

FLOOD RISK ASSESSMENT
FOR A PROPOSED CAMPING POD SITE
AT
WHITEGATE COTTAGE
LLANARMON DYFFRYN CEIRIOG



FOR
HENLLE DEVELOPMENTS LTD

REPORT VERIFICATION

SITE ADDRESS	Whitegate Cottage Llanarmon Dyffryn Ceiriog
REPORT TITLE	Flood Risk Assessment
JOB NUMBER	585-20
7PREPARED BY	JRS

ISSUE NO.	DATE	STATUS	REPORT VERSION	ISSUED BY
1	17-12-20	for Planning	01	JRS

INDEX

1. BRIEF	3
2. SITE INFORMATION	3
3. FLOOD INFORMATION	4
4. FLOOD RISK MITIGATION AND EVACUATION	6
5. OTHER SOURCES OF FLOODING	8
6. SURFACE WATER DRAINAGE	9
7. FOUL WATER DRAINAGE	9
8. CONCLUSION	10

APPENDICES

Appendix 1	Site Location Plan
Appendix 2	NRW Main Rivers Flood Defences Storage Areas
Appendix 3	FR Davies Architectural Services Site Survey drawing 2021:10
Appendix 4	Site Survey drawing 585-20-01
Appendix 5	Site Survey & Contours to National Grid drawing 585-20-02
Appendix 6	Photographs
Appendix 7	NRW Flood Risk from Rivers
Appendix 8	Flood Levels Adjoining the Site drawing 585-20-05
Appendix 9	Flood Levels drawing 585-20-06
Appendix 10	NRW Development Advice Map
Appendix 11	NRW Flood Risk from Surface Water & Small Watercourses

BRIEF

- 1.1. Sumner Consultancy has been appointed by Henlle Developments Ltd to carry out a Flood Risk Assessment in connection with their proposal to erect 3 camping pods on a Site adjoining Whitegate Cottage Llanarmon Dyffryn Ceiriog.

1. SITE INFORMATION

- 1.1. The Site is situated on the northern side Llanarmon Dyffryn Ceiriog and on the western side of the B4500. It is rectangular in shape with an approximate area of 0.19ha. The Site Location Plan is in Appendix 1.
- 1.2. The Site is located at Grid Reference X315739 Y332908 with the nearest post code of LL20 7LD.
- 1.3. The existing use of the Site is the garden to Whitegate Cottage.
- 1.4. Along the north eastern Site boundary runs the Afon Ceiriog, which is classed as a Main River. Running along the eastern side of the B4500 is a watercourse which is also classed as a Main River. Natural Recourses Wales (NRW) Main Rivers Flood Defences Storage Areas plan is in Appendix 2.
- 1.5. The proposal is to construct 3 camping pods and a new access onto the B4500 with the provision of 6 parking spaces. The Site proposal is shown on FR Davies Architectural Services Site Survey drawing 2021:10 in Appendix 3.
- 1.6. The Site Survey provided and shown on drawing 585-20-01 is to an arbitrary grid and level. The Site area where the camping pods are proposed has a level along the north eastern boundary of approximately 45.50m and along the south western boundary 46.32m. The area where the proposed camping pods are located has an approximate level of 46.00m. The Site Survey drawing 585-20-01 is in Appendix 4.
- 1.7. Since the Site Survey was not to Ordnance Survey datum the levels around the area of the Site have been obtained via Promap from a Digital Terrain Model (DTM) of the bare earth/underlying terrain of the earth's surface. They are usually derived from Digital Surface Model's (DSM's) by digitally removing the cultural (man-made) and vegetation features. The LiDAR level information is to a resolution of 1.0m and has a vertical accuracy of +/-15cm. The Site Survey & Contours to National Grid drawing 585-20-02 is in Appendix 5.
- 1.8. On checking a number of corresponding points between the Ordnance Survey datum and the Site Survey, it is considered that the level difference between the Ordnance Survey levels & Site Survey is 217.87m.
- 1.9. The ground level where the proposed camping pods are located on the Site Survey is approximately 46.00m or 263.87m AOD.
- 1.10. Along the south eastern side of the Site is a headwall with 3 x 825mm diameter pipes, which are presumably to allow the overland surface water to drain under the road to the adjoining watercourse. Photograph 1 in Appendix 6.

2. FLOOD INFORMATION

2.1. NRW maps show that all of the Site and surrounding area is in a High Risk to Low Risk Area, which are shown on NRW Flood Risk from Rivers plan in Appendix 7. These areas take into account the effect of any flood defences that may be in this area. Flood defences reduce, but do not completely stop the chance of flooding as they can be overtopped or fail.

- A High Risk from rivers means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%).
- Medium means that each year, this area has a chance of flooding of between 1 in 200 (0.5%) and 1 in 30 (3.3%).
- Low means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 200 (0.5%).

2.2. A digital drawing of the flood level data has been obtained from Envirocheck which has been produced by The Environment Agency.

This Data includes:

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

Flood Zones 3 & 2 would appear to coincide with NRW High Risk & Medium Risk Areas

2.3. The contours shown on the Flood Levels Adjoining the Site drawing 585-20-05 in Appendix 8, and the Flood Levels drawing 585-20-06 in Appendix 9, have been obtained via Promap from a Digital Terrain Model (DTM) of the bare earth/underlying terrain of the earth's surface. They are usually derived from Digital Surface Model's (DSM's) by digitally removing the cultural (man-made) and vegetation features. The LiDAR level information is to a resolution of 1.0m and has a vertical accuracy of +/-15cm.

2.4. It appears from the contours that the level of the limit of Flood Zone 2 (Medium Risk) is approximately 264.50m AOD (46.63m on the Site Survey), and Flood Zone 3 (High Risk) at level of 264.25m AOD (46.38m). The ground level in the area of the camping pods is 263.87m AOD (46.00m), therefore the depth of water for Flood Zone 2 (Medium Risk) is approximately 630mm, and for Flood Zone 3 (High Risk), 380mm.

