GeoSmart Information

FloodSmart Plus

Site Address
Brookland Road,
Risca,
Wales,
NP11 6AT

Grid Reference
ST 24180 90198

Report Prepared for
Andrew Villis
QuadConsult Ltd
Columbus House
Village Way,
Cardiff,
Wales,
CF15 7NE

Date
2022-05-24

Report Status
FINAL

Site Area
5,150 m^2

Report Reference
76644R1

Flood Consequence Assessment

The Site is located partially within the NRW's fluvial Flood Zone 2 (Medium probability). According to the NRW's Development Advice Map the built infrastructure on Site is located within Zone B.

The Site is at a Very Low risk of fluvial flooding from the Ebbw River. The Site has a Very Low to Medium risk of surface water flooding and a Moderate risk of groundwater flooding.

Report Author
Jack Croft
Consultant

Report Checker
Mike Piotrowski
Principal Hydrologist

Report Reviewer
Bob Sargent
Associate

GeoSmart Information Ltd
Old Bank Buildings,
Shrewsbury, SY1 1HU
+44(0)1743 298 100
info@geosmartinfo.co.uk
www.geosmartinfo.co.uk

1. Executive summary

The Planning Policy Wales (PPW) 11th edition (2021) and Technical Advice Note 15 (TAN 15) (2004) requires Flood Consequence Assessments (FCA) to review flooding from all potential sources. A review has been undertaken of national environmental data sets to assess the potential flood risk to the Site. The review is provided within this concise interpretative report written by an experienced GeoSmart consultant.

It should be noted the TAN15 (2004) is anticipated to be updated at the end of the Summer 2021 and a new Flood Map for Planning will be published at the same time to support this. The new Flood Map for Planning will supersede the NRW's Development Advice Map (DAM) and the conclusions of this report may change as a result.

Site analysis

Source of Flood Risk	Baseline	After Mitigation
River (fluvial) flooding	Very Low	N/A
Sea (coastal/tidal) flooding	Negligible	N/A
Surface water (pluvial) and small watercourses flooding	Very Low to Medium	Very Low
Groundwater flooding	Moderate	Negligible
Other flood risk factors present	Yes	N/A
Is any other further work recommended?	Yes	No

N/A = mitigation not required

Summary of existing and proposed development

The Site is located in Risca, South Wales in a setting of residential land use at National Grid Reference ST 24180 90198. The Site is currently used within a commercial capacity as the former council owned youth and community centre, with associated gardens and parking. Proposals include but not limited to: demolition of the existing building; construction of up to 30 residential affordable dwellings with associated gardens and parking. The general level of the Site is between 45.23-45.95 mAOD with the Site falling gradually in a southerly direction. This is based upon a Site specific topographic survey undertaken by Corner Point Surveys Ltd ±150 mm.

Summary of flood risks

The flood risks from all sources have been assessed as part of this report and are as follows:

River (fluvial) Flooding Risks

According to Natural Resources Wales' (NRW) National Flood Hazard and Risk maps (2021), the Site has a Very Low probability of being affected by fluvial flooding.

According to NRW's Flood Zone Map, the Site is located within fluvial Flood Zones 2. According to the NRW's Development Advice Map (DAM) the Site is located within Zone B.

According to NRW's Flood Risk Assessment Wales map, which considers the type, condition and crest height of flood defences, the area currently developed on Site has a Very Low risk of flooding from Rivers and the Sea.

The NRW modelled flood data for the 1 in 100 year plus 25% climate change using the central estimate was provided. The maximum flood level for the 1 in 100 year plus 25% climate change would be 44.70mAOD, and therefore would not affect the Site.

The nearest flood defences are located approximately 175m southwest to the southern boundary of the Site. The NRW notes the asset is a wall up to 45.78mAOD and lists its condition as Fair (category 3). It should be noted that the Site is located within a TAN15 defended zone.

There is a negligible flood risk from the Sea due to the Site's topography and location away from the tidal estuary.

Surface Water and Small Watercourses (Pluvial) Flooding Risk

According to Natural Resources Wales' (NRW) National Flood Hazard and Risk maps and the Flood Risk Assessment Wales (FRAW) maps (2021), part of the Site could be affected by flooding in events with a Medium probability of occurring. The majority of the Site (central and eastern areas) would not be impacted by the 100 or 1000 year events.

- The Site would be affected by the 1 in 100 year (medium risk) surface water and small watercourses event. Flood depths would be up to 0.15m, flowing towards the south with velocities of less than 1m/s. This would affect the Site at the northwestern corner, flowing along its western perimeter.
- The Site would be affected by the 1 in 1000 year (low risk) surface water and small watercourses event. Flood depths would be up to 0.15m, flowing towards the south with velocities of less than 1m/s. This would affect the Site at the northwestern corner, flowing along its western perimeter.
- The majority of the Site though would not be impacted by flooding in the 1 in 1000 year event, so has a very low risk of pluvial flooding.

Groundwater Flooding Risk

GeoSmart's Groundwater Flood Risk (GW5) Map indicates a Moderate potential for groundwater flooding in the area of proposed development in a 1% annual probability (1 in 100 year) event. Based on a review of (limited) site specific data:

- The hydrogeological characteristics and the borehole records suggest there is potential for a groundwater table within 5mbgl beneath the Site. The SAND and GRAVEL beds are likely to be yielding groundwater which could vertically migrate to the surface through the granular permeable sand and topsoil layers above. Boreholes R79 (ref: ST28NW21) and S89 (ST28NW35) record a groundwater strike within less than 3m of the surface upon encountering the sand and gravel beds (BGS, 2022).
- Groundwater levels may rise in the bedrock and superficial aquifer in response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years, subject to hydraulic continuity between the groundwater system and the Site.
- The risks are higher for basements (their inclusion is unknown at this stage), buried infrastructure and soak-away systems which may be affected by high groundwater levels. This should be considered when formulating a SuDS strategy for development.

Artificial Flooding Risk

The risk of flooding from artificial sources such as reservoirs, sewers and canals have been assessed:

- According to NRW's Risk of Flooding from Reservoir mapping, the Site is not at risk of Reservoir Flooding;
- According to Ordnance Survey (OS) mapping, there are no canals within the vicinity of the Site;
- There are a number of bridges and culverts in the surrounding area however the risk to the Site has been considered Low.
- The PFRA has identified a low risk of sewer flooding with the area but due to the coarse dataset, this cannot be used to determine wherever any sewer flooding has occurred at the Site (Caerphilly, 2011).

On the basis of the above the risk of flooding from artificial sources is considered Low.

The risk to the development has been assessed over its expected 100 year lifetime, including appropriate allowances for the impacts of climate change. More extreme weather events could increase the risk to the Site from increased river flows and fluvial flooding. Site specific assessment indicates risk to the Site will not increase significantly and appropriate mitigation measures are proposed.

Recommendations for flood mitigation are provided below, based upon the flood risk identified at the Site and TAN15 (2004) requirements for residential 'Highly Vulnerable' development:

- *Developer is required to demonstrate that the site is designed to be flood free for the lifetime (A1.5) of development for either a 1 in 100 chance (fluvial) flood event, or a 1 in 200 chance (tidal) flood event including an allowance for climate change (depending on the type of flood risk present) in accordance with table A1.14. In addition, for tidal breach flood events, an escape route should be practical in all conditions. Finish floor levels (FFL) of highly vulnerable developments should be set 0.30m above the maximum flood level.*

  GeoSmart Comment. Analysis of the Site does demonstrate that the development would be flood free during a 1 in 100 year (fluvial) event including an allowance for climate change, thus satisfying the requirements of A1.5 and A1.14 of TAN15 (2004).

- *In respect of the residual risk to the development, it should be designed so that over its lifetime (A1.5) in an extreme (1 in 1000 chance) event there would be less than 600mm of water on access roads and within properties, the velocity of any water flowing across the development would be less than 0.3 m/second on access roads and 0.15m/second in properties, and the maximum rate of rise of floodwater would not exceed 0.1m/hour. (see table A1.15).*

  GeoSmart Comment: Analysis of the Site does demonstrate the access roads would be affected by less than 0.60m during a 1 in 1000 year event, thus satisfying the requirements of A1.15 of TAN15 (2004).

Recommendations

Recommendations for flood mitigation are provided below, based upon the flood risk to the Site:

River (fluvial) Flooding Risks

Using the NRW modelled flood data for the 2117 1 in 100 year plus 25% climate change allowance, the 2122 flood level was calculated. The maximum flood level for the 2122 1 in 100 year plus 25% climate change would be 44.72mAOD, and therefore would not affect the Site. Even if finished floor levels (FFL) were raised above the 2122 1 in 100 year plus CC event, the level of 45.02mAOD would still be lower than the current ground level. For that reason, no mitigation measures are required for the risk of flooding from Rivers.

Surface Water and Small Watercourses (Pluvial) Flooding Risk

As the northern and western areas of the Site could be affected by surface water flooding, it is recommended that finished floor levels (FFL) of the proposed development should be set at least 0.15m above ground level.

Additional Mitigation

In addition, the regular maintenance of any drains and culverts surrounding/on the Site under the riparian ownership of the developer should be undertaken to reduce the flood risk.

A separate assessment of surface water runoff is required, as the Statutory requirements in Wales are to include a SuDS strategy, where development proposals are greater than 100m^2 in size. This is to ensure surface water runoff is managed in accordance with the Welsh Statutory requirements over the lifetime of the proposed development.

Groundwater Flooding Risk

It is likely the flood mitigation measures recommended for surface water (pluvial) risk will be sufficient to reduce the groundwater flood risk at the development from Moderate to Low. However specific groundwater measures that may also be considered for the Low risk identified include:

- Waterproof tanking of the ground floor;
- Interceptor drains;
- Automatic sump to extract flood water;
- Non-return flap valves on the proposed foul and surface water sewer lines.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.

2. Introduction

Background and purpose

This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the PPW (2021) and the source(s) of any flood risk present. Finally, a preliminary assessment of the steps that can be taken to manage any flood risk to the development was undertaken.

This report has been prepared with reference to the TAN 15 (2004) which supplements the PPW (2021).

The general approach of PPW, supported by the TAN, is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions. The overarching aim of the precautionary framework is, in order of preference, to:

- Direct new development away from those areas which are at high risk of flooding; and
- Where development is considered to be in high-risk areas (Zone C) only those developments which can be justified on the basis of the tests outlined in section 6 and section 7 are located within such areas.

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

Report scope

A thorough review of a commercially available flood risk report and NRW supplied data indicating potential sources of flood risk to the Site from rivers and coastal sources, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the property.

Information obtained from NRW and a review of the Caerphilly County Council Preliminary Flood Consequence Assessment (PFRA) (Caerphilly, 2011) and the Review of Preliminary Flood Risk Assessment Addendum (PFRA addendum, 2017) has been used to ascertain local flooding issues and, where appropriate, identify information to support a Justification test and Assessment of Flood Consequences required as part of the PPW (2016).

Using available data, the existing and future flood risks to and from the Site from all flood sources will be assessed in line with current best practice.

An indication of potential flood risk from the Site to downstream receptors is provided where the proposed development increases run-off from the Site.

Report limitations

It is noted that the findings presented in this report are based on a desk study of information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

Datasets

The following table shows the sources of information that have been consulted as part of this report:

Table 1. Datasets consulted to obtain confirmation of sources of flooding and risk

Source of flooding	Datasets consulted			
	Commercial Flood Maps	FRMP	Natural Resources Wales (Appendices B and C)	OS Data
Historical	X	X	X	
River (Fluvial) / Sea (tidal)	X	X	X	
Surface water (pluvial)	X	X	X	
Groundwater	X	X		
Sewer		X		
Culvert/bridges		X		X
Reservoir		X	X	

3. Site analysis

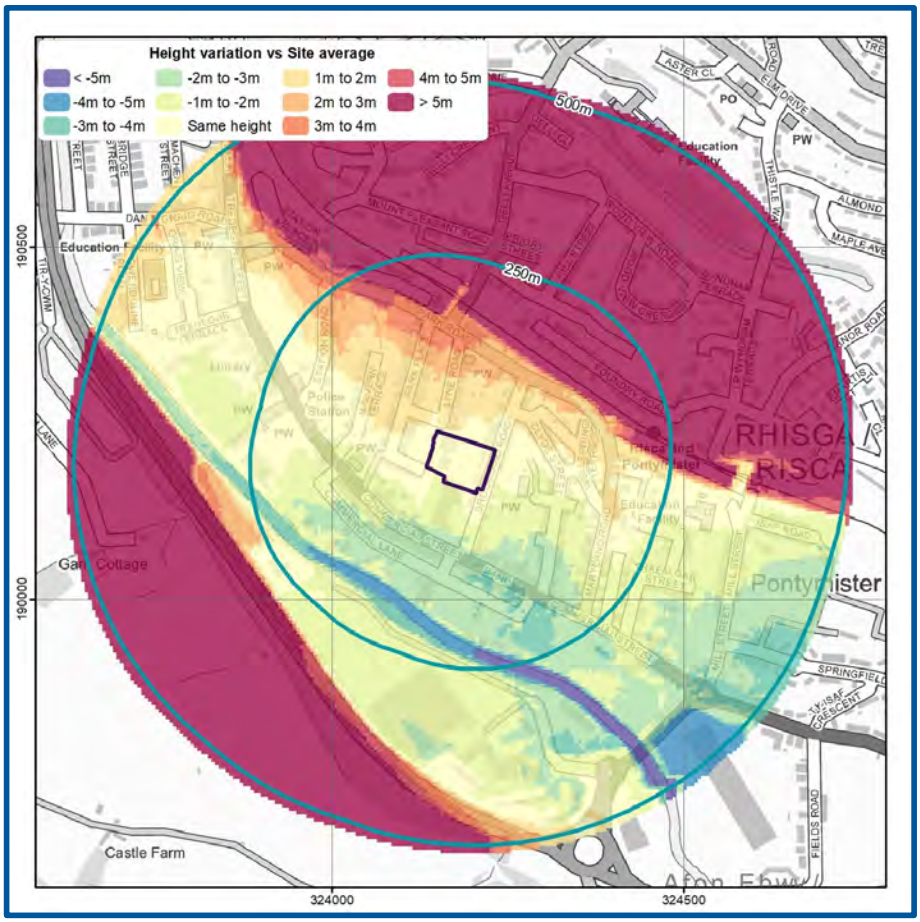
Site information

The Site is located in Risca, South Wales, in a setting of residential land use at National Grid Reference ST 24180 90198. Site plans and drawings are provided in Appendix A.

