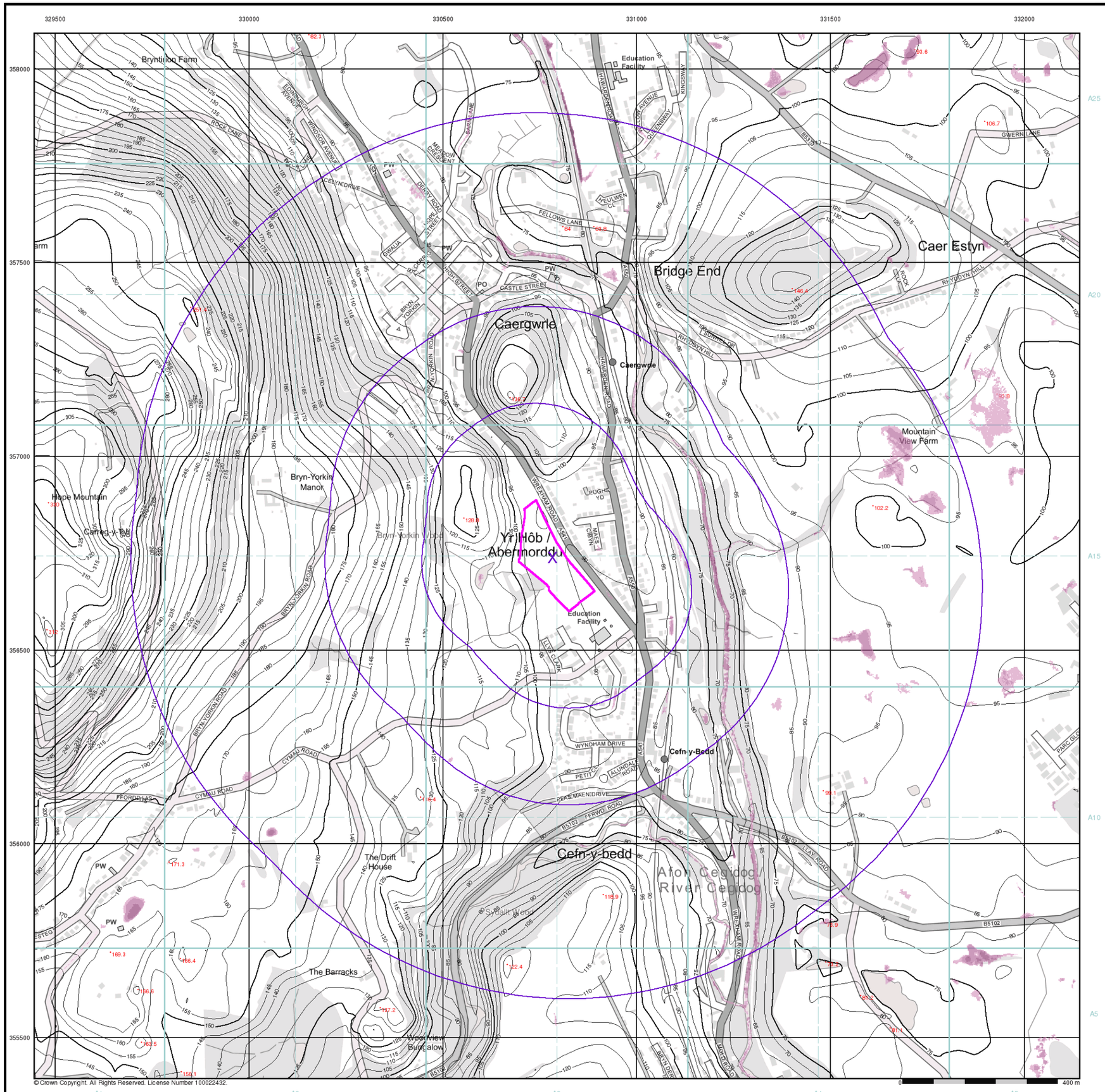

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EA/NRW Surface Water 30 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height 167.8

MLW Mean Low Water

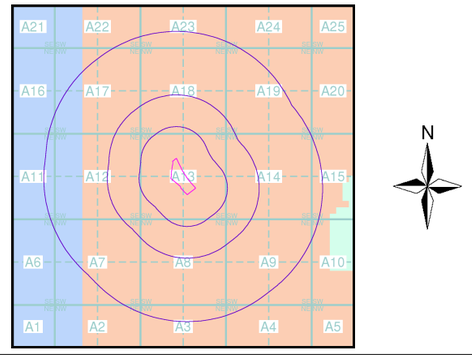
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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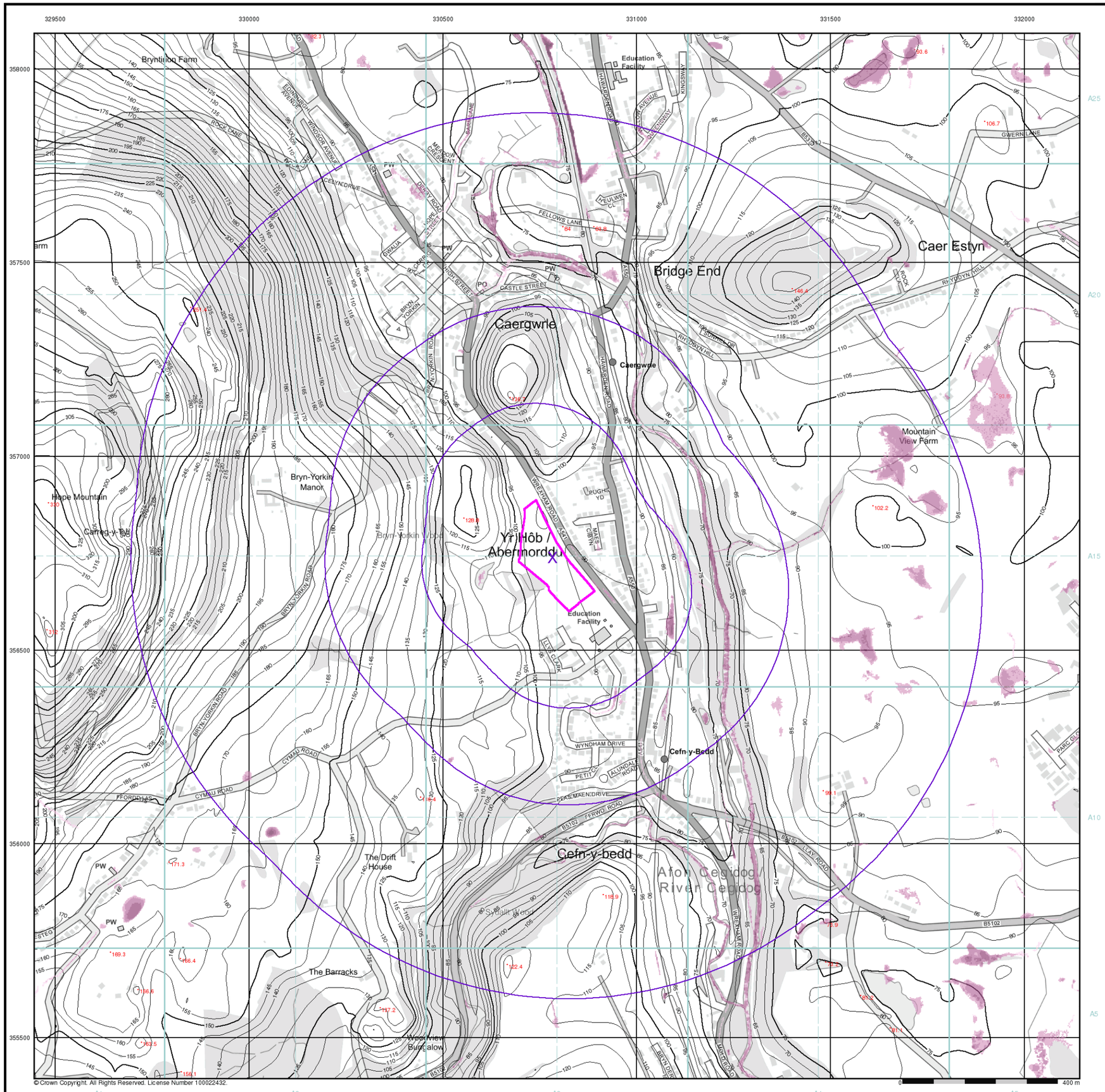


Envirocheck®

LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Depth Map

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Master Contour | Spot Height 167.8

MLW Mean Low Water

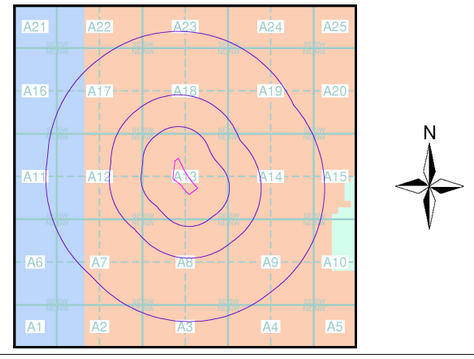
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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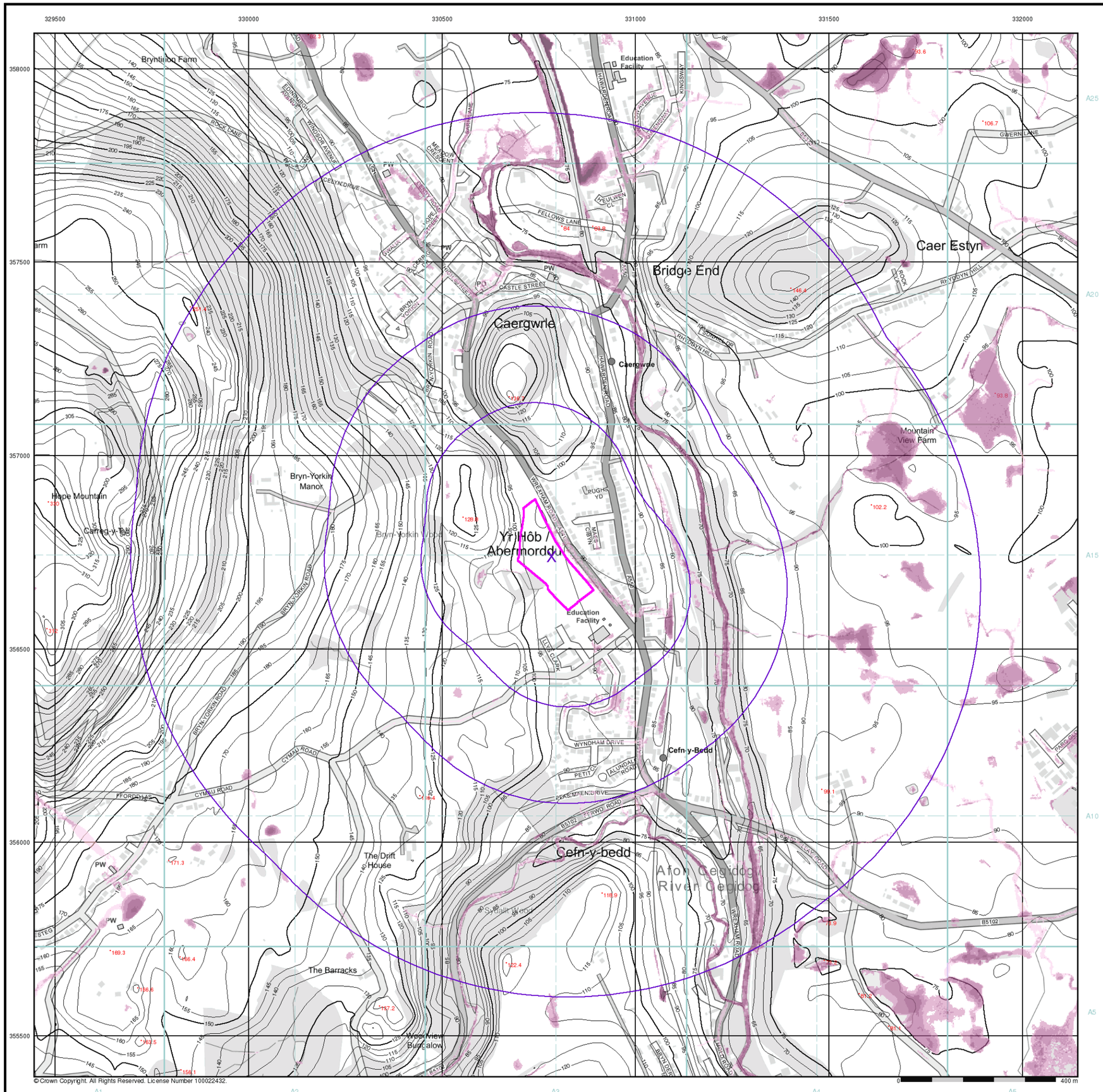

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 1000 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour 105 | Master Contour 100 | Spot Height 167.8

MLW Mean Low Water

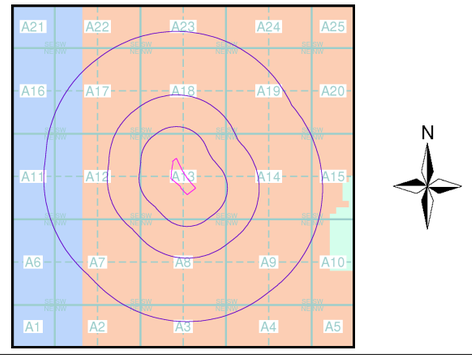
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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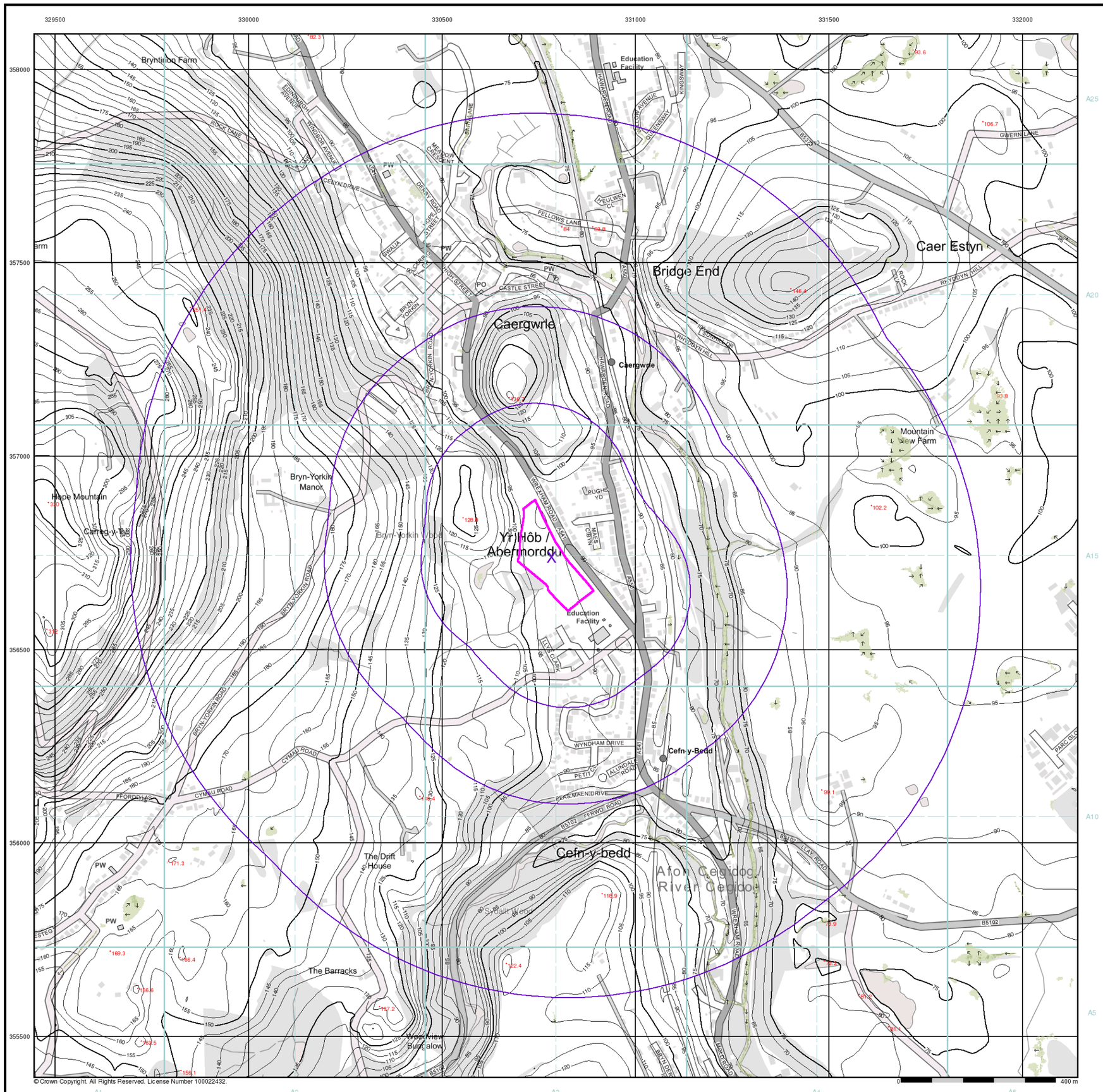

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour 105
Master Contour 100
Spot Height 167.8

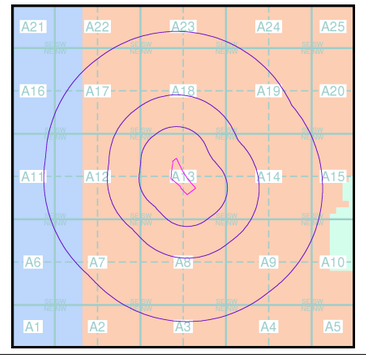
MLW Mean Low Water
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

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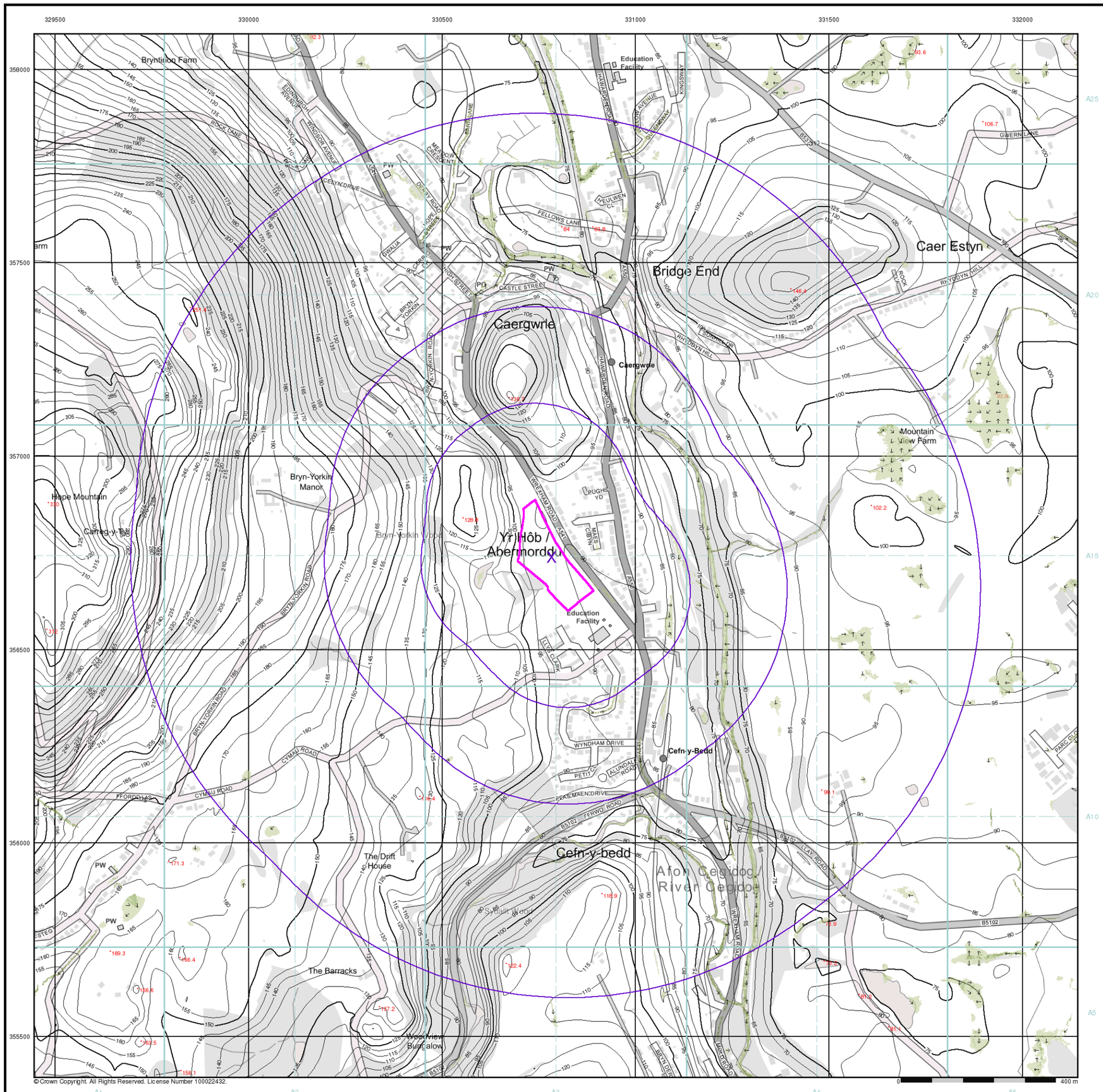