2.5. Photograph 2 shows some flood water along the north eastern boundary of the Site which was taken during the floods in February 2020.

2.6. It is understood from the Architect that the highest floor level he considers the camping pods can be without compromising the visual aspect of the Site is 800mm above the existing ground level, which would be 264.67m AOD (46.80m) and 170mm above the approximate Medium Risk Level of 264.50m AOD (46.63m). The contour level of 264.50m is shown on the Flood Levels drawing 585-20-06 in Appendix 9.

2.7. In DEFRA/Environment Agency's Technical Report FD2320-TRL - Flood Risk Assessment Guidance for New Development, Table 13.1 indicates the danger to people for different combinations of depth and velocity. Table 13.1 is reproduced below.

2.8. The Table provides a very simplified guide which has been taken from HR Wallingford (2005) Flood Risks to People Phase 2, The Flood Risk to People Methodology, and shows the groups of people that should be considered as falling into these danger classifications:

- Danger for some – includes children, the elderly and the infirm
- Danger for most – includes the general public
- Danger for all – includes emergency services

- 2.9. Technical Report FD2320-TRL refers to the outputs of the Flood Risk to People project and indicates that flood depths below 0.25m and velocities below 0.5m/s are generally considered low hazard. When designing safe access and exit routes, the combinations of depth and velocity on the routes should correspond to the white boxes in Table 13.1. As flood depth and/or velocity increase the hazard to people increases. Combinations of depths and velocities in the white boxes (below the 'danger for some' class) are 'very low hazard', but a hazard does remain.

Velocity (m/s)	Depth of flooding (m)											
	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.00												
0.10												
0.25												
0.50												
1.00												
1.50												
2.00												
2.50												
3.00												
3.50												
4.00												
4.50												
5.00												

Key:
 Danger for some
 Danger for most
 Danger for all

Table 13.1 - Danger to people for different combinations of depth and velocity

- 2.10. The Table suggests that a depth of flooding of 0.4m with a velocity of up to 0.5m/s is in the orange area and therefore constitutes a danger for most, and a depth of flooding of up to 1.0m with a velocity of up to 0.5m/s is also a danger for most.
- 2.11. The Site is not located within a NRW Flood Alert Area.
- 2.12. The Site Owner however should monitor any local flood warnings so that they can advise the occupants if they need to vacate the camping pods. The nearest Flood Alert Area to the Site is in Rhiwals for the Afon Ogau which is 3 miles to the southeast.
- 2.13. As meteorological conditions and corresponding flood levels are harder to predict across fluvial catchments for a certain area, sites at risk of fluvial flooding could have a minimum of 2 hours warning before any of the levels of flood warning is issued.
- 2.14. According to the Met Office document entitled Together – make a difference with a coordinated response to emergency management dated 2013, EMARC (Environment Monitoring and Response Centre) is one of the forecast production units at the Met Office.

It provides specialist forecasts to the UK emergency services and other government departments, as well as to the international community and has continuous operational capability. This enables the Met Office to provide an immediate response to customers requiring meteorological information to deal with a variety of environmental incidents. These could range from chemical or radiological releases to biological hazards such as foot and mouth disease.

- 2.15. Flood Alerts, Flood Warnings and Severe Flood Warnings are issued to residents and businesses within flood risk areas by Natural Resources Wales, which can be in Welsh or English. Twitter Alerts are also provided for imminent flooding to homes and businesses, pollution that presents a risk to people and failures of waterway structures presenting a hazard to the public or property.

2.16. NRW flood warning duty officers use weather forecasts, along with their local knowledge of community flood risk, to make decisions about issuing warnings to those at risk. They issue three different kinds of flood warning: Flood Alerts, Flood Warnings and Severe Flood Warnings. They ensure that warnings are broadcast on local radio and television. This information can also be obtained through their dedicated Floodline information service (0345 988 1188) and on their website, which is updated every 15 minutes.

2.17. Figure 1 shows National Recourses Wales flood warning categories:

National Recourses Wales Flood Warnings	
	Flood Alert Flooding is possible. Be prepared
	Flood Warning Flooding is expected. Immediate action required
	Severe Flood Warning Severe flooding. Danger to life.

Figure 1

2.18. NRW Development Advice Map in Appendix 10, shows the Site as being in Zone C2, which is without significant flood defence infrastructure.

3. FLOOD RISK MITIGATION AND EVACUATION

3.1. Reducing Exposure to the Hazard

3.1.1. Since the Site is within the Low to High Risk Areas, the Site and surrounding area is susceptible to flooding.

3.1.2. It is understood from the Architect that the highest floor level he considers the camping pods can be without compromising the visual aspect of the Site is 800mm above the existing ground level, which would be 264.67m AOD (46.80m) and 170mm above the approximate Medium Risk Level of 264.50m AOD (46.63m).

3.1.3. NRW Flood Risk from Surface Water & Small Watercourses in Appendix 10, indicates that the Site is at risk from overland flow through it, which is evident from Photograph 3 taken in February 2020, where the water is flowing towards the 3 x 825mm pipes.

A suggestion would be to excavate a ditch or swale along the route so that the flow of water is contained and directed towards the 3 pipes with a small bridge where it crosses the footpath to the camping pods.

3.2. Reducing Vulnerability to the Hazard

3.2.1. The Site Owner should ensure that all camping pods are provided with a flood evacuation plan should it be necessary for the occupants evacuate.

