Flood & Water Management Act 2010

Section 19 Flood Investigation Report
FI0084/B

Location: Meadowside, Queens Park, Holland Cottages and Alyn Meadows, Mold, Flintshire

Incident Date: October 2023

CYNGOR
Sir y Fflint
Flintshire
COUNTY COUNCIL

Document Control Sheet

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Revision History

Date	Version Number	Summary of Changes
18/10/2024	Draft Report 1	NA
10/02/2025	Version 02	Updated with additional information on the drainage system in the Meadowside Area
10/06/2025	Version 03	Updated to document feedback from Risk Management Authorities
10/07/2025	Version 04	Updated to document feedback from Risk Management Authorities
01/09/2025	Final Version	Final edits made by the LLFA

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Executive Summary

Following widespread flooding throughout Flintshire County in October 2023, Section 19 (Flood and Water Management Act 2010) Flood Investigation Reports have been prepared. The town of Mold experienced flooding at numerous locations some of which were hydraulically connected and others at locations with no connectivity to flooding elsewhere. Two separate Section 19 Reports have been produced, one for the areas connected hydraulically and one for the areas flood that are not connected. This report considers the areas that were flooded that are not hydraulically connected and include Meadowside, Queens Park, Holland Cottages and Alyn Meadows, Mold. A second Section 19 Report has been prepared to consider the areas of Mold where the flooding was found to be hydraulically connected.

This report has been prepared for the purpose of meeting the requirements of Section 19 of the Flood and Water Management Act 2010. Under Section 19 of the Flood and Water Management Act 2010, the Lead Local Flood Authority (Flintshire County Council) on becoming aware of a flood in its area must, to the extent it considers necessary or appropriate, investigate, prepare and publish a Flood Investigation Report.

As a Lead Local Flood Authority (LLFA), it is the responsibility of Flintshire County Council (FCC) to manage the local flood risk from surface water, groundwater and ordinary watercourses such as streams and small watercourses (including lakes and ponds).

Section 19 of the Flood and Water Management Act 2010 states:

"On becoming aware of a flood in its area, a lead local flood authority must, to the extent it considers necessary or appropriate, investigate –

(a) Which risk management authorities have relevant flood risk management functions, and
(b) Whether each of those risk management authorities has exercised, or is intending to exercise, those functions in response to the flood"

The flood risk management authorities in Flintshire are:

- Flintshire County Council
- Flintshire's Environment Department
- Natural Resources Wales
- Dŵr Cymru / Welsh Water

The relevant Flood Risk Management Authority for this event is Flintshire County Council as flooding was mainly attributed to an 'ordinary watercourse'. Internal flooding to a single residential property warrants that the incident should be investigated, and a report prepared in accordance with the Council's Local Flood Risk Management Strategy (LFRMS):[1]

In October 2023, Storm Babet brought periods of heavy rainfall across large areas of the United Kingdom. The Met Office reported that the 18th to the 21st of October saw "the third-wettest independent 3-day period for England and Wales in a series from 1891".

[1] https://www.flintshire.gov.uk/en/PDFFiles/Flooding-and-Drainage/Flintshire-Local-Flood-Risk-Management-Strategy.pdf.

Representatives of Waterco Ltd, on behalf of FCC, have carried out community engagement and communicated with relevant stakeholders to gain an understanding of the nature of the October 2023 flood event. This Report provides details of the flooding incident.

Across the Meadowside, Queens Park, Holland Cottages and Alyn Meadows areas of Mold, there were 7 reports of internal flooding. The majority of the internal flooding incidents can be attributed to the high levels of surface water runoff that occurred due to the prolonged rainfall experienced during Storm Babet. This resulted in soils becoming saturated and increased water levels in ordinary watercourses, causing overtopping.

The table below sets out the recommended actions required to reduce the flooding and the stakeholder required to undertake each action.

Table 1 – Recommendations to Address Flooding

Ref	Stakeholder	Action
01	FCC Highways Authority	**Queens Park area** - inspect the culverts beneath Cilnant, Parc Hendy and Clayton Road on a frequent basis and remove debris as required. Prepare and adopt Asset Management Plan for culvert maintenance.
02	FCC Highways Authority	**Holland Cottages area** - inspect the Black Brook arched bridge and upstream channel for debris and obstructions on a frequent basis and inform riparian landowners if any issues are identified.
03	FCC Highways Authority	Continue maintaining highway assets, especially in high-risk areas.
04	FCC LLFA	**Meadowside area** - review condition of the ordinary watercourses (culvert) and inform the riparian landowners if any issues are identified.
05	FCC LLFA	**Meadowside area** - consider a scheme to formalise connectivity of runoff from the upstream catchment into the culverted section of watercourse.
06	FCC LLFA	**Queens Park area** - consider a scheme for replacement of the culvert inlet grilles with alternative wider grilles as to avoid impeding the flow of water.
07	FCC LLFA	**Holland Cottages area** - further investigation required to ascertain cause of flooding of the Black Brook watercourse around the Black Brook arched bridge.
08	FCC LLFA	Communicate with local communities to raise awareness of property level flood resilience measures that can be implemented to help mitigate flood risk
09	FCC LLFA	Where budget allows, consider implementing flood management measures upstream of the areas impacted by flooding from ordinary watercourses / surface water.
10	FCC LLFA	FCC to use permissive duties and powers under the LDA and FWMA to allow free flow via culvert entrances, watercourses and culverts are maintained to convey flows as intended.
11	NRW	Inspect and review the design, condition and suitability of the embankment defending land off Blackbrook Road (Holland Cottages) from flooding originating from the River Alyn to understand whether it is working as designed or if design standard was exceeded during Storm Babet. Additional works may be required.
12	NRW	Ensure Main Rivers are inspected on a risk-based frequency and where appropriate and justifiable, a maintenance regime is documented and completed by an appropriate Risk Management Authority and/or Riparian Owner.
13	DCWW	Review customer complaints and investigate the associated sections of public sewer system to remove any blockage / significant debris following the October 2023 event.

14	DCWW	Inspect the outfall arrangement of the public surface water sewer near Meadowside. Consider a formal connection to the culvert rather than discharge to land.
15	Property Owners / Residents	Sign up to the free signing up to the NRW Flood Warning System and consider the implementation of property level flood resilience measures. These could include; the installation of non-return valves to prevent ingress of floodwater on private drainage systems and installing flood barriers or flood doors.

1.0 Introduction

1.1 Since the introduction of the Flood and Water Management Act 2010 (FWMA) Flintshire County Council (FCC) is the designated Lead Local Flood Authority (LLFA).

1.2 Under Section 19 of the FWMA, Flintshire County Council as the LLFA on becoming aware of a flood in its area must, to the extent that it considers necessary or appropriate, investigate and prepare a report.

1.3 Where a LLFA carries out an investigation then the report must be published, and any relevant risk management authorities notified.

1.4 Waterco have been commissioned by FCC to carry out a Flood Investigation Report in relation to flooding in the Meadowside, Queens Park, Holland Cottages and Alyn Meadows areas of Mold during Storm Babet which occurred in October 2023. Storm Babet caused both internal and external flooding to residential properties in Mold. The flooding to areas considered in this Section 19 report are not hydraulically linked to flooding recorded elsewhere in Mold or each of the other locations considered in this report, during Storm Babet. A separate Section 19 report is available for the wider urban area of Mold which flooded during Storm Babet where the flooding mechanism is linked.

1.5 The purpose of this Section 19 (S19) Flood Investigation Report is to identify the cause of internal flooding to properties in the Meadowside, Queens Park, Holland Cottages and Alyn Meadows areas of Mold during the October 2023 flood event. This report will provide an overview of flooding mechanisms, identify relevant Risk Management Authorities and stakeholders, and provide a list of recommendations.

1.6 The opinions expressed in this report and the comments and recommendations given are based on an assessment of available information.

1.7 The information, views and conclusions drawn are based, in part, on information supplied to Waterco by other parties. Waterco has proceeded in good faith on the assumption that this information is accurate. Waterco accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to Waterco from others.

2.0 Summary of Storm Babet and Impact

National Context

2.1 Storm Babet brought heavy and persistent rainfall across much of the UK and 'was the third-wettest independent 3-day period for England and Wales in a series from 1891' according to the Met Office[2]. As shown in Figure 1, many parts of the UK received over 50mm of rain, with 75-100mm of rain recorded across areas of North Wales. Several areas across the UK received over 100% of the average rainfall amout for October.

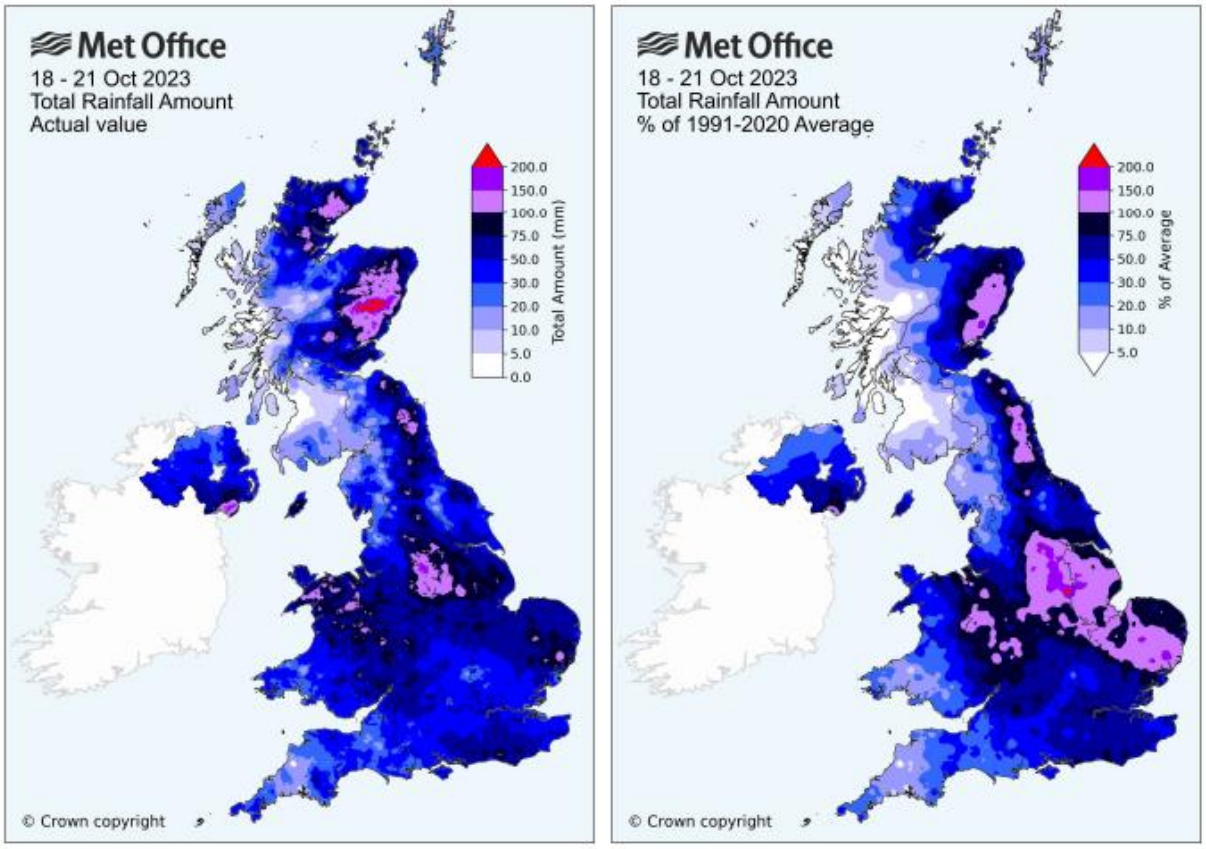

Figure 1 - Met Office Accumulated Daily Rainfall 18th-21st of October 2023

2.2 Storm Babet was part of a wider period of heavy rainfall across the country. According to NRW, the 9 month period ending in March 2024 was the second wettest of any 9 month period recorded in North Wales, and the wettest 9-month period ending in the month of March. Storms over this period (such as Storm Babet) were characterised more by their prolonged rainfall rather than their intensity. Between September 2023 and March 2024 NRW issued 194 Flood Warnings and 3 Severe Flood Warnings.

Regional Context

2.3 Unlike most storms, Storm Babet did not pass over rapidly. This allowed multiple fronts to add more rainfall over a prolonged period of time. The evapotranspiration rate in October was low and rainfalls were frequent throughout the month, with high levels of antecedent rainfall on October 13th / 14th (27mm in Mold) leading to soils being close to saturation.

2.4 Rainfall records have been obtained from NRW's Mold rain gauge[3].

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[2] Storm Babet Reporthttps://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023_08_storm_babet.pdf

[3] https://rivers-and-seas.naturalresources.wales/Station/1011?parameterType=2

2.5 Figure 2 shows the rainfall in the days leading up to the flooding on the 20th October. Flintshire experienced rainfall two days prior to the 20th October, with 15.2mm of rainfall on the 18th and 11.8mm on the 19th. On 20th October, Mold rain gauge recorded 61.8mm of rainfall.