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 100 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height 167.8

MLW Mean Low Water

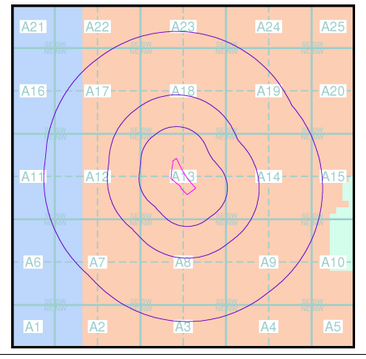
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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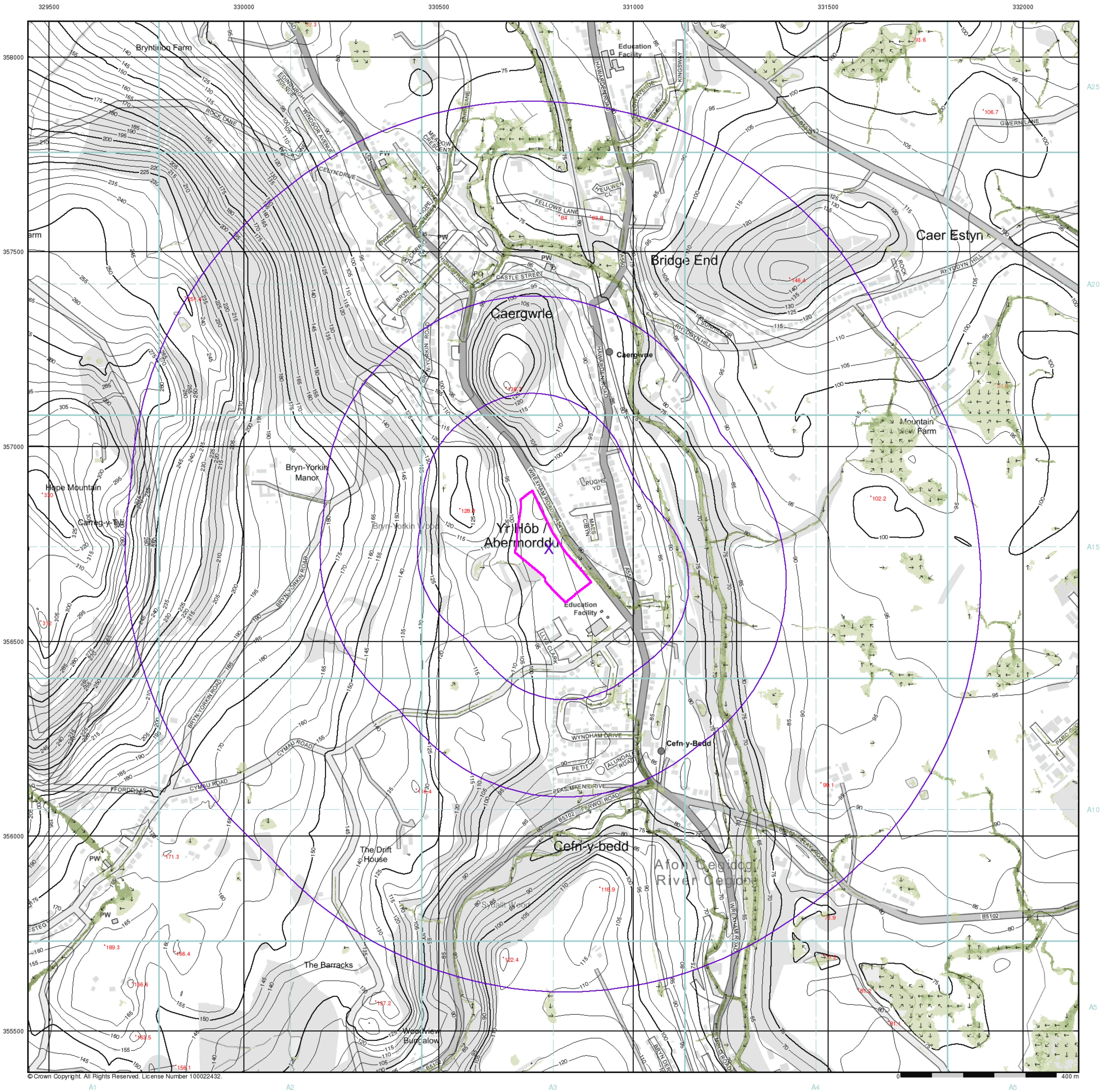

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EA/NRW Surface Water 1000 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height 167.8
- MLW Mean Low Water
- MHW Mean High Water

Suitability

See the suitability map below

- National to county
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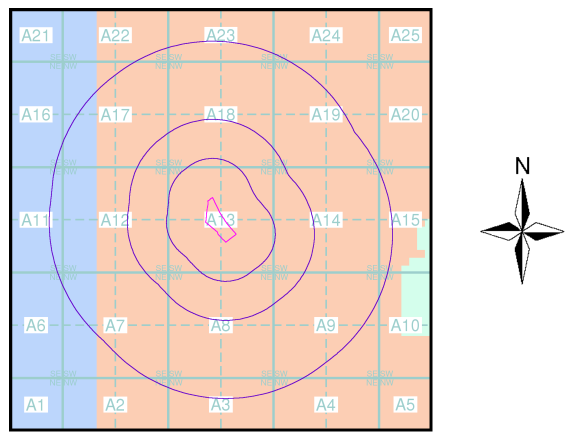
- Property

EA/NRW Suitability Map - Slice A



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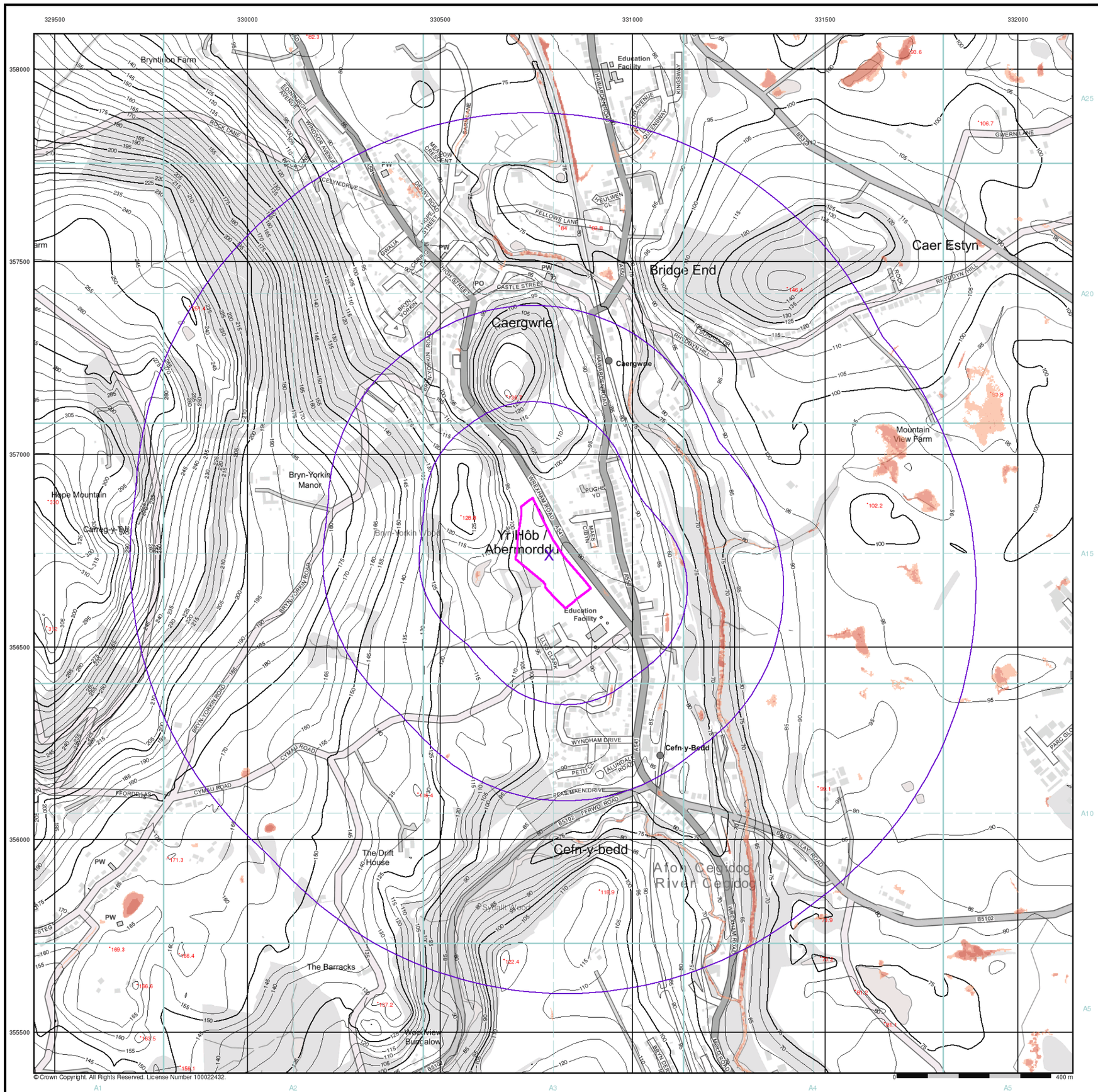

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LANDMARK INFORMATION GROUP®

EA/NRW Surface Water 30 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height 167.8

MLW Mean Low Water

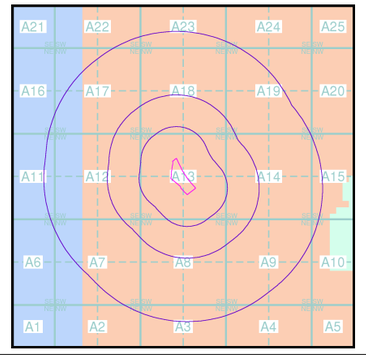
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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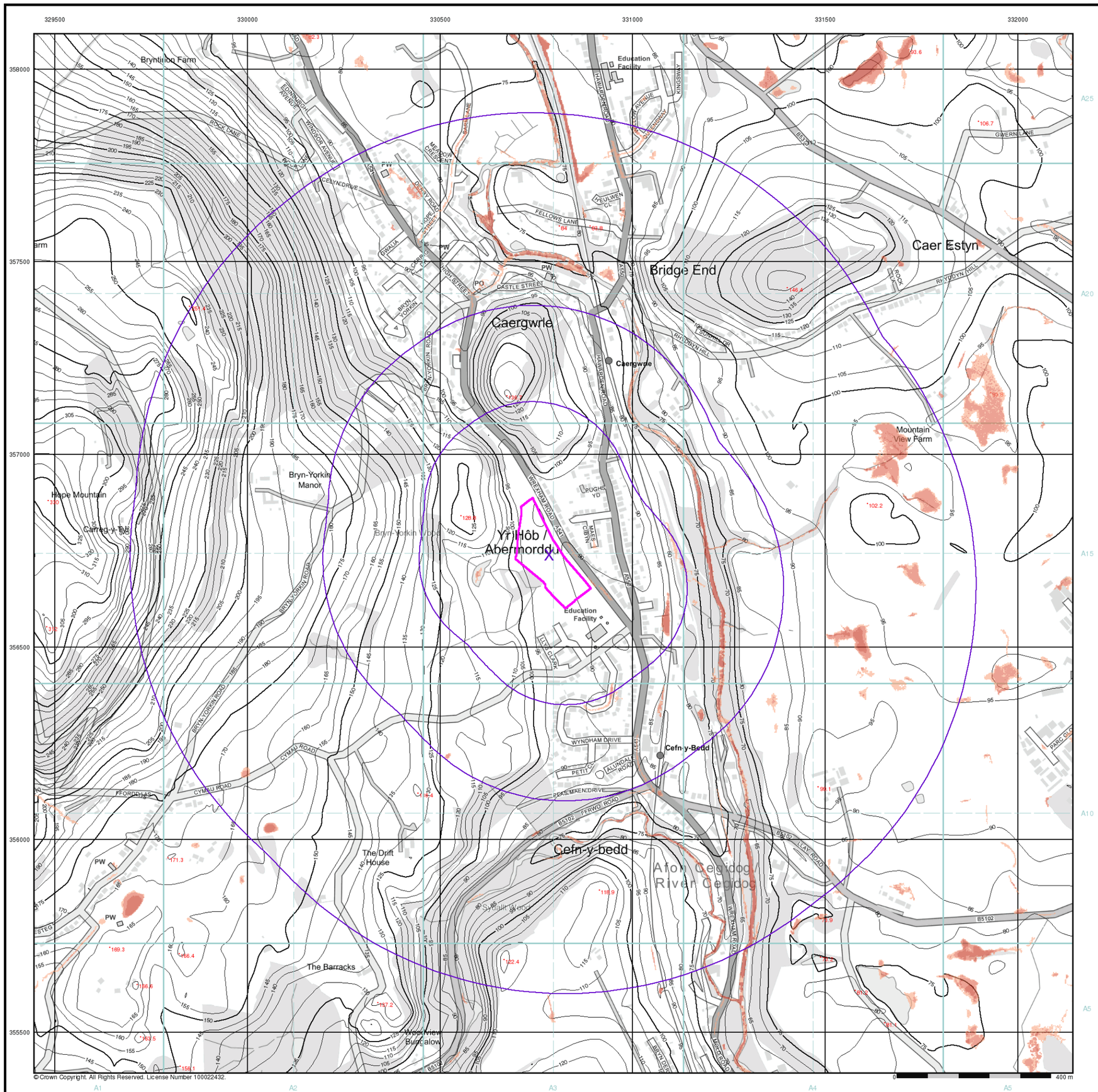

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EA/NRW Surface Water 100 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height *167.8

MLW Mean Low Water

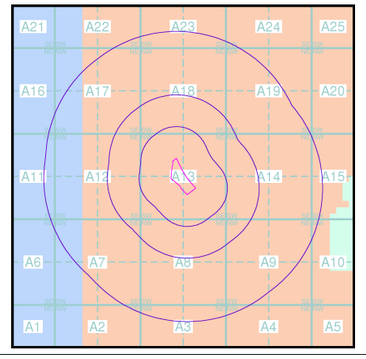
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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Search Buffer (m):	1000

Site Details

Wrexham Road, Abermorddu, LL12 9DG

Landmark INFORMATION GROUP

Tel: 0844 844 9952
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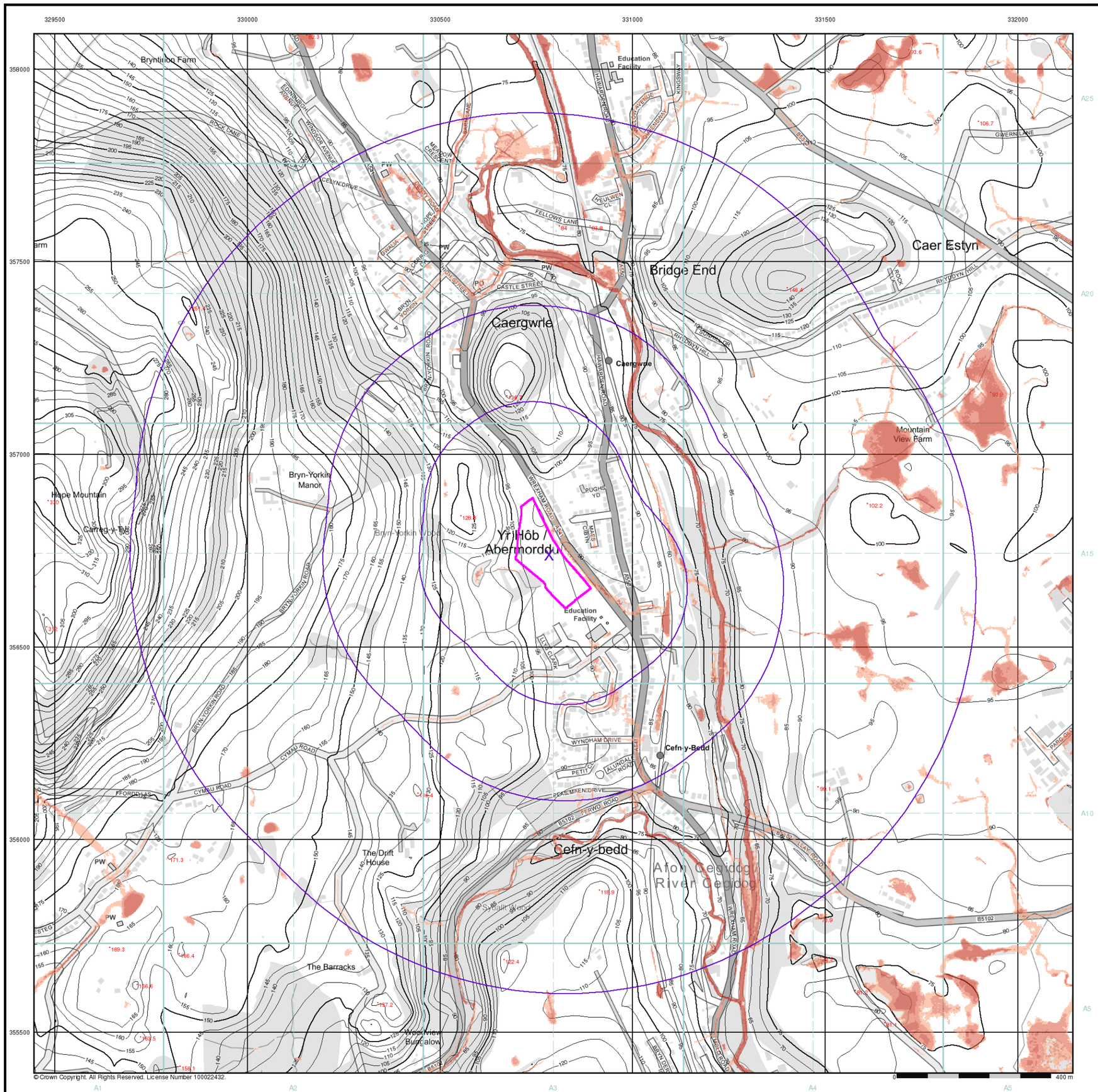
Web: www.envirocheck.co.uk



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EA/NRW Surface Water 1000 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height 167.8

MLW Mean Low Water

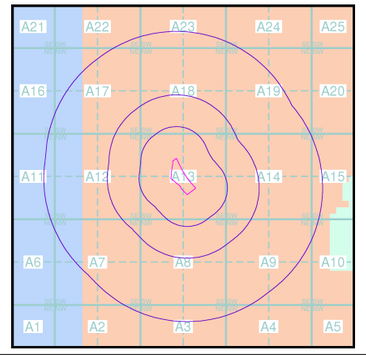
MHW Mean High Water

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number:	299240197_1_1
Customer Ref:	7896
National Grid Reference:	330780, 356740
Slice:	A
Site Area (Ha):	2.36
Search Buffer (m):	1000