3.2.2. For flood evacuation plan information, NRW website provides a link to the Gov.UK website:
<https://www.gov.uk/guidance/flood-risk-management-plans-frmps-responsibilities>

3.3. Safe Access/Egress

- 3.3.1. Pedestrian access from the camping pods will be via a gravel footpath link to the car park and then from the car park access by vehicle or on foot to an area above the flood level is 60m to the north, which is on the bridge, or 100m to the south and then east along the Llanarmon Pensarn Road.
- 3.3.2. The existing ground level in the proposed parking area is approximately 264.17m AOD (46.30m) therefore the depth of water for Flood Zone 2 (Medium Risk) is approximately 330mm, and for Flood Zone 3 (High Risk), 80mm.
- 3.3.3. In DEFRA/Environment Agency's Technical Report FD2320-TRL - Flood Risk Assessment Guidance for New Development, Table 13.1 indicates the danger to people for different combinations of depth and velocity. Table 13.1 is reproduced in Paragraph 2.9.
- 3.3.4. The Table provides a very simplified guide which has been taken from HR Wallingford (2005) Flood Risks to People Phase 2, The Flood Risk to People Methodology, and shows the groups of people that should be considered as falling into these danger classifications:
- Danger for some – includes children, the elderly and the infirm
 - Danger for most – includes the general public
 - Danger for all – includes emergency services
- 3.3.5. The Table suggests that a depth of flooding of 0.3m with a velocity of up to 0.25m/s is in the cream colour, which is a danger to some. A depth of flooding of 0.3m with a velocity of up to 0.5m/s is in the orange area and therefore does constitute a danger for most people, and a velocity of greater than 0.5m/s is a danger for all.
- 3.3.6. If the depth of the flood in the car park is only 300mm, then it will be possible to walk through this depth of flood water.

3.4. Extra Flood Resistance and Resilience Measures

- 3.4.1. Which flood resistance and resilience measures need to be considered depends on the estimated depth in metres (m) that flood water will reach in the building, or in this case, the camping pod.
- 3.4.2. Water depth up to 0.3m.
Design the camping pod to keep water out as much as possible. Do this by using materials that have low permeability (ie materials that water cannot pass through).
- 3.4.3. Water depth from 0.3m to 0.6m.
Design the camping pod to keep water out (unless there are structural concerns) by:
- a) Using materials with low permeability to at least 0.3m.
 - b) Using flood resilient materials and raised electrical sockets.
 - c) Making sure there's access to all spaces to enable drying and cleaning.
- 3.4.4. Water depth above 0.6m.
Design the camping pod to allow water to pass through the unit to avoid structural damage by:
- a) Using materials with low permeability to at least 0.3m.
 - b) Making it easy for water to drain away after flooding.
 - c) Making sure there's access to all spaces to enable drying and cleaning

- 3.4.5. The proposed floor level for the camping pods is 264.67m AOD, (46.80m) and with a possible Medium Risk flood level of 264.50m AOD (46.63m), this will result in a depth of flood water of up to 0.63m. Therefore it is recommended that Flood Resistance and Resilience Measures for water a depth of 0.3m – 0.6m should be considered.

4. OTHER SOURCES OF FLOODING

4.1. Ground Water Flooding

- 4.1.1. According to Cobby et al (2009), groundwater flooding can be defined as flooding caused by the emergence of water originating from subsurface permeable strata. The greatest risks of groundwater flooding are considered to be from either:

- A rise of groundwater in unconfined permeable strata, such as Chalk, after prolonged periods of extreme rainfall;
- A rise of groundwater in unconsolidated, permeable superficial deposits, which are in hydraulic continuity with local river water levels and where the hydraulic gradient of the water table is low.

- 4.1.2. Groundwater flooding from Chalk aquifers, for example, mainly occurs when the surface of the Chalk is close to, or outcrops at the ground surface. The rise in the water table during prolonged and extreme rainfall can be significant, especially if the Chalk aquifer is unconfined and if the original water level in the aquifer is high. Flooding from such aquifers may occur within a few hours or days of the rainfall or up to a few weeks after.

- 4.1.3. Deposits comprising a mixture of permeable and impermeable soils can lead to a presence of perched water. Perched water tables are located above less permeable deposits such as clay and are located within water-bearing soils such as sand and gravel. If perched water is unconfined then the potential for recharge and groundwater flooding can be high. If the perched water is confined by less permeable clay deposits, then the clay deposits will have a buffering effect on percolating surface water and thus the recharge potential and rise in the water table is low.

- 4.1.4. It is common for groundwater flooding from water-bearing superficial deposits to occur within the vicinity of watercourses, as the water table is generally in hydraulic continuity with the water levels in the watercourse. Therefore, if the watercourse floodplain is flat and low-lying, the water table is likely to have a low hydraulic gradient and will rise to the equivalent water level within the watercourse. This, in turn, can cause the water table to breach the ground surface. This is more prominent in winter during which groundwater flooding often precedes fluvial flooding.

4.2. Groundwater Flooding Potential at the Site

- 4.2.1. There is no suitable borehole data via the online BGS Geology Viewer within the immediate area of the site that give any suitable information.

- 4.2.2. It is considered that the evidence suggests an overall low risk of groundwater flooding.

4.3. Surface Water Flooding and Sewer Flooding

- 4.3.1. Surface water and sewer flooding across urban areas is often a result of high intensity storm events which exceed the capacity of the sewers thus causing them to surcharge and flood. Poorly maintained sewer networks and blockages can also exacerbate the potential for sewer flooding.

4.3.2. NRW plans showing the Flood Risk from Surface Water & Small Watercourses indicate that the Site is at risk with overland flow through it. Along the south eastern side of the Site is a headwall with 3 x 825mm pipes, which are presumably to allow the surface water to drain under the road to the adjoining watercourse. A copy of NRW Flood Risk from Surface Water & Small Watercourses plan is in Appendix 11.

4.3.3. NRW Flood Risk from Reservoirs indicates that the Site is not at risk from flooding from reservoirs.

5. SURFACE WATER DRAINAGE

5.1. Information.

5.1.1. Planning policy recommends the maximum practical use of Sustainable Drainage Systems (SUDS) for new development sites. There is a requirement that SUDS be installed where appropriate, in order to limit the amount of surface water runoff entering drainage systems and to return surface water into the ground to follow its natural drainage path.