The Site is located within the base of a valley. (Figure 1). It is noted that to the north land rises to c. 74.59m above Ordnance Datum (AOD). To the west land rises to 74.08mAOD, to the east land rises to c. 50.43mAOD and to the south falls to 43.11 mAOD. The valley trends northwest - southeast.

According to OS data, the general level of the Site is between 45.23-45.95 mAOD with the Site falling gradually in a southerly direction. This is based upon a Site specific topographic survey undertaken by Corner Point Surveys Ltd ±150 mm (Appendix C).

Figure 1. Site Location and Relative Elevations (GeoSmart, 2022).



Development

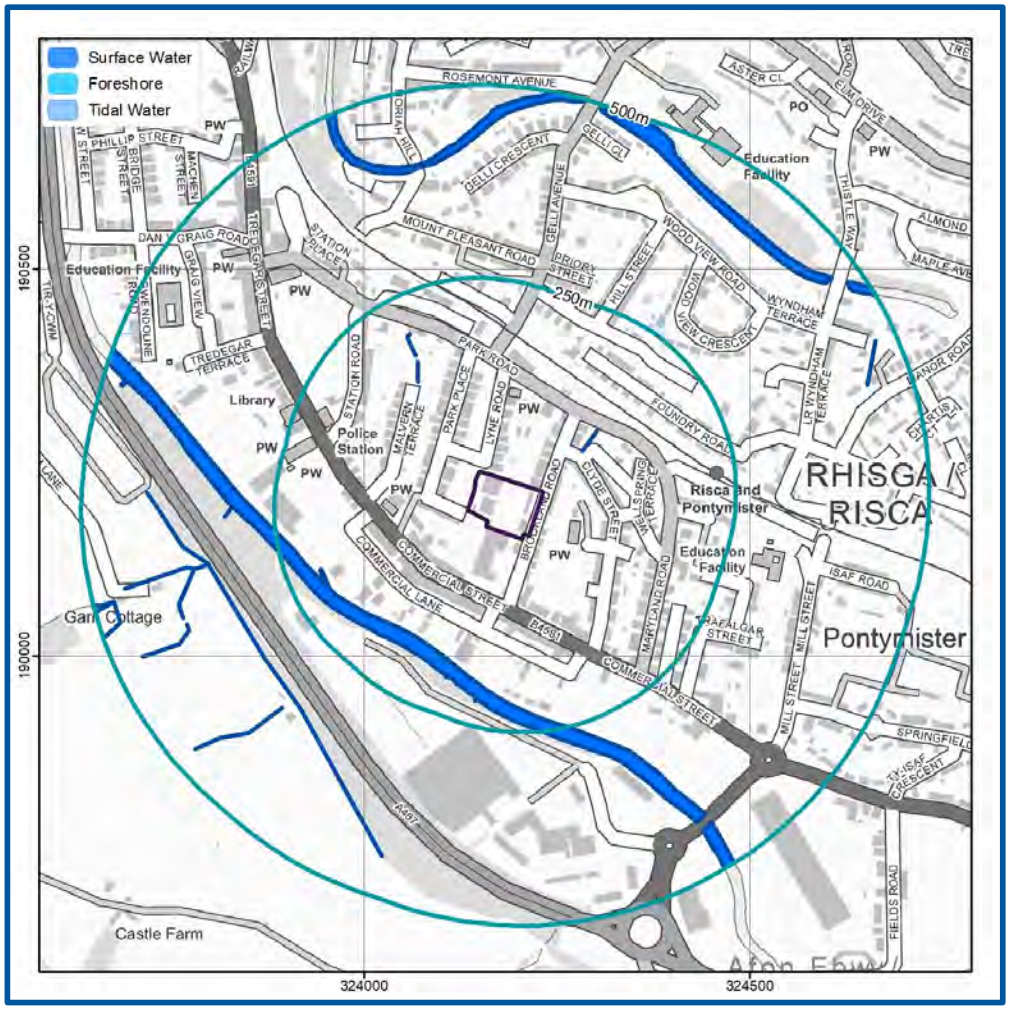
The Site is currently used within a commercial capacity as the former council owned youth and community centre, with associated gardens and parking.

Proposals include but not limited to: demolition of the existing building; construction of up to 30 residential affordable dwellings with associated gardens and parking.

The current Site use as a council ran youth centre is classified as Less Vulnerable according to Table 9 (Summary of Policy Requirements) in TAN 15 (2004). The proposed Site use as properties are classified as Highly Vulnerable according to Table 9 (Summary of Policy Requirements) in TAN 15 (2004).

Hydrological features

Figure 2. Surface water features (NRW, 2022)



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The Ebbw River is located approximately 175m southwest to the southern boundary of the Site.

A drainage ditch is located approximately 90m northeast to the northern boundary of the Site.

A drainage ditch associated with the allotments is located approximately 525m northwest to the northern boundary of the Site.

A number of drainage ditches are shown beyond the A467, approximately 360m southwest to the southern boundary of the Site.

A number of springs feeding northeast draining streams are shown approximately 700m and 400m southwest to the southern boundary of the Site.

Relevant Infrastructure

The Monmouthshire and Brecon Canal is located approximately 420m northeast to the northern boundary of the Site.

A footbridge spans over the Ebbw River is located approximately 325m southeast to the southern boundary of the Site.

A road bridge B4591 spans over the Ebbw River is located approximately 450m southeast to the southern boundary of the Site.

A road bridge Dan Y Graig Road spans over the Ebbw River is located approximately 600m northwest to the northern boundary of the Site.

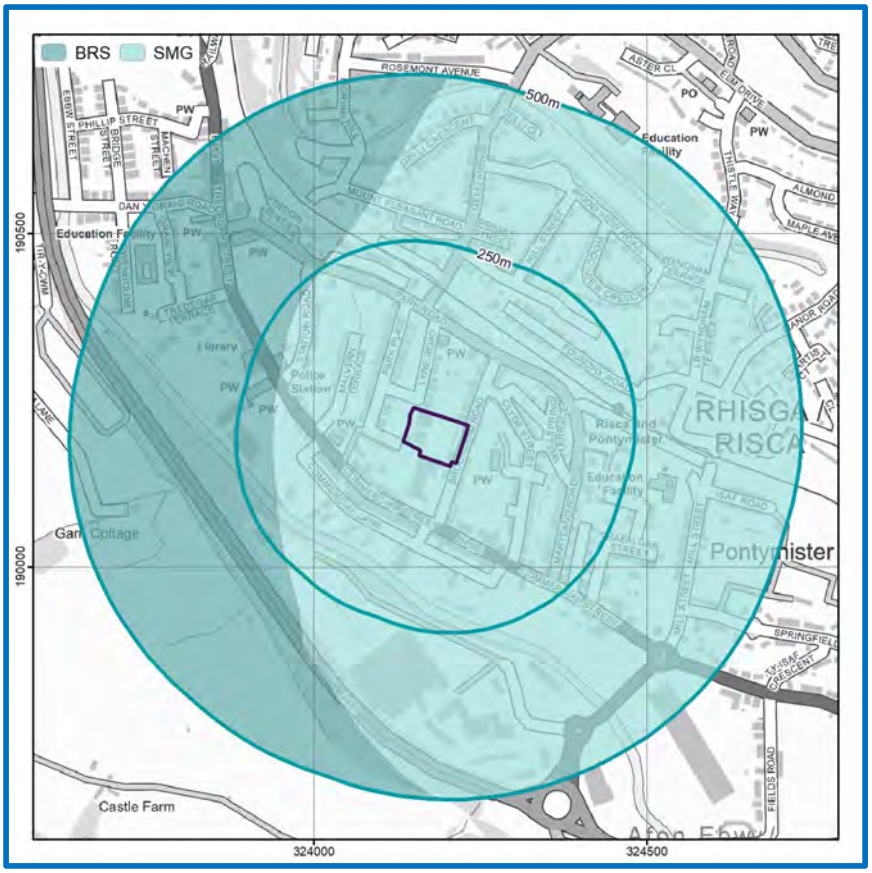
Hydrogeological features

British Geological Survey (BGS) mapping indicates that the underlying superficial geology consists of Alluvial Deposits- Clay, silt sand and gravel (BGS, 2022) and is classified as a Secondary (A) Aquifer (NRW, 2022).

Figure 3. Superficial Geology (BGS, 2022)

BGS mapping indicates the underlying bedrock geology consists of St Maughans Formation-Interbedded mudstones and sandstones (BGS, 2022) and is classified as a Secondary (A) Aquifer (NRW, 2022).

Figure 4. Bedrock Geology (BGS, 2022)



The Site does not lie within a groundwater Source Protection Zone (SPZ) (NRW, 2022).

A review of the BGS borehole database (BGS, 2022) indicates there are no available borehole records within close proximity of the Site. However, there are a number of borehole records available within the nearby area which can be used reflectively to infer the ground conditions beneath the Site.

Borehole R79 (ref: ST28NW21) located approximately 300m south of the Site, with a lower elevation of 43.30mAOD was drilled in 1976. The log records:

- TOPSOIL of reddish black clay with some rootlets. With a thickness of 1.00m to a proven depth of 1.00m below ground level (bgl).
- Greyish brown clayey silty SAND with some fine to coarse gravel at base. With a thickness of 0.60m to a proven depth of 1.60mbgl.
- Very dense reddish brown clayey silty fine to coarse SAND and GRAVEL with a moderate cobbles content. With a thickness of 0.55m to a proven depth of 2.15mbgl.

- Strong reddish brown SANDSTONE. With at least a thickness of 0.45m, proven to the base of the borehole at 2.50mbgl.
- Groundwater was encountered at 1.60mbgl and rose to 1.30mbgl. The groundwater was noted after taking the out the undisturbed sampler therefore the geology that yielded the groundwater has a degree of uncertainty. However, it was likely to be held within the SAND and GRAVEL beds.

Borehole S89 (ref: ST28NW35) located approximately 450m southeast of the Site, with a lower elevation of 41.62mAOD was drilled in 1976. The log records:

- MADE GROUND: Loose black clayey ash. With a thickness of 1.50m to a proven depth of 1.50mbgl.
- MADE GROUND: Medium dense black clayey silty fine to coarse sand and gravel. With a thickness of 1.26m to a proven depth of 2.76mbgl.
- Medium dense to dense brown fine to coarse rounded SAND and GRAVEL with a low cobble content. With at least a thickness of 7.24m, proven to the base of the borehole at 10.00mbgl.
- Groundwater was encountered at 2.80mbgl and rose to 2.60mbgl. This groundwater was struck within the SAND and GRAVEL beds.

The hydrogeological characteristics and the borehole records suggest there is potential for a groundwater table within 5mbgl beneath the Site. The SAND and GRAVEL beds are likely to be yielding groundwater which could vertically migrate to the surface through the granular permeable sand and topsoil layers above.

Groundwater levels may rise in the bedrock and superficial aquifer in response to high river events subject to hydraulic continuity between the driving water level, the groundwater system and the Site.

Groundwater levels may rise in the bedrock and superficial aquifer in response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years, subject to hydraulic continuity between the groundwater system and the Site.

4. Flood risk to the development

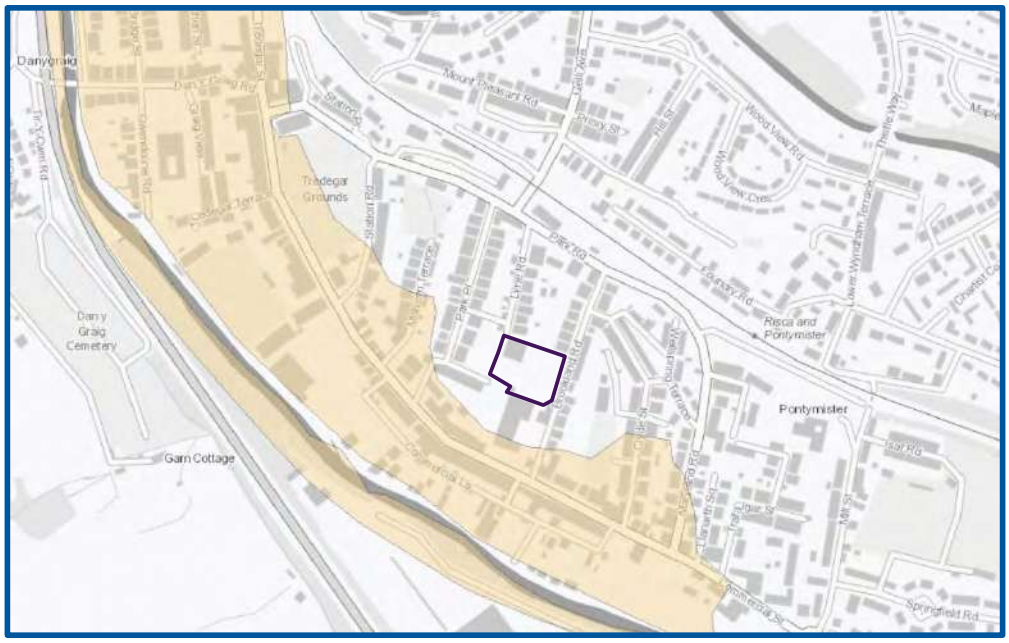
Historical flood events

According to the NRW's Recorded Flood Extents Map (Figure 5), no historical flood events have been recorded at the Site (NRW, 2022).

According to Figure 3 of the PFRA, there have been historical requests for unblocking the highway gully and major highway flooding in the area however, due to the coarse scale and dataset, it cannot be determined if the historical events affected the Site (Caerphilly, 2011) and (PFRA addendum, 2017).

The purpose of historical flood data is to provide information on where and why flooding may have occurred in the past. The absence of any recorded events does not mean flooding has never occurred on-Site or that flooding will never occur at the Site.

Figure 5. NRW Historic Flood Event Outline



Rivers (fluvial) / Sea (coastal/tidal) flooding

The predominant risk at the Site is from flooding from rivers, termed as fluvial flooding. The Site is located in an inland location and the risk of flooding from coastal and tidal processes are therefore considered to be Negligible.