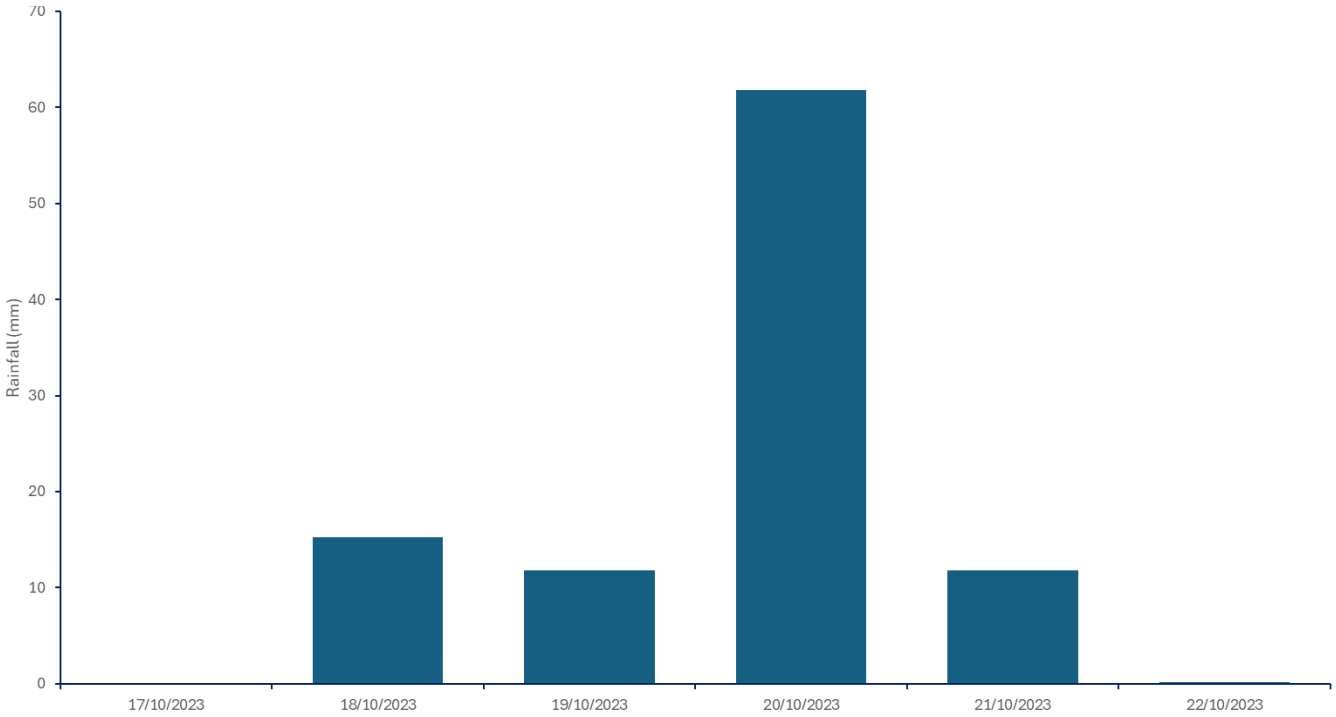

Figure 2 - NRW Mold Rain Gauge - Daily Rainfall From 18th-21st October

2.6 Figure 3 shows that there was a period of intense rainfall on Wednesday the 18th October which began at 19:00pm and peaked between 21:00-22:00 with 5mm of rainfall per hour. There was some additional rainfall on Thursday the 19th October peaking at approximately 1mm per hour. During 20th October, rainfall was prolonged with peak rainfall intensities at approximately 4.2mm per hour.

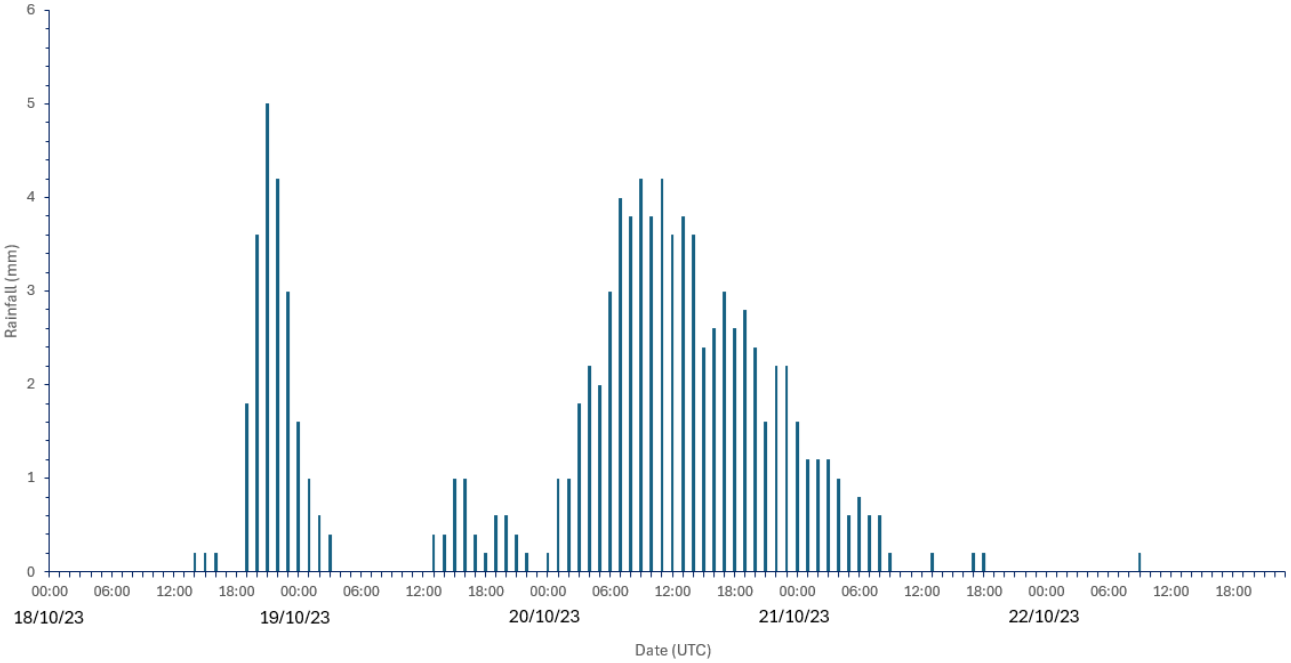

Figure 3 - Hourly rainfall between the 18th and 22nd of October

2.7 Flood Estimation Handbook (FEH) analysis estimates that a total of 61.8mm of rainfall over 24 hours (on the 20th of October), as recorded at the NRW Mold rain gauge, equates to an approximate return period of 1 in 20 years.

2.8 The 73.6mm of rainfall over a 48-hour period between the 19th and 20th of October (recorded at the NRW Mold rain gauge) equates to a return period of approximately 1 in 23 years. The 88.8mm of rainfall over a 72-hour period between the 18th and 20th of October equates to an approximate return period of 1 in 39 years.

2.9 Due to high amounts of rainfall throughout October, there would have been a lack of soil water storage and in consequence, higher and quicker runoff resulting in flooding.

Local Context

2.10 Community Engagement was undertaken by Waterco in Mold's Meadowside, Queens Park, Holland Cottages and Alyn Meadows areas on the 29th of August 2024. The purpose of the community engagement exercise was to gather information on the number of properties affected and the flooding mechanisms / source(s). In addition to speaking with householders, a questionnaire was posted to seek additional feedback. Table 2 shows a summary of the number of responses received.

Table 2 - Summary of Community Engagement Undertaken in Mold

Location	Verbal responses received (properties)	Number of postal / email responses
Meadowside	1	1
Queens Park	3	1
Holland Cottages	3	3
Alyn Meadows	3	0

2.11 In addition to the community engagement exercise, relevant stakeholders were consulted regarding any information on flooding in Mold's Meadowside, Queens Park, Holland Cottages and Alyn Meadows areas:

- **Natural Resources Wales** – provided information on calls received during Storm Babet; a record of properties known to have flooded; and correspondence with North Wales Fire & Rescue Service.
- **FCC Highways Authority** – provided a call log showing where members of public had reporting flooding.
- **Dŵr Cymru Welsh Water** – held a post-Storm Babet meeting with FCC and Waterco to share details of asset performance and flooding records during Storm Babet.

2.12 Table 3 provides a summary of the locations and reported effects of flooding following the community engagement exercise and stakeholder engagement.

Table 3 - Summary of Flooding in Mold During Storm Babet

Location	Internal Flooding	Impact
Meadowside	3	Internal flooding to 3 properties, external driveway / garden flooding confirmed to at least 2 others.
Holland Cottages	2	Internal flooding to 2 properties, external driveway / garden flooding confirmed to at least 1 other.
Queens Park	2	Internal flooding to 2 properties, external driveway / garden flooding confirmed to at least 1 other.
Alyn Meadows	0	No confirmed internal flooding to properties. External flooding confirmed to rear of buildings.
Total Internal Flooding Reports	**7**	**Number of internal flooding incidents based on community engagement exercises and stakeholder engagement. Flooding to additional properties may have occurred but not reported to FCC.**

2.13 A photographic record showing the flooding during and following Storm Babet for the Meadowside, Queens Park, Holland Cottages and Alyn Meadows areas of Mold is included in Appendix A.

3.0 Study Area Overview

Location

3.1 This report focuses on flooding near the Meadowside, Queens Park, Holland Cottages and Alyn Meadows areas of Mold.

3.2 Figure 4 shows the approximate location of areas impacted by flooding during Storm Babet and considered by this S19 report.

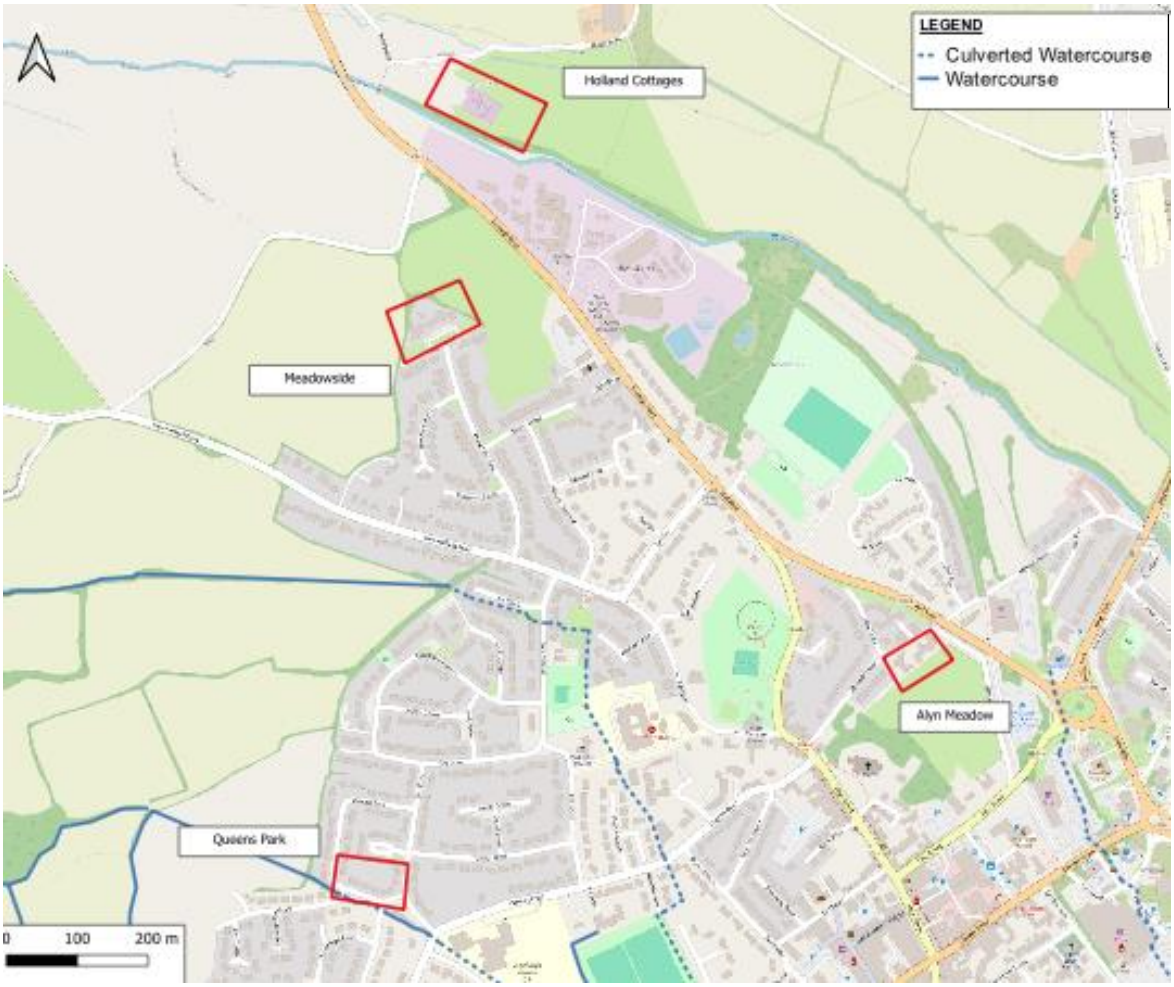

Figure 4 - Plan of Reported Flooding Areas
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Geology

3.3 The British Geological Survey (BGS)[4] online mapping (1:50,000 scale) indicates that Mold is predominantly underlain by Glaciofluvial superficial deposits generally comprising Sand and Gravel, and Alluvium, generally comprising of Clay, Silt, Sand and Gravel. The underlying bedrock geology is identified as being a mixture of Sandstone, Mudstone, Siltstone and Conglomerate. BGS Mapping is included in Appendix B.

[4] British Geological Survey - https://mapapps2.bgs.ac.uk/geoindex/home.html

Hydrological Setting

Meadowside Area

3.4 As shown in Figure 5, there is an unnamed culverted watercourse to the east of Meadowside. The watercourse flows east towards Denbigh Road. The culvert is assumed to have connectivity to the River Alyn. Figure 6 provides additional detail of the culverted watercourse and its upstream connectivity. The upstream end of the culvert is believed to have been plugged and there is no clear route for flows in the catchment upstream of Meadowside to enter the culverted watercourse.