5.1.2. Planning Policy Wales Technical Advice Note (TAN) 15 Development and Flood Risk requires that the effects of climate change to be considered in any assessment of flood risk for developments. An allowance of 30% for climate change should be included in the calculations.

5.2. Existing Surface Water Drainage

5.2.1. Surface water runoff from the Site will be towards the eastern side of the site and into the adjoining watercourse or Afon Ceiriog. A proportion of the surface water landing across the area will infiltrate into the soils of the Site.

5.3. Proposed Surface Water Drainage

5.3.1. The proposal is for the surface water from the camping pods to drain into a gravel area around the pod.

5.3.2. The proposed parking area will be constructed using a permeable surfacing.

6. FOUL WATER DRAINAGE

6.1.1. It is understood that the foul water drainage from the camping pods will be pumped up to the cottage outfall which is connected to the public sewer.

6.1.2. It is recommended that the foul pump chamber is surrounded by a wall with no gaps in it at a level in excess of 265.00m AOD (47.13m), to reduce the risk of the pump being inundated by flood water.

6.1.3. In the event that flood water reaches the walled area, consideration should be given to switching the pump off to avoid the pump being overloaded.

7. CONCLUSION

- 7.1. NRW maps show that all of the Site and surrounding areas are in a High Risk to Low Risk Area
- A High Risk from rivers means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%).
 - Medium means that each year, this area has a chance of flooding of between 1 in 200 (0.5%) and 1 in 30 (3.3%).
 - Low means that each year, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 200 (0.5%).
- 7.2. It appears from the contours that the level of the limit of the Medium Risk flooding is approximately 264.50m AOD (46.63m on the Site Survey), and the High Risk at level of 264.25m AOD (46.38m). The ground level in the area of the camping pods is 263.87m AOD (46.00m), therefore the depth of water for the Medium Risk flooding is approximately 630mm, and for the High Risk, 380mm.
- 7.3. It is considered that the flooding to the south of the Site is a result of the watercourse flowing from the south and alongside the eastern side of the B4500 meeting the flood water from the Afon Ceiriog, which is evident from the flood levels on drawing 585-20-06.
- 7.4. It is understood from the Architect that the highest floor level he considers the camping pods can be without compromising the visual aspect of the Site is 800mm above the existing ground level, which would be 264.67m (46.80m) and 170mm above the approximate Medium Risk Level of 264.50m AOD (46.63m).
- 7.5. The Site is not located within a NRW Flood Alert Area.
- 7.6. The Site Owner however should monitor any local flood warnings so that they can advise the occupants if they need to vacate the camping pods. The nearest Flood Alert Area to the Site is in Rhiwals for the Afon Ogau which is 3 miles to the southeast.
- 7.7. NRW Development Advice Map in Appendix 10, shows the Site as being in Zone C2, which is without significant flood defence infrastructure.
- 7.8. NRW Flood Risk from Surface Water & Small Watercourses indicates that the Site is at risk from overland flow through it. A suggestion would be to excavate a ditch or swale along the route so that the flow of water is contained and directed towards the 3 pipes with a small bridge where it crosses the footpath to the camping pods.
- 7.9. The Site Owner should ensure that all camping pods are provided with a flood evacuation plan should it be necessary for the occupants evacuate.
- 7.10. In DEFRA/Environment Agency's Technical Report FD2320-TRL - Flood Risk Assessment Guidance for New Development, Table 13.1 indicates the danger to people for different combinations of depth and velocity.
- 7.11. The Table provides a very simplified guide which has been taken from HR Wallingford (2005) Flood Risks to People Phase 2, The Flood Risk to People Methodology, and shows the groups of people that should be considered as falling into these danger classifications:
- Danger for some – includes children, the elderly and the infirm
 - Danger for most – includes the general public
 - Danger for all – includes emergency services
- 7.12. The Table suggests that a depth of flooding of 0.3m with a velocity of up to 0.25m/s is in the cream colour, which is a danger to some. A depth of flooding of 0.3m with a velocity of up to 0.5m/s is in the orange area and therefore does constitute a danger for most people, and a velocity of greater than 0.5m/s is a danger for all.

- 7.13. Pedestrian access from the camping pods will be via a gravel footpath link to the car park and then from the car park access by vehicle or on foot, the route to an area above the flood level is 60m to the north, which is on the bridge, or 100m to the south and then east along the Llanarmon Pensarn Road.
- 7.14. The existing ground level in the proposed parking area is approximately 264.17m AOD (46.30m) therefore the depth of water for the Medium Risk flooding is approximately 330mm, and for the High Risk flooding, 80mm.
- 7.15. If the depth of the flood in the car park is only 300mm, then it will be possible to walk through this depth of flood water.
- 7.16. When developments cannot be located in a lower flood risk area, then consideration needs to be given to flood resistance and resilience measures if the development's ground floor levels cannot be raised above the estimated flood level for the site.
- 7.17. The proposed floor level for the camping pods is 264.67m AOD, (46.80m) and with a possible Medium Risk flood level of 264.50m AOD (46.63m), this will result in a depth of flood water of up to 0.63m. Therefore it is recommended that Flood Resistance and Resilience Measures for water a depth of 0.3m – 0.6m should be considered.
- 7.18. Water depth from 0.3m to 0.6m.
Design the camping pod to keep water out (unless there are structural concerns) by:
- a) Using materials with low permeability to at least 0.3m.
 - b) Using flood resilient materials and raised electrical sockets.
 - c) Making sure there's access to all spaces to enable drying and cleaning.
- 7.19. There is no suitable borehole data via the online BGS Geology Viewer within the immediate are of the site that give any suitable information, however it is considered that the evidence suggests an overall low risk of groundwater flooding.
- 7.20. NRW Flood Risk from Reservoirs indicates that the Site is not at risk from flooding from reservoirs.
- 7.21. The proposal is for the surface water from the camping pods to drain into a gravel area around the pod. And the proposed parking area will be constructed using a permeable surfacing.
- 7.22. It is understood that the foul water drainage from the camping pods will be pumped up to the cottage outfall which is connected to the public sewer.
- 7.23. It is recommended that the foul pump chamber is surrounded by a wall with no gaps in it at a level in excess of 265.00m AOD (47.13m), to reduce the risk of the pump being inundated by flood water.
- 7.24. In the event that flood water reaches the walled area, consideration should be given to switching the pump off to avoid the pump being overloaded.