Site Details

Wrexham Road, Abermorddu, LL12 9DG

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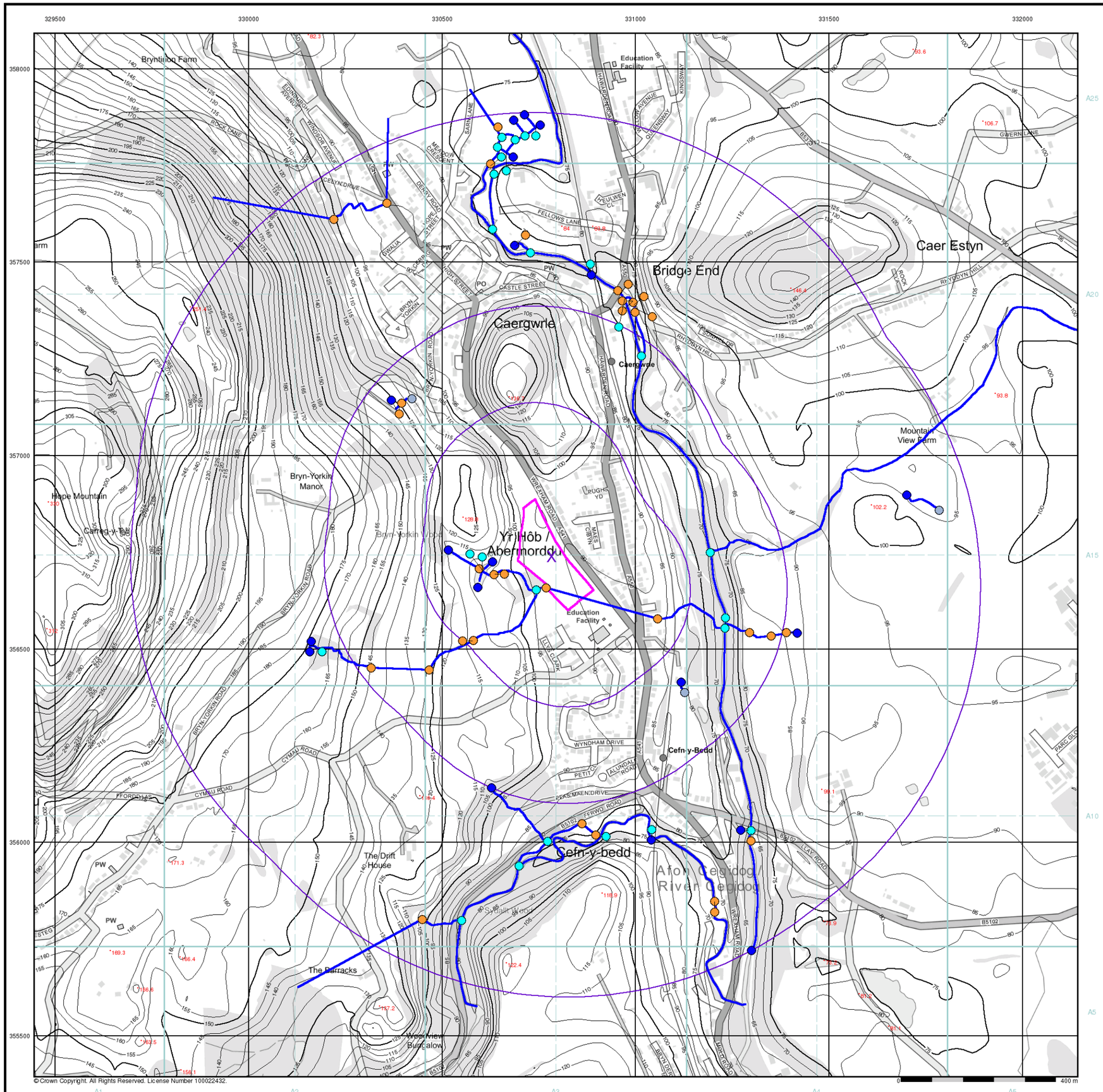

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OS Water Network Lines Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

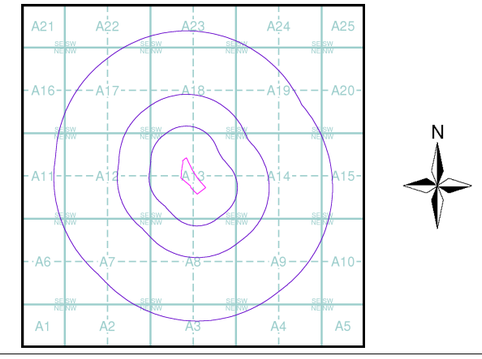
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea
- Junction
- Outlet
- Pseudo
- Source
- Other

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height 167.3
- MLW Mean Low Water
- MHW Mean High Water

OS Water Network Map - Slice A



Order Details

Order Number:	299240197_1_1
Customer Ref:	7896
National Grid Reference:	330780, 356740
Slice:	A
Site Area (Ha):	2.36
Search Buffer (m):	1000

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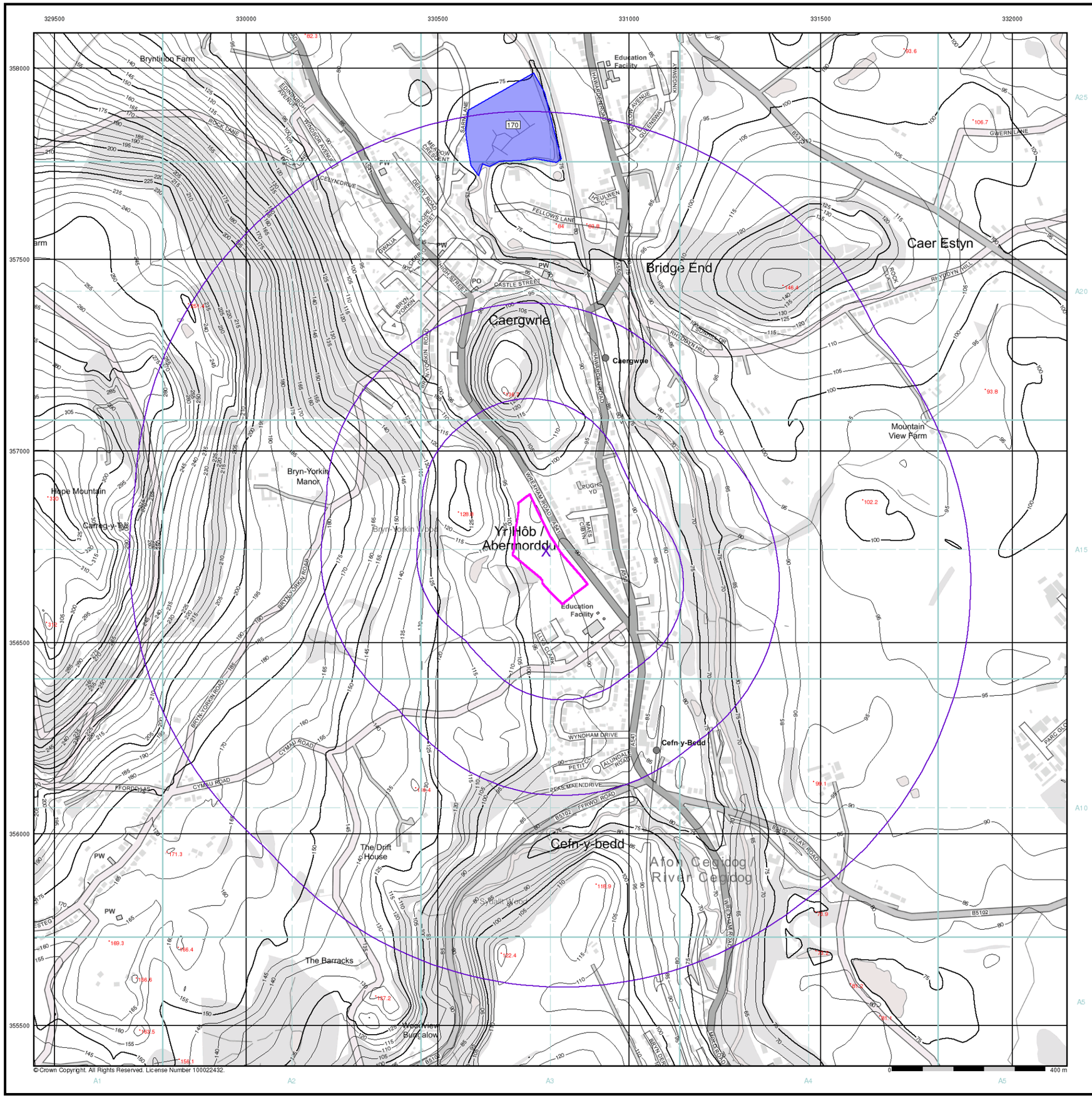

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LANDMARK INFORMATION GROUP®

EA/NRW Historic Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

Historic Flood Events Data

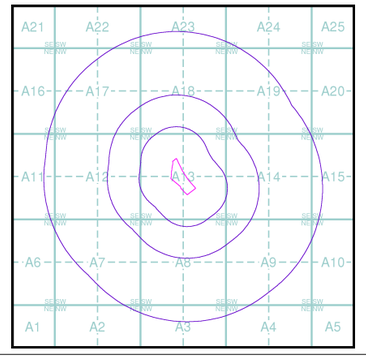
- Channel Capacity Exceeded (no raised defences)
- Channel Capacity Exceeded /Surface Water
- Groundwater/High Water Table
- Local Drainage/Surface Water
- Mechanical Failure
- Obstruction/Blockage - Bridge
- Obstruction/Blockage - Channel
- Historical Flood Liabilities
- Obstruction/Blockage - Culvert
- Obstruction/Blockage - Debris Screen
- Operational Failure/ Breach of Defence
- Other
- Overtopping of Defences
- Surface Water
- Unknown

Contours (height in metres)

Standard Contour 105
Master Contour 100 95
Spot Height 167.8

MLW Mean Low Water
MHW Mean High Water

EA/NRW Historic Flood Map - Slice A



Order Details

Order Number:	299240197_1_1
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Slice:	A
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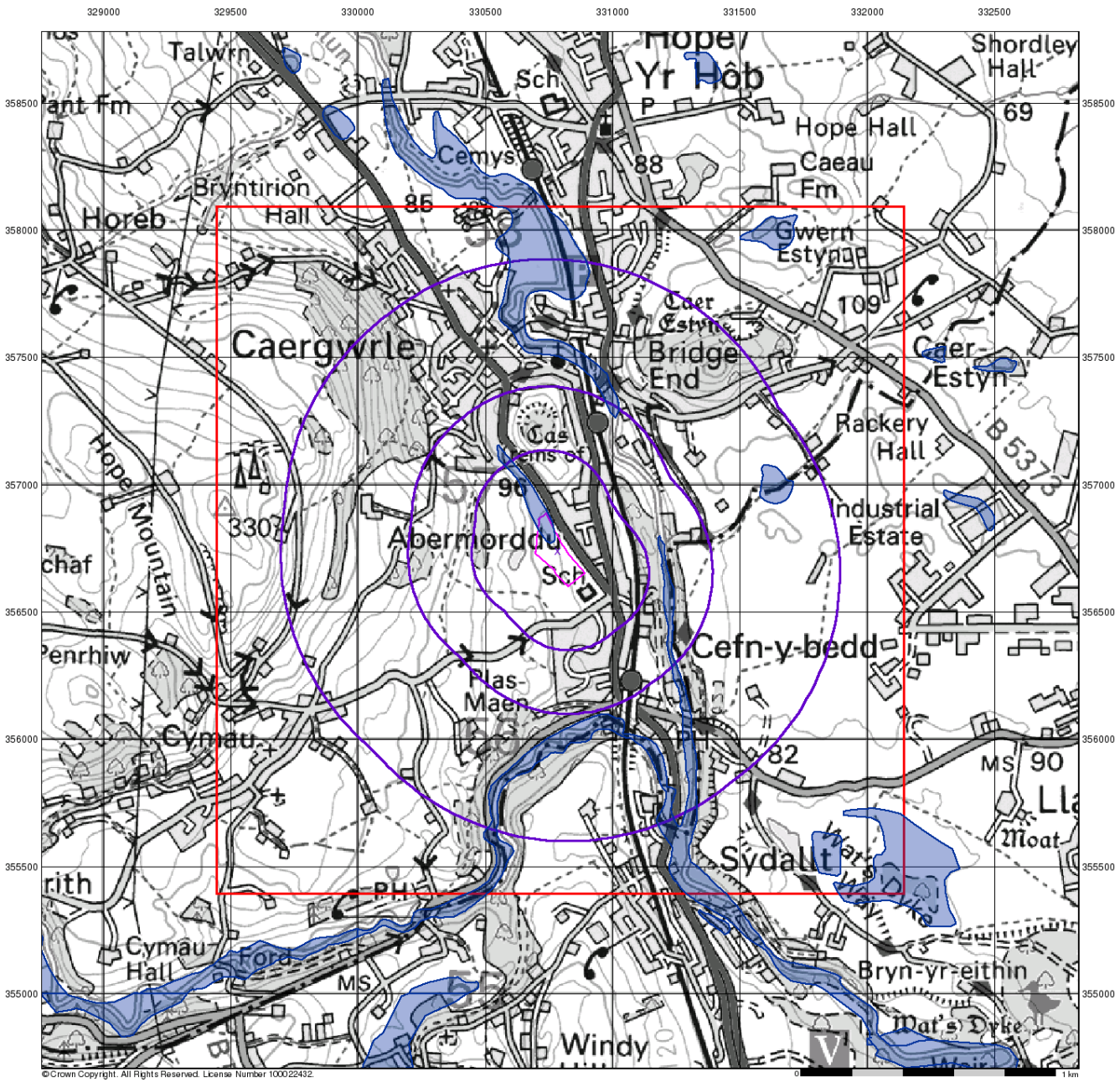

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BGS Flood Data (1:50,000)

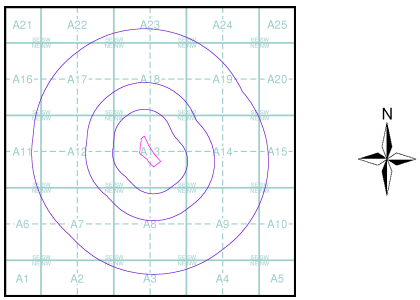
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

BGS Geological Indicators of Flooding

- Coastal
- Inland
- Bodies of Water

BGS Flood Data Map - Slice A



Order Details

Order Number:	299240197_1_1
Customer Ref:	7896
National Grid Reference:	330780, 356740
Slice:	A
Site Area (Ha):	2.36
Search Buffer (m):	1000

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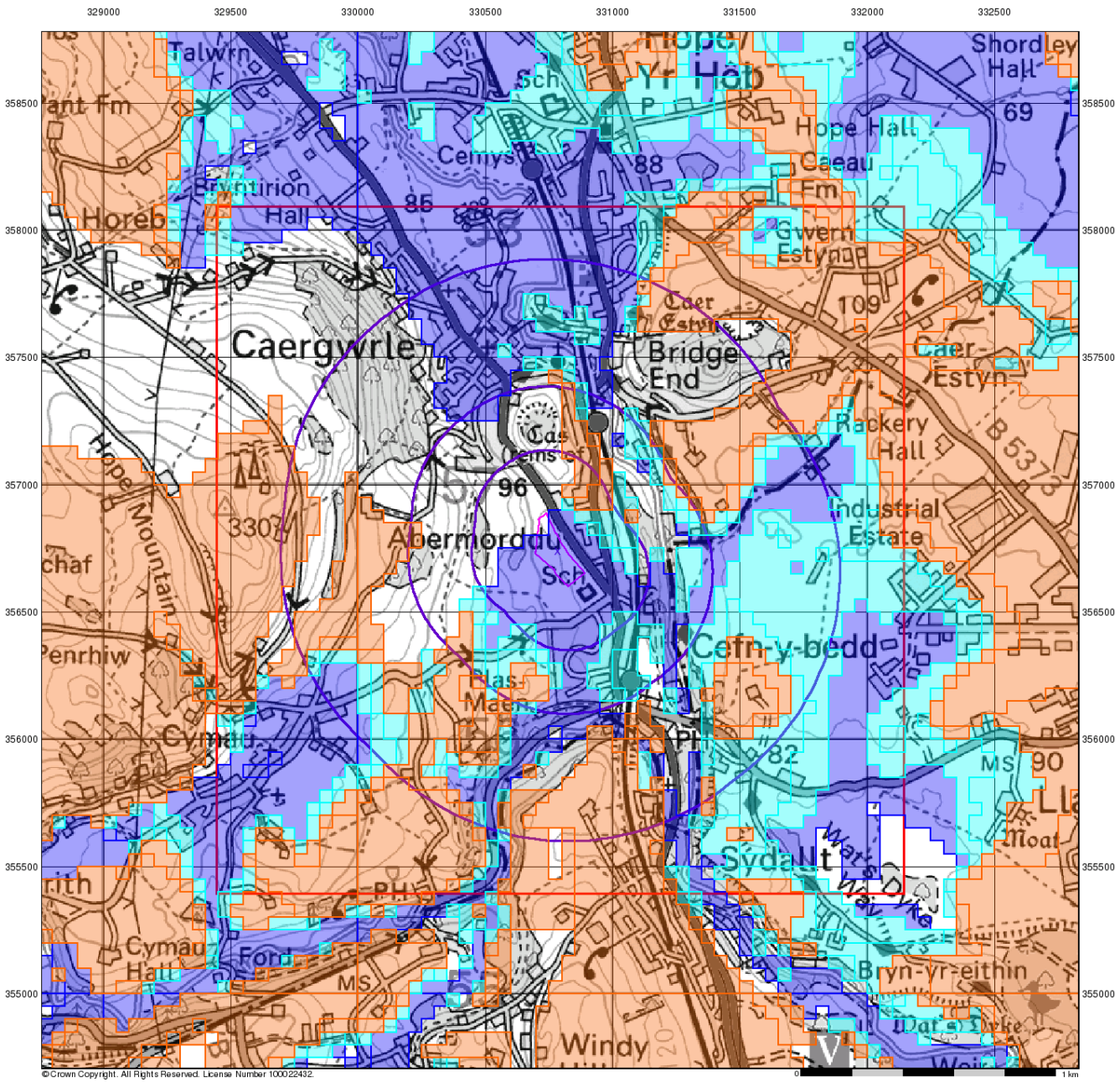

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BGS Flood Data (1:50,000)

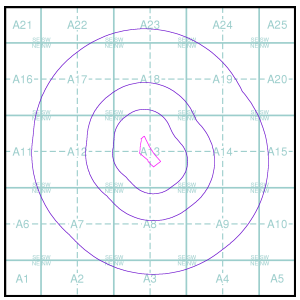
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

BGS Groundwater Flooding Susceptibility

- Potential for Groundwater Flooding to Occur at Surface
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