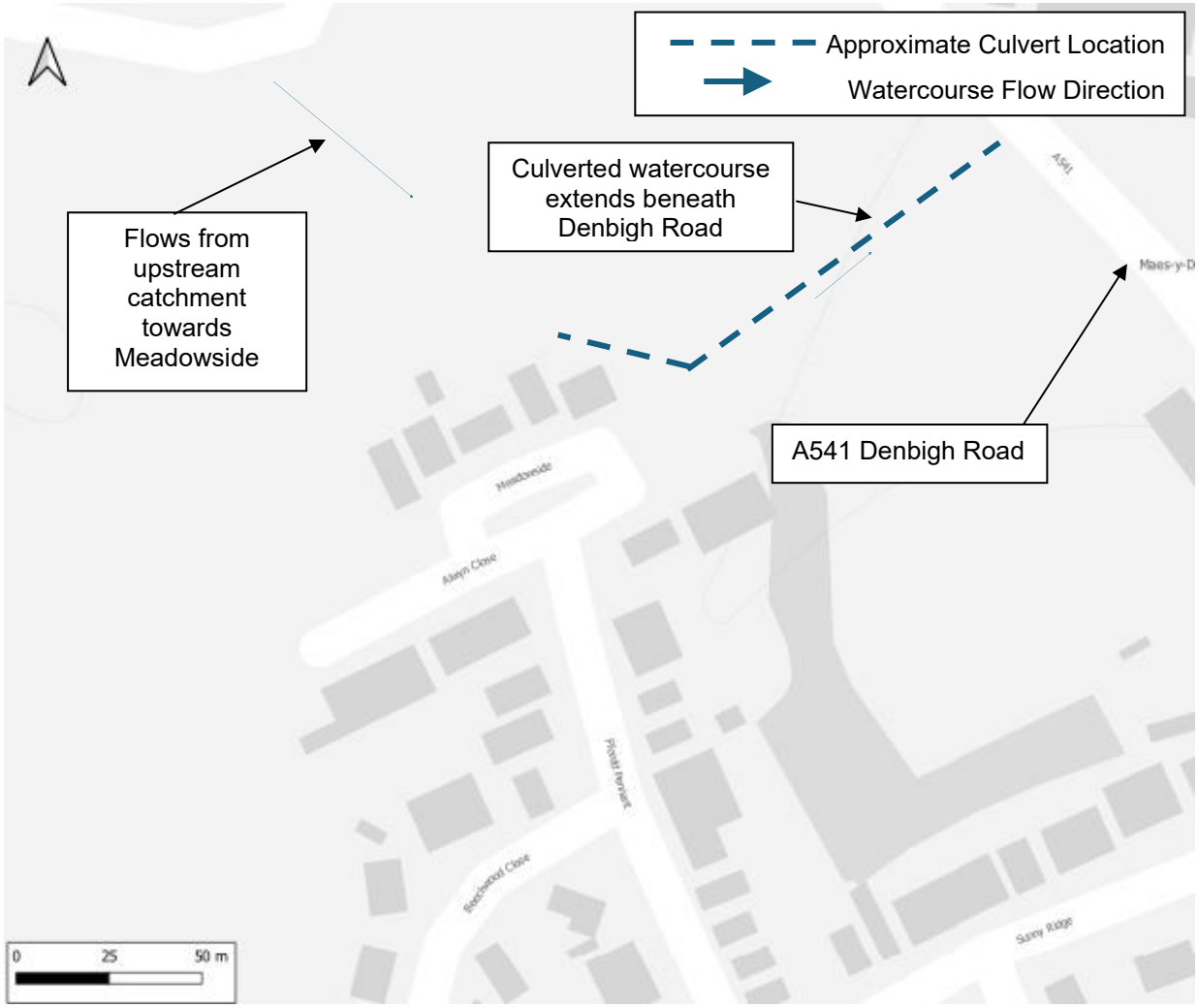

Figure 5 – Meadowside Area Watercourse Map

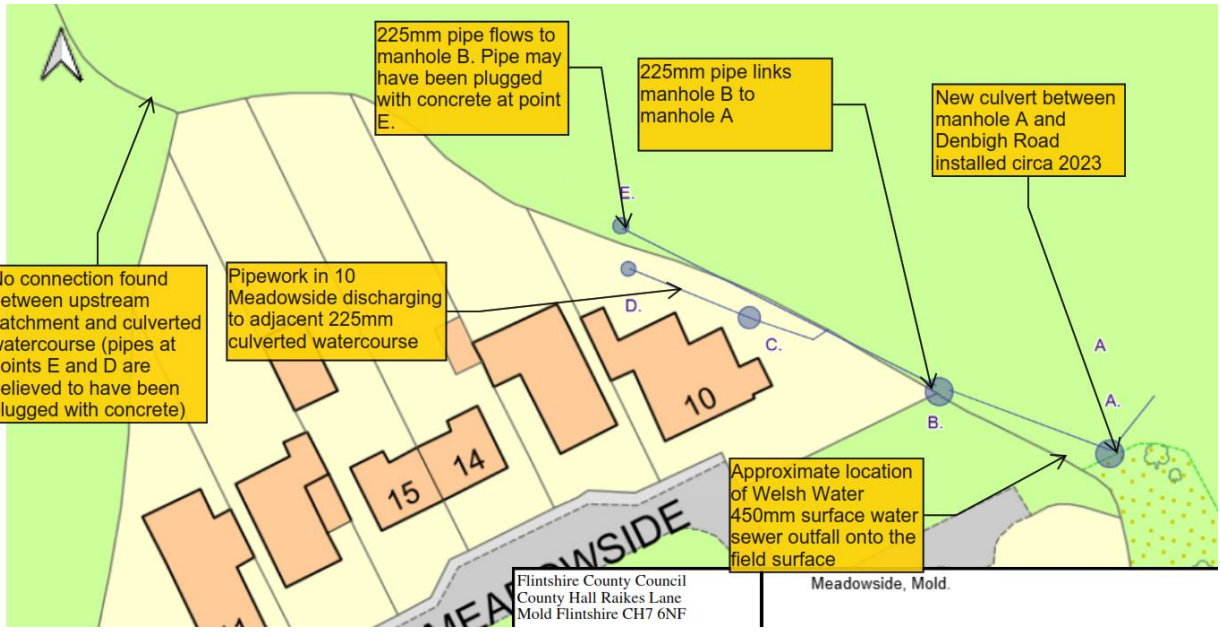

Figure 6 – Meadowside Area Detailed Map
Contains OS Data © Crown Copyright (2024)

3.5 The catchment area of the culverted watercourse at Meadowside (shown in Figure 5 above) covers approximately 0.34km^2. Figure 7 shows the approximate catchment area generated using Scalgo software. The catchment area shown is approximate only and features such as highway drainage and private drainage systems may intercept flow and redirect water.

Figure 7 – Meadowside Contributing Watercourse Catchment
(source: SCALGO)

Queens Park Area

3.6 As shown in Figure 8, an unnamed watercourse is located to the south of Queens Park which flows east. The unnamed watercourse is culverted beneath Cilnant (road) at NGR: 322953, 363988 and is also culverted beneath Parc Hendy (Road) at NGR 323010, 363967. The watercourse is culverted beneath Clayton Road at NGR 323078, 363931 and continues south-east in a culverted channel beneath the urban area of Mold.

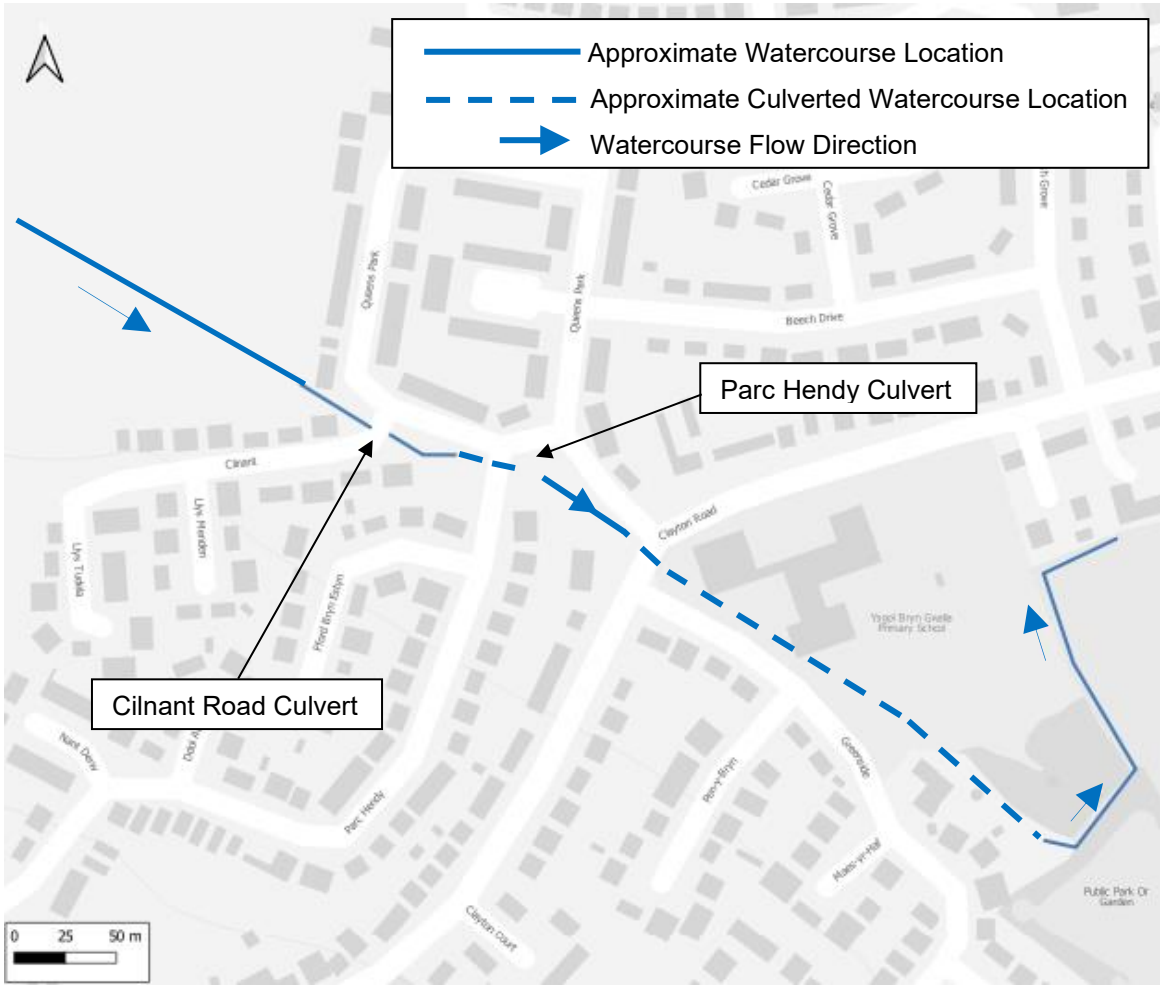

Figure 8 – Queens Park Area Watercourse Map
Contains OS Data © Crown Copyright (2024)

3.7 The catchment area of the unnamed watercourse at Queens Park covers approximately 4.2km^2. Figure 9 shows the approximate catchment area generated using Scalgo software.

Figure 9– Queens Park Area Contributing Watercourse Catchment
(source: SCALGO)

Holland Cottages Area

3.8 As shown in Figure 10, the River Alyn is located to the south of Holland Cottages and flows south-east. The River Alyn is a designated main river and is the supervisory duty of NRW. Black Brook (ordinary watercourse) is located to the north of Holland Cottages and is routed beneath Blackbrook Road at NGR: 323157, 365179. There is a section of Black Brook which is non main river, this then flows to the east into Black Brook 'main' which is main river.

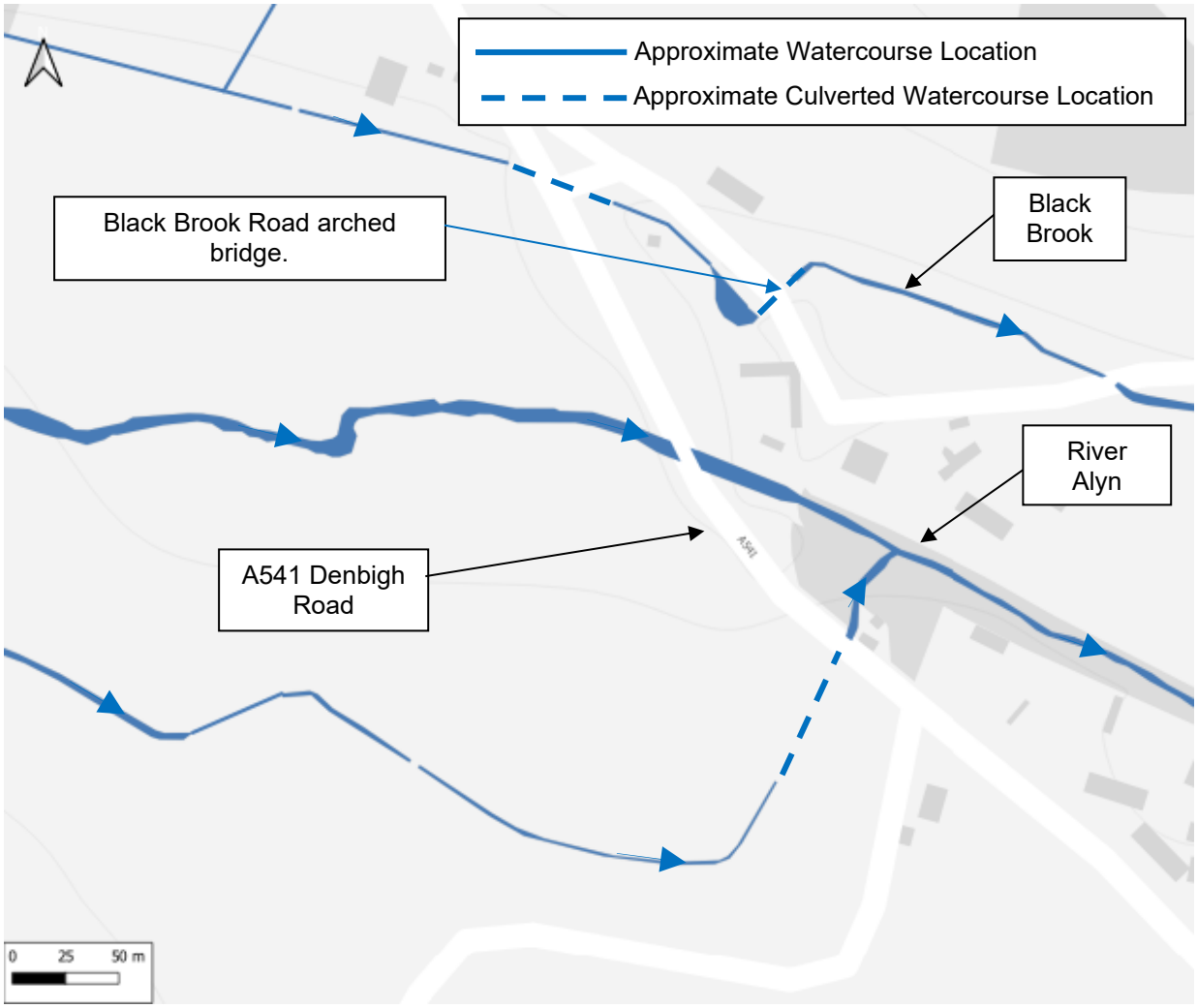

Figure 10 – Holland Cottages Area Watercourse Map

3.9 The catchment area of the River Alyn at Holland Cottages covers approximately 100km^2 and is highlighted in green in Figure 11. This catchment area mapping was generated using Scalgo software[5].

