

G Appendix G1 - Newport Flood Risk Review

1.1 Historical Flooding

Newport City Council has a history of recorded flood events caused by multiple sources of flooding. Significant flood events within the Newport City Council authority area (which have been taken from the NRW recorded flood outlines dataset and Newport City Council flood risk reports) are recorded below by date in Table 5-13.

No records of groundwater flooding or flooding from artificial sources were made available at the time of writing.

A summary of the spatial distribution of historic sewer flooding incidents by electoral ward is summarised in Table 5-14.

Table 5-1 Flooding Incidents by year

Year of Flood Event	Flood Incident
December 1979	The NRW recorded flood extents dataset shows that flooding occurred in Caerleon and open green areas due to the channel capacity of the River Usk being exceeded. Flooding also occurred in Rogerstone and Bassaleg as a result of the channel capacity of the River Ebbw being exceeded.
December 1981	The NRW recorded flood extents dataset shows that flooding occurred in Crindau and Nash due to the channel capacity of the River Usk being exceeded.
July 1997	The PFRA reports that flash flooding occurred in the centre of Newport due to approximately 46mm of rain falling in a 15-minute period. The number of properties affected is unknown; however, it is expected that both residential and commercial properties were affected by surface water flooding.
December 1999	The NRW recorded flood extents dataset shows that part of Llanwern flooded due to local drainage and surface water.
October 2000	The PFRA reports that flooding occurred in Gaer Vale and Goodrich Crescent, where 50-60 residential properties flooded as a result of the Crindau Pill overtopping its defences.
January 2014	The NRW recorded flood extents dataset shows that part of Caerleon flooded as a result of flood defences being overtopped.
Unknown	The PFRA reports that surface water flooding (caused by a blocked trash screen) resulted in approximately 28 residential properties in Ringland Circle flooding. The date of flooding is unknown.
Unknown	The LFRMS reports that 16 properties are reported to have flooded due to the Tredegar Reen overflowing. The date of flooding is unknown.
Unknown	The PFRA reports that the overflowing of the Tredegar Reen resulted in approximately ten properties in Duffryn flooding. The date of flooding is unknown.
The PFRA contains additional information on flood extents across Newport, however the exact nature and details of these flood events are not available.	

Table 5 14 - Sewer Flooding Incidents by Electoral Ward

Electoral Ward	Number of sewer flooding incidents
Allt-yr-yn	31
Alway	7
Beechwood	8
Bettws	4
Caerleon	30
Gaer	9
Graig	6
Langstone	17
Liswerry	14
Llanwern	30
Malpas	13
Marshfield	74
Mill	1
Pillgwenlly	8
Ringland	12
Rogerstone	8
Shaftesbury	6
St. Julians	101
Stow Hill	15
Tredegar Park	1
Victoria	4

1.2 Fluvial

The River Usk and the River Ebbw are the main watercourses in the Newport City Council authority area. These watercourses are all classified as NRW Main Rivers. Maps showing the extent of the flood outlines from the NRW FMfP- Rivers in Newport are provided in Appendix G.

The River Usk rises in the Brecon Beacons before flowing through the neighbouring county of Monmouthshire. The river flows along the northern boundary of the Newport City Council authority area before flowing into the authority area east of Caerleon. The River Usk continues to flow in a westerly direction before flowing south through Newport towards its confluence with the Severn Estuary. Tributaries of the River Usk include the Malpas Brook, Crindau Pill, River Lwyd and the Sor Brook. The floodplain of the River Usk in the upper reaches around Caerleon is extensive; however, flood extents are predominantly confined to rural areas. Areas of Flood Zones 2 and 3 through the Newport City Council authority area are mostly restricted to the banks of the River Usk. Parts of Bettws and Crindau are located in Flood Zones 2 and 3 due to flood risk from the Malpas Brook. No NRW fluvial flood defences are present along the River Usk, however fluvial/tidal flood defences are present along the Malpas Brook and have a standard of protection of 1 in 100 years. These flood defences form part of the TAN-15 Defended Zone.