John Sumner IEng MICE
Director
Sumner Consultancy Ltd
December 2020

APPENDIX 1

SITE LOCATION PLAN

SITE LOCATION PLAN

Nearest Post Code LL20 7LD

Grid Reference X315739 Y332908

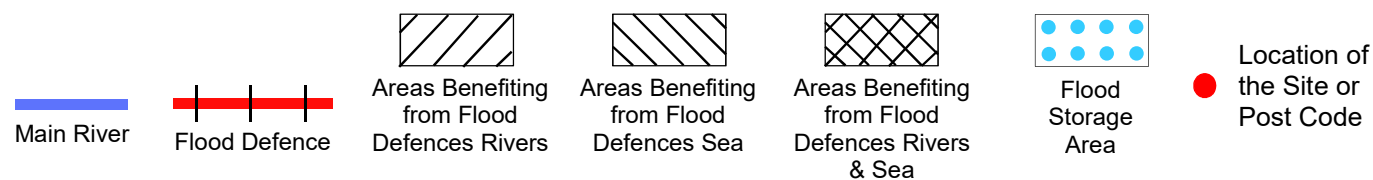


APPENDIX 2

NRW MAIN RIVERS FLOOD DEFENCES STORAGE AREAS

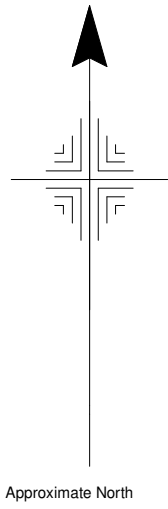
NATURAL RESOURCES WALES MAIN RIVERS FLOOD DEFENCES & STORAGE AREAS

Nearest Post Code LL20 7LD
Grid Reference X315739 Y332908



APPENDIX 3

**FR DAVIES ARCHITECTURAL SERVICES
SITE SURVEY DRAWING 2021:10**



PROJECT
whitegate cottage llanarmon

NAME	SCALE	DATE	DRAWN	DRAWING No
site survey	1:200	August 2020		2021:10



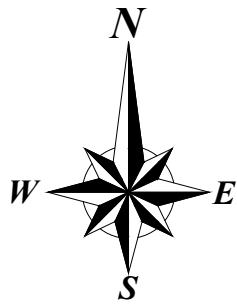
R F DAVIES ARCHITECTURAL SERVICES

RIVERSIDE BARN COED-Y-GO OSWESTRY SHROPSHIRE SY10 9AF

MCIAT tel: 01691 662813 e-mail: rfdaviesarchitectural@hotmail.com

APPENDIX 4

SITE SURVEY DRAWING 585-20-01



1. Do not draw from this drawing.
2. All drawings are to be checked by the contractor and setting out engineer and read in conjunction with one another to ensure they are mutually compatible with each other before any setting out or construction commences.
3. In the event of apparent ambiguity or contradiction the engineer and/or architect shall be notified immediately. Summer Consultancy accepts no liability in the event of not being so notified and where construction work has commenced.
4. The site survey was produced by Battifield Land Surveys Ltd. Reference WH12220. Date 19-08-20 Levelled as to an arbitrary Datum. Any services shown are as located by radar detection equipment and may not represent a comprehensive record.
5. Summer Consultancy have not undertaken, nor have been instructed to undertake, any special investigations to verify the information provided. The Principal contractor, sub contractors and others who may need to rely on this information must ascertain its accuracy before commencing the works.
6. Summer Consultancy accept no responsibility or liability for the accuracy of this information.
7. The Ordnance Survey details have been reproduced via Promote from the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationary Office, © Crown Copyright.
8. Ordnance Survey Stationery Office *Survey Paper Mapping Licence Number* 100059047.

Rev	Date	Description

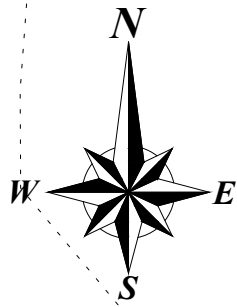


Drawing Title: SITE SURVEY

Drawing Number:	585-20-01	Revision:
-----------------	-----------	-----------

APPENDIX 5

SITE SURVEY & CONTOURS TO NATIONAL GRID DRAWING 585-20-02



1. Do not scale from this drawing.
2. All drawings are to be checked by the contractor and setting out engineer and read in conjunction with one another to ensure they are mutually compatible with each other before any setting out or construction commences.
In the event of apparent ambiguity or contradiction the engineer and/or architect shall be notified immediately. Summer Consultancy accepts no liability in the event of not being so notified and where construction work has commenced.
3. The site survey was produced by Battfielded Land Surveys Ltd. Reference WH12220. Data 19-08-20 Levels are to an arbitrary Datum Any services shown are as located by radio detection equipment and may not represent a comprehensive record.
Summer Consultancy have not undertaken, nor have been instructed to undertake, any special investigations to verify the information provided. The Principal Contractor, sub contractors and others who may need to rely on this information must ascertain its accuracy before commencing the works.
Summer Consultancy accept no responsibility or liability for the accuracy of this information.
4. The Ordinance Survey details have been reproduced via Promap from the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright.
Summer Consultancy Ltd Ordnance Survey Paper Mapping Licence Number 100059047.
5. The contours have been obtained via Promap from a Digital Terrain Model (DTM) of the bare earth/underlying terrain of the earth's surface. They are usually derived from Digital Surface Models (DSMs) by digitally removing the cultural (man-made) and vegetation features.
The UKAS level information is to a resolution of 1m and has a vertical accuracy of $\pm 15\text{cm}$.
These contours and any level information must only be used as guide