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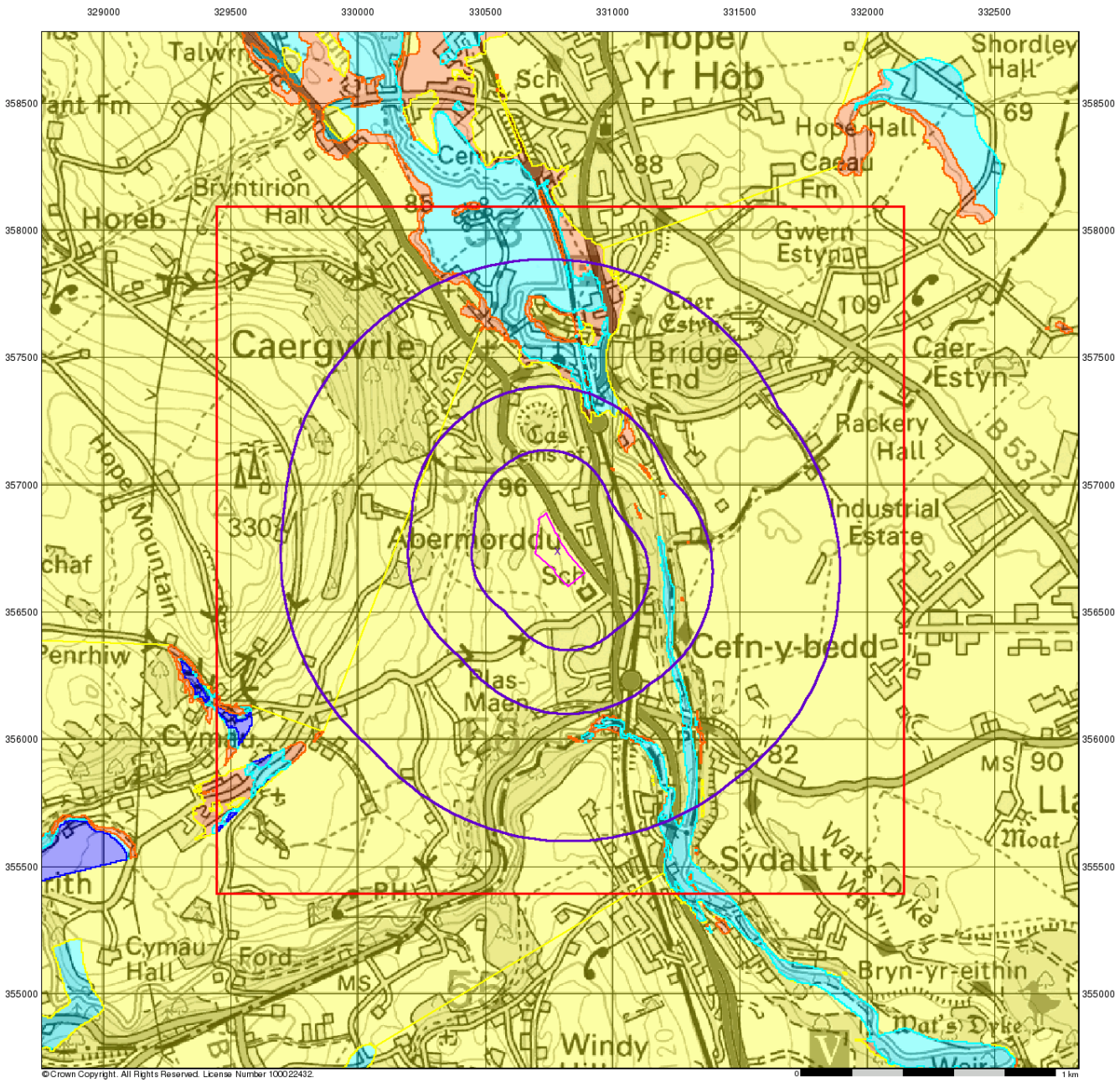

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GeoSmart Information Groundwater Flood Map (1:50,000)

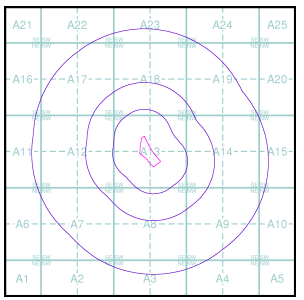
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

GeoSmart Information Groundwater Flooding Risk

- High Risk
- Moderate Risk
- Low Risk
- Negligible Risk

GeoSmart Information Groundwater Flood Map - Slice A



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Customer Ref:	7896
National Grid Reference:	330780, 356740
Slice:	A
Site Area (Ha):	2.36
Search Buffer (m):	1000

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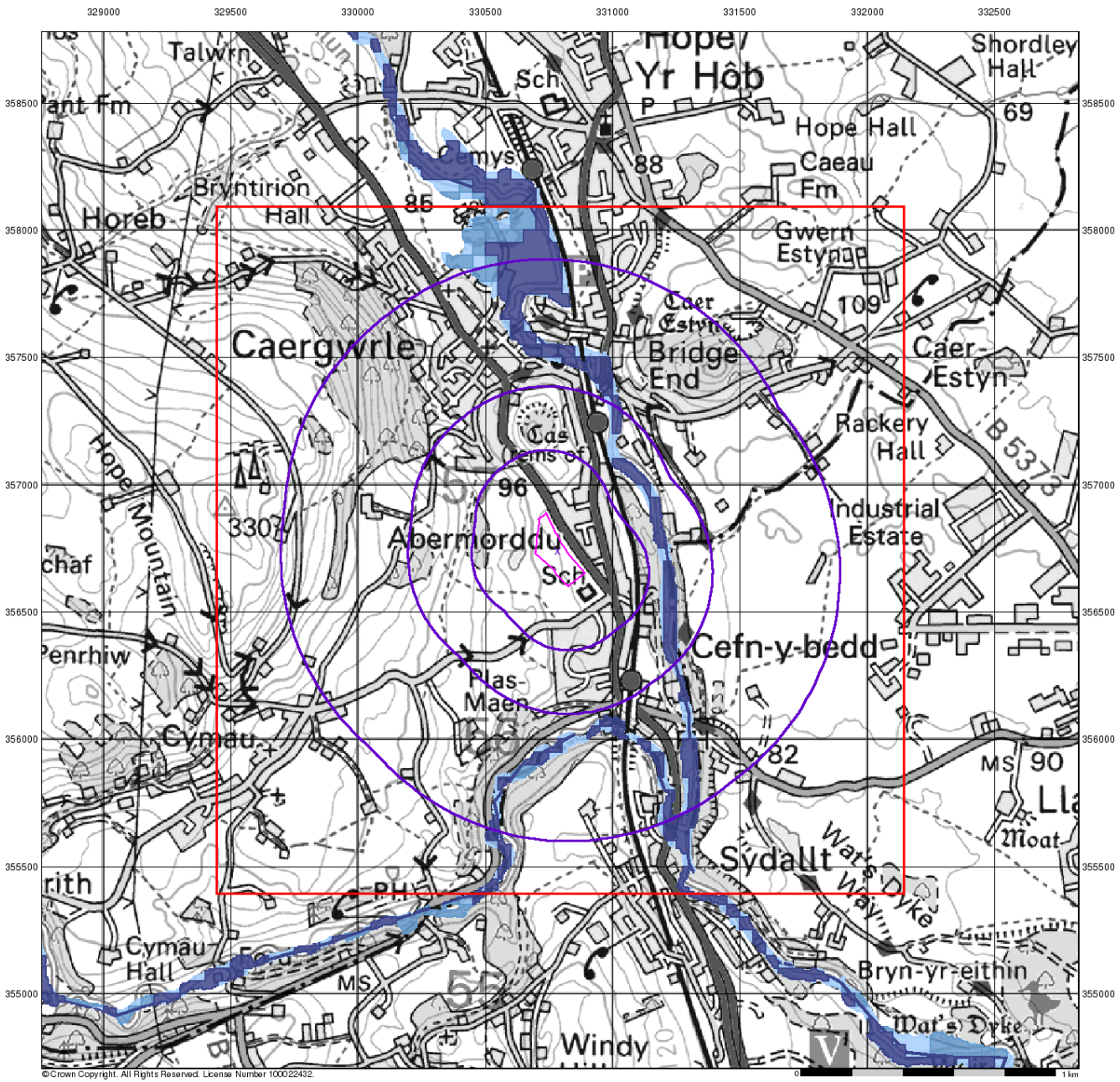

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EA/NRW RoFRS Data (1:50,000)

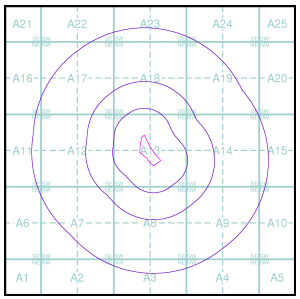
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Risk of Flooding from Rivers and Sea (RoFRS)

- High Risk
- Medium Risk
- Low Risk
- Very Low Risk

EA/NRW RoFRS Data Map - Slice A



N

Order Details

Order Number:	299240197_1_1
Customer Ref:	7896
National Grid Reference:	330780, 356740
Slice:	A
Site Area (Ha):	2.36
Search Buffer (m):	1000

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Appendix 3

Infiltration Consideration

Trial Pit Information

and

Infiltration Test Results

DO NOT SCALE

NORTH

95.1m

A 541

94.2m

Hillcrest Bungalow

Play Area

Jovero

Jalna

Corbiere

Faes-Y-Gad

A550

92.4m

Works

Alvordor

Castle Crag

Wrenwood

The Wold

Coniston

Ash Grove

Roma

Hazelmere

Alyn Dale

Newlands

Silverdale

Rose Villa

PUGHS YARD

Castle View

Cae Mefys

Pentwyn

CROSSWAYS

ESS

WREXHAM ROAD

MAES CIBYN

90.2m

84.6m

88.4m

Spreads

CH

Play Area

Abermorddu CP School

LLYS CROMLECH

LLYS CLARK

Track

Cairn

Stable Cottage

TP01 TP02 TP03 TP04 TP05 TP06 TP07 TP08 TP09 TP10 TP12 TP13 TP14 TP15 TP16 TP201 TP202 TP203 TP204 TP205 TP206 TP207 TP208 TP209 TP210 TP211 TP301

DCP1 DCP2 DCP3 DCP4 DCP5 DCP6 DCP7 DCP8 DCP9 DCP10 DCP11

ITP1 ITP2 ITP3

KEY TO EXPLORATORY HOLES

(All positions are approximate unless otherwise stated)

- Trial pits TP01 - TP16 excavated by Coopers on 15 June 2021
- Trial pits TP201 - TP211 excavated by Coopers on 02 July 2021
- Trial pit TP301 excavated by Coopers on 17 August 2021
- Infiltration trial pits ITP1 - ITP3 excavated by Coopers on 02 July 2021
- Dynamic cone penetrometer Test locations DCP1 - DCP11 taken by Coopers on 02 July 2021

KEY TO EXISTING FEATURES

(All positions are approximate unless otherwise stated)

- Existing tree (taken from ref. a)
- Conjectured stream (taken from ref. a)
- Surveyed overhead electricity line (taken from ref. a)
- Site boundary

KEY TO GEOLOGICAL FEATURES

(All positions are approximate unless otherwise stated)

- Fault line (taken from ref. g)

KEY TO CONJECTURED SERVICES

(All positions are approximate unless otherwise stated)

- BT lines (taken from ref. c)
- High voltage electricity lines (taken from ref. d)
- Gas lines (taken from ref. b)
- Potable water lines (taken from ref. e)
- Foul sewer line (taken from ref. f)
- Foul (combined) water (taken from ref. f)

Note:
Only above services available to Coopers at time of drawing production.

This drawing is to be read in conjunction with the following:-

a) Powers & Tiltman, Wrexham Road, Abermorddu, Topographical Survey, ref. 7558/01, dated 06 June 2016.
b) Wales & West, ref. 17863366, dated 03 March 2020.
c) BT Openreach utilities map, ref. VFD09488S, dated 27 May 2021.
d) SP Energy, Map ref. 330,824 356,749, dated 24 February 2020.
e) Hafren Dyfrdwy, ref. 375394 - 1, dated 28 February 2020.
f) Dwr Cymru Welsh Water, Map ref. 330710,356855, dated 13 March 2020.
g) Groundsure, Wrexham Road, Abermorddu, ref. GS-7893436, dated 25 May 2021.

THIS DRAWING SHOULD ONLY BE PRINTED IN COLOUR

Rev.	Date	Revision	By	Appd.
A	26.08.21	Trial pit TP301 added to plan.	AH	MW

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Web: http://coopers.co.uk

Client: Castle Green

Project: Wrexham Road, Abermorddu.

Title: SITE PLAN

DRAWING NUMBER: 7796 / 01

SCALE at A0 1:500
DATE 16.06.21
DRAWN OS
CHECKED AW
REVISION A

0 5 10 15 20 25 30 35 40 45 50
SCALEBAR (m)

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chartered consulting engineers

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP01
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 3.10m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.25)	TOPSOIL. Grass over dark brown, slightly sandy, slightly gravelly, clayey SILT. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.30	B				0.25	Loose, grey, slightly gravelly, clayey, fine to medium SAND. Gravel is sub-angular to sub-rounded, fine to medium of various lithologies.		
					(0.65)			
1.00	B				0.90	Firm, brown and grey, slightly gravelly, silty, sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
1.10	SV 68kPa					At 1.10m: Medium strength		
					(0.90)			
1.60	SV 70kPa				1.80	Soft, greyish brown, clayey, very sandy SILT. Sand is fine to medium.		
2.10	SV 40kPa					At 2.10m: Medium strength		
2.20	B				(0.90)			
2.80	SV 30kPa				2.70	Soft, grey, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
2.90	B				(0.40)	At 2.80m: Low strength		
						At 3.00m: Soft to firm**		
3.10	SV 50kPa				3.10	At 3.10m: Medium strength		
						Complete at 3.10m		

Remarks

Sides stable during excavation.
No groundwater encountered during excavation.
Strength of granular strata inferred from DCP01.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
**Clay contained soft and firm material recovered at this depth based upon hand tests.
Trial pit backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
1:25	ST	PRS

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chartered consulting engineers

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web: www.coopers.co.uk
email: admin@coopers.co.uk

Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP02
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.90m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.30)	TOPSOIL. Grass over dark brown, slightly gravelly, slightly silty, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.40	B				0.30 (0.45)	Loose, brown, slightly gravelly, slightly clayey, fine to coarse SAND with a high cobble content of sandstone. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.90	B				0.75	Brown and orangish brown, slightly gravelly, clayey, fine to medium SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. *Assumed as loose to medium dense.		
2.70	SV 42kPa				(1.85) 2.60 (0.30)	Soft, grey, slightly clayey, very sandy SILT with occasional sub-angular to sub-rounded, fine to coarse gravel. At 2.70m: Medium strength		
2.80	B				2.90	Complete at 2.90m		

Remarks

Sides stable during excavation.
No groundwater encountered during excavation.
Strength of granular strata inferred from DCP01.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
1:25	ST	PRS

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email: admin@coopers.co.uk

Site
WREXHAM ROAD, ABERMORDDU

Trial Pit Number
TP03

Machine : JCB 3CX

Method : Mechanical Excavation

Dimensions
3.00 x 0.60 x 2.90m

Ground Level (mOD)

Client
Castle Green Homes Ltd

Job Number
7796

Location (Observed measurements)

Dates
15/06/2021

Engineer
Coopers (Chester) Ltd

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.25) 0.25	TOPSOIL. Grass over dark brown, slightly sandy, slightly gravelly, clayey SILT. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.40	SV 80kPa					Firm, grey, slightly gravelly, silty, sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.50	B				(0.55)	At 0.40m: High strength		
0.90	B				0.80	Firm, grey brown mottled brown, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
1.00	SV 54kPa					At 1.00m: Medium strength		
1.50	SV 58kPa				(0.80) 1.60	Firm, grey, silty, gravelly, very sandy CLAY with a low cobble content. Contains pockets of grey, fine sand. Sand is fine to medium (predominantly fine). Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		▼1
			Groundwater seepage during excavation(1) at 2.50m, rose to 2.20m in 20 mins.		(1.30)			▽1
					2.90	At 2.90m: Cobble sized fragments of sandstone recovered. Planar, rectangular, possible weathered bedrock		
						Complete at 2.90m		

Remarks

Sides stable during excavation.
Groundwater encountered at 2.50m, rising to 2.20m after 20 minutes.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
No shear vane between 1.60-2.90m - clay recovered as small fragments.
Trial pit backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
1:25	ST	PRS

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP04
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 3.10m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.20) 0.20	TOPSOIL. Grass over dark brown, slightly silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.40	B				(1.10) 1.30	Brown, slightly gravelly, clayey, fine to coarse SAND with a high cobble content of sandstone. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. *Assumed as loose to medium dense.		
1.40	B				(1.40) 2.70	Firm, brown, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
2.70	B				(0.30) 3.00	Greyish brown, slightly clayey, very sandy, sub-angular to sub-rounded, fine to coarse GRAVEL of various lithologies. Sand is fine to coarse. Low cobble content. *Assumed as loose to medium dense.		
3.10	B		Slow groundwater seepage during excavation(1) at 3.00m.		(0.10) 3.10	Weak, orangish brown, medium grained SANDSTONE recovered as sub-angular, coarse gravel and cobbles. De-structured with orange and purplish brown discolouration on fractured surfaces, possibly due to groundwater.		▽1
						Complete at 3.10m		

Remarks

Sides stable below 1.30m during excavation, spalling above.
Slow groundwater seepage between 3.00-3.10m during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
No shear vane readings, clay recovered as small fragments.
Trial pit backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
1:25	ST	PRS

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP05
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 3.10m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.20) 0.20	TOPSOIL. Grass over dark brown, slightly silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.80	B				(1.10)	Firm, orangish brown, slightly gravelly, silty, very sandy CLAY with pockets of fine to medium, orangish brown sand. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content of sandstone.		
1.40	B				1.30 (0.70)	Loose to medium dense, brown, slightly clayey, very sandy, sub-angular to sub-rounded, fine to coarse GRAVEL of various lithologies. Sand is fine to coarse. Moderate cobble content of sandstone.		
2.10	B				2.00 (1.10)	Medium dense, brown and orangish brown, slightly gravelly, slightly clayey, very silty, fine to medium (predominantly fine) SAND with a low cobble content. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies including sandstone and coal.		
2.80	B		Groundwater seepage during excavation(1) at 2.80m.		3.10	Complete at 3.10m		▽1

Remarks

Tension cracks between 2.00-3.10m, otherwise stable.
Groundwater seepage between 2.80-3.10m during excavation.
Strength of granular strata inferred from DCP03.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
No shear vane readings, clay recovered as small fragments.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP06
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.70m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.20) 0.20	TOPSOIL. Grass over dark brown, slightly silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.60	B				(1.00)	Medium dense, brown, slightly gravelly,very clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Moderate cobble content.		
1.40	B				1.20 (1.30)	Medium dense, greyish brown, sandy, very clayey, angular to sub-rounded, fine to coarse GRAVEL of various lithologies. Sand is fine to medium. High cobble content. Low boulder content.		
2.60 2.70	SV 114kPa B		Seepage at base of trial pit(1) at 2.70m.		2.50 (0.20) 2.70	Stiff, grey, slightly gravelly, silty, sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. At 2.60m: High strength Complete at 2.70m		▽1

Remarks

Spalling throughout.
Groundwater seepage at base of trial pit.
Strength of granular strata inferred from DCP07.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP07
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 3.20m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.25) 0.25	TOPSOIL. Grass over dark brown, slightly silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.50	B				(1.25)	Medium dense, brown, slightly clayey, very sandy, sub-angular to sub-rounded, fine to coarse GRAVEL of various lithologies including coal and sandstone. Moderate cobble content. Contains pockets of firm, brown clay throughout. At 1.20m: Loose to medium dense		
1.60	B				1.50 (1.70)	Loose to medium dense, brown, clayey, gravelly, fine to coarse SAND (predominantly fine to medium). Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. At 2.90m: Loose		
					3.20	Complete at 3.20m		

Remarks

Tension crack slowly forming at surface.
No groundwater encountered during excavation.
Strength of granular strata inferred from DCP06.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP08
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.60m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.30)	TOPSOIL. Grass over dark brown, slightly sandy, slightly gravelly, clayey SILT. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.40	B				0.30	Firm, brown and orangish brown mottled grey, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content.		
0.50	SV 54kPa					At 0.50m: Medium strength		
1.00	SV 62kPa				(1.60)			
1.50	SV 60kPa							
2.00	B				1.90	Medium dense, orangish brown, slightly gravelly, clayey, silty, fine to coarse SAND with pockets of grey clay. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble and boulder content.		
					(0.70)			
					2.60	Complete at 2.60m		

Remarks

Tension crack between 0.30-0.90m. Spalling due to cobbles/boulders.
No groundwater encountered during excavation.
Strength of granular strata inferred from DCP05.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit terminated on sandstone boulder at 2.60m.
Trial pit backfilled with arisings upon completion.