The River Ebbw flows into the north-west of the Newport City Council authority area from the neighbouring county borough of Caerphilly. The river flows in a south easterly direction through Rogerstone, Bassaleg and Maes-glas before its confluence with the River Usk. The floodplains of these watercourses result in parts of Rogerstone, Bassaleg, Duffryn and a

small area of Maes-glas being located within Flood Zones 2 and 3. NRW Flood defences are present along parts of the River Ebbw in Rogerstone, Bassaleg, Maes-glas, and Duffryn. These defences have a standard of protection of 1 in 100 years. Flood defences in Duffryn and Maes-glas form part of the TAN-15 Defended Zone for Rivers in this area.

The River Rhymney flows predominantly through the county borough of Caerphilly however a small section forms the boundary between Caerphilly and the north-west of Newport local authority area before flowing into the neighbouring authority area of Cardiff. The functional floodplain of the River Rhymney within the Newport authority area is predominantly confined to rural, agricultural areas.

Areas of Flood Zones 2 and 3 are also present across the Caldicot and Wentlooge Levels associated with the reens in this area. There are no NRW fluvial flood defences present in this area.

Information on any local authority managed or private flood defences was not available at the time of writing.

Fluvial Flood Risk & TAN-15

Flood defences found along the River Ebbw in the Newport City Council authority area are maintained by NRW. As a result of these flood defences, most of the fluvial floodplain in Duffryn and Crindau are categorised as a TAN-15 Defended Zone. Therefore, all forms of development are possible if the requirements of the Justification Test can be satisfied. The flood defences have a 1% AEP event standard of protection, making areas behind the flood defences favourable to the requirements of TAN-15. The areas of Zone 3 in Newport, which are not protected by flood defences are suitable for less vulnerable development only, subject to TAN-15 requirements.

Large areas of Bassaleg, Rogerstone and Caerleon are currently at flood risk with no significant protection from flood defences. Consequently, development in these areas will have to be carefully located away from flood risk areas, particularly areas of Flood Zone 3. Development within these floodplain areas will only be justified where land is previously developed. Any proposed highly vulnerable development in these areas should be located within Flood Zone 2 or Zone 1. Due to the lack of protection from NRW flood defences in these areas, any proposed development is likely to require flood mitigation considerations and may be more challenging to meet TAN-15 requirements.

As there are extensive areas of Flood Zone 3 in significant developed parts of Newport, highly vulnerable development is likely to be challenging. Flood Zone 3 is not suitable for highly vulnerable development and less vulnerable development is suitable subject to the stringent Justification Tests outlined in TAN-15. Development in these areas shall be subject to site specific assessment and detailed flood modelling shall be required.

1.3 Tidal

The Severn Estuary and the tidally influenced River Usk are the primary sources of tidal flooding in the Newport City Council authority area. Tidal flooding is most likely to occur during storm surge conditions characterised by wind-driven waves, low atmospheric pressure, and high spring tides. In areas protected from flooding by sea defences, tidal flooding can occur due to a breach in the flood defences, failure of a mechanical barrier, or the overtopping of flood defences.

The NRW FMfP - Sea, shown in Appendix G, identifies that a significant part of Newport is within Flood Zones 2 and 3 and therefore is at risk of tidal flooding. This is from the overtopping of the coastal defences along the Severn Estuary and the tidal influence on the River Usk and smaller watercourses in the city. A large part of the area at risk of flooding is the Caldicot and Wentlooge levels located along the tidal estuary. These areas contain a number of reens (artificial drainage channels). Flooding from the reens is predominantly tidally influenced, although a fluvial flood risk is still present, see Section 5.7.2.

The River Usk freely discharges into the sea, and consequently, water levels in the river (and parts of its tributaries) are influenced by tide levels. As a result, a significant portion of central Newport and areas upstream of Newport along the River Usk are within Flood Zones 2 and 3 at risk of tidal flooding. NRW tidal flood defences are present along with

parts of the River Usk and its tributaries in Newport. These flood defences have a design standard of protection of 1 in 200 years. The flood defences form part of the TAN-15 Defended Zone for the sea in this area. Tidal flood defences and the Crindau Pill (a tributary of the River Usk) have a standard of protection of 1 in 10 years and do not form part of the TAN-15 defended zone.