Rev	Date	Description
-----	------	-------------



Client: HENLLE DEVELOPMENTS LTD

Project: WHITEGATE COTTAGE
LLANARMON DYFFRYN

Drawing Title: SITE SURVEY & CONTOURS TO NATIONAL GRID

Scale: 1:200	Drawn by: JRS	Date: November 2020
--------------	---------------	---------------------

Drawing Number:	585-20-02	Revision:
-----------------	-----------	-----------

Drawing Size: A1

APPENDIX 6

PHOTOGRAPHS



PHOTOGRAPH 1
3 x 825mm pipes passing from the Site under the B4500



PHOTOGRAPH 2
Flood water along the north eastern site boundary in February 2020



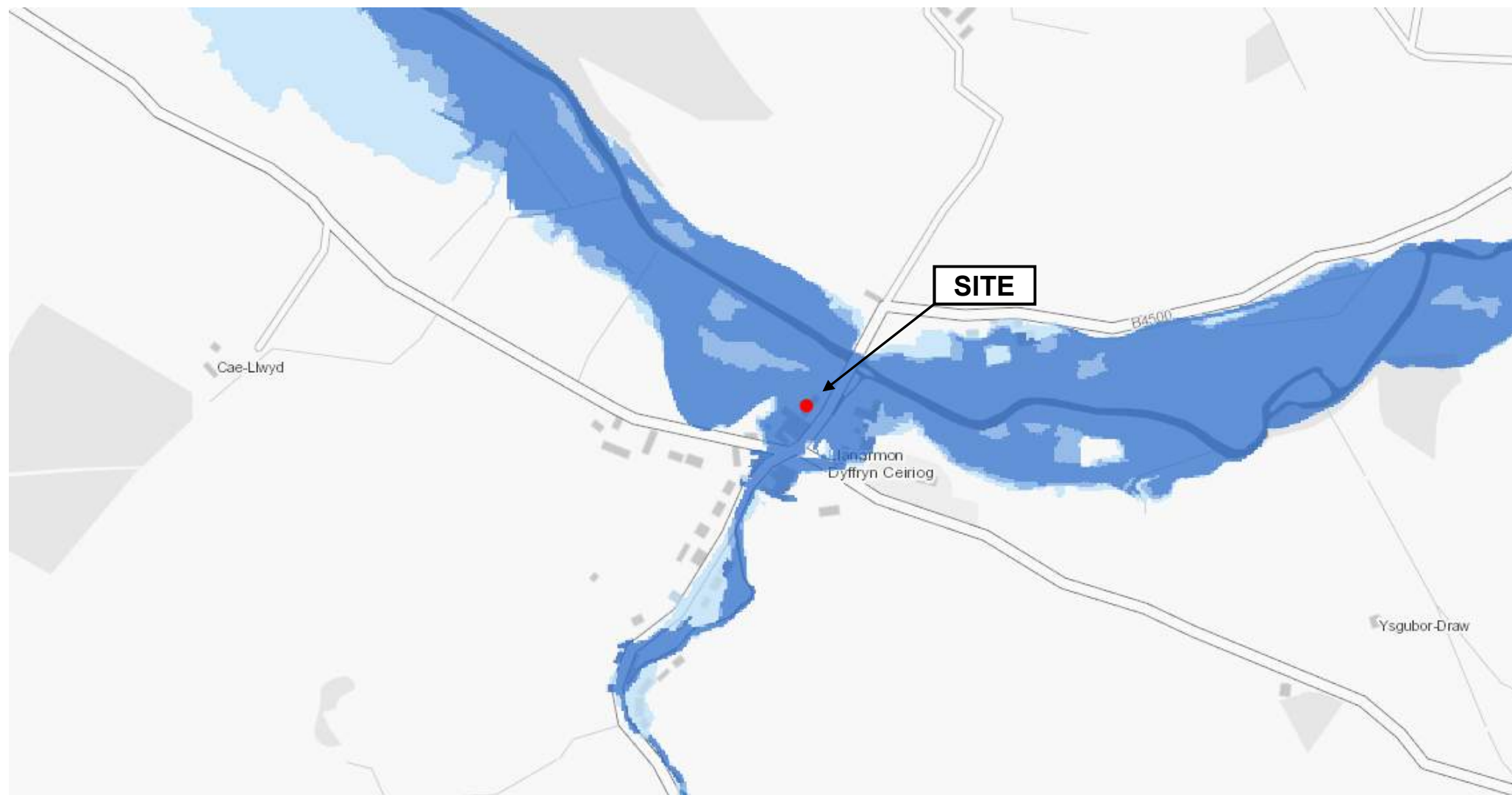
PHOTOGRAPH 3
Overland flow through the Site where the water is flowing towards the 3 x 825mm pipes