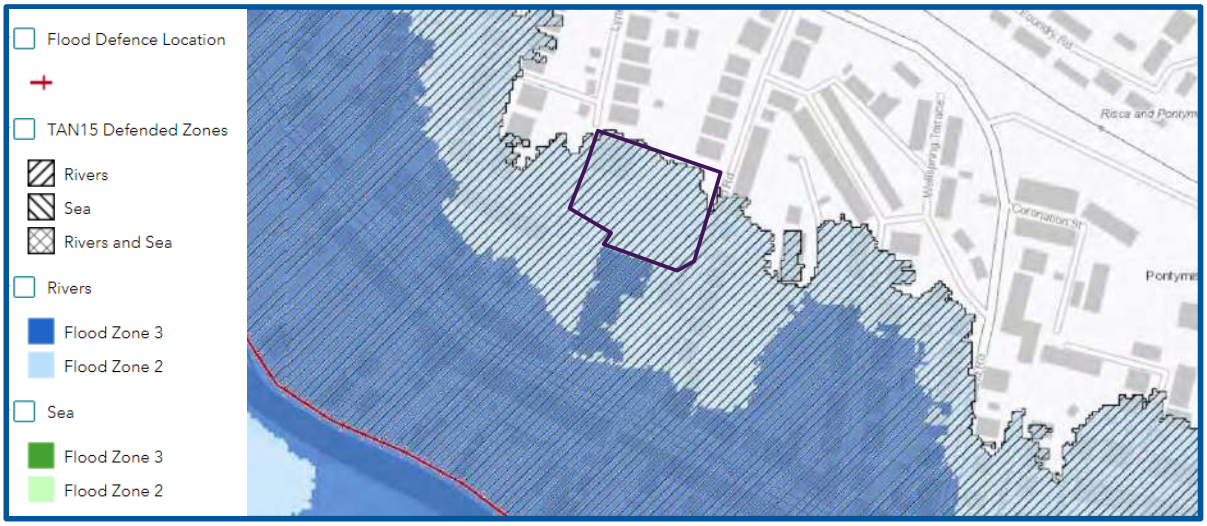
River (fluvial) flooding occurs during times of heavy rainfall or snow melt when watercourses' capacity can be exceeded, over topping the banks and flood defences.

Flood Map for Planning

According to the NRW's Flood Map for Planning (2022) (Figure 6), the Site is located in Fluvial Flood Zone 1 and 2.

The built infrastructure on Site is located with Flood Zone 2 and is therefore classified as having a Medium probability of fluvial flooding from the Ebbw River. According to Figure 6, it should be noted that the Site is located within a TAN15 defended zone.

Figure 6. Flood Map for Planning Purposes (NRW 2022)



Please note these Flood Zones are not currently used for planning purposes, but instead provide an indicative extent for the 1 in 100 year / 1 in 200 year and 1 in 1000 year fluvial and tidal events, respectively. The above flooding extents will be used from June 2023.

Development Advice Map (DAM)

According to NRW's Development Advice Map (DAM), the majority of the Site (more than 99%) is located within fluvial zone B from the Ebbw River which is located adjacent to the southwest of the Site (TAN15, 2004). Less than 1% of the Site is mapped within fluvial flood zone C1, but this zone is mapped over areas proposed for gardens and landscaping. No building footprints are proposed within fluvial flood zone C1 and therefore would not impact the area proposed or development.

Figure 7. Development Advice Map (NRW, 2022)

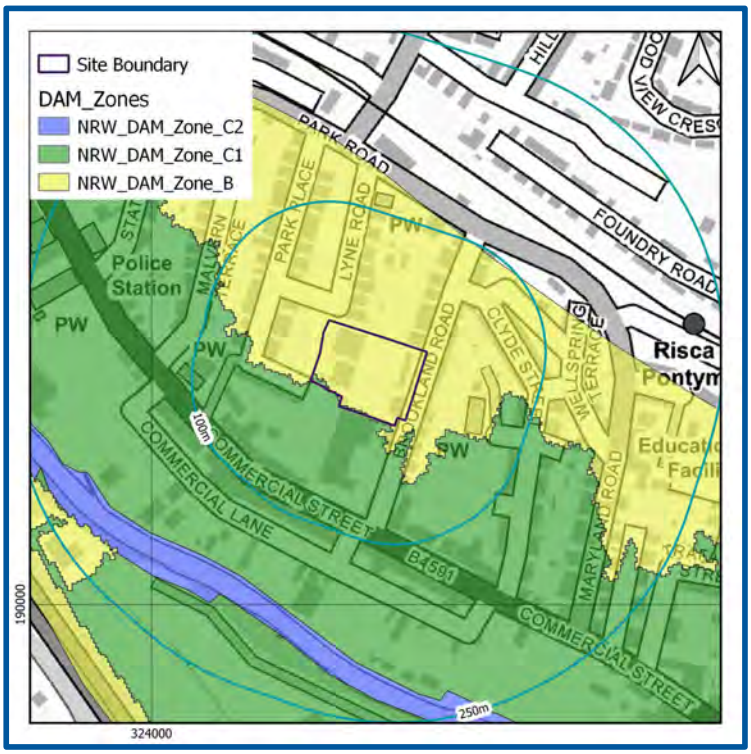


Table 2. Development Advice Map Classification

Description of Zone	Zone
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1

Areas of the floodplain without significant flood defence infrastructure.	C2

National Flood Hazard Maps

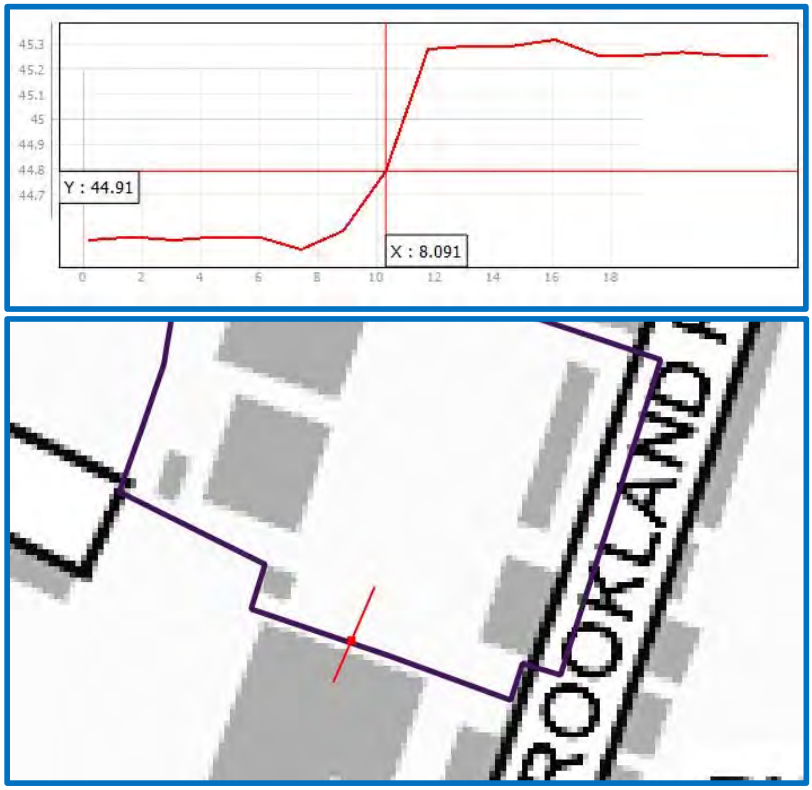
The National Flood Hazard Maps were published in the Summer of 2020. These maps has no official status for planning purposes and the NRW advise the information contained within the Development Advice Map is used for development planning matters. The National Flood Hazard Maps confirm the Site is not at risk from coastal flooding.

National Flood Hazard – Fluvial

The National Flood Hazard Maps for fluvial flooding show the Site would not be affected by fluvial flooding from the Ebbw River in the 1 in 30 year (high risk) event, 1 in 100 year (medium risk) event or the 1 in 1000 year (low risk) event.

Figure 8 shows cross sectional analysis of Lidar data at the Site's southern perimeter. The national flood hazard mapping shows both fluvial and surface water flooding adjacent to the Site but not affecting the Site. This is likely because of the steep increase in elevation recorded within the Lidar data at the southern perimeter of the Site.

Figure 8. Cross sectional analysis of Lidar data at the Site's southern perimeter

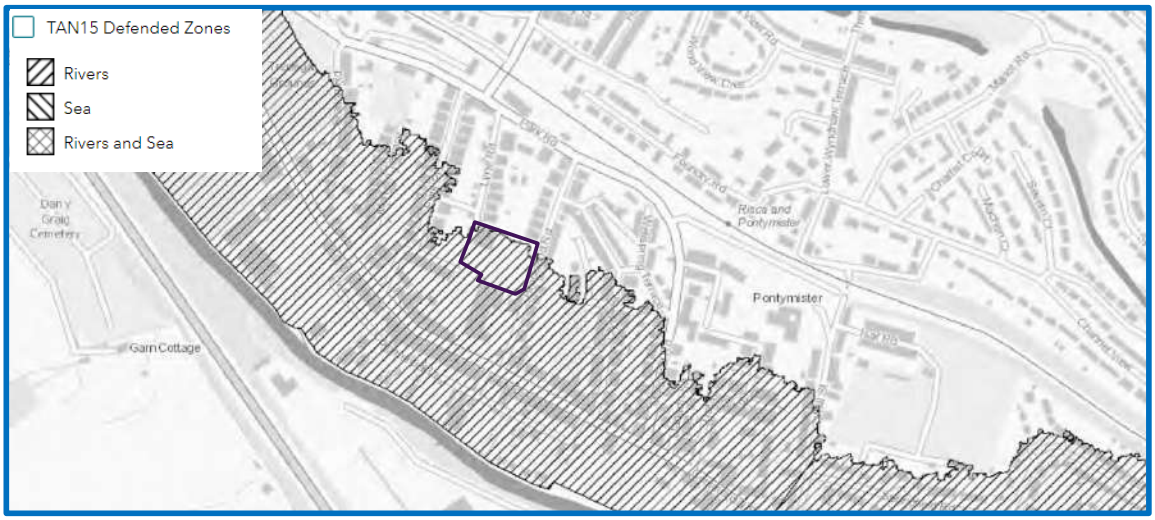


Flood defences

The Site is located within an area that benefits from flood defences.

The nearest flood defences are located approximately 175m southwest to the southern boundary of the Site. The NRW notes the asset is a wall up to 45.78mAOD and lists its condition as Fair (category 3).

Figure 9. FRAW map of areas benefitting from flood defences (NRW, 2022)



Guidance

Sites that are located close to flood defences are likely to be zones where rapid inundation will occur in the event of the flood defences being overtopped or breached. A Site located close to flood defences (within 250 m) may require a more detailed FRA subject to local topography.

Flood Risk including the benefit of defences

The Flood Risk Assessment Wales (FRAW) maps were published in the Summer of 2020, these show the results of flooding.

The FRAW mapping includes consideration of flood defences that have been built to protect against flooding from rivers and the sea. The defences shown provide different levels of flood protection and this is recognised in the risk classification shown in the Flood Risk Assessment Wales (FRAW) map.

- The risk from Rivers is Very Low.
- The risk from the Sea is Negligible.
- The risk from Surface Water and Small Watercourses is Medium.

Figure 10. FRAW map of the flood risk from Rivers

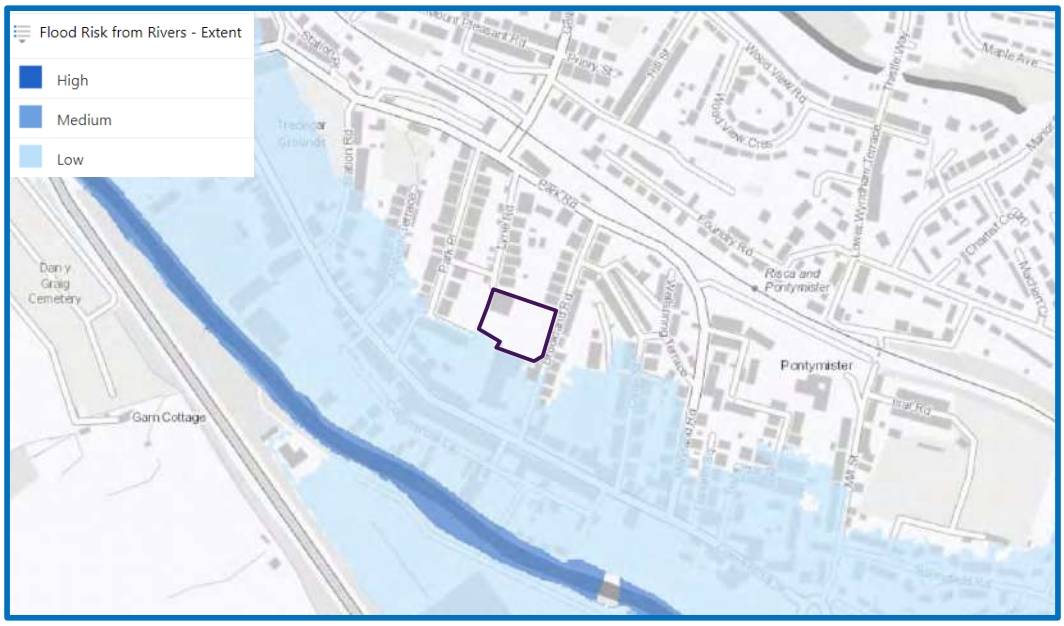
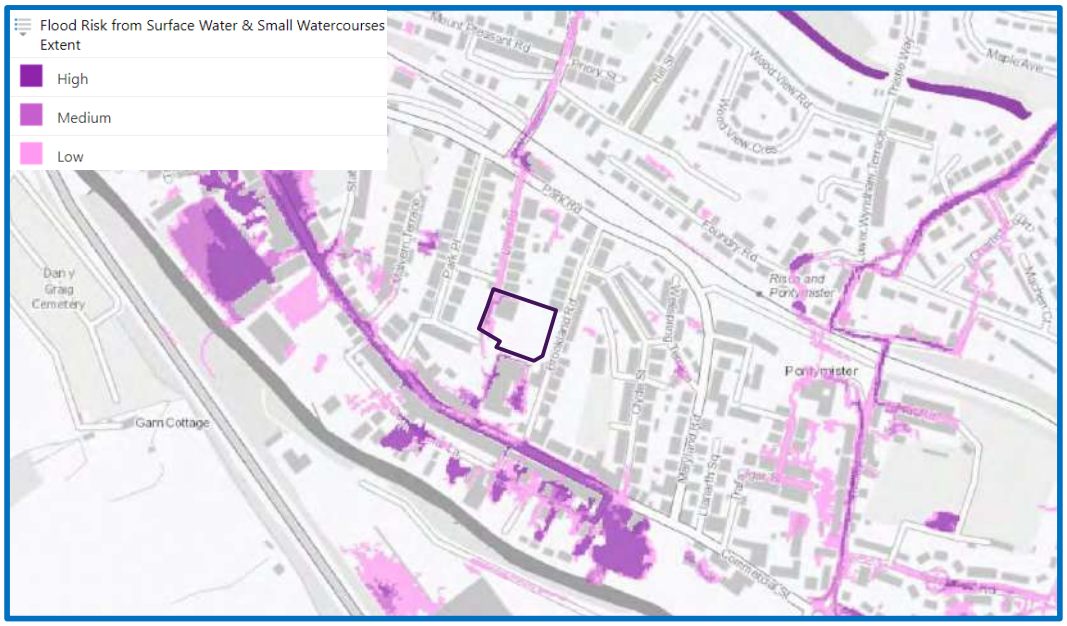


Figure 11. FRAW map of the flood risk from Rivers



Model data

Modelled flood data was requested from NRW and a preliminary pre-application advice was sought. The NRW provided a response which is presented in Appendix D.