[5] Scalgo - https://scalgo.com/

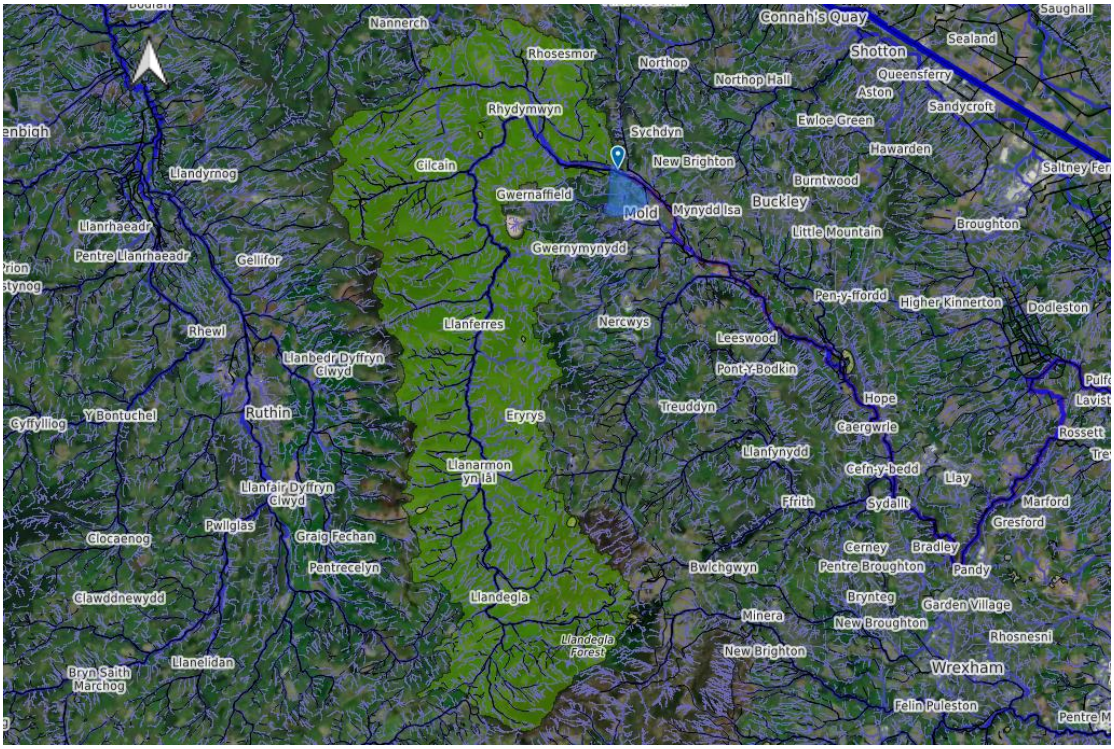

Figure 11 – Holland Cottages Area Contributing Watercourse Catchment (Alyn)
(source: SCALGO)

3.10 The catchment area of Black Brook at Holland Cottages has been estimated using LiDAR data and covers approximately 1.18km^2.

Alyn Meadows Area

3.11 The Alyn Meadows Area of Mold is not located in the immediate vicinity of a watercourse. The nearest watercourse is a tributary of the River Alyn located approximately 160m east of the site, which is lower in elevation by approximately 3m. Flood risk to the Alyn Meadows area is attributed to surface water flooding.

Drainage Assets

3.12 Public sewer records have been obtained from Dŵr Cymru Welsh Water (DCWW). The sewer records show that Queens Park and Alyn Terrace are served by a combined drainage system. Meadowside and its linking road Alwyn Close are served by separate surface water and foul sewers. The surface water sewers in Meadowside and Alwyn Close are shown to discharge onto land at NGR: 323161, 364787. DCWW sewer plans are included in Appendix C.

3.13 No public sewers are shown near to Holland Cottages and Holland Farm.

NRW Flood Maps

3.14 The NRW 'Flood Risk from Surface Water and Small Watercourses' map (Appendix D) identifies the flood risk associated with small watercourses. The NRW map shows land within Flood Zones 2 and 3. Flood Zone 2 is defined as an area with between a 0.1% and 1% chance of flooding from surface water and / or small watercourses in any given year, including the effects of climate change. Flood Zone 3 is defined as an area with a greater than 1% chance of flooding from surface water and / or small watercourses in any given year, including the effects of climate change.

3.15 The flood risk shown on the NRW ‘Flood Risk from Surface Water and Small Watercourses’ map is based on a combination of rainfall and LiDAR data. The mapping identifies areas where surface water may flow or pool during heavy rainfall.

3.16 The NRW ‘Flood Risk from Rivers’ map (Appendix D) identifies the flood risk associated with rivers. The NRW map identifies land within Flood Zones 2 and 3. Flood Zone 2 is defined as an area with between a 0.1% and 1% chance of flooding from rivers in any given year, including the effects of climate change. Flood Zone 3 is defined as an area with a greater than 1% chance of flooding from rivers in any given year, including the effects of climate change.

Meadowside

3.17 NRW mapping shows pooling of water within the agricultural land to the north and east of Meadowside. Figure 12 shows the flood extent in Meadowside presented on the NRW 'Flood Map for Planning - Surface Water and Small Watercourses' map.

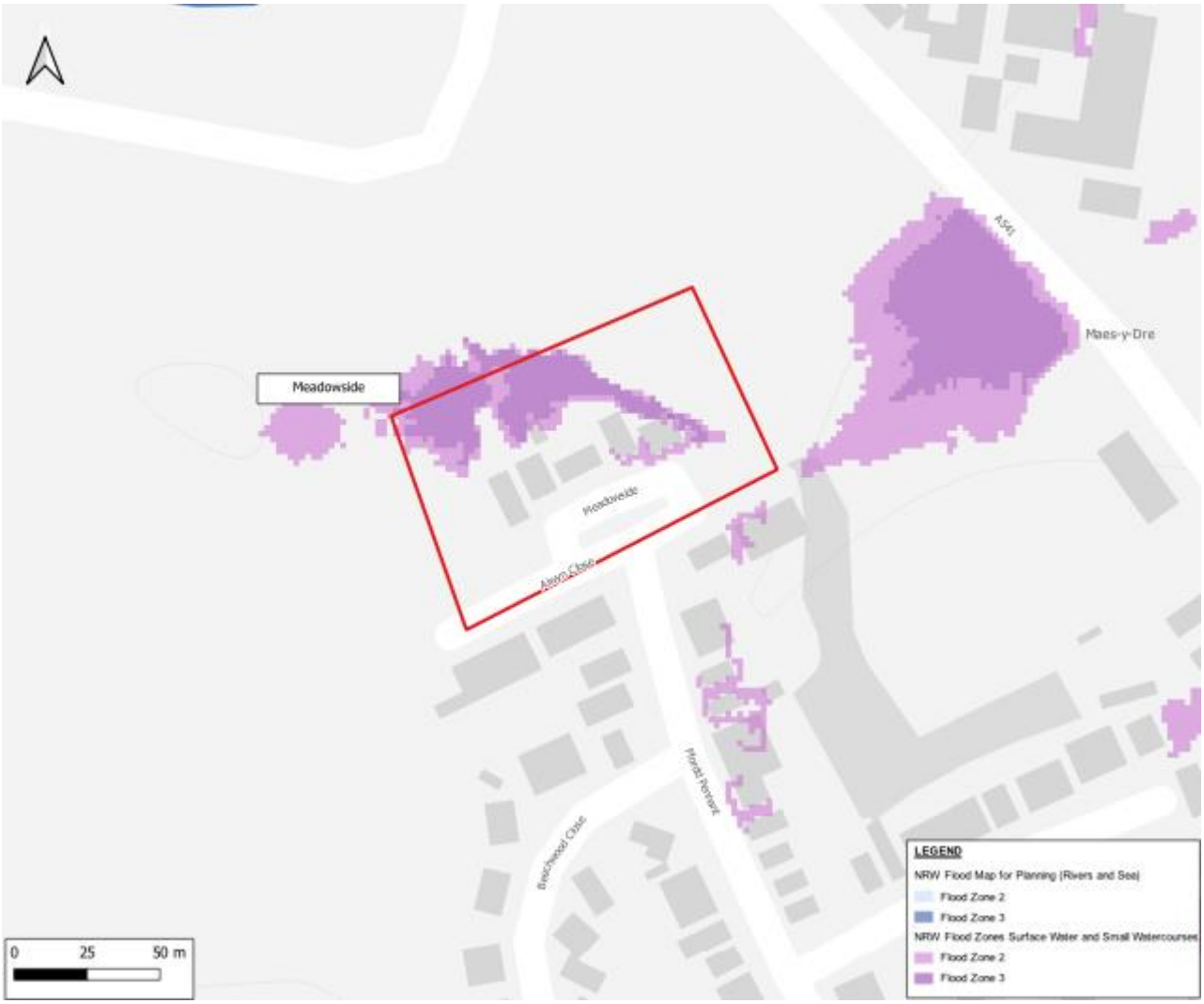

Figure 12 – Meadowside - NRW Flood Map for Planning - Surface Water and Small Watercourses Map

Queens Park

3.18 NRW mapping shows that in the event that the Queens Park culvert system exceeds its capacity, flood flows spill onto Queens Park, generally flowing south-east. Figure 13 shows the flood extent around Queens Park presented on the NRW Flood Map for Planning – Rivers, Sea, Surface Water and Small Watercourses.

Figure 13 – Queens Park - NRW Flood Map for Planning - Rivers, Sea, Surface Water and Small Watercourses Map

Holland Cottages

3.19 The Holland Cottages area is shown within the flood extent of the River Alyn. Black Brook is also a likely flood source, especially when river levels in the Alyn are high. Figure 14 shows the flood extent around Holland Cottages presented below.

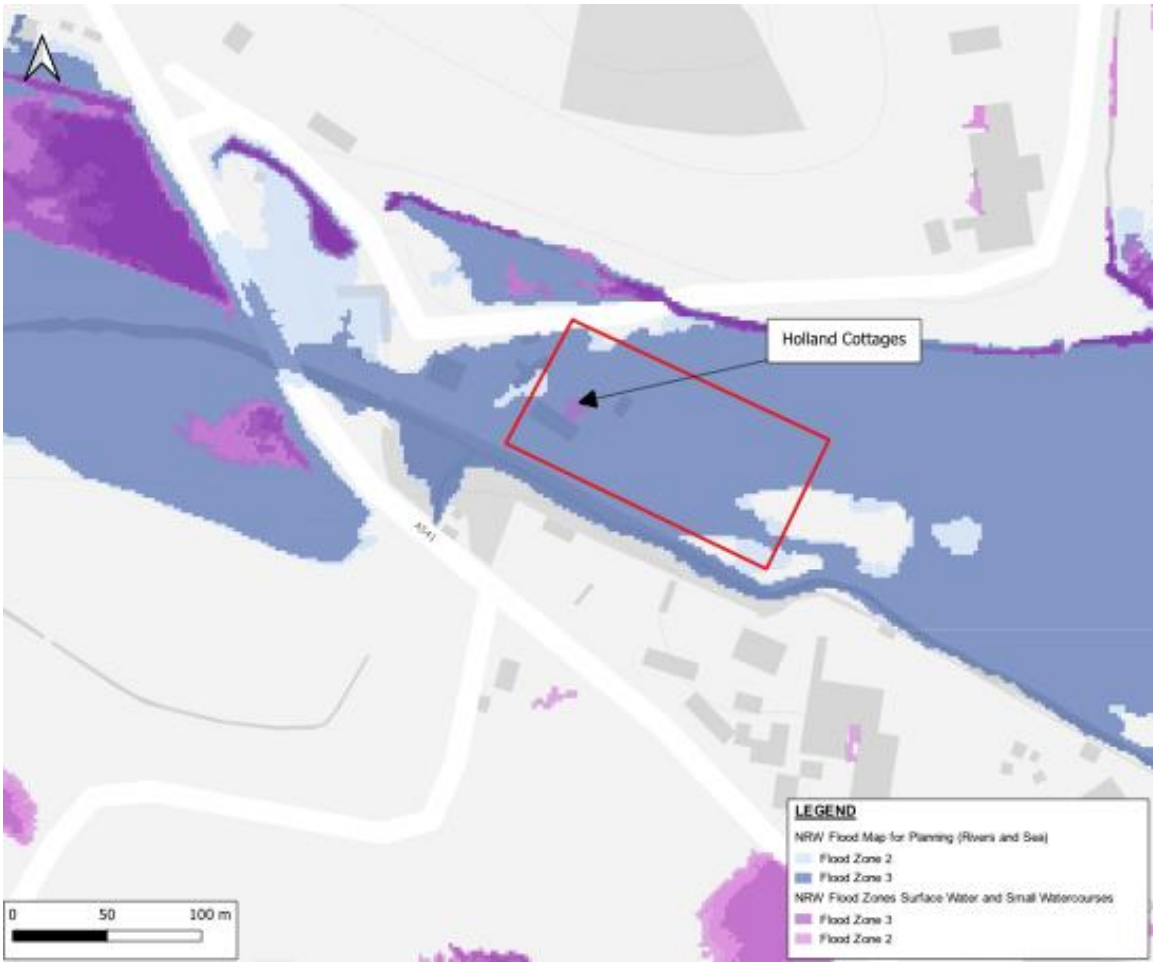

Figure 14 – Holland Cottages - NRW Flood Map for Planning - Rivers, Sea, Surface Water and Small Watercourses Map

Alyn Meadows

3.20 NRW mapping shows pooling of water within the land to the east of Alyn Meadows. No flood risk is shown to Alyn Meadows. Figure 15 shows the flood extent in the vicinity of Alyn Meadows.