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Site
WREXHAM ROAD, ABERMORDDU

Trial Pit Number
TP09

Machine : JCB 3CX

Method : Mechanical Excavation

Dimensions
3.00 x 0.60 x 3.10m

Ground Level (mOD)

Client
Castle Green Homes Ltd

Job Number
7796

Location (Observed measurements)

Dates
15/06/2021

Engineer
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Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	B				(0.30)	TOPSOIL. Grass over dark brown, slightly silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
					0.30			
0.60	B				(0.60)	Brown, slightly gravelly, slightly silty, very clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. *Assumed as loose to medium dense.		
					0.90			
1.00	B					Firm, brown and orangish brown mottled grey, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
1.10	B							
1.20	SV 64kPa					At 1.20m: Medium strength		
					(0.80)			
					1.70			
1.80	B					Greyish brown, slightly gravelly, clayey, fine to medium SAND with a low cobble content. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies including coal and sandstone. *Assumed as loose to medium dense.		
					(0.70)			
					2.40			
2.50	B					Greyish brown, slightly clayey, very sandy, sub-angular to sub-rounded, fine to coarse GRAVEL of various lithologies including coal and sandstone. Sand is fine to coarse. Wet. *Assumed as loose to medium dense.		
					(0.70)			
					3.10	Between 3.00-3.10m: 5 minutes scrape, still recovering gravelly but fresh sandstone pieces too. Sandstone boulder or rockhead.		
						Complete at 3.10m		

Remarks

Sides stable, minor spalling only.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP10
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.60m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.25)	TOPSOIL. Grass over dark brown, slightly gravelly, slightly silty, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.40	B				0.25	Loose to medium dense, brown, clayey, gravelly, fine to medium SAND with a low cobble content. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies including coal.		
					(1.55)			
1.90	B				1.80	Loose to medium dense, brown, very sandy, sub-angular to rounded, fine to coarse GRAVEL of various lithologies. Sand is fine to coarse. Low cobble content.		
					(0.80)			
					2.60	Complete at 2.60m		

Remarks

Repeated minor collapses below 1.70m.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit terminated at 2.60m due to slow progress due to collapses.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP11
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.20m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.20) 0.20	TOPSOIL. Grass over dark brown, slightly gravelly, slightly silty, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.40	B				(1.10)	Loose to medium dense, brown, slightly clayey, gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies including coal and sandstone.		
1.40	B				1.30 (0.90)	Loose to medium dense, brown, slightly clayey, very sandy, sub-angular to rounded, fine to coarse GRAVEL of various lithologies including coal and sandstone with a moderate cobble content. Sand is fine to coarse.		
2.20	B				2.20	Complete at 2.20m		

Remarks

Spalling throughout. Repeated minor collapses below 1.30m.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit terminated at 2.20m due to slow progress due to collapses.
Trial pit backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP12
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.30m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.20) 0.20	TOPSOIL. Grass over dark brown, slightly gravelly, slightly silty, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.80	B				(2.10)	Loose to medium dense, brown, slightly clayey, very gravelly, fine to coarse SAND with a moderate cobble content. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies including sandstone and coal. At 1.20m: Loose Below 1.50m: Very gravelly		
1.60	B					At 2.00m: Loose to medium dense		
					2.30	Complete at 2.30m		

Remarks

Collapsed to 2.10m. Repeated minor collapses and spalling below 0.50m.
No groundwater encountered during excavation.
Strength of granular strata inferred from DCP11.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP13
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.90m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	B				(0.30)	TOPSOIL. Grass over dark brown, slightly sandy, slightly gravelly, clayey SILT. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
					0.30			
0.50	B					Firm, orangish brown mottled grey, slightly gravelly, slightly silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Contains pockets of orangish brown, fine to medium sand throughout. Low cobble content.		
0.60	SV 58kPa					At 0.60m: Medium strength		
					(1.80)			
1.30	SV 64kPa							
1.80	SV 64kPa							
2.00	B				2.10			
2.20	B					Firm, grey, slightly gravelly, silty, sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
2.30	SV 60kPa					At 2.30m: Medium strength		
					(0.80)			
2.80	SV 62kPa				2.90			
						Complete at 2.90m		

Remarks

Sides stable during excavation.
No groundwater encountered during excavation.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP14
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.70m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.20) 0.20	TOPSOIL. Grass over dark brown, slightly gravelly, slightly silty, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.60	B				(1.60)	Firm, brown, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content.		
1.90	B				1.80 (0.40) 2.20	Medium dense, bhrown, slightly gravelly, slightly silty, very clayey, fine to medium SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content.		
2.30 2.40	SV 62kPa B				(0.50)	Firm, grey, slightly gravelly, silty, sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. At 2.30m: Medium strength		
2.70	SV 66kPa				2.70	Complete at 2.70m		

Remarks

Sides stable during excavation.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Unable to take shear vanes from 0.20-1.80m due to fragmented recovery.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP15
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 1.10m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.35)	MADEGROUND. Grey, sandy, angular to sub-angular, fine to coarse GRAVEL of various lithologies, predominantly limestone. *Assumed as loose to medium dense.		
0.50	B				0.35	Firm, brown, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies.		
0.60	SV 64kPa				(0.75)	At 0.60m: Medium strength		
					1.10	Complete at 1.10m		

Remarks

Sides stable during excavation.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP16
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 2.50m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 15/06/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.40)	TOPSOIL. Grass over dark brown, slightly gravelly, slightly silty, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Contains fine to coarse roots throughout.		
					0.40			
0.70	B				(2.10)	Firm, brown, slightly gravelly, silty, very sandy CLAY. Sand is fine to medium (predominantly fine). Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. Contains rare pockets of light grey, fine to medium sand throughout. Below 2.00m: Feels stiff		
2.40	B				2.50	Complete at 2.50m		

Remarks

Sides stable during excavation.
No groundwater encountered during excavation.
Unable to take shear vanes, recovery fragmented due to sand content.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Trial pit backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP201
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.50 x 0.60 x 2.90m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.30)	Turf over, dark brown, silty, sandy TOPSOIL with some fine roots		
0.40	SV 100kPa				0.30	Stiff, high strength, brown/grey, slightly silty CLAY.		
0.50	B				(0.80)			
0.80	SV 100kPa				1.10	Brown, slightly silty, fine SAND. *Assumed as medium dense.		
1.30	B				(0.65)			
1.90	B				1.75	Grey, very silty, clayey, fine SAND with occasional gravel and cobbles of sub-angular to sub-rounded natural stone.		
					(1.15)			
					2.90	Complete at 2.90m		

Remarks

Location CAT scanned prior to excavation.
Stable during excavation.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled with arisings upon completion.

North	Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU				**Trial Pit Number** TP202
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.50 x 0.60 x 2.95m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.25) 0.25	Turf over, dark brown, silty, sandy TOPSOIL with some fine roots.		
0.40	B				(1.05) 1.30	Brown, slightly clayey, fine to medium SAND. *Assumed as medium dense.		
1.50	B				(1.10) 2.40	Brown, slightly clayey, slightly silty, fine SAND. *Assumed as medium dense.		
2.60	B				(0.55) 2.95	Brown, slightly gravelly, silty, medium to coarse SAND. *Assumed as loose.		
						Complete at 2.95m		

Remarks

Location CAT scanned prior to excavation.
All sides collapsing below 2.40m during excavation.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled with arisings upon completion.

North	Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP203
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.50 x 0.60 x 2.70m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.25) 0.25	Turf over, dark brown, silty, sandy TOPSOIL with some fine roots.		
0.60	B				(1.15) 1.40	Brown, slightly silty, fine to medium SAND. *Assumed as loose to medium dense.		
1.60	B				(0.70) 2.10	Brown, very silty, gravelly, coarse SAND with occasional cobbles. Gravel and cobbles are fine to coarse, angular to sub-rounded natural stone. *Assumed as loose to medium dense.		
2.30 2.30	SV 200kPa B				(0.60) 2.70	Very stiff, very high strength, grey/brown, silty CLAY with occasional gravel of fine to coarse, angular to sub-rounded natural stone.		
						Complete at 2.70m		

Remarks

Location CAT scanned prior to excavation
Minor spalling below 1.40m.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled with arisings upon completion.

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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP204
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.60 x 0.60 x 3.00m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.30) 0.30	Turf over, dark brown, sandy TOPSOIL with some fine roots.		
0.50	B				(0.70) 1.00	Brown, silty, fine to medium SAND. *Assumed as loose to medium dense. Between 0.30-1.00m: 3 No. large boulders of sandstone measuring approximately 0.8 x 0.5 x 0.5m, 0.6 x 0.6 x 0.5m and 0.5 x 0.5 x 0.6m		
1.20	SV 64kPa				(0.30) 1.30	Firm, medium strength, light brown/grey, silty, sandy CLAY.		
1.20	B							
1.50	B				(1.00) 2.30	Brown, silty, fine to coarse SAND. *Assumed as medium dense.		
2.50	B				(0.70) 3.00	Brown/grey, silty, fine to coarse SAND and GRAVEL. Gravel is fine to coarse, angular to sub-rounded natural stone. *Assumed as loose.		
						Complete at 3.00m		

Remarks

Location CAT scanned prior to excavation.
Unstable below 2.30m sides collapsing.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP205
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.60 x 0.60 x 3.00m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.20) 0.20	Turf over dark brown, sandy, clayey TOPSOIL with some fine roots.		
0.40 0.40	SV 80kPa B				(0.60) 0.80	Firm to stiff, high strength, grey, silty CLAY.		
1.00 1.00	SV 76kPa B				(1.00) 1.80	Firm, high strength, brown, silty CLAY with occasional gravel of fine to coarse, sub-rounded natural stone.		
1.50	SV 88kPa							
2.00	B				(0.50) 2.30	Brown, silty, fine SAND. *Assumed as loose to medium dense.		
2.40	SV 96kPa					Stiff in places firm, high strength, grey, silty, gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded, natural stone.		
2.50	B				(0.70)			
2.70	SV 100kPa					At 2.70m: 1 No. large boulder approximately 0.8 x 0.8 x 0.4m		
					3.00	Complete at 3.00m		

Remarks

CAT scanned prior to excavation.
Stable during excavation.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP206
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 3.00 x 0.60 x 3.00m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.25)	Turf over dark brown, sandy TOPSOIL with some fine roots.		
0.10	B				0.25			
0.30	B				(0.35)	Light grey, clayey, silty, fine SAND. *Assumed as medium dense.		
					0.60			
0.90	SV 84kPa					Firm to stiff, high strength, brown, silty CLAY with occasional gravel and cobbles of sub-rounded natural stone.		
0.90	B				(0.80)			
1.20	SV 84kPa							
					1.40			
1.60	SV 30kPa					Soft, low strength, grey/brown, slightly silty, sandy, gravelly CLAY with lenses of medium to coarse brown sand.		
1.60	B							
2.00	SV 28kPa		Accumulation at time of backfill(1) at 2.10m.		(1.20)			▽1
2.40	SV 35kPa							
					2.60	Brown, sandy SILT.		▽2
2.80	B		Groundwater during excavation(2) at 2.70m.		(0.40)			
					3.00	Complete at 3.00m		

Remarks

Location CAT scanned prior to excavation.
Sides stable during excavation.
Groundwater at 2.70m during excavation. Accumulation at 2.10m at time of backfill.
*Based upon trenchside stability characteristics.
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP207
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.80 x 0.60 x 2.95m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Dark brown, clayey, sandy TOPSOIL.		
0.40	B				(0.40) 0.60	Grey, slightly clayey, silty, fine to medium SAND. *Assumed as medium dense.		
0.70	SV 76kPa					Firm, high strength, brown, silty, gravelly CLAY. Gravel is fine to coarse, angular to sub-rounded.		
0.80	B				(0.50)			
1.00	SV 84kPa				1.10	Brown/grey, clayey, sandy SILT.		
1.30	B							
					(1.85)			
2.30	B				2.95	Complete at 2.95m		

Remarks

Location CAT scanned prior to excavation.
Sides stable during excavation.
No groundwater encountered during excavation.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled with arisings upon completion.

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Site
WREXHAM ROAD, ABERMORDDU

Trial Pit Number
TP208

Machine : JCB 3CX

Method : Mechanical Excavation

Dimensions
2.50 x 0.60 x 2.90m

Ground Level (mOD)

Client
Castle Green Homes Ltd

Job Number
7796

Location (Observed measurements)

Dates
02/07/2021

Engineer
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Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Truf over dark brown, sandy TOPSOIL.		
					0.30	Firm, high strength, grey, sandy CLAY.		
0.50	SV 80kPa				(0.30)			
0.50	B				0.60	Stiff, high strength, brown, silty CLAY.		
0.80	SV 104kPa							
0.80	B				(0.90)			
1.20	SV 128kPa							
					1.50	Grey/brown, sandy SILT.		
1.80	B				(0.90)			
					2.40	Soft to firm, low strength, brown, silty, gravelly CLAY.		
2.60	SV 40kPa				(0.50)			
2.60	B							
2.90	SV 45kPa		Seepage on south side(1) at 2.90m.		2.90	Complete at 2.90m		▽1

Remarks

Location CAT scanned prior to excavation.
Sides stable during excavation.
Minor groundwater seepage at 2.90m on south side of trial pit during excavation.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP209
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.50 x 0.60 x 3.00m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Dark brown, sandy TOPSOIL with some roots.		
0.30	B				0.40			
					(0.30)	Firm, medium strength, grey, sandy CLAY.		
0.60	SV 64kPa				0.70			
0.60	B					Firm to stiff, high strength, brown, silty CLAY.		
0.90	SV 80kPa							
0.90	B				(0.80)			
1.20	SV 88kPa							
					1.50	Grey/brown, sandy SILT.		
1.70	B				(0.80)			
					2.30	Soft, low strength, brown, silty CLAY.		
2.50	SV 20kPa							
2.50	B				(0.70)			
2.80	SV 28kPa							
					3.00	Complete at 3.00m		

Remarks

Location CAT scanned prior to excavation.
Sides stable during excavation.
No groundwater encountered during excavation.
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP210
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.50 x 0.60 x 3.00m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Dark brown, sandy TOPSOIL with some roots.		
0.10	B				0.20	Firm, medium strength, grey, sandy CLAY.		
0.40	SV 56kPa				(0.45)			
0.40	B							
					0.65	Firm, medium strength, brown, silty CLAY.		
0.80	SV 64kPa							
0.90	B				(0.55)			
1.10	SV 72kPa				1.20	Grey/brown, sandy SILT.		
1.40	B							
					(0.90)			
					2.10	Soft to firm, low strength, grey/brown CLAY with occasional gravel of sub-angular to sub-rounded natural stone.		
2.20	SV 30kPa							
2.30	B							
					(0.90)			
2.60	SV 35kPa							
2.90	SV 45kPa							
					3.00	Complete at 3.00m		

Remarks

Location CAT scanned prior to excavation.
Sides stable during excavation.
No groundwater encountered during excavation.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled with arisings upon completion.

North	Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP211
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.70 x 0.60 x 3.00m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	B				(0.30)	Turf over dark brown, sandy TOPSOIL with some fine roots.		
					0.30	Firm, medium strength, light brown, sandy CLAY.		
0.50	B				(0.50)			
					0.80	Grey/brown, silty, fine SAND with occasional gravel and cobbles of sub-rounded natural stone. *Assumed as medium dense.		
1.10	B					At 1.50m: 1 No. large boulder approximately 0.75 x 0.4 x 0.4m		
					(2.20)			
			Groundwater at base of trial pit(1) at 3.00m.		3.00	Complete at 3.00m		▽1

Remarks

Location CAT scanned prior to excavation.
Minor spalling below 0.30m on north side of trial pit.
Groundwater seepage at base of trial pit during excavation.
*Based upon trenchside stability characteristics.
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Backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** TP301
Machine : 13 Tonne Tracked Excavator **Method :** Mechanical Excavation	**Dimensions** 5.00 x 6.00 x 5.20m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location	**Dates** 17/08/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	Turf over dark brown, gravelly, silty, sandy TOPSOIL with some fine roots. Gravel is fine to coarse, angular to sub-rounded natural stone.		
					(0.80) 1.10	Loose to medium dense, brown, slightly clayey, gravelly, fine to medium SAND. Gravel is fine to coarse, angular to sub-rounded natural stone. Rare cobbles of sub-rounded natural stone.		
					(3.10)	Loose to medium dense, brown, silty, fine to coarse SAND and GRAVEL with gravel and cobbles of sub-angular to rounded natural stone. At 2.80m: Loose		
					4.20 (0.70)	Very loose, brown, fine to medium SAND.		
			Perched groundwater(1) at 4.90m.		4.90 (0.30) 5.20	Weak, thinly bedded, dark grey distinctly weathered, highly fractured MUDSTONE, recovered as a coarse, angular gravel with rare inclusions of coal. Complete at 5.20m		▽1

Remarks

Sides very unstable and collapsing throughout.
Groundwater seepage on north side of trial pit at 4.90m, perched above bedrock.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Relative density of granular strata inferred from DCP09.
Trial pit backfilled with arisings upon completion.

Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** ITP1
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.20 x 0.60 x 1.95m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	Turf over dark brown, silty, sandy TOPSOIL with some fine roots and rare gravel of fine to coarse angular to sub-angular natural stone.		
					(0.70) 1.00	Brown, slightly gravelly, silty, fine to coarse SAND. Gravel is fine to coarse sub-rounded natural stone. *Assumed as loose to medium dense.		
					(0.95) 1.95	Brown, silty medium to coarse SAND and GRAVEL. Gravel is fine to coarse angular to sub-rounded natural stone.		
						Complete at 1.95m		

Remarks

Location CAT scanned prior to excavation.
Tension cracks forming between 1.00m and 1.95m during excavation.
No groundwater encountered during excavation or after the construction of the ITP.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled upon completion of ITP test left slightly mounded.

North	Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** ITP2
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.30 x 0.60 x 2.15m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Dark brown, silty, sandy TOPSOIL with some fine roots.		
					(1.30)	Brown, very gravelly, fine to coarse SAND. Gravel and cobbles of fine to coarse, angular to sub-rounded natural stone. *Assumed as loose to medium dense.		
					1.50 (0.65)	Brown, slightly clayey, fine to medium SAND with rare boulders of sub-rounded natural stone. *Assumed as loose to medium dense.		
					2.15	Complete at 2.15m		

Remarks

*Based upon trenchside stability characteristics.
Location CAT scanned prior to excavation.
Stable during excavation and construction of ITP.
No groundwater encountered during excavation or upon starting ITP test.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled upon completion of ITP test left slightly mounded.

North	Scale (approx)	Logged By	Checked By
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Site WREXHAM ROAD, ABERMORDDU			**Trial Pit Number** ITP3
Machine : JCB 3CX **Method :** Mechanical Excavation	**Dimensions** 2.70 x 0.60 x 2.45m	**Ground Level (mOD)**	**Client** Castle Green Homes Ltd	**Job Number** 7796
	Location (Observed measurements)	**Dates** 02/07/2021	**Engineer** Coopers (Chester) Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	Turf over dark brown, sandy TOPSOIL with some fine roots.		
					(1.00)	Orangish brown, slightly clayey, silty, fine SAND. *Assumed as loose to medium dense.		
					1.30 (1.15)	Brownish grey, very silty, fine SAND. *Assumed as loose to medium dense.		
					2.45	Complete at 2.45m		

Remarks

CAT scanned prior to excavation.
Stable during excavation and construction of ITP.
No groundwater encountered during excavation. Upon commencing ITP test water level at 2.40m.
*Based upon trenchside stability characteristics.
Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy.
Backfilled upon completion of ITP test left slightly mounded.