As the Site is located within the NRW's fluvial floodplain, modelled flood elevation data was obtained from the NRW and has been used to assess flood risk and to provide recommendations for mitigation for the proposed development.

Defended and Breach modelled flood data from the River Ebbw Integrated Catchment Model (NRW, 2019) has been extracted from grid data at the Site and have been used to assess flood risk[1].

The data has been extracted from the point shown on the map (overleaf) and is provided in tables below and is included within Appendix B. The 2117 climate change scenario has been used as the proposed development is residential and has an estimated life span of 100 years.

Table 3. NRW defended modeled flood level data

Ground levels at the Site 45.23 – 45.95 (mAOD)	Modelled Flood Levels 2017 (mAOD)			
	1 in 30 year	1 in 100 year	1 in 200 year	1 in 1000 year
Flood level (mAOD)	43.92	44.29	44.59	44.99
Flood depths (m)	No Flooding	No Flooding	No Flooding	No Flooding

[1] The accuracy of the modelled flood levels are not known. These are dependent on the accuracy of input datasets such as LiDAR data, used to model the impacts of flooding within the 2D domain. Confirmation of the accuracy of the modelled flood data can be obtained separately from Natural Resource Wales

Figure 12. NRW defended modeled flood level high risk (1 in 30 year)

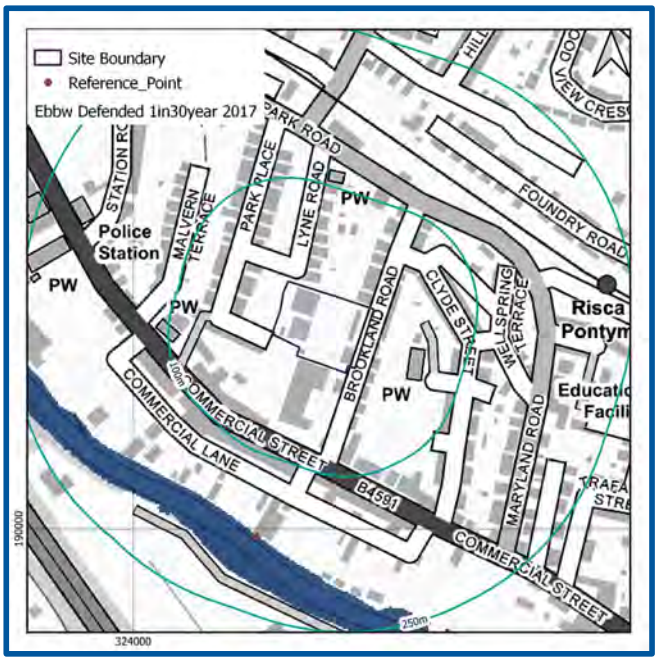


Figure 13. NRW defended modeled flood level medium risk (1 in 100 year)

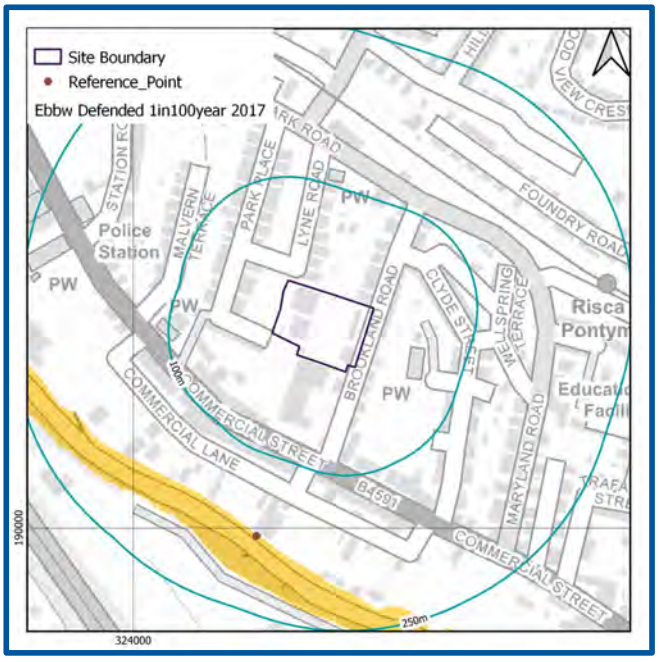
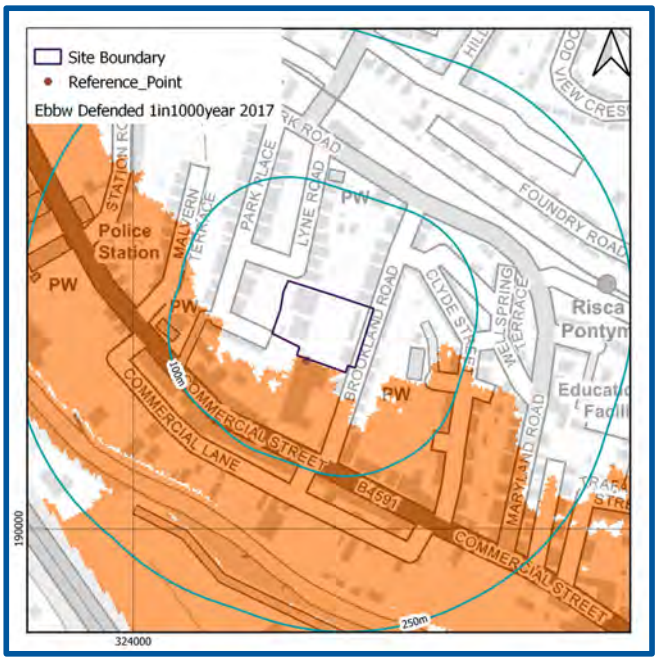


Figure 14. NRW defended modeled flood level low risk (1 in 1000 year)



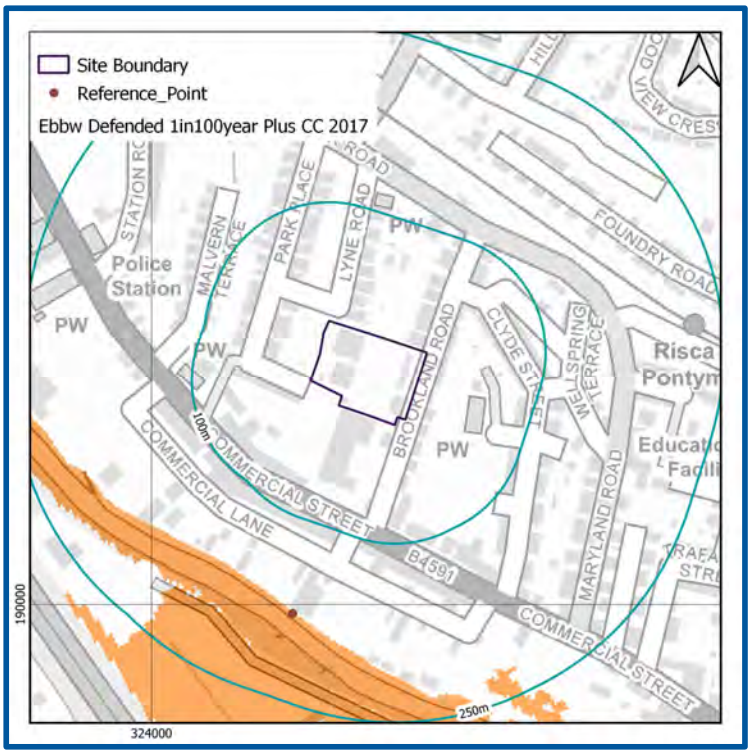
Climate Change factors

In accordance with the Welsh Governments Climate change allowances for planning purposes, CL-09-21 guidance (2021), allowances should be made for increased river levels and flows to proposed development, where applicable. The River Ebbw Integrated Catchment Model (NRW, 2019) provides a 1 in 100 year plus 25% CC flood level, using the central estimate as the change factor.

Table 4. NRW defended modeled flood level data with additional 2122

Ground levels at the Site 45.23 – 45.95 (mAOD)	Modelled 1 in 100 year plus 25% CC flood levels (mAOD)
Flood level (mAOD)	44.70
Flood depths (m)	No Flooding

Figure 15. NRW defended modeled flood level 1 in 100 year plus 25% CC



Surface water (pluvial) flooding

Surface water flooding occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems. It can occur in most locations even at higher elevations and at significant distances from river and coastal floodplains.

According to the National Flood Hazards Map's Flood Risk from Surface Water and Small Watercourses map, there is a Medium risk of pluvial flooding at the Site.

National Flood Hazard – Surface Water and Small Watercourses

Figure 16 shows the Site would not be affected by the 1 in 30 year (high risk) surface water and small watercourses event.

Figure 16. 1 in 30 year (High risk) map for Surface Water and Small Watercourses

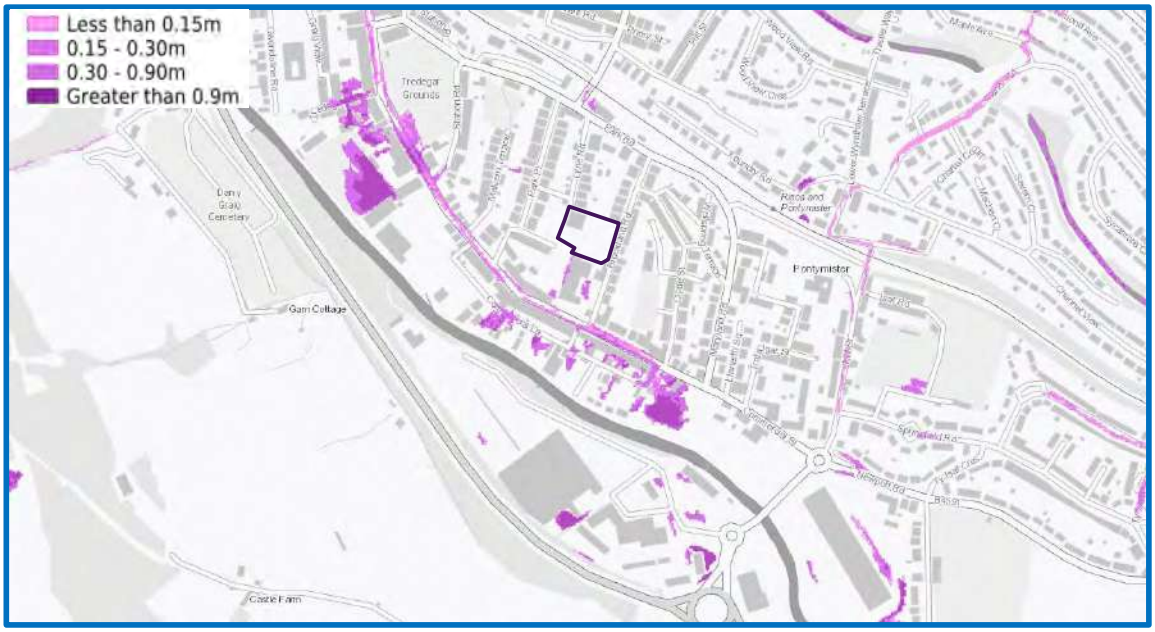


Figure 17 shows the Site would be affected by the 1 in 100 year (medium risk) surface water and small watercourses event. Flood depths would be up to 0.15m, flowing towards the south with velocities of less than 1m/s. This would affect the Site at the northwestern corner, flowing along its western perimeter. The central and eastern areas of the Site would not be impacted by surface water and small watercourses flooding.