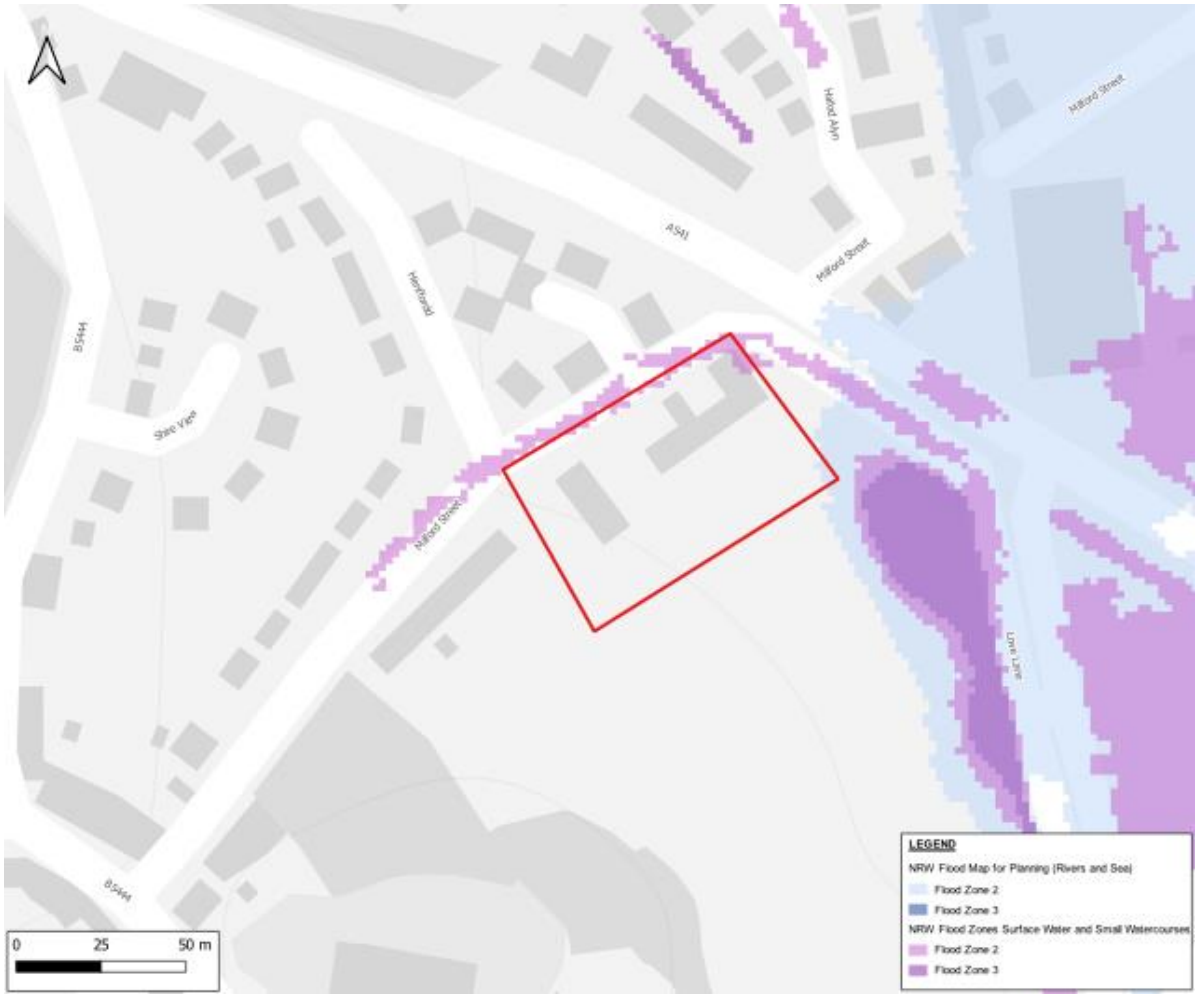

Figure 15 – Alyn Meadows - NRW Flood Map for Planning - Rivers, Sea, Surface Water and Small Watercourses Map

4.0 Flood Locations, Descriptions and Mechanisms

Meadowside

4.1 Based on the findings of the community engagement exercise and stakeholder engagement, the flooding to Meadowside is attributed to runoff from the fields to the north of Meadowside. Internal flooding was reported to 3no. properties.

4.2 Residents reported that flooding to the fields to the rear of the properties occurs regularly. There were also concerns for the condition of the culverted watercourse, noting that it may be obstructed.

4.3 High soil saturation levels prior to Storm Babet resulted in an increase in surface water runoff from the catchment upstream of Meadowside. An image taken by a resident (Appendix A) shows the extent of flooding in Meadowside.

4.4 Figure 16 provides a summary of the reported flooding.

Figure 16 – Flood Description - Meadowside Area

Holland Cottages

4.5 Two incidents of internal flooding were reported at Holland Cottages. Information collected during the community engagement exercise suggests that the cause of flooding was from the River Alyn, high ground water and obstruction to the Black Brook watercourse at the arched bridge where the watercourse crosses Blackbrook Road.

4.6 Residents reported that flooding originated around the Black Brook arched bridge. It is not clear whether this flooding was due to the structure being obstructed. There were also reports that river flooding caused private drainage systems to surcharge.

4.7 An embankment was constructed by NRW along the River Alyn, behind Holland Cottages, following flooding that occurred in the year 2000. Residents reported that during Storm Babet, the River Alyn overtopped into the field adjacent, and flood flows from the Alyn may have bypassed the defence and was directed towards their properties, although there is little other evidence to support this.

4.8 There were also reports of groundwater flooding, likely linked to high water levels in the Alyn and the saturated ground conditions. Figure 17 provides a summary of the reported flooding.

4.9 Holland Cottages is within the River Alyn Flood Warning area, such that flood warnings and alerts are available and indeed issued at 11:30 on Friday 20th October 2023.

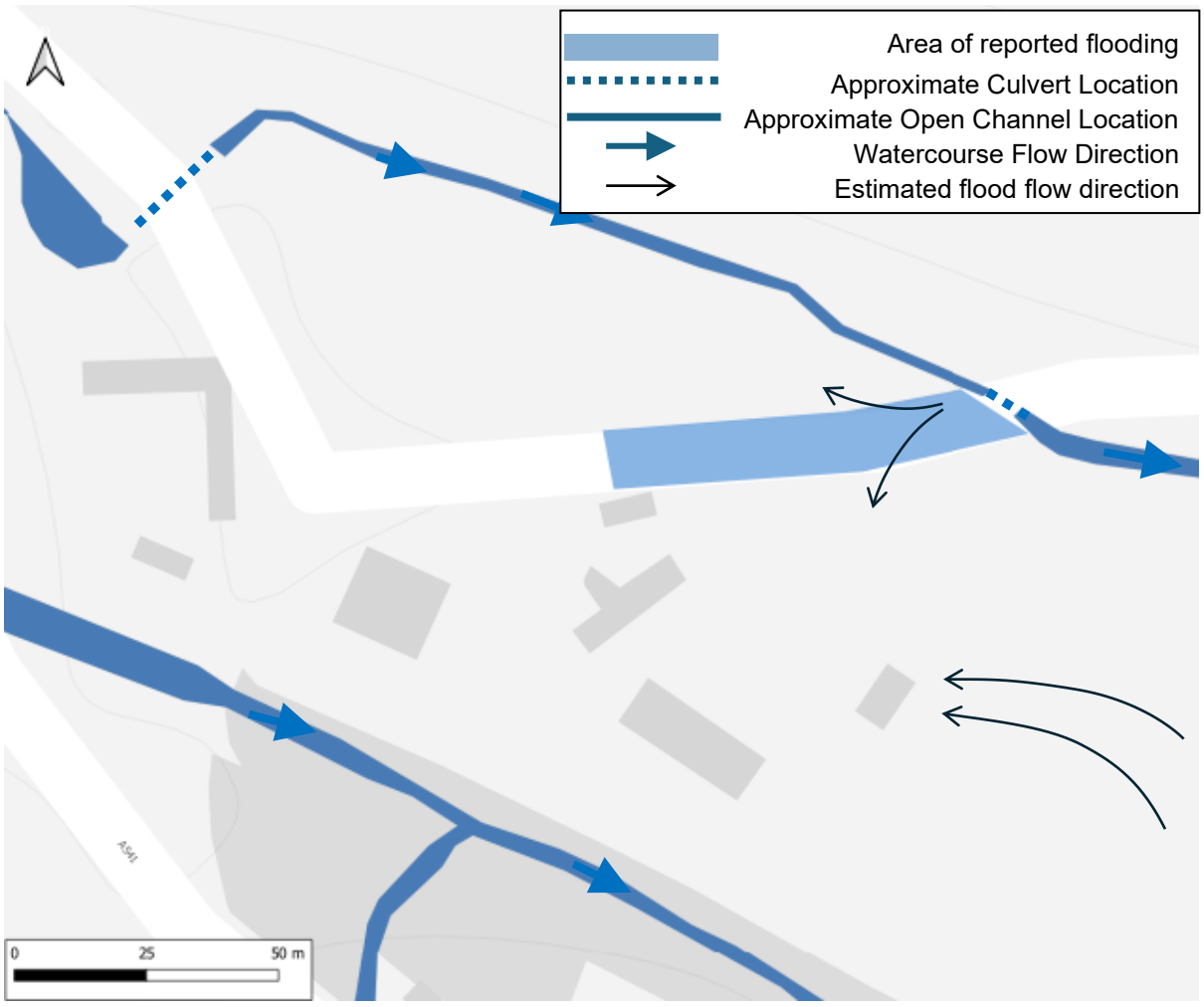

Figure 17 – Holland Cottages Area
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Queens Park

4.10 Based on the findings of the community engagement exercise and stakeholder engagement, the flooding at Queens Park is a result of an exceedance of the capacity of the unnamed watercourse which is culverted beneath Cilnant, Parc Hendy and Clayton Road.

4.11 Residents reported that flooding originated from the unnamed watercourse to the south of Queens Park. It is unclear whether the flooding occurred as a result of overtopping due to lack of channel capacity or overtopping due to an obstructed culvert. The culvert headwall immediately upstream of Clayton Road is fitted with a grille which is known to become rapidly restricted with floating debris and results in flows becoming impeded.

4.12 Figure 18 provides a summary of the reported flooding.

4.13 Queens Park is within the River Alyn Flood Warning area, such that flood warnings and alerts are available and indeed issued at 17:40 on Thursday 19th October 2023.

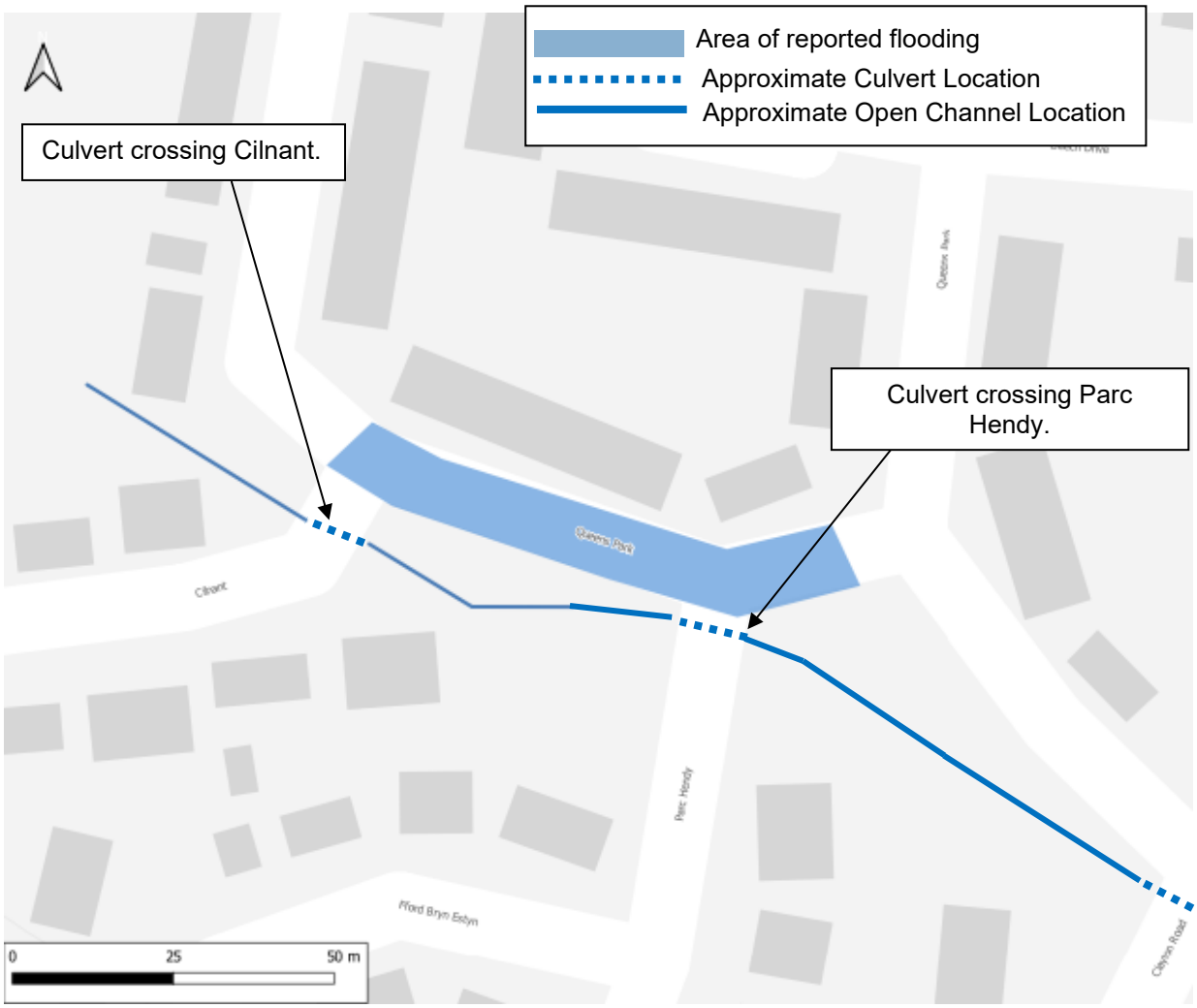


Figure 18 – Queens Park Area
Contains OS Data © Crown Copyright (2024)

Other Areas

Alyn Meadows

4.14 Alyn Meadows comprises a number of apartment blocks off Milford Street. Based on the findings of the community engagement exercise and stakeholder engagement, the reported source of flooding was surface water runoff from undeveloped land to the south-west of the properties.