Tides may affect flooding much further inland during extreme events, especially if sea levels rise as predicted in the future.

Tidal Flood Risk & TAN-15

Flood defences found along the River Usk and its tidal tributaries in the Newport City Council authority area and around its coastline are maintained by NRW. As a result of these flood defences, a significant part of the tidal floodplain in Newport is categorised as a TAN-15 Defended Zone. Therefore, all forms of development are possible if the requirements of the Justification Test can be satisfied.

The Caldicot and Wentlooge levels are protected by NRW flood defences. In these tidal areas it is known that with the application of climate change, the coastal defences overtop which results in a large tidal flood extent with significant depths of flooding. This increase in flood risk may make it difficult to meet the requirements of the acceptability criteria of TAN-15.

No tidal TAN-15 defended zones are present in Caerleon and a significant part of Newport, making highly vulnerable development in these areas challenging. Less vulnerable development should only be considered in Flood Zone 3 subject to the application of the Justification Test and acceptability of consequences. It is likely that flood mitigation measures will be required for developments in these areas, which may have implications for third parties. Development in these areas shall be subject to site specific assessment and detailed modelling shall be required. Opportunities for highly vulnerable development should be located in areas outside Flood Zone 3.

1.4 Surface water and smaller watercourses

Maps showing the extent of the flood outlines for the surface water in the Newport City Council authority area are provided in Appendix G.

The NRW FMfP- Surface Water and Small Watercourses shows that many areas around Newport are located within Flood Zones 2 and 3 at the most significant risk of surface water flooding. The predicted flood extents predominantly follow topographical flow paths or small existing watercourses. Due to the dense urban infrastructure and the significant impermeable area in central Newport, surface water ponding is present in many areas. Some isolated ponding occurs on topographic depressions and around embanked and elevated urban infrastructure like railway lines and roads.

Surface water flow paths around the Newport area are shaped by urban infrastructure and topographic depressions. Surface water is channelled by the roads around the city, pooling in areas of wide-open spaces and topographic depressions.

Surface Water Flood Risk & TAN-15

All development types are permissible in Flood Zone 2 and 3 provided that acceptability criteria in TAN-15 can be met. Development in these areas shall be subject to site specific assessment which should consider flow pathways, potential ground levelling for topographic depressions and how SuDS can be used to manage surface water flow across a development site. Developers should consult the LLFA for any specific knowledge related to surface water and small watercourse flooding at a proposed development site. Developments should be located outside of Zone 2 and 3 where possible.

1.5 Groundwater

The bedrock geology of Newport is predominantly comprised of Mudstone, Siltstone and Sandstone. Mudstone tends to have low porosity and permeability; however, this is dependent upon grain size percentages and level of compaction undergone. Sandstone is regarded as more permeable and allows for the storage and movement of groundwater. As a result, upward percolation of groundwater and subsequent flooding should be considered. The superficial deposits overlaying the bedrock in the Newport City Council authority area

are comprised of Clay, Silt and Sand in some areas, which is likely to be more impermeable due to the low porosity of Clay, and Sand and Gravel in others, which are generally permeable. The variation in Geology throughout the Newport City Council authority area suggest that groundwater flooding could present a localised risk to some areas. Maps showing the indicative Groundwater flood depth in the Newport City Council authority area are provided in Appendix G.

The majority of the Newport City Council authority area shows areas where groundwater levels are at least 5m below the ground surface, suggesting a low risk of groundwater flooding. Areas in the north-eastern part of Newport have large areas where the groundwater is between 0.025 and 5m below the surface, making groundwater flooding more likely in these areas. This area is predominantly rural with very little built development. Other small areas around the Newport City Council authority area where groundwater flood depths are close to the surface are Maes-Glas, Coedkernew, Caerleon and Lower Machen.