Figure 17. 1 in 100 year (medium risk) map for Surface Water and Small Watercourses

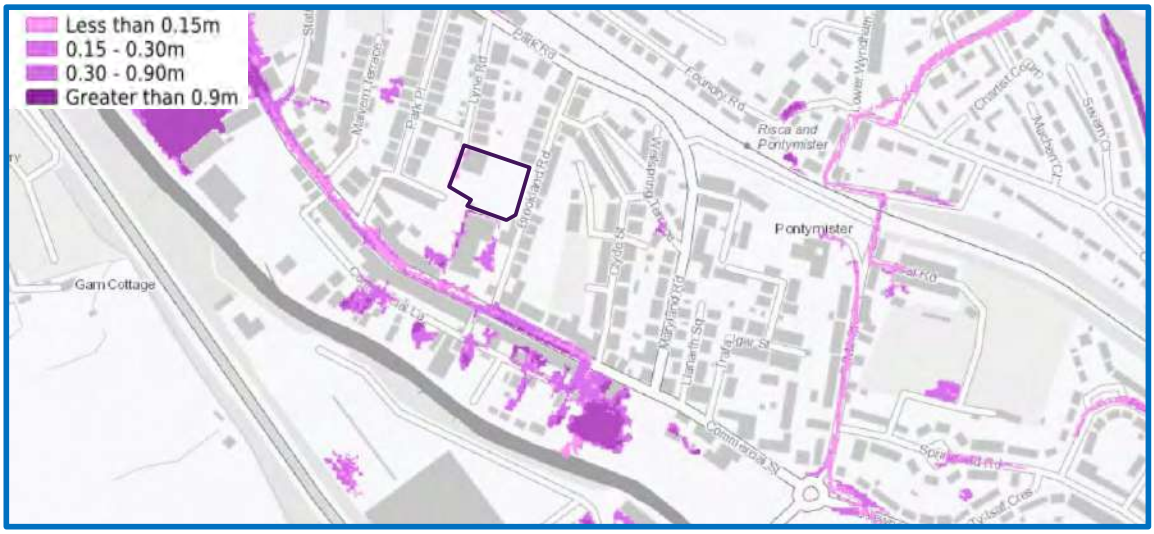


Figure 18 shows the Site would be affected by the 1 in 1000 year (low risk) surface water and small watercourses event. Flood depths would be up to 0.15m, flowing towards the south with velocities of less than 1m/s. This would affect the Site at the northwestern corner, flowing along its western perimeter. The central and eastern areas of the Site would not be impacted by surface water and small watercourses flooding.

Figure 18. 1 in 1000 year (Low risk) map for Surface Water and Small Watercourses

Guidance

According to NRW's surface water flood risk map the Site is at:

- According to NRW's surface water flood risk map, the Site has a Medium risk has a chance of flooding 1 in 100 (1%).

According to Figure 3 of the PFRA, there have been historical requests for unblocking the highway gully and major highway flooding in the area however, due to the coarse scale and dataset, it cannot be determined if this historical event affected the Site or the Site's access roads (Caerphilly, 2011 and PFRA addendum, 2017).

Climate change may lead to an increase in rainfall intensity which affects river levels, land and urban drainage systems. Rainfall intensity for small and urban catchments may increase from 5 % to 20 % (central estimate) or 10 % to 40 % (Upper estimate) over the period to 2115 (NRW, 2022).

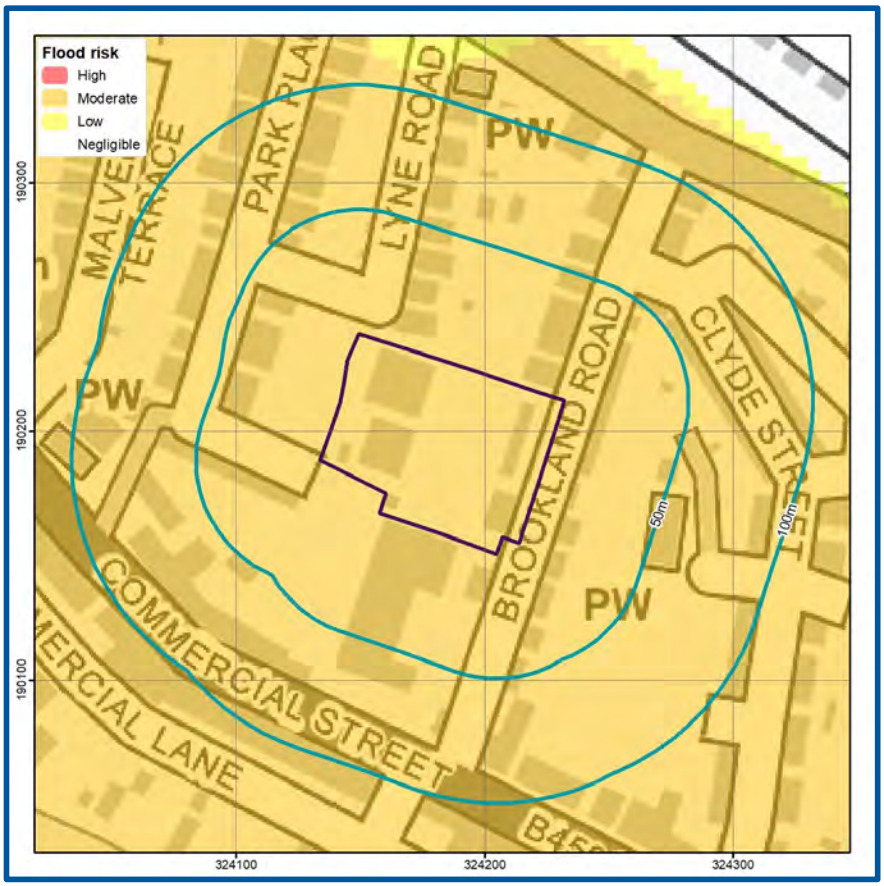
On-Site surface water drainage systems should be designed appropriately to manage the run-off.

Groundwater flooding

Groundwater flooding occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 19) indicates there is a Moderate risk of groundwater flooding at surface in the vicinity from permeable superficial deposits during a 1 in 100-year event.

Figure 19. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2022)



Mapped classes combine likelihood, possible severity and the uncertainty associated with predicting the subsurface system. The map is a national scale screening tool to prompt site-specific assessment where the impact of groundwater flooding would have significant adverse consequences. Mapping limitations and a number of local factors may reduce groundwater flood risk to land and property even where it lies within mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area.

A site-specific assessment has been undertaken to refine the groundwater risk screening information on the basis of site-specific datasets (see Section 3) including the NRW's fluvial floodplain data (where available) to develop a conceptual groundwater model. The risk rating is refined further using the vulnerability of receptors including occupants and the existing and proposed Site layout, including the presence of basements and buried infrastructure. The presence of any nearby or on-Site surface water features such as drainage ditches, which could intercept groundwater have also been considered.

Based on a review of (limited) site specific data groundwater levels may rise in the bedrock and superficial aquifer in response to high river events and high rainfall events.

The SFRA does not record any groundwater flooding at the Site, but does note how in South Wales the presence of floodplain sands and gravels is increasingly associated with groundwater flooding (Caerphilly, 2011).

The hydrogeological characteristics and the borehole records suggest there is potential for a groundwater table within 5mbgl beneath the Site. The SAND and GRAVEL beds are likely to be yielding groundwater which could vertically migrate to the surface through the granular permeable sand and topsoil layers above. Boreholes R79 (ref: ST28NW21) and S89 (ST28NW35) record a groundwater strike within less than 3m of the surface upon encountering the sand and gravel beds (BGS, 2022).

Groundwater levels may rise in the bedrock and superficial aquifer in response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years, subject to hydraulic continuity between the groundwater system and the Site.

Spring lines can give rise to groundwater seepage, although a spring line has not been identified in the vicinity of the Site. Spring lines have been identified within 400m of the Site, but due to the distance from the Site, the risk from spring lines has been determined unlikely.

On the basis of the site-specific assessment the groundwater flood risk is considered to be Moderate.

The risks are higher for basements (their inclusion is unknown at this stage), buried infrastructure and soak-away systems which may be affected by high groundwater levels. This should be considered when formulating a SuDS strategy for development

Guidance
Moderate Risk - There will be a significant possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. Rainfall recharge patterns will vary regionally resulting in changes to average groundwater levels. A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment. Sea level rises of between 0.4m and 1m are predicted by 2100, leading to a rise in average groundwater levels in the adjacent coastal aquifer systems, and potential increases in water levels in the associated drainage systems. The 'backing up' of groundwater levels from both coast and tidal estuary locations may extend a significant distance inland and affect infrastructure previously constructed above average groundwater levels.

The impact of climate change on groundwater levels beneath the Site is linked to the predicted risk in both peak river and the variation in rainfall recharge which is uncertain.

Based on the available evidence the resulting increase to groundwater flood risk will be mitigated by the proposed measures.

Flooding from artificial sources

Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs (and associated water supply infrastructure), docks, sewers and canals. The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, sewer, canal, flood storage areas, etc.)

Sewer flooding

Figure 4 of the PFRA has identified a low risk of sewer flooding with the area but due to the coarse dataset, this cannot be used to determine wherever any sewer flooding has occurred at the Site (Caerphilly, 2011 and PFRA addendum, 2017). It is advisable to contact the local water company (Dwr Cymru Welsh Water) to obtain more recent flooding events that may have occurred at or in close proximity to the Site.

Guidance

Properties classified as "at risk" are those that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system either once or twice in the ten year reference period. Records held by the sewage utility company provide information relating to reported incidents, the absence of any records does not mean that the Site is not at risk of flooding.

Culverts and bridges

The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage and percolation leading to failure of earth embankments or other structures. Debris accumulations can change flow patterns, leading to scour, sedimentation or structural failure.

Bridges have been identified within 500 m of the Site, as follows:

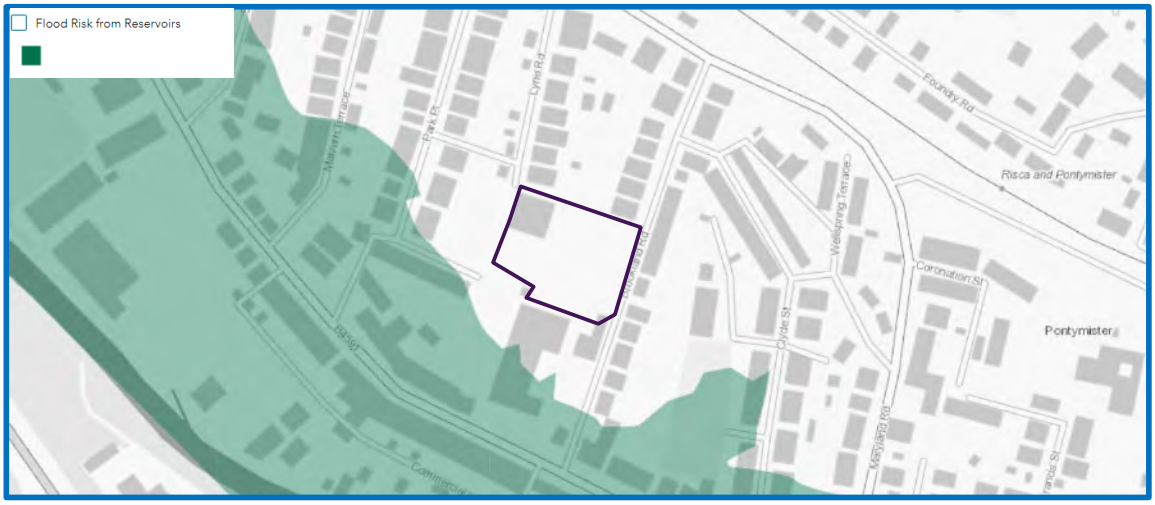
- The Monmouthshire and Brecon Canal is located approximately 420m northeast to the northern boundary of the Site.
- A footbridge spans over the Ebbw River is located approximately 325m southeast to the southern boundary of the Site.
- A road bridge B4591 spans over the Ebbw River is located approximately 450m southeast to the southern boundary of the Site.
- A road bridge Dan Y Graig Road spans over the Ebbw River is located approximately 600m northwest to the northern boundary of the Site.

It is likely that these bridges would not cause a blockage issue to the Site because to the topography difference within the valley.

Reservoir flooding

According to the NRW's Risk of Flooding from Reservoir mapping the Site is not at risk of flooding from reservoirs but land directly adjacent to the south is at risk from Blaen-y-cwm and Pen-y-Fan Pond reservoirs (NRW, 2021).

Figure 20. Flood risk from reservoirs (NRW, 2022)



Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 m^3 of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (NRW, 2022).

Water supply infrastructure

Water supply infrastructure is comprised of a piped network to distribute water to private houses or industrial, commercial or institution establishments and other usage points. In urban areas, this represents a particular risk of flooding due to the large amount of water supply infrastructure, its condition and the density of buildings. The risks of flooding to properties from burst water mains cannot be readily assessed.

If more information regarding the condition and history of the water supply infrastructure within the vicinity of the Site is required, then it is advisable to contact the local water supplier (Dwr Cymru Welsh Water).

Canal failure

According to Ordnance Survey (OS) mapping, there are no canals within 500 m of the Site.

5. Flood risk from the development

Floodplain storage

The development is located within a fluvial Flood Zone 2 and DAM Zone B. However the River Ebbw Integrated Catchment Model (NRW, 2019) shows the Site is not affected by the 1 in 100 year plus 25% climate change event. The built footprint would not displace flood water therefore the proposed built footprint would not displace water.

Drainage and run-off

The proposed development involves a change of impermeable surfaces at the Site. An estimation of run-off is therefore required to permit effective Site water management and prevent any increase in flood risk to off-Site receptors from the Site.

The potential surface water run-off generated from the Site during a 1 in 100 year return period should be calculated, using FEH 2013 rainfall data from the online Flood Estimation Handbook (FEH), developed by NERC (2009) and CEH (2016).

The NPPF (2021) recommends the effects of climate change are incorporated into FRA's and the recently updated climate change guidance (published in 2016 and updated in 2021) confirms the requirements for inclusion within FRA's.

As the proposed development is being changed to residential, the lifespan of the development and requirements for climate change should allow up to the 2115 scenario.

Table 5. Climate change rainfall allowances

Severn river basin district	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Upper end	10%	20%	40%
Central	5%	10%	20%

A separate assessment of surface water runoff is required, as the Statutory requirements in Wales are to include a SuDS strategy, where development proposals are greater than 100m^2 in size. This is to ensure surface water runoff is managed in accordance with the Welsh Statutory requirements over the lifetime of the proposed development.

6. Suitability of the proposed development

The information below outlines the suitability of proposed development in relation to national and local planning policy.

National policy and guidance

The aims of the national planning policies TAN15 (2004) and PPW (2021) are achieved through application of the Justification Test and by assessing Flood Consequences. The key requirements of these are outlined below:

Guidance

Justification Test: New developments should be directed away from Zone C and towards suitable land in Zone A, otherwise Zone B, where river or coastal flooding will be less of an issue. In Zone C the tests outlined in sections 6 and 7 of TAN15 will be applied, recognizing, however, that highly vulnerable development and Emergency Services in Zone C2 should not be permitted. All other new development should only be permitted within Zones C1 and C2 if determined by the planning authority to be justified in that location.