North	Scale (approx)	Logged By	Checked By
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Date of Test: 2nd July 2021

Produced by: Matthew Wall

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WREXHAM ROAD. ABERMORDDU

INFILTRATION TEST PIT No. 1 (Test 1)

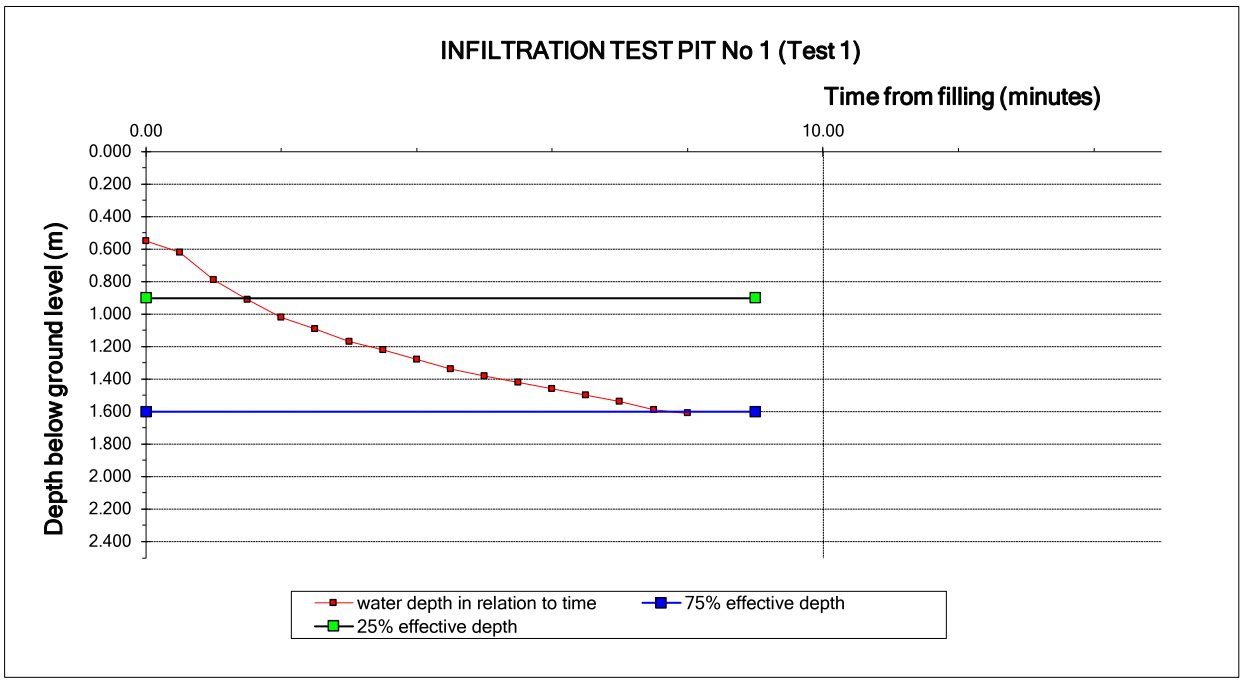
Time of reading			Absolute Time	Depth below Ground level
hrs	min	sec	mins	m
0	00	00	0.00	0.550
0	00	30	0.50	0.620
0	01	00	1.00	0.790
0	01	30	1.50	0.910
0	02	00	2.00	1.020
0	02	30	2.50	1.090
0	03	00	3.00	1.170
0	03	30	3.50	1.220
0	04	00	4.00	1.280
0	04	30	4.50	1.340
0	05	00	5.00	1.380
0	05	30	5.50	1.420
0	06	00	6.00	1.460
0	06	30	6.50	1.500
0	07	00	7.00	1.540
0	07	30	7.50	1.590
0	08	00	8.00	1.610

Test Pit Dimensions

Test Pit Length	2.20	m
Test Pit Width	0.60	m
Test Pit Depth	1.95	m
Standing Water Level		m

Infiltration Parameters

Total Depth	1.400	m
Total Effective Depth	1.400	m
25% Depth	0.900	m
75% Depth	1.600	m
25% Time	1.46	min
75% Time	7.75	min
Free Volume	0.2772	cu.m
Surface Area	5.24	sq.m
Time of Outflow	6.29	min



Soil infiltration Rate	**5.04E-01**	**m/hr**
	1.40E-04	**m/sec**

Date of Test: 2nd July 2021
Produced by: Matthew Wall

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WREXHAM ROAD. ABERMORDDU
INFILTRATION TEST PIT No. 1 (Test 2)

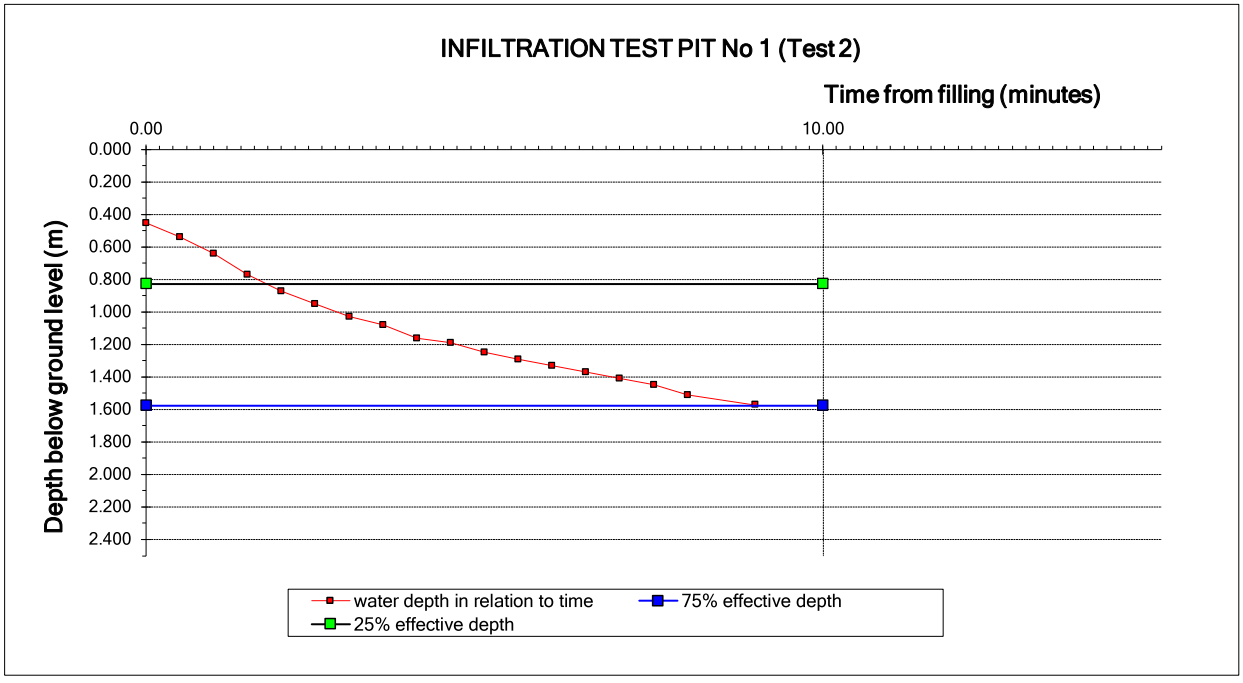
Time of reading			Absolute Time	Depth below Ground level
hrs	min	sec	mins	m
0	00	00	0.00	0.450
0	00	30	0.50	0.540
0	01	00	1.00	0.640
0	01	30	1.50	0.770
0	02	00	2.00	0.870
0	02	30	2.50	0.950
0	03	00	3.00	1.030
0	03	30	3.50	1.080
0	04	00	4.00	1.160
0	04	30	4.50	1.190
0	05	00	5.00	1.250
0	05	30	5.50	1.290
0	06	00	6.00	1.330
0	06	30	6.50	1.370
0	07	00	7.00	1.410
0	07	30	7.50	1.450
0	08	00	8.00	1.510
0	09	00	9.00	1.570

Test Pit Dimensions

Test Pit Length	2.20	m
Test Pit Width	0.60	m
Test Pit Depth	1.95	m
Standing Water Level		m

Infiltration Parameters

Total Depth	1.500	m
Total Effective Depth	1.500	m
25% Depth	0.825	m
75% Depth	1.575	m
25% Time	1.78	min
75% Time	8.90	min
Free Volume	0.297	cu.m
Surface Area	5.52	sq.m
Time of Outflow	7.12	min



Soil infiltration Rate	4.53E-01	m/hr
	1.26E-04	m/sec

Date of Test: 2nd July 2021
Produced by: Matthew Wall

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WREXHAM ROAD. ABERMORDDU
INFILTRATION TEST PIT No 1 (Test 3)

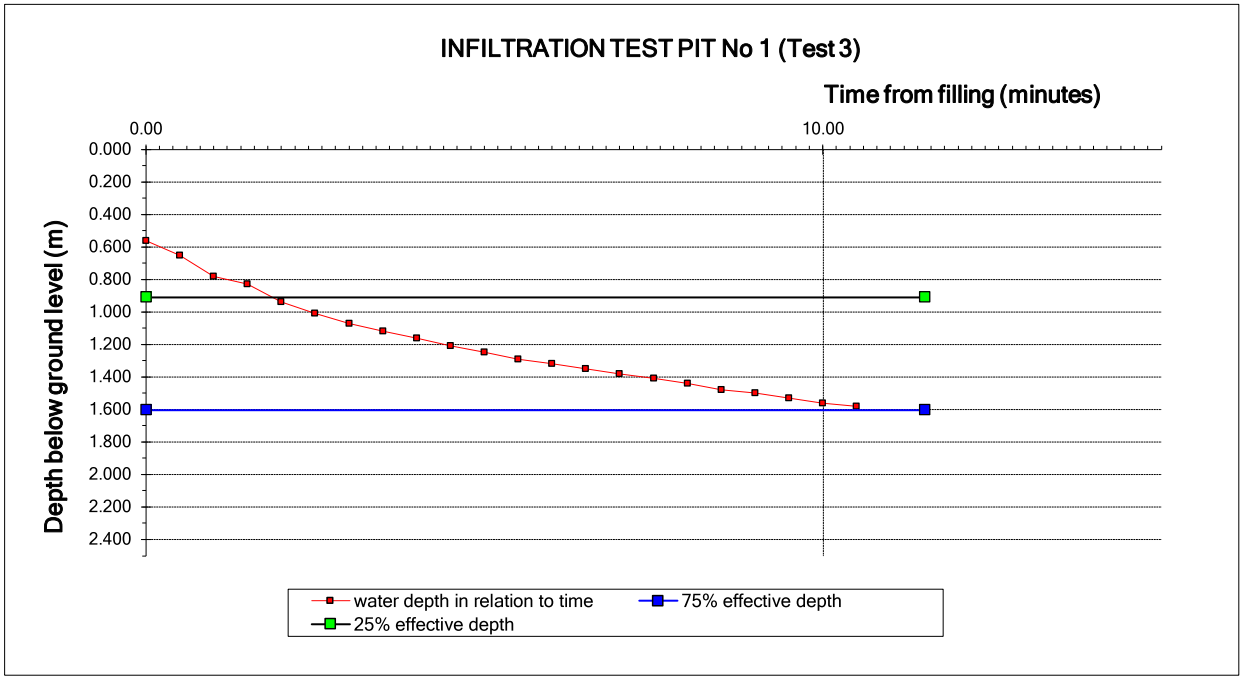
Time of reading			Absolute Time	Depth below Ground level
hrs	min	sec	mins	m
0	00	00	0.00	0.560
0	00	30	0.50	0.650
0	01	00	1.00	0.780
0	01	30	1.50	0.830
0	02	00	2.00	0.940
0	02	30	2.50	1.010
0	03	00	3.00	1.070
0	03	30	3.50	1.120
0	04	00	4.00	1.160
0	04	30	4.50	1.210
0	05	00	5.00	1.250
0	05	30	5.50	1.290
0	06	00	6.00	1.320
0	06	30	6.50	1.350
0	07	00	7.00	1.380
0	07	30	7.50	1.410
0	08	00	8.00	1.440
0	08	30	8.50	1.480
0	09	00	9.00	1.500
0	09	30	9.50	1.530
0	10	00	10.00	1.560
0	10	30	10.50	1.580

Test Pit Dimensions

Test Pit Length	2.20	m
Test Pit Width	0.60	m
Test Pit Depth	1.95	m
Standing Water Level		m

Infiltration Parameters

Total Depth	1.390	m
Total Effective Depth	1.390	m
25% Depth	0.908	m
75% Depth	1.603	m
25% Time	1.85	min
75% Time	10.91	min
Free Volume	0.27522	cu.m
Surface Area	5.212	sq.m
Time of Outflow	9.05	min



Soil infiltration Rate	**3.50E-01**	**m/hr**
	9.72E-05	**m/sec**

Date of Test: 2nd July 2021

Produced by: Matthew Wall

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WREXHAM ROAD. ABERMORDDU

INFILTRATION TEST PIT No. 2 (Test 1)

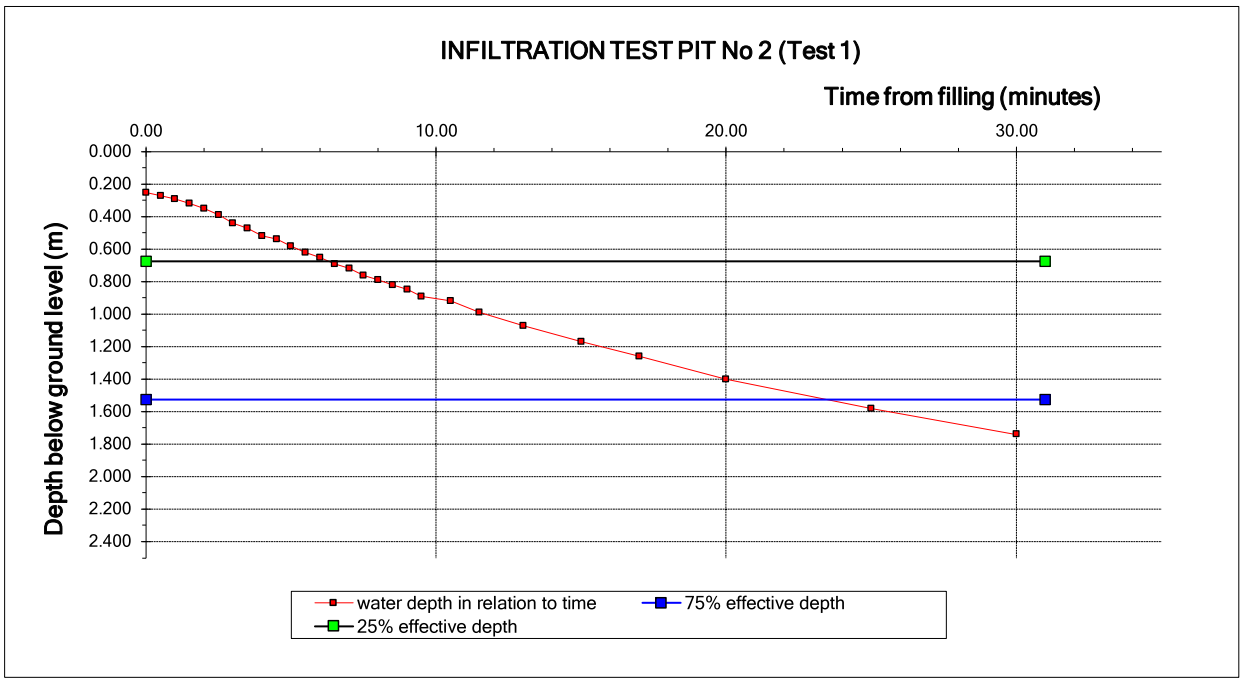
Time of reading			Absolute Time	Depth below Ground level
hrs	min	sec	mins	m
0	00	00	0.00	0.250
0	00	30	0.50	0.270
0	01	00	1.00	0.290
0	01	30	1.50	0.320
0	02	00	2.00	0.350
0	02	30	2.50	0.390
0	03	00	3.00	0.440
0	03	30	3.50	0.470
0	04	00	4.00	0.520
0	04	30	4.50	0.540
0	05	00	5.00	0.580
0	05	30	5.50	0.620
0	06	00	6.00	0.650
0	06	30	6.50	0.690
0	07	00	7.00	0.720
0	07	30	7.50	0.760
0	08	00	8.00	0.790
0	08	30	8.50	0.820
0	09	00	9.00	0.850
0	09	30	9.50	0.890
0	10	30	10.50	0.920
0	11	30	11.50	0.990
0	13	00	13.00	1.070
0	15	00	15.00	1.170
0	17	00	17.00	1.260
0	20	00	20.00	1.400
0	25	00	25.00	1.580
0	30	00	30.00	1.740

Test Pit Dimensions

Test Pit Length	2.20	m
Test Pit Width	0.60	m
Test Pit Depth	1.95	m
Standing Water Level		m

Infiltration Parameters

Total Depth	1.700	m
Total Effective Depth	1.700	m
25% Depth	0.675	m
75% Depth	1.525	m
25% Time	6.31	min
75% Time	23.47	min
Free Volume	0.3366	cu.m
Surface Area	6.08	sq.m
Time of Outflow	17.16	min



Soil infiltration Rate	**1.94E-01**	**m/hr**
	5.38E-05	**m/sec**

Date of Test: 2nd July 2021

Produced by: Matthew Wall

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WREXHAM ROAD. ABERMORDDU

INFILTRATION TEST PIT No. 2 (Test 2)

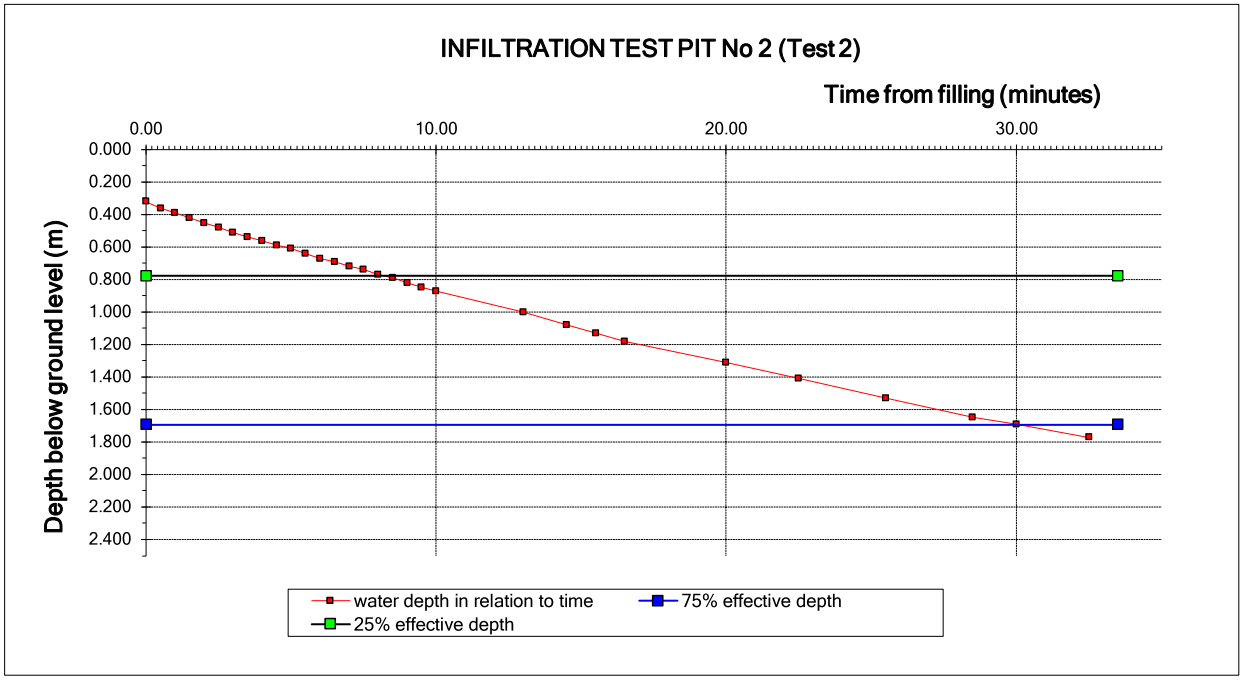
Time of reading			Absolute Time	Depth below Ground level
hrs	min	sec	mins	m
0	00	00	0.00	0.320
0	00	30	0.50	0.360
0	01	00	1.00	0.390
0	01	30	1.50	0.420
0	02	00	2.00	0.450
0	02	30	2.50	0.480
0	03	00	3.00	0.510
0	03	30	3.50	0.540
0	04	00	4.00	0.560
0	04	30	4.50	0.590
0	05	00	5.00	0.610
0	05	30	5.50	0.640
0	06	00	6.00	0.670
0	06	30	6.50	0.690
0	07	00	7.00	0.720
0	07	30	7.50	0.740
0	08	00	8.00	0.770
0	08	30	8.50	0.790
0	09	00	9.00	0.820
0	09	30	9.50	0.850
0	10	00	10.00	0.870
0	13	00	13.00	1.000
0	14	30	14.50	1.080
0	15	30	15.50	1.130
0	16	30	16.50	1.180
0	20	00	20.00	1.310
0	22	30	22.50	1.410
0	25	30	25.50	1.530
0	28	30	28.50	1.650
0	30	00	30.00	1.690
0	32	30	32.50	1.770