4.15 Residents reported flooding to the rear of the buildings. No internal flooding was confirmed during the community engagement exercise. Water is reported to pool in isolated topographical low points adjacent to the buildings (at the foot of grassed slopes). There is limited drainage provision at the bottom of the grassed slopes to divert floodwater away from the buildings.

4.16 Figure 19 provides a summary of the reported flooding.

Figure 19 – Alyn Meadows Area
Contains OS Data © Crown Copyright (2024)

St. David's Lane

4.17 FCC had a report of internal flooding at 1 address in this location, however during the community engagement the resident advised that the property did not flood, therefore no further consideration has been undertaken.

5 Relevant Parties Communication Register

5.1 The table below provides the details of communications that have taken place with relevant parties up to the time of writing this report. Relevant parties are considered to be all authorities and stakeholders directly involved and responsible for flood risk management, property owners affected by the flood event, and all parties who may be able to provide information salient to the flood investigation.

Table 4 - Relevant Parties Communications Register

Contact	Communications
Local Residents	Community engagement undertaken on 29/08/2024. Questionnaires and photographs returned to Waterco.
Flintshire County Council (FCC)	Shared details of call logs and confirmed flooding locations
Dŵr Cymru Welsh Water DCWW	Meeting on the 19/02/2024 to share information of flood locations and sources. S19 Report sent to DCWW for comment on 20/02/2025. No response or comments received to date.
Natural Resources Wales (NRW)	Email consultation from NRW with information on flood locations and sources. NRW also shared data from North Wales Fire and Rescue (on callouts / flood locations). S19 Report sent to NRW for comment on 20/02/2025
North Wales Fire & Rescue	

6.0 Conclusions

6.1 Waterco Ltd were appointed by FCC to prepare a Flood Investigation Report for Mold following flooding from Storm Babet on the 20th of October 2023.

6.2 Rainfall experienced during Storm Babet was prolonged and steady, and high levels of rainfall throughout October meant soils were already saturated which led to faster runoff rates.

Meadowside

6.3 Internal flooding was recorded to 3 properties at Meadowside, with the source of flooding being from surface water runoff from the upstream catchment. An additional 2 properties recorded external flooding.

Queens Park

6.4 Internal flooding was confirmed to 2 properties at Queens Park, with the source of flooding being from the unnamed watercourse which is culverted beneath Cilnant and Parc Hendy. One additional property was affected by external flooding.

Holland Cottages

6.5 Properties at Holland Cottages were affected by internal flooding, where the sources of flooding were cited as being from the River Alyn and Black Brook which is routed beneath Blackbrook Road. One additional property was affected by external flooding.

7.0 Recommendations

7.1 Table 5 sets out the recommended actions required following the flooding of October 2023 and the stakeholder required to undertake each action.

Table 5 – Recommendations to Address Flooding

Ref	Stakeholder	Action
01	FCC Highways Authority	**Queens Park area** - inspect the culverts beneath Cilnant, Parc Hendy and Clayton Road on a frequent basis and remove debris as required. Prepare and adopt Asset Management Plan for culvert maintenance.
02	FCC Highways Authority	**Holland Cottages area** - inspect the Black Brook arched bridge and upstream channel for debris and obstructions on a frequent basis and inform riparian landowners if any issues are identified.
03	FCC Highways Authority	Continue maintaining highway assets, especially in high-risk areas.
04	FCC LLFA	**Meadowside area** - review condition of the ordinary watercourses (culvert) and inform the riparian landowners if any issues are identified.
05	FCC LLFA	**Meadowside area** - consider a scheme to formalise connectivity of runoff from the upstream catchment into the culverted section of watercourse.
06	FCC LLFA	**Queens Park area** - consider a scheme for replacement of the culvert inlet grilles with alternative wider grilles as to avoid impeding the flow of water.
07	FCC LLFA	**Holland Cottages area** - further investigation required to ascertain cause of flooding of the Black Brook watercourse around the Black Brook arched bridge.
08	FCC LLFA	Communicate with local communities to raise awareness of property level flood resilience measures that can be implemented to help mitigate flood risk
09	FCC LLFA	Where budget allows, consider implementing flood management measures upstream of the areas impacted by flooding from ordinary watercourses / surface water.
10	FCC LLFA	FCC to use permissive duties and powers under the LDA and FWMA to allow free flow via culvert entrances, watercourses and culverts are maintained to convey flows as intended.
11	NRW	Inspect and review the design, condition and suitability of the embankment defending land off Blackbrook Road (Holland Cottages) from flooding originating from the River Alyn to understand whether it is working as designed or if design standard was exceeded during Storm Babet. Additional works may be required.

12	NRW	Ensure Main Rivers are inspected on a risk-based frequency and where appropriate and justifiable, a maintenance regime is documented and completed by an appropriate Risk Management Authority and/or Riparian Owner.
13	DCWW	Review customer complaints and investigate the associated sections of public sewer system to remove any blockage / significant debris following the October 2023 event.
14	DCWW	Inspect the outfall arrangement of the public surface water sewer near Meadowside. Consider a formal connection to the culvert rather than discharge to land.
15	Property Owners / Residents	Sign up to the free signing up to the NRW Flood Warning System and consider the implementation of property level flood resilience measures. These could include; the installation of non-return valves to prevent ingress of floodwater on private drainage systems and installing flood barriers or flood doors.

APPENDIX A

Photographic Record

Waterco

PHOTOGRAPHIC LOG

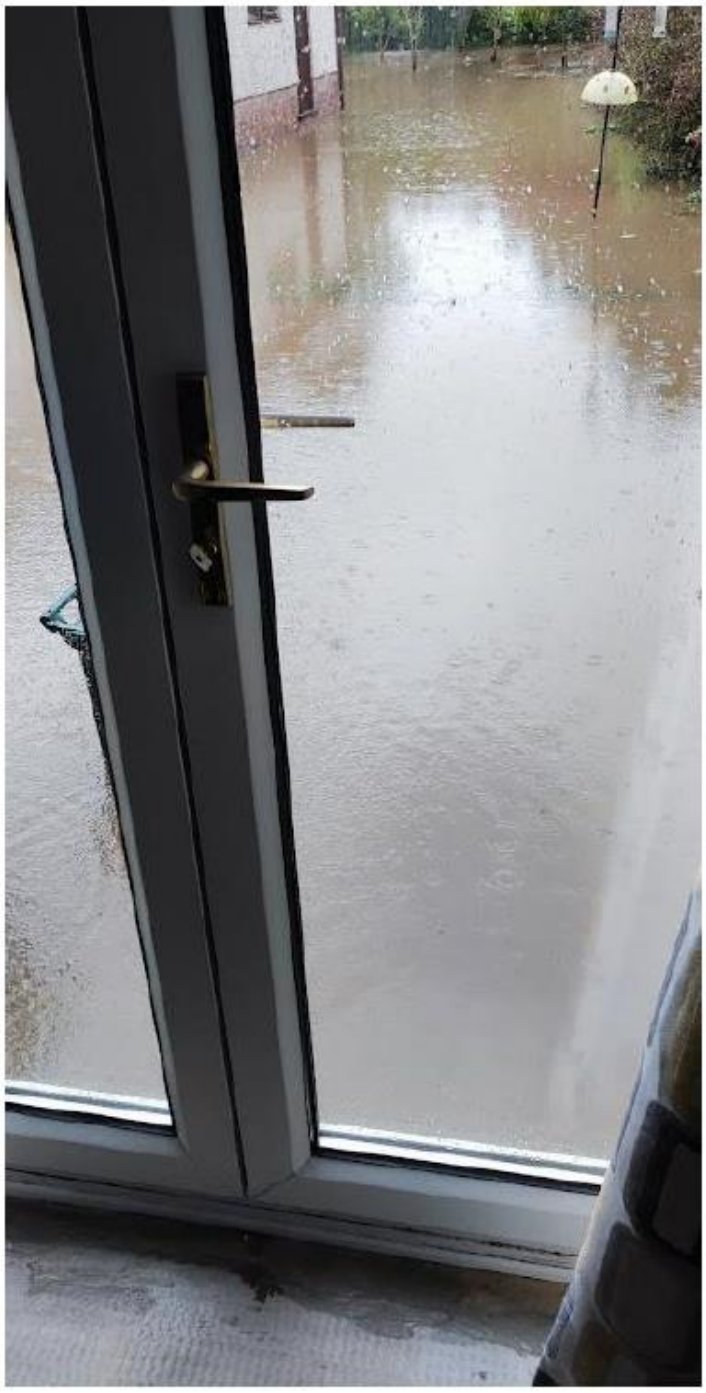
Photo No.3	
Date: 20th October 2023 Description: Back door of property at Meadowside Source: Resident of Meadowside, Mold	

Photo No. 4	
Date: 20th October 2023 Description: Flooding in field to rear of Meadowside during Storm Babet Source: Resident of Meadowside, Mold	
Photo No. 5	
Date: 29th August 2024 Description: Flood defence protecting Holland Farm and Cottages Source: Waterco Site Visit	

Photo No. 6	
Date: 29th August 2024 Description: Flood defence protecting Holland Farm and Cottages Source: Waterco Site Visit	
Photo No. 7	
Date: 29th August 2024 Description: Field and end of flood defence protecting Holland Farm and Cottages Source: Waterco Site Visit	

Photo No. 8	
Date: 29th August 2024 Description: Black Brook watercourse beneath Blackbrook Road Source: Waterco Site Visit	

[redacted]

Photo No. 10	
Date: 29th August 2024 Description: Track behind properties on Milford Street, sloping towards Alyn Meadows Source: Waterco Site Visit	

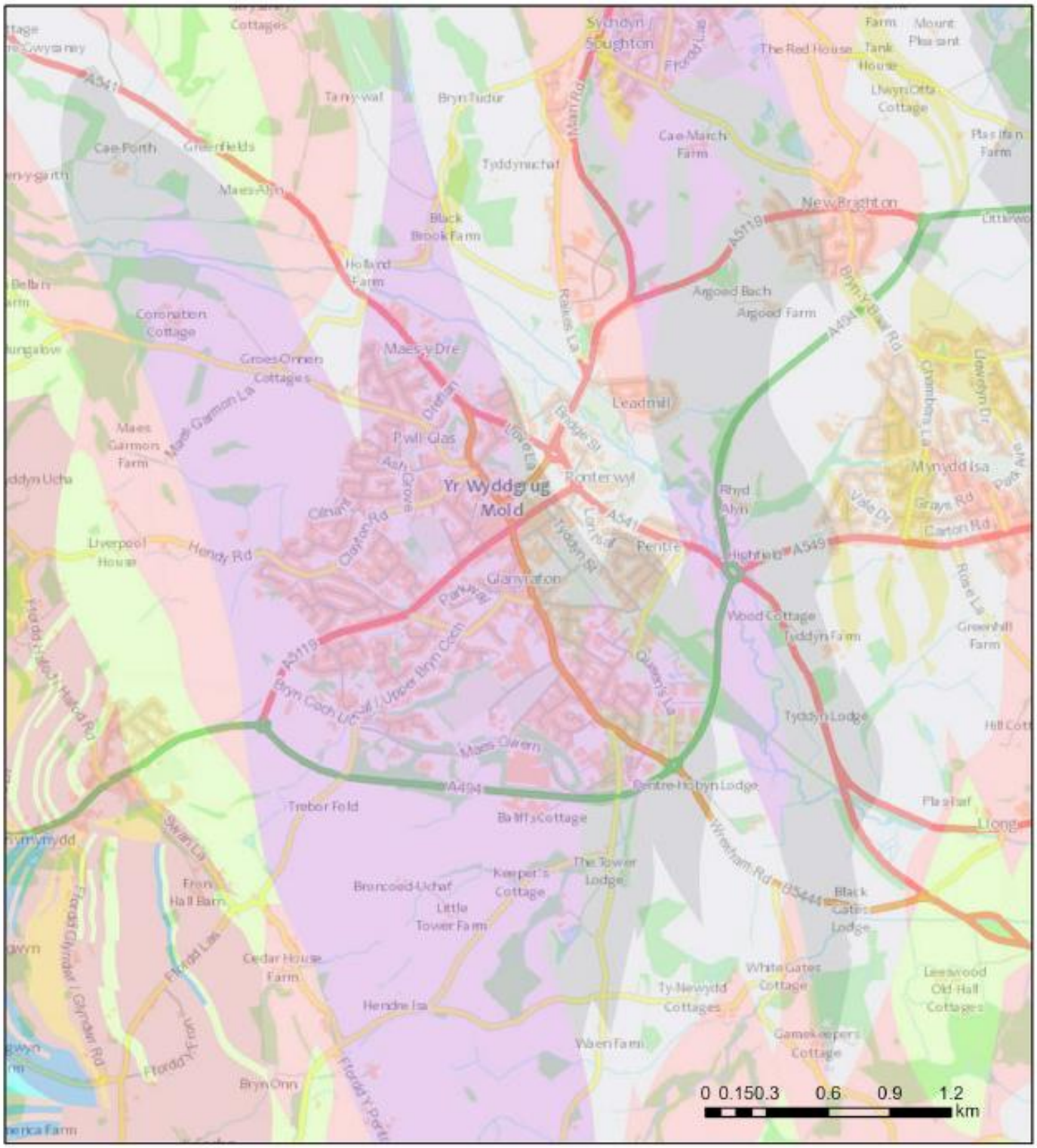
[redacted]