Assessing Flood Consequences: If a development proposal in Zone C1, or in C2 and if it is defined as being of low vulnerability, it would meet the test outlines in section 6, however it should be noted that those developments would be more likely to flood and appropriate mitigation would need to be planned accordingly. This section applies to Zone C, and those parts of Zone B where flooding has been identified as a material consideration to allow for localised problems.

Assessing whether a development should proceed or not will depend upon whether the consequences of flooding of that development can be managed and reduced to a level which is acceptable for the nature/type of proposed development, including its effects on existing development.

The proposed Site use is residential, classified as "Highly Vulnerable" development. The Site is located with the Development Advice Map (DAM) Zone B.

Table 6. Flood risk vulnerability and flood zone compatibility (taken from TAN15, 2004)

DAM Zone	Development Type	Planning Requirements	Acceptability Criteria	Development Advice
A	Emergency Services, highly vulnerable development, less vulnerable	• Justification test not applicable • Refer to surface water requirements	No increase in flooding elsewhere	No constraints relating to river or coastal flooding, other than to avoid

	development, other			increasing risk elsewhere
B	Emergency services & Highly vulnerable development	• If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further • Refer to surface water requirements	• Acceptable consequences for nature of use • Occupiers aware of flood risk • Escape/Evacuation routes present • Effective flood warning provided • Flood emergency plans and procedures • Flood resistant design • No increase in flooding elsewhere	Generally suitable for most forms of development. Assessments where required, are unlikely to identify consequences that cannot be overcome or managed to an acceptable level. It is unlikely, therefore, that these would result in a refusal of planning consent on the grounds of flooding.
	Less vulnerable development		• Occupiers aware of flood risk • No increase in flooding elsewhere	
	Other	Refer to surface water requirements	No increase in flooding elsewhere	
C1	Emergency services, highly vulnerable development, less vulnerable development	• Application of justification test including acceptability of consequences • Refer to surface water requirements	• Acceptable consequences for nature of use • Flood defences adequate • Agreement for construction and maintenance costs secured • Occupiers aware of flood risk • Escape/evacuation routes present • Effective flood warning provided • Flood emergency plans and procedures • Flood resistant design • No increase in flooding elsewhere	Plan allocations and applications for all development can only proceed subject to justification in accordance to section 6 of TAN 15 and acceptability of consequences in accordance to section 7 and Appendix 1 of TAN 15

	Other	• Application of acceptability of consequences (TAN 15 section 7 and Appendix 1) • Refer to surface water requirements	• Acceptable consequences for nature of use • Occupiers aware of flood risk • Desirable if effective flood warning and evacuation routes/procedure provided depending on nature of proposal • No increase in flooding elsewhere	Plan allocations and applications for development should only be made if considered acceptable in accordance with section 7 and Appendix 1 of TAN 15
C2	Emergency services, highly vulnerable development	The flooding consequences associated with Emergency Services and highly vulnerable developments are not considered to be acceptable. Plan allocations should not be made for such developments and planning applications not proposed		
	Less vulnerable development	• Application of justification test (section 6 of TAN 15), including acceptability of consequences (section 7 and Appendix 1 of TAN 15) • Refer to surface water requirements	• Acceptable consequences for nature of use • Flood defences adequate • Agreement for construction and maintenance costs secured • Occupiers aware of flood risk • Escape/evacuation routes present • Effective flood warning provided • Flood emergency plans and procedures	Plan allocations or applications for less vulnerable development can only proceed subject to justification in accordance with section 6 of TAN 15 and acceptability of consequences in accordance with section 7 and Appendix 1 of TAN 15
	Other	• Application of acceptability of consequences (section 7 and Appendix 1 of TAN 15) • Refer to surface water requirements	• Flood resistant design • No increase in flooding elsewhere • Acceptable consequences for nature of use • Occupiers aware of flood risk • Effective flood warning provided	Plan allocations and applications for development should only be made if considered acceptable in accordance with section 7 and Appendix 1 of TAN 15.

			• No increase in flooding elsewhere	

The Site is not required to undertake the Justification Test.

Natural Resources Wales Flood Risk Standing Advice for Sites located in Flood Zones 2 or 3

We are aware there are no new proposals however, the following has been included if development on Site is ever to occur.

For all relevant vulnerable developments (i.e. more vulnerable, less vulnerable and water compatible), advice on the points should be followed:

- Surface water management;
- Access and evacuation; and
- Floor levels.

Surface water management

Plans for the management of surface water need to meet the requirements set out in either the local authority's:

- Surface water management plan where available; OR
- Strategic flood consequence assessment.

They also need to meet the requirements of the approved building regulations Part H: drainage and water disposal. Read section H3 rainwater drainage.

Planning permission is required to use a material that can't absorb water (e.g. impermeable concrete) in a front garden larger than 5 square metres.

Access and evacuation

Details of emergency escape plans should be provided for any parts of a building that are below the estimated flood level:

Plans should show:

- Single storey buildings or ground floors that don't have access to higher floors can access a space above the estimated flood level, e.g. higher ground nearby;
- Basement rooms have clear internal access to an upper level, e.g. a staircase; and
- Occupants can leave the building if there's a flood and there's enough time for them to leave after flood warnings.

Floor levels

The following should be provided:

- Average ground level of the building; and
- Finished floor level of the lowest habitable room in the building.

Ground floor levels should be a minimum of whichever is higher of:

- 300 millimetres (mm) above the general ground level of the site; OR
- At least 600 mm above the estimated river or sea flood level.

7. Resilience and mitigation

Based on the flood risk identified at the Site, the national and local policies and guidance and proposed development, the mitigation measures outlined within this section of the report are likely to help protect the development from flooding.

Sea (coastal/tidal) flood mitigation measures

As the Site is not identified as being at risk of flooding from the sea, mitigation measures are not required.

Rivers (fluvial) flood mitigation measures

As the Site is not identified as being at risk of flooding from the sea, mitigation measures are not required.

Table 7. NRW modeled flood level data

Ground levels at the Site 45.23 – 45.95 (mAOD)	Modelled Flood Levels 2017 (mAOD)			
	1 in 30 year	1 in 100 year	1 in 200 year	1 in 1000 year
Flood level (mAOD)	43.92	44.29	44.59	44.99
Flood depths (m)	No Flooding	No Flooding	No Flooding	No Flooding

Table 8. NRW modeled flood level data with additional 2122 calculation

Ground levels at the Site 45.23 – 45.95 (mAOD)	Modelled 1 in 100 year plus 25% CC flood levels (mAOD)
Flood level (mAOD)	44.70
Flood depths (m)	No Flooding

Surface water (pluvial) flood mitigation measures

A Medium surface water (pluvial) flooding risk has been identified at the Site. In order to ensure the development includes sufficient flood mitigation measures to reduce the risk of pluvial flooding over its lifetime, the flood depths, levels and appropriate mitigation measures are summarised below:

Table 9. NRW surface water and small water courses mapped flood depths

Flood event	Flood depth (m)
1 in 30	No Flooding
1 in 100	Up to 0.15
1 in 1000	Up to 0.15

Raising minimum floor levels

It is therefore recommended that the finished floor levels (FFL) are raised 0.15m above ground level to reduce the Very Low to Medium surface water and small watercourses (pluvial) flood risk to Very Low.

Additional Mitigation

In addition, the regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.

A separate assessment of surface water runoff is required, as the Statutory requirements in Wales are to include a SuDS strategy, where development proposals are greater than 100m^2 in size. This is to ensure surface water runoff is managed in accordance with the Welsh Statutory requirements over the lifetime of the proposed development.

Groundwater flood mitigation measures

It is likely the flood mitigation measures recommended for surface water (pluvial) risk will be sufficient to reduce the groundwater flood risk at the development from Moderate to Low.

However specific groundwater measures that may also be considered for the Low risk identified include:

- Waterproof tanking of the ground floor;
- Interceptor drains;
- Automatic sump to extract flood water;
- Non-return flap valves on the proposed foul and surface water sewer lines.

If these mitigation measures are implemented this could reduce the flood risk to the development from Low to Negligible.

Reservoir flood mitigation measures

The Site is not a risk of flooding from reservoirs; therefore, mitigation measures are not required.

Other flood risk mitigation measures

There are a number of bridges and culverts in the surrounding area however the risk to the Site has been considered Low.

Residual flood risk mitigation measures

The risk to the Site has been assessed from all sources of flooding and appropriate mitigation and management measures proposed to keep the users of the development safe over its lifetime. There is however a residual risk of flooding associated with the potential for failure of mitigation measures if regular maintenance and upkeep isn't undertaken. If mitigation measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

Further flood mitigation information

More information on flood resistance, resilience and water entry can be found here: http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

www.knowyourfloodrisk.co.uk

Emergency evacuation - safe access / egress and safe refuge

Emergency evacuation to land outside of the floodplain should be provided if feasible. Where this is not possible, 'Highly Vulnerable' developments and, where possible, development in general, should have internal stair access to an area of safe refuge within the building to a level higher than the maximum likely water level. An area of safe refuge should be sufficient in size for all potential users and be reasonably accessible to the emergency services.

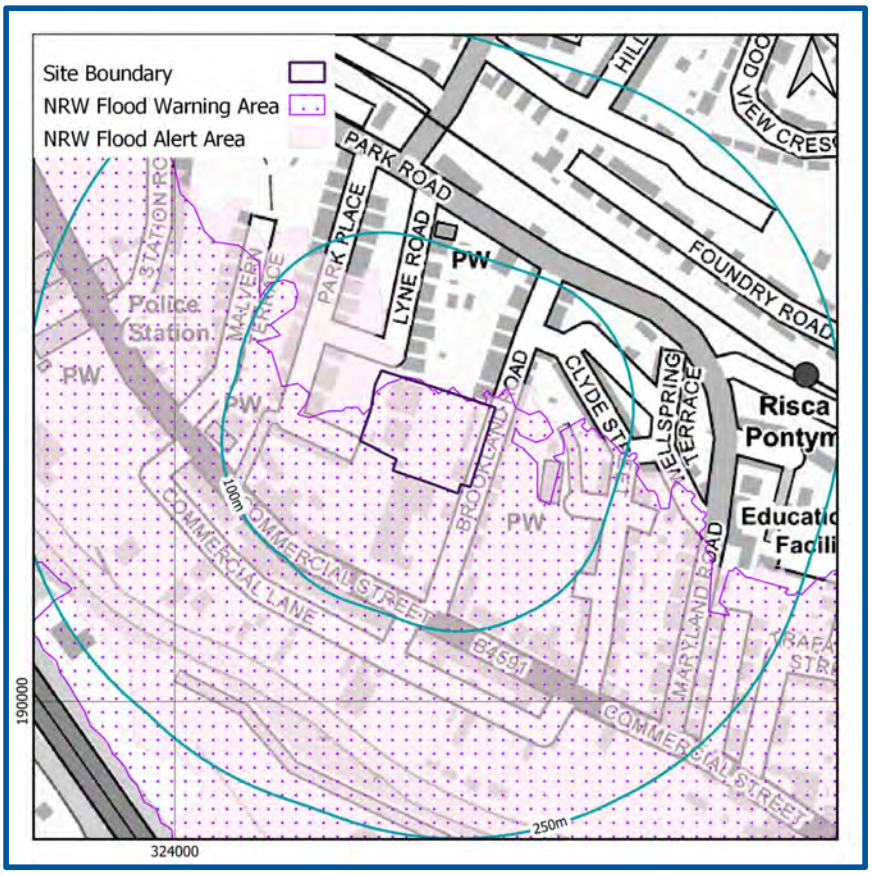
Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of occupants and preferred evacuation routes.

Flood warnings

The NRW operates a flood warning service in all areas at risk of flooding; this is available on their website: https://www.gov.uk/check-flood-risk. The Site is located within an NRW Flood Alerts and Warning coverage area so is able to receive alerts and warnings (Figure 21). All warnings are also available through the NRW's 24 hour Floodline Service 0345 988 1188 (quick dial 197307).

The NRW aims to issue Flood Warnings 2 hours in advance of a flood event. Flood Warnings can provide adequate time to enable protection of property and evacuation from a Site, reducing risk to life and property.

Figure 21. NRW Flood Warning Coverage for the local area (NRW, 2022).



Emergency evacuation

Where possible, a safe access and egress route with a 'Very Low' hazard rating from areas within the floodplain to an area wholly outside the 1 in 100 year flood event including an allowance for climate change should be demonstrated.

Based on the NRW's Flood Zone Map the closest dry evacuation area within Flood Zone 1 is along the access road in a northern direction. It is advised that evacuation from the premises would be the preferred option in a flood event if safe to do so. It is recommended that residents prepare to evacuate as soon as an NRW Flood Warning is issued in order to completely avoid flood waters.

On-Site refuge

Evacuation should be the primary action in preference; however, safe refuge could be sought at loft level in a worst-case scenario within residential areas.

Other relevant information

A Flood Warning and Evacuation Plan (FWEP) is recommended, and Site Management teams and occupants will be signed up to receive NRWs Flood Alerts and Warnings.

Registration to the Natural Resource Wales flood warning scheme can be done by following this link: https://www.gov.uk/sign-up-for-flood-warnings.

It is recommended that main communication lines required for contacting the emergency services, electricity sockets/meters, water supply and first aid stations and supplies are not compromised by flood waters. Where possible these should all be raised above the extreme flood level.

8. Conclusions and Recommendations

Site analysis

Source of Flood Risk	Baseline	After Mitigation
River (fluvial) flooding	Very Low	N/A
Sea (coastal/tidal) flooding	Negligible	N/A
Surface water (pluvial) and small watercourses flooding	Very Low to Medium	Very Low
Groundwater flooding	Moderate	Negligible
Other flood risk factors present	Yes	N/A
Is any other further work recommended?	Yes	No

N/A = mitigation not required

Providing the recommended mitigation measures are put in place (see previous sections) it is likely that flood risk to this Site will be reduced to an acceptable level.

The table below provides a summary of where the responses to key questions are discussed in this report.