Test Pit Dimensions

Test Pit Length	2.30	m
Test Pit Width	0.60	m
Test Pit Depth	2.15	m
Standing Water Level		m

Infiltration Parameters

Total Depth	1.830	m
Total Effective Depth	1.830	m
25% Depth	0.778	m
75% Depth	1.693	m
25% Time	8.19	min
75% Time	30.08	min
Free Volume	0.37881	cu.m
Surface Area	6.687	sq.m
Time of Outflow	21.89	min



Soil infiltration Rate	**1.55E-01**	**m/hr**
	4.31E-05	**m/sec**

Date of Test: 2nd July 2021
Produced by: Matthew Wall

Coopers
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WREXHAM ROAD. ABERMORDDU
INFILTRATION TEST PIT No 2 (Test 3)

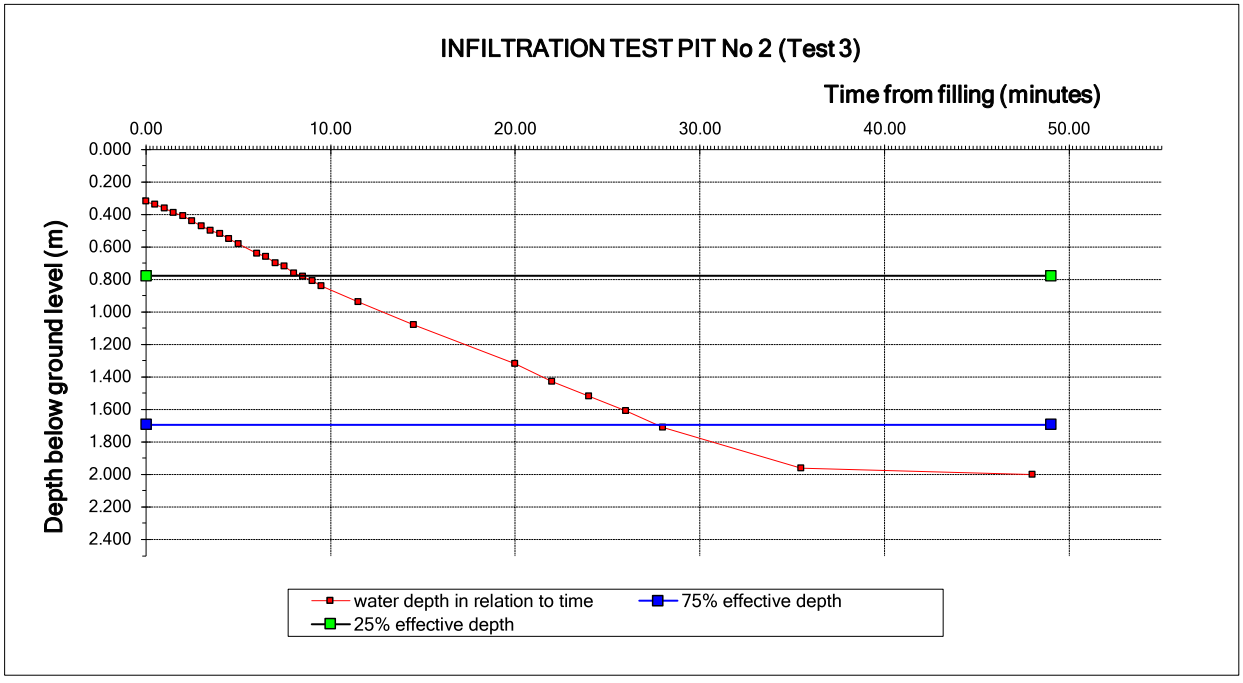
Time of reading			Absolute Time	Depth below Ground level
hrs	min	sec	mins	m
0	00	00	0.00	0.320
0	00	30	0.50	0.340
0	01	00	1.00	0.360
0	01	30	1.50	0.390
0	02	00	2.00	0.410
0	02	30	2.50	0.440
0	03	00	3.00	0.470
0	03	30	3.50	0.500
0	04	00	4.00	0.520
0	04	30	4.50	0.550
0	05	00	5.00	0.580
0	06	00	6.00	0.640
0	06	30	6.50	0.660
0	07	00	7.00	0.700
0	07	30	7.50	0.720
0	08	00	8.00	0.760
0	08	30	8.50	0.780
0	09	00	9.00	0.810
0	09	30	9.50	0.840
0	11	30	11.50	0.940
0	14	30	14.50	1.080
0	20	00	20.00	1.320
0	22	00	22.00	1.430
0	24	00	24.00	1.520
0	26	00	26.00	1.610
0	28	00	28.00	1.710
0	35	30	35.50	1.960
0	48	00	48.00	2.000

Test Pit Dimensions

Test Pit Length	2.30	m
Test Pit Width	0.60	m
Test Pit Depth	2.15	m
Standing Water Level		m

Infiltration Parameters

Total Depth	1.830	m
Total Effective Depth	1.830	m
25% Depth	0.778	m
75% Depth	1.693	m
25% Time	8.44	min
75% Time	27.65	min
Free Volume	0.37881	cu.m
Surface Area	6.687	sq.m
Time of Outflow	19.21	min



Soil infiltration Rate	**1.77E-01**	**m/hr**
	4.91E-05	**m/sec**

Date of Test: 2nd July 2021

Produced by: Matthew Wall

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WREXHAM ROAD. ABERMORDDU

INFILTRATION TEST PIT No. 3 (Test 1)

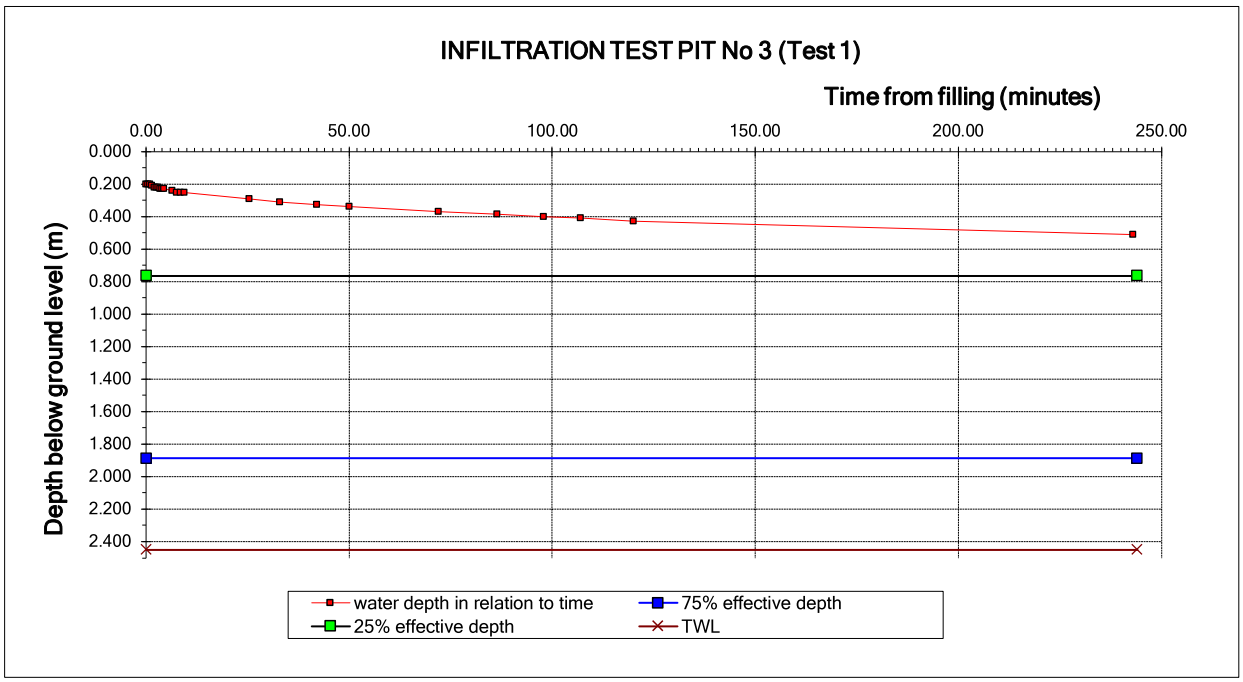
Time of reading			Absolute Time	Depth below Ground level
hrs	min	sec	mins	m
0	00	00	0.00	0.200
0	00	30	0.50	0.200
0	01	00	1.00	0.200
0	01	30	1.50	0.210
0	02	00	2.00	0.220
0	02	30	2.50	0.220
0	03	00	3.00	0.220
0	03	30	3.50	0.230
0	04	00	4.00	0.230
0	04	30	4.50	0.230
0	06	30	6.50	0.240
0	07	30	7.50	0.250
0	08	30	8.50	0.250
0	09	30	9.50	0.250
0	25	30	25.50	0.290
0	33	00	33.00	0.310
0	42	00	42.00	0.325
0	50	00	50.00	0.340
1	12	00	72.00	0.370
1	26	30	86.50	0.385
1	38	00	98.00	0.400
1	47	00	107.00	0.410
2	00	00	120.00	0.430
4	03	00	243.00	0.510

Test Pit Dimensions

Test Pit Length	2.70 m
Test Pit Width	0.60 m
Test Pit Depth	2.45 m
Standing Water Level	2.45 m

Infiltration Parameters

Total Depth	2.250 m
Total Effective Depth	2.250 m
25% Depth	0.763 m
75% Depth	1.888 m
25% Time	FAIL min
75% Time	FAIL min
Free Volume	FAIL cu.m
Surface Area	FAIL sq.m
Time of Outflow	FAIL min



Soil infiltration Rate	**N/A**	**m/hr**
	N/A	**m/sec**

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Method Statement for Soakaway Investigation Fieldwork

1.0 Office Preparation Prior to Field Work

1.1 Once an instruction has been received from the client preparation may be made for the construction of infiltration test pits (ITPs). This usually follows a previous investigation of the proposed site for development. All works will be completed in accordance with BRE Digest 365: Soakaway Design.

1.2 The field engineer must determine the number of ITPs required on the site. This will require consultation with the drainage designer to determine the possible locations for the ITPs taking into account the position of proposed soakaways and trial pits and borehole information obtained from the previous site investigation. Unless detailed design and site investigation information is available the ITPs should be relatively equally spaced around the site, and located in sand strata with a low silt content. The soakage pits should not be located within close proximity to lines of existing services, and also should not be located beneath a proposed building.

1.3 Once the number of pits has been determined a volume of stone can be calculated. Generally the ITPs have 2m depth of stone deposited within the excavation, and the excavations are generally 0.6m x 2.5m (assuming the sides of the excavation remain stable). It is generally good practice to over estimate in case the excavation collapses, thereby requiring extra stone.

1.4 The administration staff will have to ensure that a JCB (with a 2 foot bucket) and a calculated volume of stone that will fill all the proposed ITPs arrives on the site for investigation at **9am**, the day of the investigation. A 3,000 gallon water bowser will also be required to be present on site (full of uncontaminated water) from **10:30am** on the day of the investigation.

1.5 The JCB should be sought from a reputable firm local to the site. The water bowser is usually hired from Willis Plant Hire (however since they are based in Deeside other companies may be sought if the travelling distance is deemed too great – charged travel time + overtime after 8hrs – time and a half). The stone will be 20mm single sized limestone chippings (assuming the pH is not such that the chippings dissolve in the natural groundwaters or natural strata) and is usually acquired from Marchington Stone.

1.6 The field engineer, in agreement with the client, will be required to contact the local authority (usually highways or technical services departments) to enquire whether a representative of their department will be required to witness the tests. Some Councils **always** require a representative on site. This is primarily to ensure the local authority that all the tests are carried out according to the latest standards – they may require the tests to be repeated if they are not informed in advance and given an opportunity to attend site. They may also have information on similar projects within the vicinity of the site for development. The field engineer should ensure the bowser size is sufficient (i.e. 3000 gallon) or alternatively make arrangements for refilling the bowser via standpipes and associated mains connection, or from a permitted watercourse.

1.7 The field engineer will be required to obtain 2.5m lengths of piping for each of the ITP proposed on the site with a diameter (typically 50mm) such that the dipmeter can be inserted. The piping should be slotted either beforehand in the office or on site with a saw to allow the waters to percolate. The slots should be cut at approximately 150mm lengths along the pipe and present on alternative sides. The slots should be cut with a slight notch to ensure tension does not close one side of the pipe, yet not large enough to allow the 20mm stone to enter. It would be prudent to purchase extra lengths of piping since the smaller diameter pipes are prone to snapping whilst the stone is carefully being added to the ITP. The engineer must ensure he has an L-shaped coupling to connect to the head of the vertical pipe for safety requirements. A second horizontal pipe is fixed to the L-shaped coupling to form a directional handle for the engineer to hold away from the pouring of the stone.

1.8 As with any field investigation the engineer should ensure he/she has adequate copies of the site plan with waterproof copies available. The engineer should also ensure that the dipmeters taken to site are in working order and spare batteries are also present.

2.0 Field Work

2.1 The engineer should ensure that he/she arrives on site generally half an hour prior to the JCB, bowser and stone to complete a quick site walk over to review existing services on site and also if required to slot the pipes.

2.2 The engineer should not start the excavation for the ITPs prior to the arrival of the stone since the majority of the strata excavated may be unstable, therefore since the volume of the pit has to be kept as low as possible the pit should be shored by stone immediately after excavation.

2.3 Once the (first load of) stone arrives on site the engineer should ask the driver of the wagon to estimate a time of arrival for the remaining stone if required (whether he will return or a second wagon is following).

2.4 The JCB driver should then be instructed to distribute the stone approximately 1m from the long face of the proposed ITPs, approximately 1m from the sides. If more than one wagon load of stone is required, then enough stone should be stockpiled (usually 4 to 5 front buckets) by each pit in sequence until all the stone has been used.

2.5 The engineer should place one slotted pipe by each ITP once the stone has been distributed and the bowser should be situated close to the first pit.

2.6 Prior to excavation of the first ITP the machine driver should be briefed on his requirements. The driver should be aware that the excavation will be 2.5m in depth yet should be kept as small in length and width as possible (to reduce potential for collapse, and excess use of stone). The standard 2ft bucket must be used (to allow clear visibility of strata variations, whilst not creating a large excavation). During excavation the strata types should be recorded, samples taken, and the dimensions of the excavation recorded. Where the depths or widths vary across the ITP these should also be noted. It is useful to draw a sketch of pit to allow quick dimensions to be added. The time between completion of the excavation and infilling (refer to point 2.7) should be minimised to reduce the potential for collapse of the sides.

2.7 Once the excavation has reached a depth of approximately 2.5m (or base target strata such as top of clay – dependant upon site specific requirements), the pipe should be held in a position as centrally as possible within the pit. This must be done with due consideration of the stability of the excavation. The sides of the excavation with granular or soft strata can collapse very rapidly, and should only be approached from the narrow face of the trial pit (opposite the machine). If the sides are unstable, then in cognisance of this the pipe can be positioned closer to the sides. If this is still not considered safe then the project engineer from Cooper Associates should be contacted to discuss feasible alternatives.

2.8 The piping should either be fitted with a cap (possibly a plastic tub). Whilst the engineer is positioning the pipe the JCB should have the first load of stone in his back bucket. Once the engineer is happy that he/she is safe, and the pipe is in position the stone may be deposited very carefully. The stone should be lightly poured from the back bucket (for wheeled excavators) into the near face of the excavation (i.e. not onto the engineers arm, head, or directly onto the pipe cap) thereby not destabilising the sides of the excavation, breaking the pipe or injuring the engineer. The engineer will be required to hold the pipe in position until enough stone has been deposited to hold the pipe in position and also until the engineer is content that the unsupported length of pipe will not shatter or snap due to being hit by the deposited stone. The driver of the wheeled excavator must be aware that at no point should the stone be poured onto the pipe cap or rammed into the excavation using the front bucket (due to the potential for damage to the pipe or collapse of sides from the weight of the machine.

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web: www.coopers.co.uk
email: admin@coopers.co.uk

2.9 The stone should be deposited until it is approximately 0.5m below ground level. Once the stone has reached this level the mechanical excavator can be sent to the location of the next pit whilst the engineer levels the surface of the stone and records the level of stone below ground level. The engineer should then join the JCB at the next proposed soakage location and repeat sections 2.5 to 2.9. These should be completed until all the ITPs possible (due to the availability of the stone) have been completed.

2.10 Once the last possible pit has been completed the engineer should return to the first ITP and dip and record the natural groundwater level, then instruct the bowser driver to discharge enough water so as the water rises to the level of the stone. The driver should then be instructed to wait by the second pit ready to discharge.

2.11 The field engineer should monitor and record the water level within the standpipe initially at intervals of half a minute, noting both the time and water level from top of the pipe. These should be completed for up to ten minutes to obtain a reasonable array of initial results (when the water outflows more rapidly). After the first ten minutes have elapsed the engineer should move to the second ITP as soon as possible repeating section 2.10. Once this pit has been completed the engineer should revisit the first pit and take several readings at half-minute intervals before moving to the third ITP. The engineer should be able to monitor numerous pits prior to starting the second set of tests.

2.12 The engineer will need to determine the effective depth of each test run of the ITPs. The effective depth is determined by base level (bottom of the trial pit unless standing groundwater is present at a shallower depth) subtracted by the depth of filled water (both must be either relative to the measuring point (i.e. top of pipe). The effective depth is then divided by 4 to determine the 25% depth and then multiplied by 3 to get the 75% effective depth. These depths should then be added to the height of pipe above filled water level to determine the crucial levels for time of outflow (refer to worked example).

2.13 Shortly after the infiltration has exceeded the 75% empty level, the pit should be re-tested. Any tests that take over 2 hours to reach the 75% level will be classified as not suitable for soakage, however these should be checked periodically throughout the day to aide the analysis at a later date. Discussions with the project engineer can determine the merits of recharging or prolonged monitoring on a ITP specific basis.

2.14 Where ITPs dissipate at a rate classified as suitable for soakage, three tests should be completed.

2.15 As soon as the second batch of stone arrives the JCB driver should repeat the procedure noted in section 2.4 and the engineer should repeat sections 2.5 to 2.11. During the excavations for additional ITPs, the first set of pits should be monitored.

2.16 Once all the tests have been completed in a satisfactory manner the pits can be backfilled to not provide a trip hazard. Due to the stone occupying a large volume of the pit a large volume of spoil will be retained. The pits should be raised to compensate for settlement, with the remaining spoil deposited either in areas rucked by the JCB/Bowser or in a discrete stockpile on the site.

3.0 References

3.1 BRE Digest 365, Soakaway Design, 1991. Revised 2003

3.2 BS 8301:1985, Code of Practice for Building Drainage, Department of the Environment.

3.3 CIRIA R156, 1996, Infiltration Drainage – Manual of Good Practice.

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Appendix 4

Correspondence

Dwr Cymru Welsh Water Historical Flooding

Flintshire County Council Historical Flooding

Natural Resources Wales Historical Flooding

Andy Jones

From: Andy Jones
Sent: 09 August 2022 17:40
To: sewerage.services@dwrcymru.com
Subject: FCA Historical Flood Information [Filed 09 Aug 2022 17:41]
Attachments: 7896 Site Location.pdf

7896 Wrexham Road, Abermorddu, Flintshire
SJ307567
X=330760 , Y=356770

FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

Regards

Andy Jones

Senior Infrastructure Engineer

COOPERS

Park House, Sandpiper Court, Chester Business Park, Chester, CH4 9QU

☎: (01244) 684910 ☎: Direct Dial No. (01244) 684933

7: (01244) 684911

✉: ajones@coopers.co.uk

Web: http://www.coopers.co.uk

Andy Jones

From: Andy Jones
Sent: 09 August 2022 17:44
To: SAB
Cc: streetscene@flintshire.gov.uk
Subject: FW: FCA Historical Flood Information [Filed 09 Aug 2022 17:44]
Attachments: 7896 Site Location.pdf

7896 Wrexham Road, Abermorddu, Flintshire
SJ307567
X=330760 , Y=356770

FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

Regards

Andy Jones
Senior Infrastructure Engineer
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🖷: (01244) 684911
✉: ajones@coopers.co.uk
Web: http://www.coopers.co.uk

Andy Jones

From: Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>
Sent: 19 August 2022 10:14
To: Andy Jones
Subject: ATI-23809a - FCA Historical Flood Information

Hi Andy.