APPENDIX 7

NRW FLOOD RISK FROM RIVERS

NATURAL RESOURCES WALES FLOOD RISK FROM RIVERS

Nearest Post Code LL20 7LD
Grid Reference X315739 Y332908



FLOOD RISK



High



Medium



Low



Very low



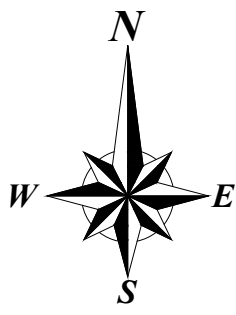
Location of the Site or Post Code

APPENDIX 8

FLOOD LEVELS ADJOINING THE SITE DRAWING 585-20-05

APPENDIX 9

FLOOD LEVELS DRAWING 585-20-06



1. Do not draw as to this drawing.
2. All drawings are to be checked by the contractor and setting out engineer and read in conjunction with one another to ensure they are mutually compatible with each other before any setting out or construction commences.
3. In the event of any apparent ambiguity or contradiction the engineer and/or architect shall be notified immediately. Sumner Consultancy accepts no liability in the event of not being so notified and where construction work has commenced.
4. The site survey was produced by Battifield Land Surveys Ltd. Reference WH112220. Date 19-08-20 Levels are to an arbitrary Datum Any services shown are as located by radio detection equipment and may not be correct. The contractor is to carry out a careful investigation. Sumner Consultancy have not undertaken, nor have been instructed to undertake, any special investigations to verify the information provided. The Principle Contractor, sub contractors and others who may need to rely on this information must ascertain its accuracy before commencing the works. Sumner Consultancy accept no responsibility or liability for the accuracy of this information.
5. The Ordnance Survey details have been reproduced via Promap from the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright.
Sumner Consultancy Ltd. Ordnance Survey Paper Mapping Licence Number: 100059047
6. The contours have been obtained via Promap from a Digital Terrain Model (DTM) of the bare earth underlying terrain of the earth's surface. They are usually derived from Digital Surface Models (DSMs) of digitaly removing the current (man-made) and vegetation features.
7. The LIDAR level information is to a resolution of 1m and has a vertical accuracy of +/-15cm.
8. These contours and any level information must only be used as guide.
9. The flood data has been obtained from Envirocheck which has been produced by The Environment Agency.
This data includes: Areas Benefiting from Flood Defences, Flood Water Storage Areas, Extreme Flooding from Rivers or Sea without Defences (Flood Zone 2), Extreme Flooding from Rivers or Sea without Defences (Flood Zone 3) and Flood Defences.
10. The site layout is an extract from R.F Davies Architectural Services Ltd's Site Drawings No. 1021-1.
CAD Ref: flannanrhm site layout 3.pcd. Received on 06-11-2011.
This is shown for information purposes only and must not be used for setting out purposes.
11. Sumner Consultancy have not undertaken, nor have been instructed to undertake, any special investigations to verify the information provided. The Principle Contractor, sub contractors and others who may need to rely on this information must ascertain its accuracy before commencing the works. Sumner Consultancy accept no responsibility or liability for the accuracy of this information

Rev	Date	Description
-----	------	-------------

Client: HENLLE DEVELOPMENTS LTD

Project: WHITEGATE COTTAGE
LLANARMON DYFFRYN

Drawing Title: FLOOD LEVELS

Scale: 1:500	Drawn by: JRS	Date: November 2020
--------------	---------------	---------------------

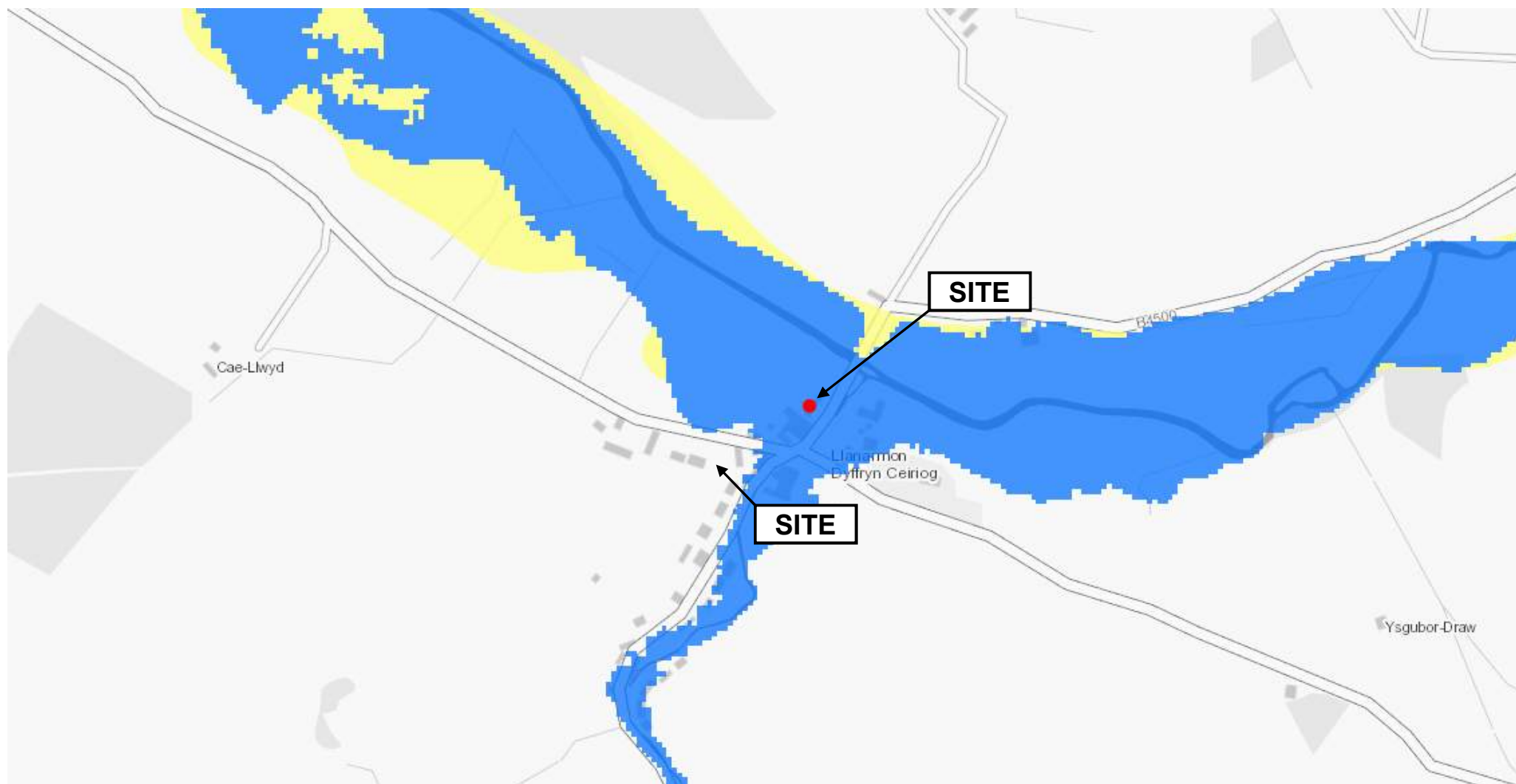
Drawing Number:	585-20-06	Revision:
-----------------	-----------	-----------