Summary of responses to key questions in the report

Key sources of flood risks identified	Pluvial, groundwater (see Section 4).
Are standard mitigation measures likely to provide protection from flooding to/from the Site?	Yes (see Section 7).
Is the development likely to satisfy the requirements of the Justification Test?	N/A (see Section 6)
Is any further work recommended?	Yes

9. References and glossary

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Welsh Government (2004). Technical Advice Note 15: Development and Flood Risk.

Welsh Government (2021). Technical Advice Note 15: Development, Flooding and Coastal Erosion.

Glossary

General terms

BGS	British Geological Survey
NRW	National Resource Wales
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.
SFCA	Strategic Flood Consequence Assessment. This is a brief flood risk assessment provided by the local council

SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Secondary A aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary undifferentiated	Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type.
Unproductive Strata	These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

Data Sources

Aerial Photography	Contains Ordnance Survey data © Crown copyright and database right 2022 BlueSky copyright and database rights 2022
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water	Natural Resource Wales copyright and database rights 2022

Features/Reservoir/ Flood Alert & Warning)	Ordnance Survey data © Crown copyright and database right 2022
Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2022) Contains British Geological Survey materials © NERC 2022 Ordnance Survey data © Crown copyright and database right 2022
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2022
Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2022 Natural Resource Wale copyright and database rights 2022

10. Appendices

GeoSmart Information

Appendix A

Site plans

	House Types	Numbers	Percentage	Desired Mix %
Affordable	Later Living Flat	14	48%	38-46%
	1 Bed Flat	4	14%	15-19%
	2 Bed	8	28%	27-29%
	3 Bed	3	10%	12-14%
Total	Total	29		

Site Boundary

N

NOTES:

NOT FOR SITE PURPOSES: This drawing is a general arrangement plan only and is not intended for site purposes.

SCALE: Do not scale from this drawing.

SETTING OUT: All setting out, levels, dimensions to be agreed on site. Do not use the information on this drawing without checking all dimensions on site. Any discrepancies between drawings, specifications and site works are to be reported to The Urbanists. Order of construction and setting out is to be agreed on site.

CHECK: This drawing must be the latest revision, read in conjunction with all other drawings, details, specifications and schedules. All dimensions are in millimetres unless otherwise stated. Where and contradicition or uncertainty arises between the drawings and/or the schedule of works, it is the contractor's responsibility to seek verification from The Urbanists before proceeding. No claims will be met by The Urbanists, where the contractor continues work in absence of such confirmation.

No.	Date	By	Revision Notes
A	11/03/2022	DR	Layout amended to accomodate updated mix

PROJECT STATUS:

Candidate Site Submission

the urbanists
planning & design

Client: Caerphilly County Borough Council

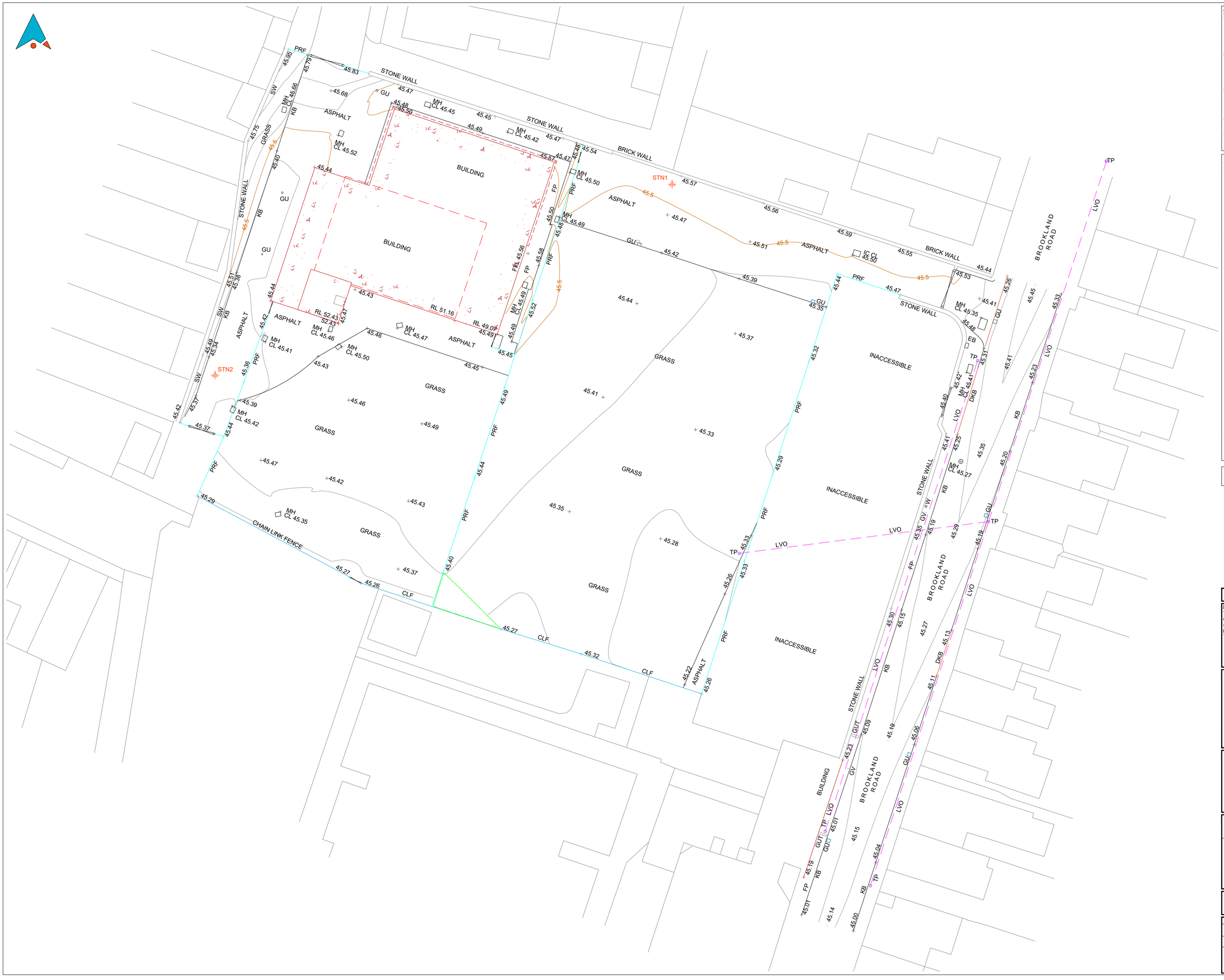
Project: Caerphilly Homes Candidate Sites

Title: Brookland Road, (GF05) - Capitiocy Plan

Project ID	Organiser	Role	Block	Level	Type	Series	Dwg	Rev.	Status
1964	URB	PL	XX	XX	SK	XX	01	A	Candidate Site Submission

Drawn DR Date 11/03/2022 Checked LH Scale 1:500 @ A4

The Urbanists - The Creative Quarter - 8A Morgan Arcade - Cardiff - CF10 1AF
T: 029 2023 6133 E: info@theurbanists.net W: www.theurbanists.net



GENERAL NOTES

1. The contractor is to check and verify all buildings and site dimensions and levels, including existing sewer invert levels, before works start on site. The contractor is to comply in all aspects with the current building legislation, British Standards, building regulations etc.
2. Positions of existing services/statutory undertakers apparatus adjacent to or crossing proposed excavations are to be checked by the contractor prior to starting work. Utility locations shown are to be verified by the contractor prior to commencement of work.
3. This drawing is to be read in conjunction with and checked against all other drawings, engineering details, specifications and any structural, geotechnical or other specialist document provided.
4. Any anomaly or contradictions between any of the above is to be reported immediately to Corner Point Surveys Ltd.
5. The topographical survey has been undertaken to OSTN15 and located to OS Grid and Datum using GPS instrumentation.

LEGEND

BUILDING		DRAIN	DR
CANOPY	CPY	DROP KERB	DKB
DOORLINE	DRL	EARTH ROD	ER
DOWNPIPE	DP	ELECTRICITY BOX	EB
EAVES	EV	FIRE HYDRANT	FH
GUTTER	GUT	FOOTPATH	FP
RIDGE	RG	GAS VALVE	GV
ROOF LINE	RFL	GULLY	G
VENT PIPE	VP	HIGH VOLTAGE OVERHEAD	HVO
WINDOW LINE	WDL	INSPECTION CHAMBER	IC
		KERB BOTTOM	KB
BOUNDARIES		KERB OUTLET	KO
ARMCO BARRIER	AB	LAMP POST	LP
BARRIER	BAR	LOW VOLTAGE OVERHEAD	LVO
BRICK WALL	BW	MANHOLE	MH
CHAIN LINK FENCE	CLF	REFLECTOR POST	RP
CLOSE BOARD FENCE	CBF	ROAD SIGN	RS
CONCRETE PANEL	CPF	SLOT DRAIN	SDR
CORRUGATED IRON	CIF	STOP TAP	ST
GABION WALL	GW	TACTILE PAVING	TPV
GATE		TELECOM POST	TP
GRATED HEADWALL	GHW	TRAFFIC LIGHT	TL
HEADWALL	HW	WATER METER	WM
HOARDING / HERAS	HF		
INTERNAL WALL	IW	**STRUCTURE**	
PALISADE FENCE	PF	BUS SHELTER	BS
PARTITION WALL	PW	COLUMN	COL
POST & RAIL FENCE	PRF	CONCRETE PLINTH	CP
POST & WIRE FENCE	PWF	CONTAINER	CONT
RETAINING WALL	RW	RAMP	RMP
STONE WALL	SW		
		GENERAL	
TOPOGRAPHY		APPROXIMATE	~
BANK BASE	BB	BED LEVEL	BL
BANK TOP	TB	CONTROL STATION	
CLUSTER TREE	CLT	COVER LEVEL	CL
HEDGE	HE	DIAMETER	Ø
TREE		EAVES LEVEL	EL
TRUNK DIA / SPREAD	X.X / X	FINISHED FLOOR LEVEL	FFL
VEGETATION	VEG	HEIGHT	HT
WATERCOURSE	WC	INVERT LEVEL	IL
		RIDGE LEVEL	RL
FURNITURE		SOFFIT LEVEL	SL
ACO DRAIN	ADR	SPOT LEVEL	+ X.XX
BOLLARD	BD	UNABLE TO LIFT	UTL
BT MANHOLE	BT	UNABLE TO SURVEY	UTS
CABLE TV	CATV	WATER LEVEL	WL

CONTROL STATIONS

STN1	324194.621	190223.014	45.533
STN2	324141.288	190200.747	45.342

Rev	Date	Description	By

Dimensions to be verified on site.
This drawing should not be scaled. Use figured dimensions only
Any discrepancies should be referred to the Engineer prior to work being put in hand.

THE SURVEY ASSOCIATION
ASSOCIATE MEMBER

Corner Point Surveys Limited
Columbus House, Village Way
Greenmeadow Business Park
Cardiff
CF15 7NE

029 22 800 100
contactus@cornerpointsurveys.co.uk
www.cornerpointsurveys.co.uk

Client: CAERPHILLY COUNTY BOROUGH COUNCIL / CYNGOR BWRDEISTREF SIROL CAERFFILI

Project: BROOKLAND ROAD, RISCA

Title: TOPOGRAPHICAL SURVEY

Drawing Status: INFORMATION

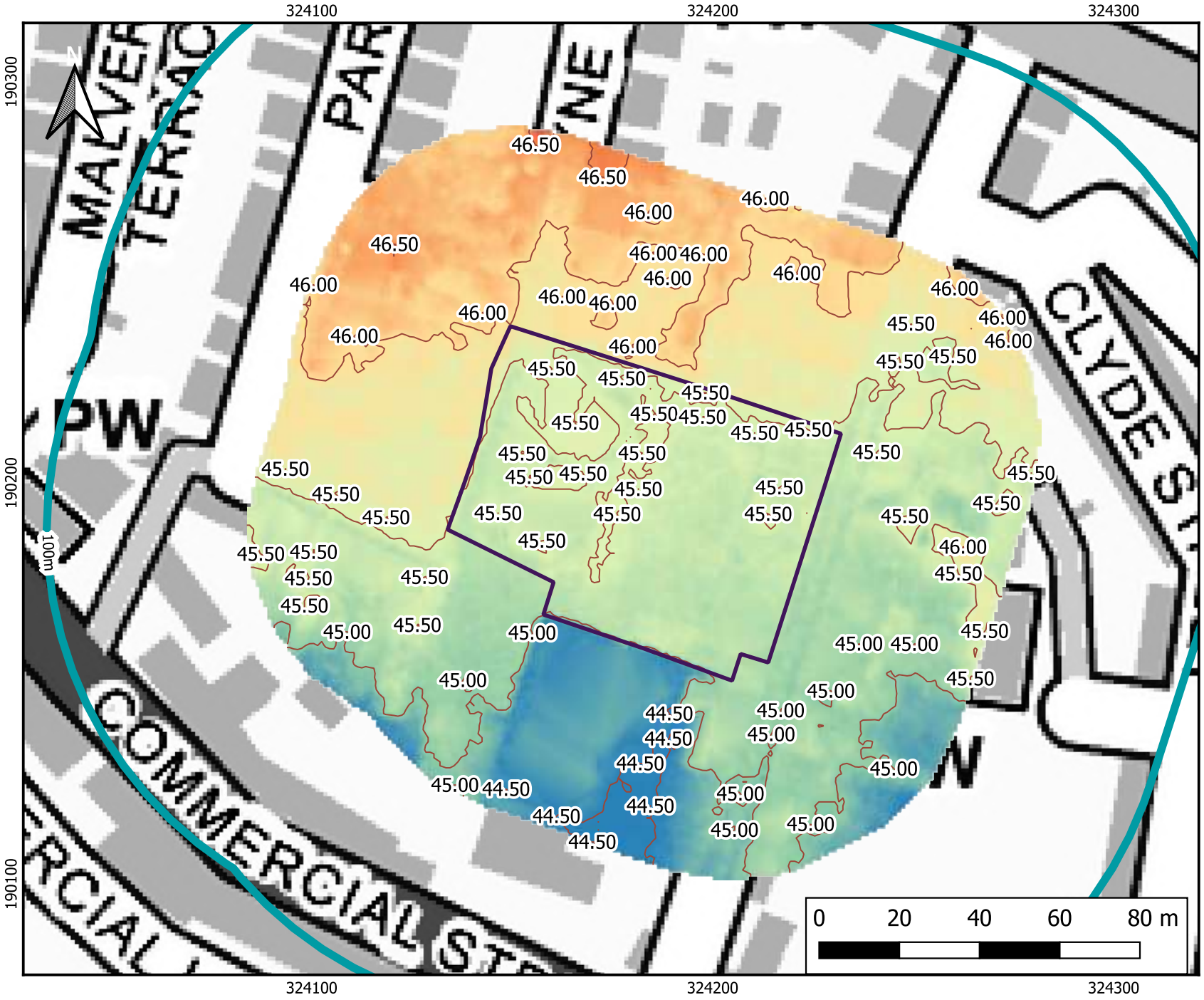
Surveyed by	Processed by	Checked by	Date	Scales @ A1 size
JPW	JPW	ACV	JAN22	1:200
Project No		Drawing No		Revision
S21113		001		