Unfortunately, we hold no information on historic flooding or flooded properties for this site. This is not to say that there has been no incidents in the past just that none have been reported to Natural Resources Wales.

Thanks,

Marc Campbell
Cymorth Technegol Cyswllt Cyfoeth / Customer Hub Technical Support
Cwsmer, Cyfathrebu a Masnach/ Customer, Communications and Commercial
Cyfoeth Naturiol Cymru/Natural Resources Wales
Ffôn/Tel: 0300 065 3000
E-bost/E-mail:marc.campbell@cyfoethnaturiolcymru.gov.uk /marc.campbell@naturalresourceswales.gov.uk
Gwefan/Website:http://www.cyfoethnaturiolcymru.gov.uk/ /www.naturalresourceswales.gov.uk

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From: Andy Jones <ajones@coopers.co.uk>
Sent: 09 August 2022 17:42
To: Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>
Subject: FCA Historical Flood Information

7896 Wrexham Road, Abermorddu, Flintshire
SJ307567
X=330760 , Y=356770

FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

Regards

Andy Jones
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Appendix 5

MicroDrainage Calculation

Source Control Greenfield Run-off Calculation (1ha)

Preliminary Surface Water Design

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Andy Jones
Site name:	Abermorddu
Site location:	Wrexham

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.10311° N
Longitude:	3.03477° W
Reference:	4064079039
Date:	Dec 01 2021 12:03

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	2	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.37

Hydrological characteristics	Default	Edited
SAAR (mm):	818	818
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	2.19	3.45
1 in 1 year (l/s):	1.92	3.03
1 in 30 years (l/s):	3.89	6.14
1 in 100 year (l/s):	4.77	7.51
1 in 200 years (l/s):	5.38	8.48

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 7896 - SW NET TOTAL SITE.SWS

Pipe Sizes 7896 - SW NET 1 REV C COM SOAKAWAY Manhole Sizes 7896 - SW NET 1 REV C COM SOAKAWAY

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.316	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for 7896 - SW NET TOTAL SITE.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	19.544	0.049	398.9	0.064	5.00	0.0	0.600	o	450	Pipe/Conduit	
1.001	12.170	0.030	405.7	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.002	31.507	0.079	398.8	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	11.006	0.028	393.1	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	22.555	0.056	402.8	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	12.429	0.031	400.9	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	28.037	0.070	400.5	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	9.954	0.059	168.7	0.064	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	34.346	1.717	20.0	0.064	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	30.766	0.077	399.6	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	26.462	0.066	400.9	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	33.474	0.084	400.0	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.000	14.535	0.036	403.8	0.064	5.00	0.0	0.600	o	450	Pipe/Conduit	
3.001	72.805	0.182	400.0	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.32	88.369	0.064	0.0	0.0	0.0	1.01	160.9	8.7
1.001	50.00	5.52	88.320	0.128	0.0	0.0	0.0	1.00	159.5	17.3
1.002	50.00	6.04	88.290	0.192	0.0	0.0	0.0	1.01	160.9	26.0
1.003	50.00	6.22	88.211	0.256	0.0	0.0	0.0	1.02	162.1	34.7
1.004	49.96	6.60	88.183	0.320	0.0	0.0	0.0	1.01	160.1	43.3
1.005	49.30	6.80	88.127	0.384	0.0	0.0	0.0	1.01	160.5	51.3
1.006	47.87	7.26	88.096	0.448	0.0	0.0	0.0	1.01	160.6	58.1
2.000	50.00	5.17	91.176	0.064	0.0	0.0	0.0	1.00	39.9	8.7
2.001	50.00	5.36	91.117	0.128	0.0	0.0	0.0	2.94	116.9	17.3
1.007	46.42	7.77	88.026	0.640	0.0	0.0	0.0	1.01	160.8	80.5
1.008	45.25	8.21	87.949	0.704	0.0	0.0	0.0	1.01	160.5	86.3
1.009	43.88	8.76	87.883	0.768	0.0	0.0	0.0	1.01	160.7	91.3
3.000	50.00	5.24	88.319	0.064	0.0	0.0	0.0	1.01	159.9	8.7
3.001	50.00	6.44	88.283	0.128	0.0	0.0	0.0	1.01	160.7	17.3

Network Design Table for 7896 - SW NET TOTAL SITE.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.002	53.010	0.133	398.6	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.003	9.663	0.024	402.6	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.004	14.165	0.035	404.7	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.005	43.740	0.110	397.6	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	13.851	0.035	395.7	0.064	5.00	0.0	0.600	o	450	Pipe/Conduit	
4.001	58.479	0.146	400.5	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	41.491	0.104	399.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.011	10.000	0.025	400.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.002	47.72	7.31	88.101	0.192	0.0	0.0	0.0	1.01	161.0	24.8
3.003	47.26	7.47	87.968	0.256	0.0	0.0	0.0	1.01	160.2	32.8
3.004	46.59	7.71	87.944	0.320	0.0	0.0	0.0	1.00	159.7	40.4
3.005	44.69	8.43	87.909	0.384	0.0	0.0	0.0	1.01	161.2	46.5
4.000	50.00	5.23	87.980	0.064	0.0	0.0	0.0	1.02	161.6	8.7
4.001	50.00	6.19	87.945	0.128	0.0	0.0	0.0	1.01	160.6	17.3
1.010	42.31	9.44	87.799	1.280	0.0	0.0	0.0	1.01	160.9	146.7
1.011	41.95	9.61	89.000	1.280	0.0	0.0	0.0	1.01	160.7	146.7

Manhole Schedules for 7896 - SW NET TOTAL SITE.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
201	90.444	2.075	Open Manhole	1500	1.000	88.369	450				
202	90.203	1.883	Open Manhole	1500	1.001	88.320	450	1.000	88.320	450	
203	90.154	1.864	Open Manhole	1500	1.002	88.290	450	1.001	88.290	450	
204	90.755	2.544	Open Manhole	1500	1.003	88.211	450	1.002	88.211	450	
205	90.989	2.806	Open Manhole	1500	1.004	88.183	450	1.003	88.183	450	
206	91.321	3.194	Open Manhole	1500	1.005	88.127	450	1.004	88.127	450	
207	91.471	3.375	Open Manhole	1500	1.006	88.096	450	1.005	88.096	450	
208	93.613	2.437	Open Manhole	1500	2.000	91.176	225				
209	93.126	2.009	Open Manhole	1500	2.001	91.117	225	2.000	91.117	225	
210	91.669	3.643	Open Manhole	1500	1.007	88.026	450	1.006	88.026	450	
								2.001	89.400	225	1149
211	91.056	3.107	Open Manhole	1500	1.008	87.949	450	1.007	87.949	450	
212	90.355	2.472	Open Manhole	1500	1.009	87.883	450	1.008	87.883	450	
213	90.000	1.681	Open Manhole	1500	3.000	88.319	450				
214	89.812	1.529	Open Manhole	1500	3.001	88.283	450	3.000	88.283	450	
215	89.352	1.251	Open Manhole	1500	3.002	88.101	450	3.001	88.101	450	
216	89.336	1.368	Open Manhole	1500	3.003	87.968	450	3.002	87.968	450	
217	89.995	2.051	Open Manhole	1500	3.004	87.944	450	3.003	87.944	450	
218	90.207	2.298	Open Manhole	1500	3.005	87.909	450	3.004	87.909	450	
219	89.120	1.140	Open Manhole	1500	4.000	87.980	450				
220	88.920	0.975	Open Manhole	1500	4.001	87.945	450	4.000	87.945	450	
221	90.000	2.201	Open Manhole	1500	1.010	87.799	450	1.009	87.799	450	
								3.005	87.799	450	
								4.001	87.799	450	
222	90.000	2.305	Open Manhole	1500	1.011	89.000	450	1.010	87.695	450	
223	90.000	1.025	Open Manhole	2000		OUTFALL		1.011	88.975	450	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
201	330726.456	356869.181	330726.456	356869.181	Required	
202	330733.580	356850.981	330733.580	356850.981	Required	
203	330734.308	356838.833	330734.308	356838.833	Required	
204	330730.750	356807.528	330730.750	356807.528	Required	
205	330733.488	356796.868	330733.488	356796.868	Required	
206	330743.607	356776.711	330743.607	356776.711	Required	

Manhole Schedules for 7896 - SW NET TOTAL SITE.SWS

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
207	330750.568	356766.414	330750.568	356766.414	Required	
208	330726.185	356719.891	330726.185	356719.891	Required	
209	330733.763	356726.345	330733.763	356726.345	Required	
210	330764.338	356741.992	330764.338	356741.992	Required	
211	330779.126	356715.013	330779.126	356715.013	Required	
212	330792.326	356692.078	330792.326	356692.078	Required	
213	330763.124	356827.651	330763.124	356827.651	Required	
214	330776.120	356834.162	330776.120	356834.162	Required	
215	330811.213	356770.374	330811.213	356770.374	Required	
216	330840.151	356725.958	330840.151	356725.958	Required	
217	330838.167	356716.501	330838.167	356716.501	Required	
218	330826.762	356708.100	330826.762	356708.100	Required	
219	330856.866	356702.799	330856.866	356702.799	Required	
220	330866.066	356692.445	330866.066	356692.445	Required	
221	330813.735	356666.345	330813.735	356666.345	Required	
222	330846.791	356641.269	330846.791	356641.269	Required	
223	330856.791	356641.269			No Entry	

Free Flowing Outfall Details for 7896 - SW NET TOTAL SITE.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.011	223	90.000	88.975	0.000	2000	0

Simulation Criteria for 7896 - SW NET TOTAL SITE.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.316		

Storage Structures for 7896 - SW NET TOTAL SITE.SWS

Infiltration Basin Manhole: 222, DS/PN: 1.011

Invert Level (m) 87.500 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.34900 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.34900

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	450.0	0.600	648.6	1.200	883.3	1.800	1154.3	2.400	1461.4
0.100	480.6	0.700	685.2	1.300	926.0	1.900	1203.0	2.500	1516.1
0.200	512.2	0.800	722.8	1.400	969.6	2.000	1252.7		
0.300	544.8	0.900	761.4	1.500	1014.3	2.100	1303.3		
0.400	578.4	1.000	801.1	1.600	1060.0	2.200	1355.0		
0.500	613.0	1.100	841.7	1.700	1106.6	2.300	1407.7		

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7896 - SW NET TOTAL SITE.SWS

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 0 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.316 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 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, 2160
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	201	15 Winter	1	+0%	100/15 Summer				88.463	-0.356	0.000
1.001	202	15 Winter	1	+0%	100/15 Summer				88.443	-0.327	0.000
1.002	203	15 Winter	1	+0%	100/15 Summer				88.420	-0.320	0.000
1.003	204	15 Winter	1	+0%	100/15 Summer				88.375	-0.286	0.000
1.004	205	15 Winter	1	+0%	100/15 Summer				88.351	-0.282	0.000
1.005	206	15 Winter	1	+0%	100/15 Summer				88.315	-0.262	0.000
1.006	207	15 Winter	1	+0%	100/15 Summer				88.284	-0.262	0.000
2.000	208	15 Winter	1	+0%					91.248	-0.153	0.000
2.001	209	15 Winter	1	+0%					91.170	-0.172	0.000
1.007	210	15 Winter	1	+0%	30/15 Winter				88.232	-0.244	0.000
1.008	211	15 Winter	1	+0%	30/15 Winter				88.168	-0.231	0.000
1.009	212	15 Winter	1	+0%	30/15 Summer				88.110	-0.223	0.000
3.000	213	15 Winter	1	+0%	100/15 Summer				88.407	-0.362	0.000
3.001	214	15 Winter	1	+0%	100/15 Summer				88.374	-0.359	0.000
3.002	215	15 Winter	1	+0%	100/15 Summer				88.210	-0.341	0.000
3.003	216	15 Winter	1	+0%	100/15 Summer				88.130	-0.288	0.000
3.004	217	15 Winter	1	+0%	100/15 Summer				88.112	-0.282	0.000
3.005	218	15 Winter	1	+0%	100/15 Summer				88.084	-0.275	0.000
4.000	219	15 Winter	1	+0%	100/15 Summer				88.071	-0.359	0.000
4.001	220	30 Winter	1	+0%	100/15 Summer				88.061	-0.334	0.000
1.010	221	30 Winter	1	+0%	30/15 Summer				88.053	-0.196	0.000
1.011	222	180 Winter	1	+0%					87.717	-1.733	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Level Status	Level Exceeded
1.000	201	0.06			7.1	OK	
1.001	202	0.13			12.8	OK	
1.002	203	0.13			18.2	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7896 - SW NET TOTAL SITE.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.003	204	0.23			22.8	OK	
1.004	205	0.21			27.9	OK	
1.005	206	0.32			32.5	OK	
1.006	207	0.27			36.9	OK	
2.000	208	0.22			7.3	OK	
2.001	209	0.12			13.5	OK	
1.007	210	0.36			50.3	OK	
1.008	211	0.39			53.5	OK	
1.009	212	0.40			55.9	OK	
3.000	213	0.07			7.2	OK	
3.001	214	0.08			12.7	OK	
3.002	215	0.12			17.3	OK	
3.003	216	0.22			20.8	OK	
3.004	217	0.24			24.9	OK	
3.005	218	0.20			28.4	OK	
4.000	219	0.07			7.1	OK	
4.001	220	0.07			10.5	OK	
1.010	221	0.61			87.3	OK	
1.011	222	0.00		117	0.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7896 - SW NET TOTAL SITE.SWS

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 0 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.316 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 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, 2160
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	201	15 Winter	30	+0%	100/15 Summer				88.599	-0.220	0.000
1.001	202	15 Winter	30	+0%	100/15 Summer				88.594	-0.176	0.000
1.002	203	15 Winter	30	+0%	100/15 Summer				88.586	-0.154	0.000
1.003	204	15 Winter	30	+0%	100/15 Summer				88.570	-0.091	0.000
1.004	205	15 Winter	30	+0%	100/15 Summer				88.557	-0.076	0.000
1.005	206	15 Winter	30	+0%	100/15 Summer				88.533	-0.044	0.000
1.006	207	15 Winter	30	+0%	100/15 Summer				88.512	-0.034	0.000
2.000	208	15 Winter	30	+0%					91.295	-0.106	0.000
2.001	209	15 Winter	30	+0%					91.208	-0.134	0.000
1.007	210	15 Winter	30	+0%	30/15 Winter				88.478	0.002	0.000
1.008	211	15 Winter	30	+0%	30/15 Winter				88.427	0.028	0.000
1.009	212	15 Winter	30	+0%	30/15 Summer				88.376	0.043	0.000
3.000	213	15 Winter	30	+0%	100/15 Summer				88.463	-0.306	0.000
3.001	214	15 Winter	30	+0%	100/15 Summer				88.434	-0.299	0.000
3.002	215	30 Winter	30	+0%	100/15 Summer				88.367	-0.184	0.000
3.003	216	30 Winter	30	+0%	100/15 Summer				88.351	-0.067	0.000
3.004	217	30 Winter	30	+0%	100/15 Summer				88.342	-0.052	0.000
3.005	218	30 Winter	30	+0%	100/15 Summer				88.328	-0.031	0.000
4.000	219	30 Winter	30	+0%	100/15 Summer				88.316	-0.114	0.000
4.001	220	30 Winter	30	+0%	100/15 Summer				88.313	-0.082	0.000
1.010	221	30 Winter	30	+0%	30/15 Summer				88.303	0.054	0.000
1.011	222	240 Winter	30	+0%					88.041	-1.409	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	201	0.13			17.0	OK	
1.001	202	0.32			31.7	OK	
1.002	203	0.34			46.9	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7896 - SW NET TOTAL SITE.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.003	204	0.56			57.0	OK	
1.004	205	0.53			70.5	OK	
1.005	206	0.78			80.0	OK	
1.006	207	0.65			89.2	OK	
2.000	208	0.54			18.0	OK	
2.001	209	0.34			37.1	OK	
1.007	210	0.91			126.1	SURCHARGED	
1.008	211	0.95			128.5	SURCHARGED	
1.009	212	0.95			132.9	SURCHARGED	
3.000	213	0.17			17.7	OK	
3.001	214	0.22			33.7	OK	
3.002	215	0.23			34.4	OK	
3.003	216	0.39			37.2	OK	
3.004	217	0.46			47.4	OK	
3.005	218	0.39			56.1	OK	
4.000	219	0.12			12.8	OK	
4.001	220	0.15			22.1	OK	
1.010	221	1.32			189.2	SURCHARGED	
1.011	222	0.00		232	0.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7896 - SW NET TOTAL SITE.SWS

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 0 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.316 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 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, 2160
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	201	15 Winter	100	+50%	100/15 Summer				89.758	0.939	0.000
1.001	202	15 Winter	100	+50%	100/15 Summer				89.749	0.979	0.000
1.002	203	15 Winter	100	+50%	100/15 Summer				89.736	0.996	0.000
1.003	204	15 Winter	100	+50%	100/15 Summer				89.707	1.046	0.000
1.004	205	15 Winter	100	+50%	100/15 Summer				89.684	1.051	0.000
1.005	206	15 Winter	100	+50%	100/15 Summer				89.642	1.065	0.000
1.006	207	15 Winter	100	+50%	100/15 Summer				89.605	1.059	0.000
2.000	208	15 Winter	100	+50%					91.401	0.000	0.000
2.001	209	15 Winter	100	+50%					91.250	-0.092	0.000
1.007	210	15 Winter	100	+50%	30/15 Winter				89.528	1.052	0.000
1.008	211	15 Winter	100	+50%	30/15 Winter				89.346	0.947	0.000
1.009	212	15 Winter	100	+50%	30/15 Summer				89.147	0.814	0.000
3.000	213	30 Winter	100	+50%	100/15 Summer				89.074	0.305	0.000
3.001	214	30 Winter	100	+50%	100/15 Summer				89.067	0.334	0.000
3.002	215	30 Winter	100	+50%	100/15 Summer				89.042	0.491	0.000
3.003	216	30 Winter	100	+50%	100/15 Summer				89.010	0.592	0.000
3.004	217	30 Winter	100	+50%	100/15 Summer				88.991	0.597	0.000
3.005	218	30 Winter	100	+50%	100/15 Summer				88.959	0.600	0.000
4.000	219	30 Winter	100	+50%	100/15 Summer				88.922	0.492	0.000
4.001	220	30 Winter	100	+50%	100/15 Summer				88.915	0.520	0.000
1.010	221	30 Winter	100	+50%	30/15 Summer				88.893	0.644	0.000
1.011	222	360 Winter	100	+50%					88.481	-0.969	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	201	0.19			24.2	SURCHARGED	
1.001	202	0.44			44.1	SURCHARGED	
1.002	203	0.46			63.5	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7896 - SW NET TOTAL SITE.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.003	204	0.82			82.8	SURCHARGED	
1.004	205	0.78			102.4	SURCHARGED	
1.005	206	1.19			121.9	SURCHARGED	
1.006	207	1.03			141.2	SURCHARGED	
2.000	208	1.02			33.7	OK	
2.001	209	0.64			70.6	OK	
1.007	210	1.56			216.8	SURCHARGED	
1.008	211	1.74			235.9	SURCHARGED	
1.009	212	1.80			252.2	SURCHARGED	
3.000	213	0.24			24.7	SURCHARGED	
3.001	214	0.28			42.6	SURCHARGED	
3.002	215	0.39			56.6	SURCHARGED	
3.003	216	0.78			74.6	SURCHARGED	
3.004	217	0.89			92.8	SURCHARGED	
3.005	218	0.76			109.6	SURCHARGED	
4.000	219	0.21			22.3	FLOOD RISK	
4.001	220	0.28			41.9	FLOOD RISK	
1.010	221	2.71			388.7	SURCHARGED	
1.011	222	0.00		384	0.0	OK	