APPENDIX 10

NRW DEVELOPMENT ADVICE MAP

NATURAL RESOURCES WALES DEVELOPMENT ADVICE MAP

Nearest Post Code LL20 7LD
Grid Reference X315739 Y332908



- Zone C1 Served by significant infrastructure, including flood defences
- Zone C2 Without significant flood defence infrastructure
- Zone B Areas known to have flooded in the past
- Zone A Considered to be at little or no risk of fluvial or coastal/tidal flooding

FLOOD ZONES



C1



C2



B



A



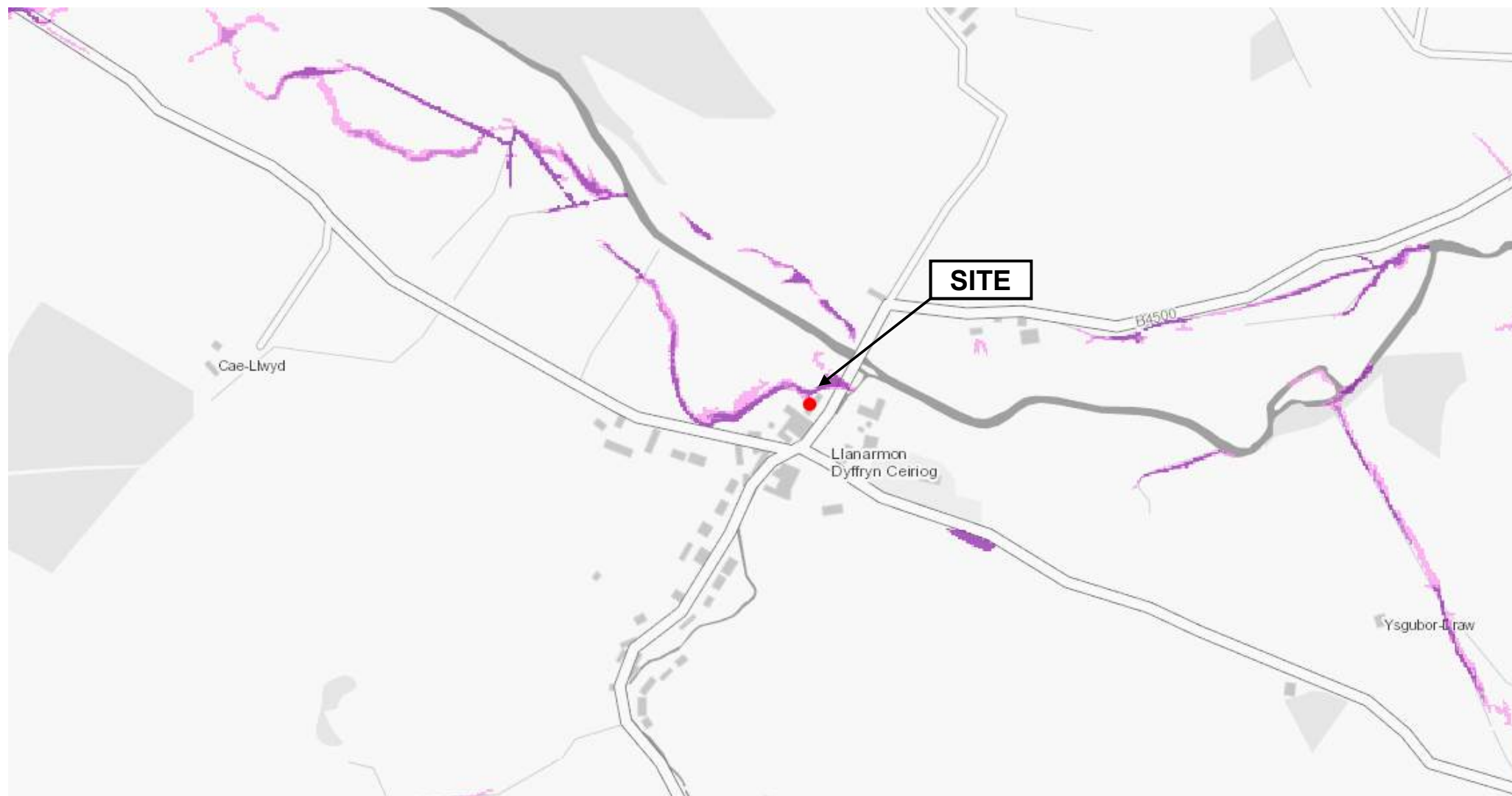
Location of the Site
or Post Code

APPENDIX 11

NRW FLOOD RISK FROM SURFACE WATER & SMALL WATERCOURSES

NATURAL RESOURCES WALES FLOOD RISK FROM SURFACE WATER & SMALL WATERCOURSES

Nearest Post Code LL20 7LD
Grid Reference X315739 Y332908



FLOOD RISK



High



Medium



Low



Very low



Location of the Site or Post Code