APPENDIX B

BGS Mapping

GeoIndex Report

British Geological Survey



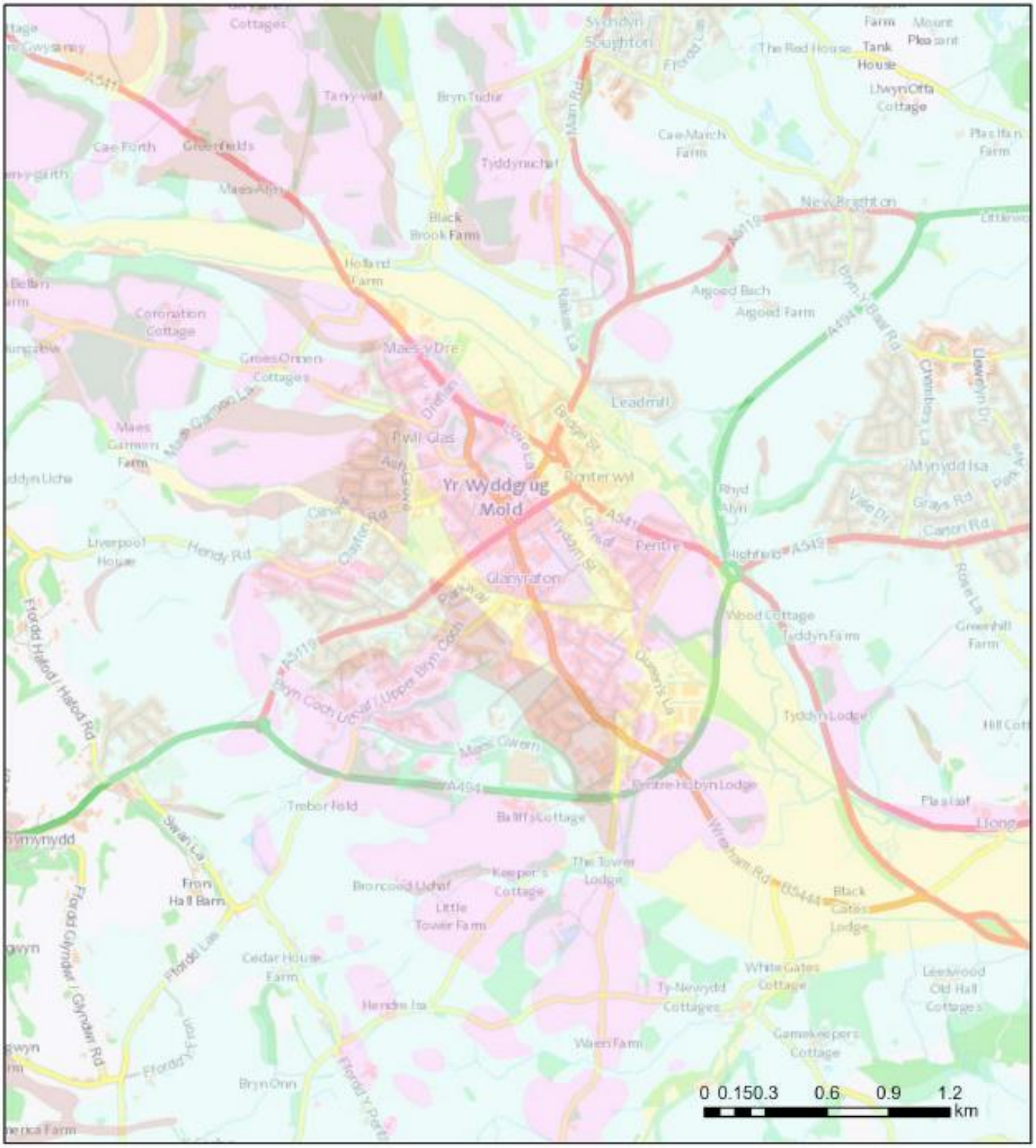
Map Key

Bedrock geology 1:50,000 scale

- LEETE LIMESTONE FORMATION - LIMESTONE
- CEFN MAWR LIMESTONE FORMATION - LIMESTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED
- PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
- ETRURIA FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE
- LOGGERHEADS LIMESTONE FORMATION - LIMESTONE
- MAIN SHALE BED (LLANGOLLEN AREA) - MUDSTONE
- LLANARMON LIMESTONE FORMATION - LIMESTONE
- NEOGENE ROCKS (UNDIFFERENTIATED) - CLAY, SILT AND SAND
- FOEL FORMATION - LIMESTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED
- ELWY FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
- ELWY FORMATION - SLUMPED MUDSTONE, SLUMPED SILTSTONE AND SLUMPED SANDSTONE
- CEFN-Y-FEDW SANDSTONE FORMATION - LIMESTONE
- MINERA FORMATION - LIMESTONE AND [SUBEQUAL/SUBORDINATE] SANDSTONE, INTERBEDDED
- GWESPYR SANDSTONE - SANDSTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED
- PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE
- MINERA FORMATION - SANDSTONE
- CEFN-Y-FEDW SANDSTONE FORMATION - SANDSTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED
- BOWLAND SHALE FORMATION - MUDSTONE
- LLWYN-Y-FRAN SANDSTONE MEMBER - SANDSTONE
- ELWY FORMATION - SANDSTONE
- PENNINE LOWER COAL MEASURES FORMATION - SANDSTONE
- PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE
- CEFN-Y-FEDW SANDSTONE FORMATION - CHERT
- ETRURIA FORMATION - SANDSTONE
- HOLLIN ROCK - SANDSTONE

GeoIndex Report

British Geological Survey



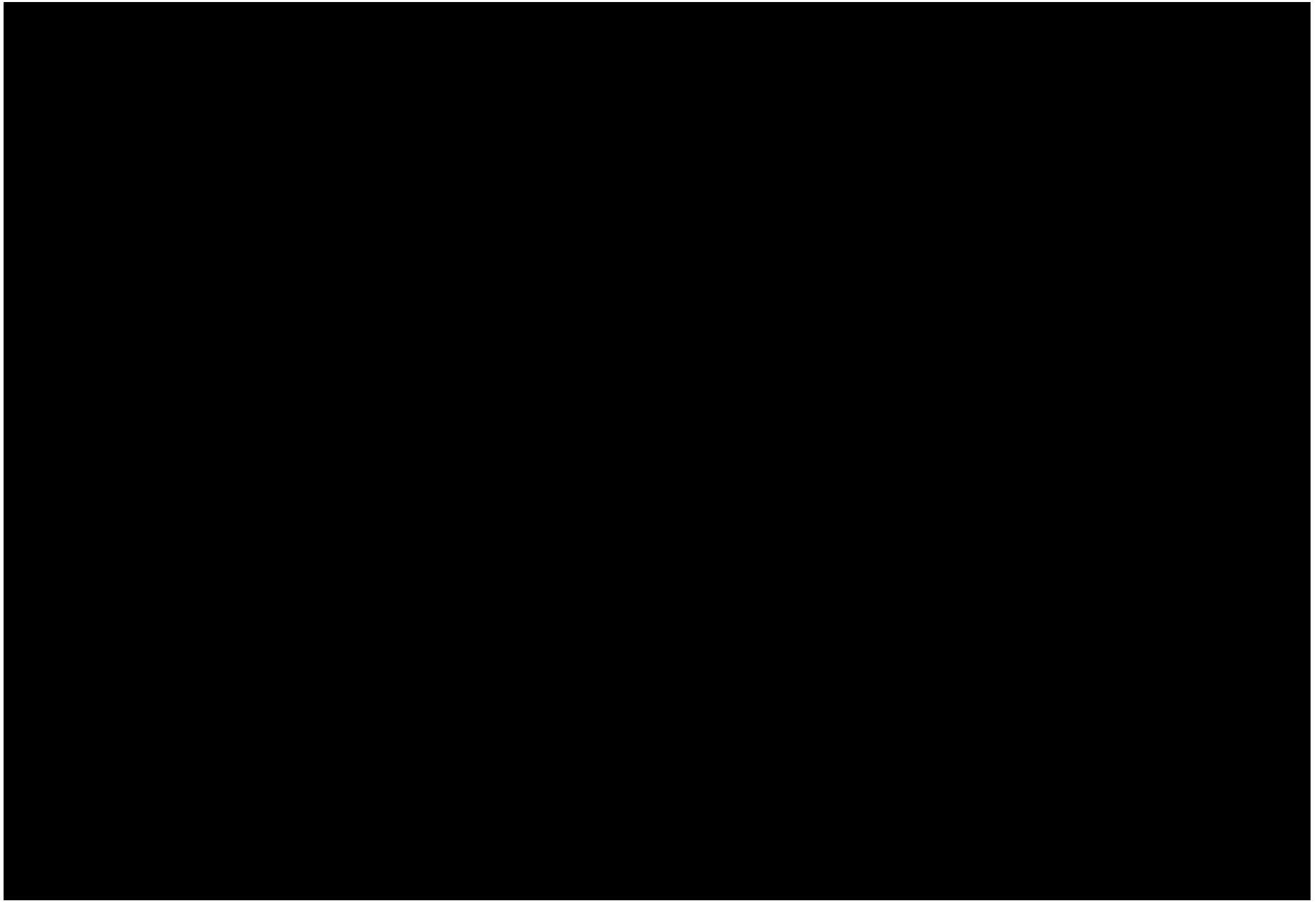
Map Key

Superficial deposits 1:50,000 scale

- GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
- GLACIOFLUVIAL ICE CONTACT DEPOSITS, DEVENSIAN - SAND AND GRAVEL
- GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN - SAND AND GRAVEL
- TILL, DEVENSIAN - DIAMICTON
- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- HEAD - CLAY, SILT, SAND AND GRAVEL
- RIVER TERRACE DEPOSITS (UNDIFFERENTIATED) - SAND AND GRAVEL
- ALLUVIAL FAN DEPOSITS - SAND AND GRAVEL
- LACUSTRINE DEPOSITS - CLAY AND SILT
- PEAT - PEAT
- SUPERFICIAL DEPOSITS - SEDIMENT

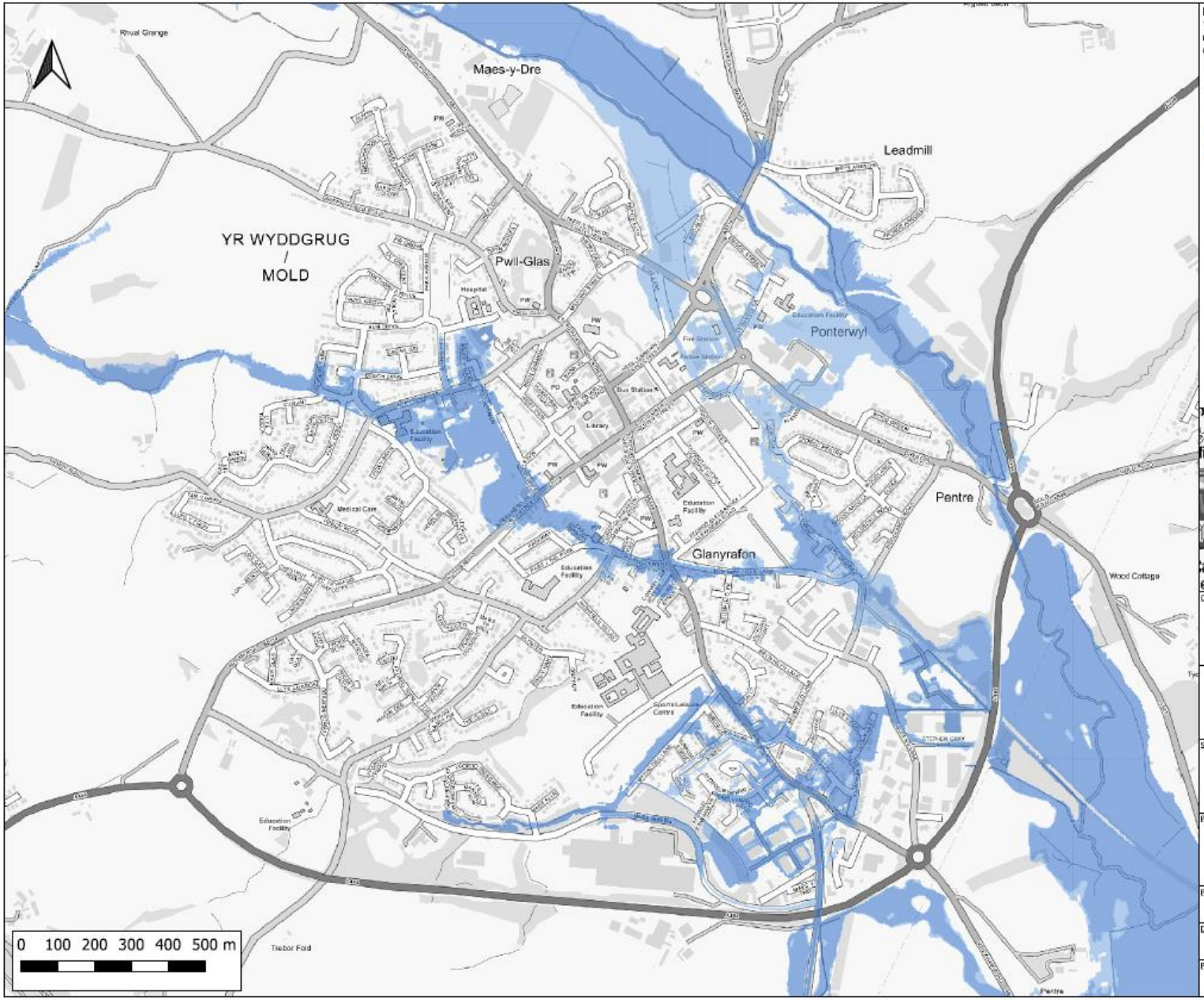
APPENDIX C

DCWW Sewer Plans



APPENDIX D

NRW Flood Mapping

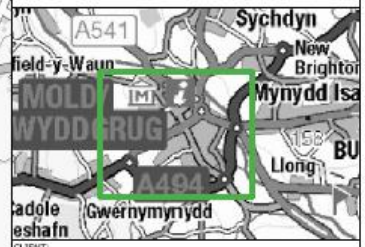


Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Flood Zones - Rivers

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



CLIENT:

Sir y Fflint Flintshire

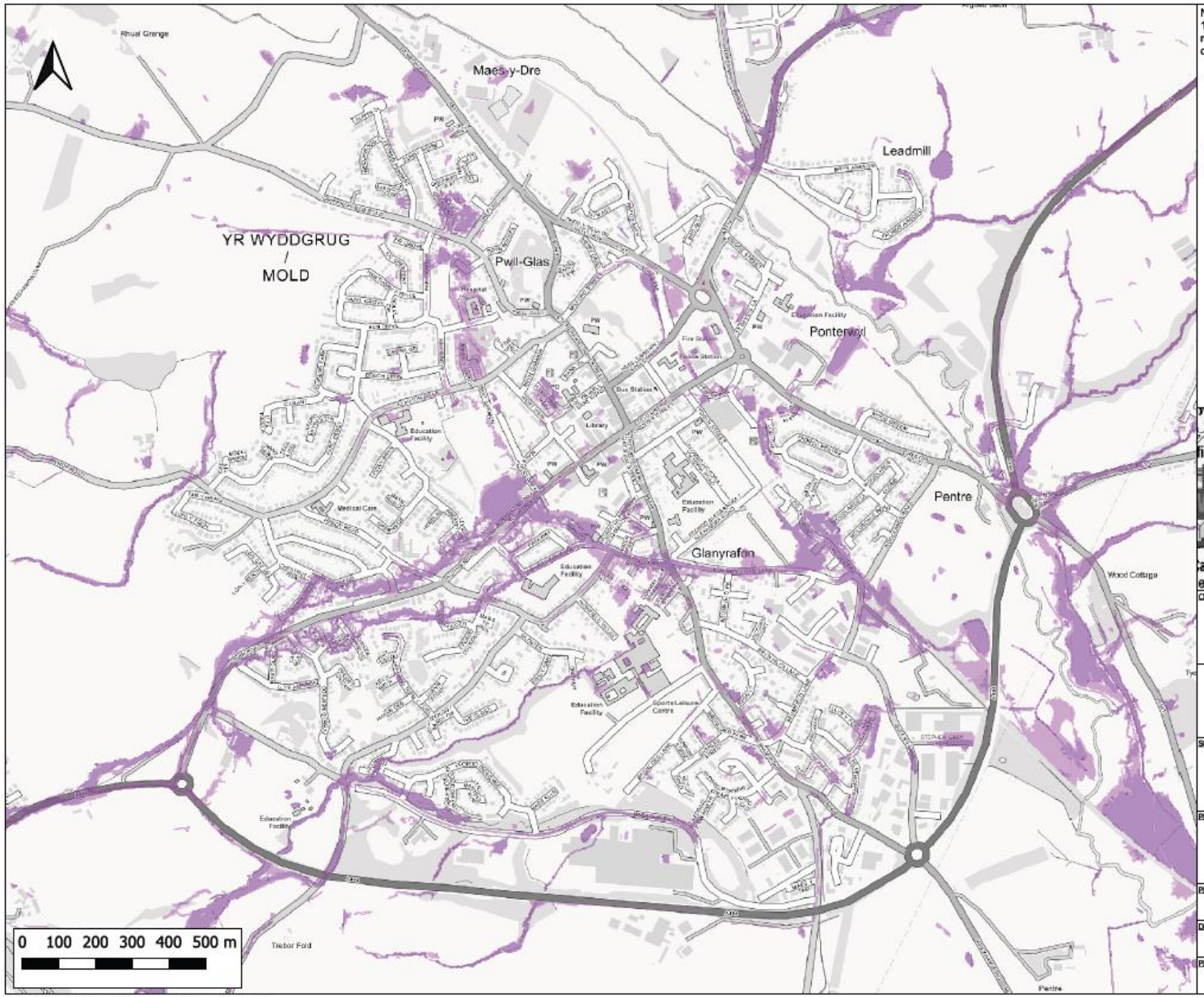
waterco

www.waterco.co.uk

SCHEME:
Mold Meadowside, Queens Park, Holland Cottages and Alyn Meadows S19 Flood Investigation Report

PLOT TITLE:
NRW Flood Zones - Rivers
Data published May 2025

PLOT STATUS:			DATE:
FINAL			02-07-2025
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	LS	MW	1:10000
PLOT NAME: 15972_NRW_Flood_Zones_Rivers			REVISION: -

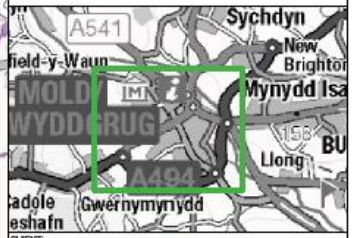


Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Flood Zones - Surface Water & Small Watercourses

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



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Waterco
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SCHEME:
Mold Meadowside, Queens Park, Holland Cottages and Alyn Meadows S19 Flood Investigation Report

PLOT TITLE:
NRW Flood Zones - Surface Water & Small Watercourses
Data published May 2025

PLOT STATUS:	DATE:
FINAL	02-07-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
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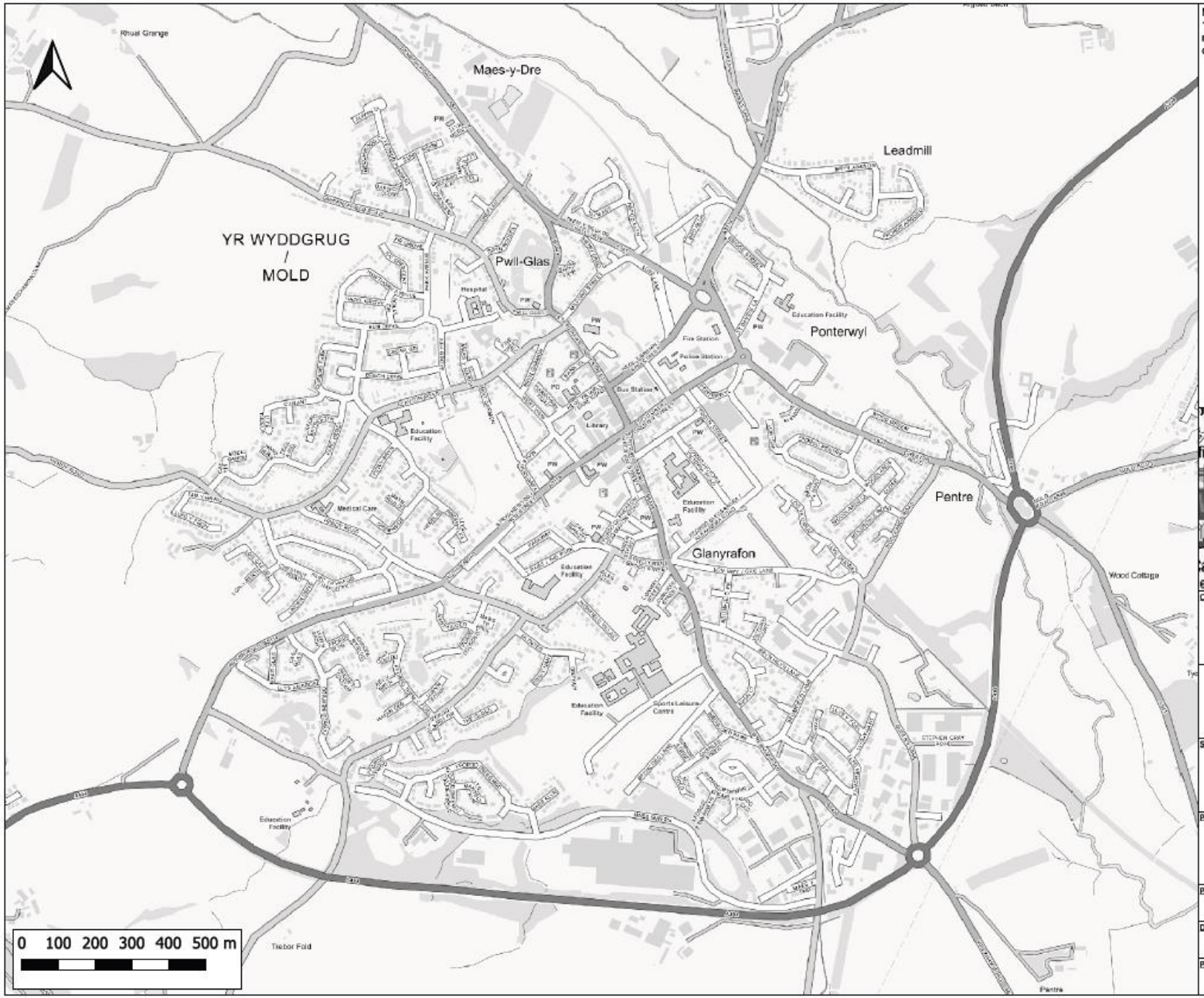
15972_NRW_Flood_Zones_Surface_Water	-



Notes:
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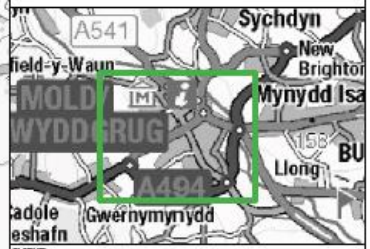
LEGEND

Flood Zones - Sea
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3



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SCHEME: Mold Meadowside, Queens Park, Holland Cottages and Alyn Meadows S19 Flood Investigation Report

PLOT TITLE: NRW Flood Risk from the Sea Data published May 2025

PLOT STATUS:	DATE:
FINAL	02-07-2025

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
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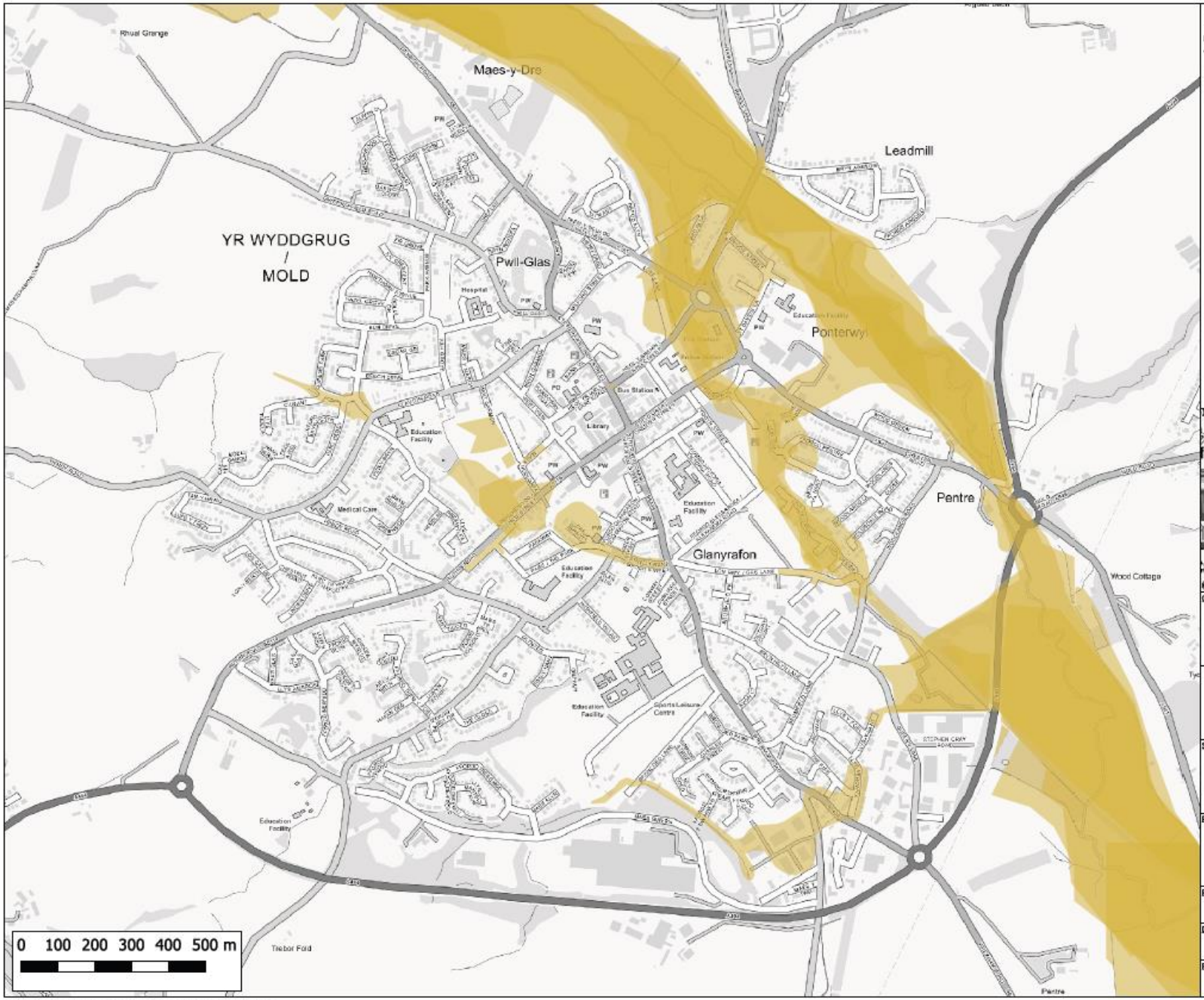
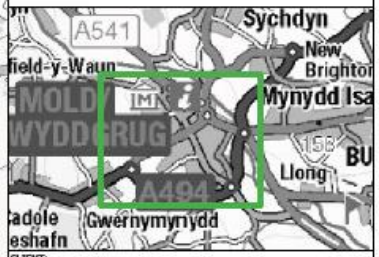
PLOT NAME:	REVISION:
15972_NRW_Flood_Zones_Sea	-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

NRW Recorded Flood Extents



CLIENT:

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SCHEME:
Mold Meadowside, Queens Park, Holland Cottages and Alyn Meadows S19 Flood Investigation Report

PLOT TITLE:
NRW Recorded Flood Extents
Data published May 2025

PLOT STATUS:			DATE:
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