File name: S21113 - DP26 Brookland Road - Topographical Survey.dwg

GeoSmart Information

Appendix B

NRW data



Elevation on Site (LiDAR Data)

Legend

- Site Boundary

Elevation (mAOD)

- 44.5000
- 45.0000
- 45.5000
- 46.0000
- 46.5000
- 47.0000

Date 17/05/2022	Drawn
Scale 1:1,341.90649	Checked
Original	Revision
File Reference	

FIGURE 3 - CCBC FLOODING INCIDENTS & HISTORIC FLOODING EVENTS

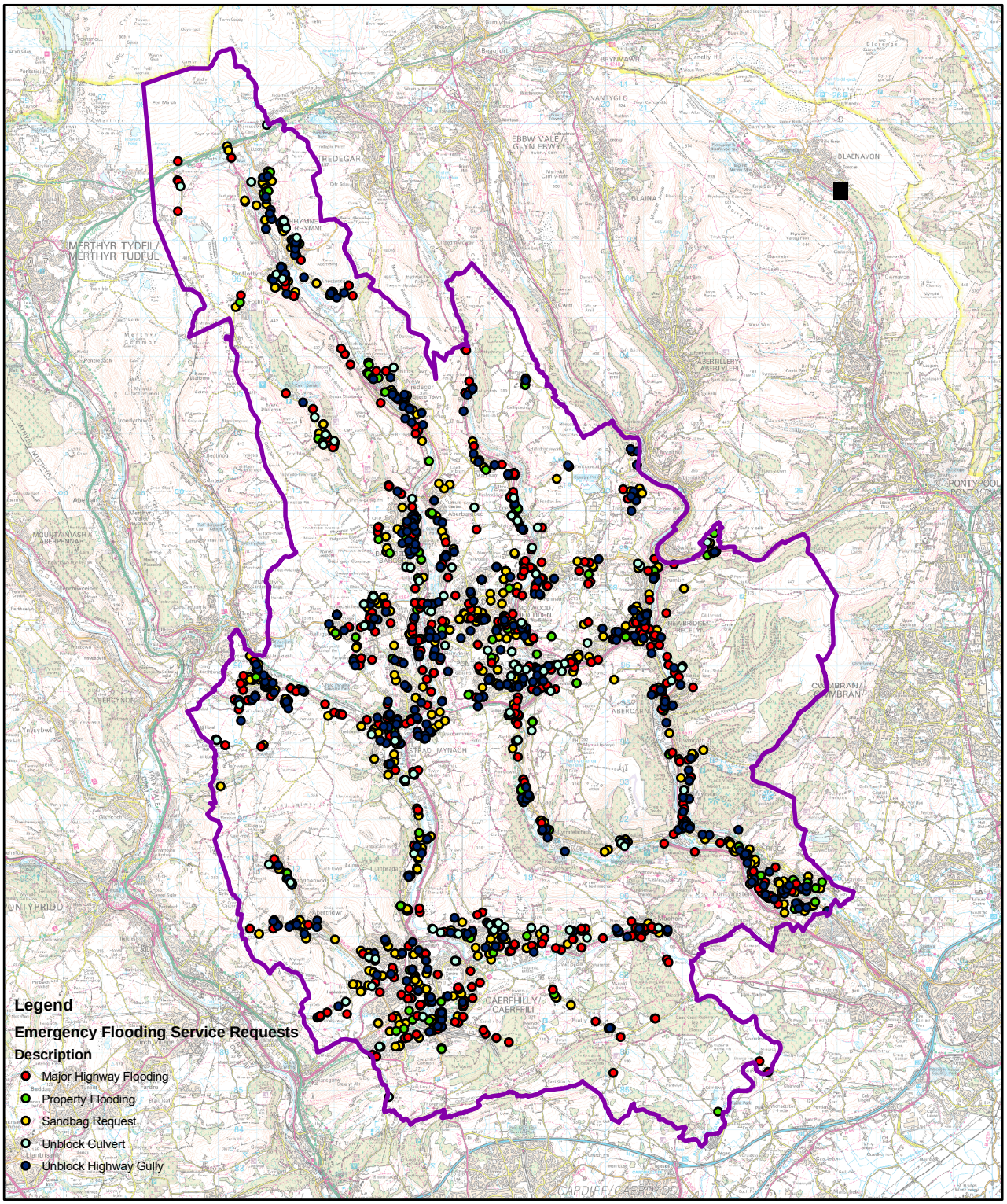
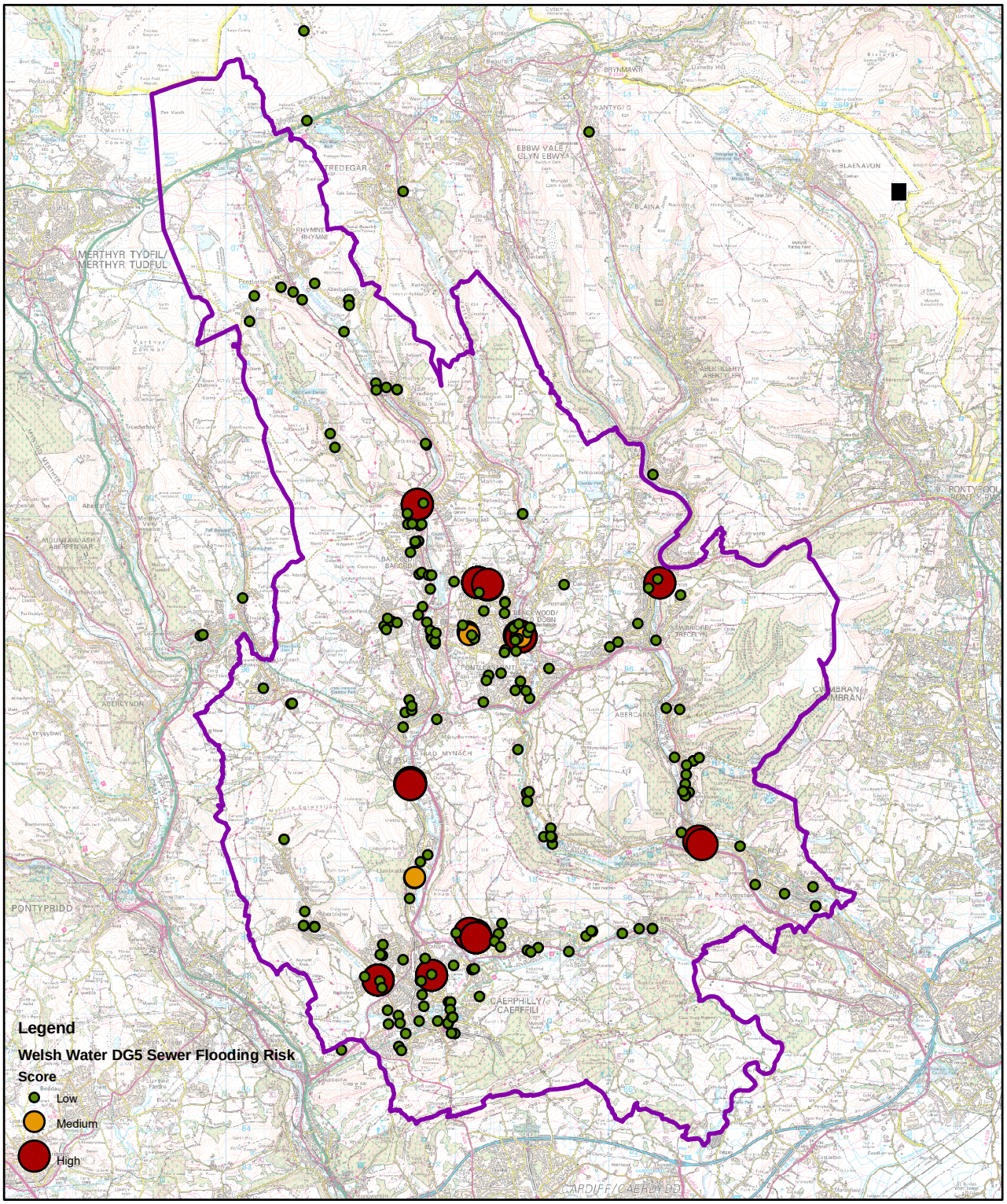


FIGURE 4 - CCBC SEWER FLOODING EVENTS



GeoSmart Information

Appendix C

Natural Resource Wales Comment

Cyfoeth Naturiol Cymru
Natural Resources Wales

Ein cyf/Our ref: CAS-186761-R0L7

Rivers House,
St Mellons Business Park,
St Mellons,
Cardiff,
CF3 0EY

ebost/email:
southeastplanning@cyfoethnaturiolcymru.gov.uk

Jasmine Spender
GeoSmart Information Ltd

29/04/2022

Annwyl Syr/Madam / Dear Sir/Madam

PRELIMINARY PRE-APPLICATION ADVICE

BWRIAD / PROPOSAL: THE EXISTING BUILDING TO THE WESTERN BOUNDARY OF THE SITE SHALL BE DEMOLISHED AND REPLACED WITH A PROPOSED RESIDENTIAL EVELOPMENT OF CIRCA 30 HOUSES, SITUATED ON THE FORMER BUILDING FOOTPRINT AND FRONTING CARPARK.

LLEOLIAD / LOCATION: (RISCA YOUTH AND COMMUNITY CENTRE) BROOKLAND ROAD, RISCA NP11 6AT

Thank you for consulting Cyfoeth Naturiol Cymru / Natural Resources Wales about the above pre-application enquiry, which we received on 11th April 2022.

We have considered your enquiry in relation to our Development Planning Consultations Topics document (September 2018). We advise that the following matters are relevant to your site / proposed development and suggest you consider these further prior to the submission of any planning application:

Flood Risk Management
Our Flood Risk Map confirms the application site lies partially within Zone C1 of the Development Advice Maps (DAM) as contained in Technical Advice Note (TAN) 15 and our Flood Map for Planning (FMfP) identifies the application site to be at risk of flooding and falls into Flood Zone 2 (River).

Section 6 of TAN15 requires the Local Planning Authority to determine whether the development at this location is justified. Therefore, we refer you to the tests set out in section 6.2 of TAN15. If the Local Planning Authority consider the proposal meets the tests set out in criteria (i) to (iii), then the final test (iv) is for you, the applicant to demonstrate through the submission of an Flood Consequences Assessment (FCA) that the potential consequences of flooding can be managed to an acceptable level. We refer you to our website and Guidance Note 028 *Modelling for Flood Consequence Assessments* for further advice.

Please note, the new TAN15 and accompanying Flood Map for Planning (FMfP) will replace the current version of TAN15 (2004) and the Development Advice Map on 1st June 2023.

Therefore, updated advice would be required should an application for planning permission be considered following the implementation of the new TAN 15 and FMfP.

European Protected Species (EPS)
Our records show there may be protected species in the vicinity of the site. Our records show evidence of bats (common pipistrelle) within 120m of the site. We advise liaison with the LPA ecologist to discuss and agree the scope of any surveys required. We refer you to our website for further advice.

Foul Drainage
Before deciding a planning application, the LPA needs to be satisfied the foul drainage arrangements for the proposed development are suitable. From the details submitted there is no reference to the foul drainage arrangements for the proposed development. We recommend you provide details regarding foul drainage arrangements with any planning application.

We refer you to Welsh Government Circular 008/2018 on private drainage, and specifically paragraphs 2.3-2.5, which stress the first presumption must be to provide a system of foul drainage discharging into a public sewer.

Historic Landfill
The proposal site is approximately 225m from a historic landfill site at Pontymister Farm. The Environment Agency provided the Local Authority with Historic Landfill data in 2007. You may wish to consult the Local Authority's Environmental Health department with regard to this aspect.

Provision of Data
In addition to the above, please note, we can also provide certain data free of charge, as set out in our Open Data Policy. Customers can access our data via our website.

Other Matters
Please note the view expressed in this letter is a response to a pre-planning enquiry only. We trust these comments will prove helpful but they should not set a precedent for any future Natural Resources Wales' response to any formal application for planning permission or other legal consent. Such applications shall be assessed on the information submitted and regulations of relevance at that time. The details contained in this letter are based on the information available to date.

As part of our discretionary advice service we can provide further advice relating to land contamination, groundwater and flood risk prior to your planning application being submitted. There is a charge for this service. Further details are available on our website.

If you have any queries on the above please do not hesitate to contact us.
Yn gywir / Yours faithfully
Tanya Leck
Cynghorydd - Cynllunio Datblygu / Advisor - Development Planning
Cyfoeth Naturiol Cymru / Natural Resources Wales

Disclaimer

This report has been prepared by GeoSmart in its professional capacity as soil, groundwater, flood risk and drainage specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client and is provided by GeoSmart solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to GeoSmart at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

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Tel: 01743 298 100

Email: info@geosmartinfo.co.uk

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- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals.
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- conduct business in an honest, fair and professional manner.
- handle complaints speedily and fairly.
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If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs contact details:

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk.

Please ask your search provider if you would like a copy of the search code.

Complaints procedure

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly. If you want to make a complaint, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk.

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

martinlucass@geosmartinfo.co.uk

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http://geosmartinfo.co.uk/terms-conditions/

CDM regulations can be found on our website:

http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/

Data use and limitations can be found on our website:

http://geosmartinfo.co.uk/data-limitations/