Groundwater Flood Risk & TAN-15

TAN-15 does not specify any requirements for groundwater flood risk, other than the risk of groundwater flooding should be considered as part of an FCA. However, it would be advisable to locate developments away from areas where groundwater is less than 0.025m below the ground surface without further groundwater monitoring and detailed assessment being undertaken.

1.6 Sewer flooding

DCWW are the responsible authority for sewer infrastructure across the study area, and they record incidents of sewer flooding across Wales.

DCWW have provided detail of historic flood incidents and active risk areas. Historical flooding incidents are recorded incidents of flooding relating to public foul, combined or surface water sewers and displays properties that have experienced both internal and external flooding. A summary of the spatial distribution of historic sewer flooding incidents by electoral ward is summarised in Table 5-14 of Section 5.7.1. This data shows that the ward with the highest number of flood incidents is the St Julian ward with over 101 incidents of sewer flooding. The Marshfield ward has also experienced a significant number of sewer flood events with 74 recorded incidences of flooding.

DCWW are working to reduce the number of sewer flood incidents by investing in maintenance and improvements to the sewer network.

DCWW has not provided any information regarding the predicted flood risk from the sewerage network.

Flood Risk from Sewers & TAN-15

TAN-15 does not specify any requirements for sewer flood risk, other than that it should be considered as part of a FCA. The LLFA and DCWW should be consulted to provide specific advice on any known history of sewer flooding and any remedial action taken.

1.7 Artificial flooding

Artificial sources of flooding identified within the Newport City Council authority area include seven reservoirs. Maps showing the potential flood risk from reservoirs in the Newport City Council authority area are provided in Appendix G. These reservoirs are:

- Pant-yr-Eos reservoir
- Ynys-y-fro Subsiding reservoir
- Ynys-y-fro Old reservoir
- Gwastad Mawr Flood Storage Area
- Uskmouth Lagoons (Gwent Levels Wetlands Reserve)
- Sloblands Lagoons

- Tredegar House Lake

Seven reservoirs are located outside of the borough and contribute to the potential risk of flooding. These are

- Blaen-y-cwm Reservoir (located 25km north of the county boundary)
- Llandegfedd reservoir (located 7.6km north of the county boundary)
- Talybont reservoir (located 35.8km north of the county boundary)
- Usk reservoir (located 65.2km north of the county boundary)
- Court Farm reservoir (located 1km north of the county boundary)
- Pen-y-Fan Pond (located 15.1km north of the county boundary)
- Cefn Mably - Lodge Lake (located 150m west of the county boundary), and
- Caerphilly Castle Moats (located 6.6km west of the county boundary).

The NRW FRAW Flood Risk from Reservoirs indicates that the areas along the course of the River Ebbw and the River Usk (and its tributaries) are at risk of reservoir flooding.

The failure of a reservoir can cause catastrophic damage due to the sudden release of large volumes of water. Reservoirs in the UK have an excellent safety record, and NRW is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected, and essential safety work is carried out. These reservoirs, therefore, present minimal risk.

1.8 Changes in understanding of flood risk

FCERM Capital Investment

NRW has appointed engineering consultants to develop a new flood defence scheme for **Liswerry, Newport (Stephenson St Scheme)**. The existing flood bund stretches 1,350m along the eastern embankment of the River Usk. The flood defence proposals recommend raising parts of the existing earth embankment. In other areas, new flood walls will be constructed to raise the defence to the required level. A new flood gate is also proposed for Corporation Road, along with a new stretch of highway to improve access to the industrial estate when the flood gate is closed. The proposals would increase flood protection to a one in 200-year flood event.

Future FMfP improvements

The locations listed below are covered by existing detailed NRW flood models which are expected to be incorporated into the Flood Map for Planning through future routine updates. Where NRW have provided an indication of timescales for these updates, this is provided in brackets.

- River Llwyd (December 2021)
- Llanederyn (unknown)
- Cardiff Area (unknown)
- Newport (unknown)
- Risca (unknown)
- Malpas Brook (unknown)
- Liswerry (unknown)
- Tidal Flood Mapping (unknown)
- Caldicot and Wentloodge (unknown)

- River Ebbw (unknown)