

Appendix G

Flood and Water Management Act 2010

Section 19 Flood Investigation Report

Storm Dennis –
Flood Investigation Area RCT11
(Pontypridd)

January 2022

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This report should be read in its entirety

This report has been prepared in accordance with the requirements of section 19 Flood and Water Management Act 2010. The Council assumes no responsibility or liability from any person in connection with its contents or findings.

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EXECUTIVE SUMMARY

This report has been produced through the duties placed upon Rhondda Cynon Taf County Borough Council under Section 19 of the Flood and Water Management Act 2010. The Act states, “On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate:

- a) which risk management authorities have relevant flood risk management functions and
- b) Whether each of those risk management authorities has exercised, or is proposing to exercise those functions in response to the flood”.

This Section 19 investigation provides a factual report of the storm event that occurred on the 15th and 16th of February 2020 within the Rhondda Cynon Taf County Borough Council area, focusing the investigation on the flooding that occurred within the impacted areas of Pontypridd (Flood Investigation Area RCT 11, Figure 1).

This report was undertaken to identify the mechanisms of flooding, establish which Risk Management Authorities have relevant flood risk management functions under the Flood and Water Management Act 2010 and ascertain if those Risk Management Authorities have undertaken or are planning to undertake actions related to those functions to manage the risk of flooding.

The flooding that affected RCT on the 15 and 16th of February 2020 was a result of an extreme rainfall event, designated by the Met Office as ‘Storm Dennis’. The impact of the event at investigation area RCT11 resulted in internal flooding to at least 158 properties in Pontypridd: including 80 residential properties and 78 non-residential properties. Significant flooding to the highway throughout the investigation area also occurred.

These impacts were identified through inspections made by RCT’s Flood Risk Management Team during the days following the storm event, as well as information collated by residents, RCT’s Public Health team, RCT’s Highway and Streetcare Depot, Natural Resources Wales and Dŵr Cymru Welsh Water.

It has been established from the evidence gathered within this report that the primary source of flooding at RCT11 in this incident was the overtopping of the main River Taf following persistent and heavy rainfall. River level gauge data from NRW’s Pontypridd monitoring station reveal that the River Taf was almost four times its typical level during Storm Dennis, reaching a peak level of 5.32 metres; the highest river level recorded at the station since its opening in 1970.

On review of NRW's FRAW Maps, the majority of the impacted properties within RCT11 are identified at low risk of flooding from the main river due to the presence of formal flood defences along sections of the eastern embankment at Sion Street and the western embankment at Pontypridd town centre. However, areas of medium main river flood risk were noted at Berw Road, where no formal flood defences are present.

Storm Dennis has been estimated as in excess of a 1 in 200 annual probability (Q200) flood event according to NRW, therefore it has been concluded that the flood defences along the River Taf became overwhelmed and were overtopped at several locations, resulting in widespread fluvial flooding to residential and commercial properties.

The investigation also identified surface water accumulation on the highway to have contributed to the fluvial flooding that occurred at RCT11. The overtopping of the River Taf, the associated settling of fluvial deposits and the sheer intensity of rainfall during Storm Dennis have been attributed as the causes of surface water flooding.

NRW has been determined as the relevant Risk Management Authority responsible for managing the main river flooding that occurred during Storm Dennis. In response to the flooding at investigation area RCT11, NRW has;

- Carried out their own post event investigative analysis work to understand the mechanism of flooding from the River Taf at Pontypridd;
- Commissioned a Lower Taf Flood modelling project and a Pontypridd-specific in-house modelling project, the outcomes of which will include an initial assessment of the viability of potential flood risk management options; and
- Developed a series of recommendations and a detailed action plan to address areas of improvement for future storm events, including the performance of NRW's Flood Warning Service and incident management response.

RCT as the Lead Local Flood Authority, Land Drainage Authority and Highway Authority has been determined as the relevant Risk Management Authority responsible for managing the surface water flooding that occurred during Storm Dennis. In response to the flooding at investigation area RCT11, RCT has;

- Carried out survey, jetting and cleansing operations to highway drainage infrastructure;
- Led on the development of a central Control Room to compliment the Council's Contact Centre and CCTV Centre; and to provide a comprehensive and informed response to residents during storm events;

- Exercised its powers, under Section 13 of the Flood and Water Management Act 2010, to engage with NRW and DCWW in relation to their responsibilities as Risk Management Authorities; and
- Working in partnership with NRW, the LLFA have expanded their interim Property Flood Resistance project offering expandable flood gates to those properties deemed at high risk of river flooding, as per NRW's determination.

The event that occurred on 15 and 16th February was extreme, and it is unlikely flooding from a similar event could be prevented entirely. It is concluded that Risk Management Authorities satisfactorily carried out their flood risk management functions in response to the flood event at RCT11, however, further measures have been proposed by all RMAs to improve preparedness and responses to future flood events.

ABBREVIATIONS & GLOSSARY

CaRR – Communities at Risk Register

DCWW – Welsh Water

FRMP – Flood Risk Management Plan

FWMA – Flood and Water Management Act 2010

LDA – Land Drainage Authority

LFRMS – Local Flood Risk Management Strategy

LLFA – Lead Local Flood Authority

NFD - Non-Flood Defense – A structure that provides a flood defense benefit, which is not designed or maintained as a Flood Defense Structure. Thereby the benefits derived from the structure cannot be depending upon to deliver a Flood Defense.

NRW – Natural Resources Wales

Q – Return Period (1 in X chance of an event occurring in any given year)

RCT - Rhondda Cynon Taf

RCT11 – Flood Investigation Area RCT 11

RCTCBC – Rhondda Cynon Taf County Borough Council

RMA – Risk Management Authority

SAB – Sustainable Drainage Approval Body

SFRA – Strategic Flood Risk Assessment

SuDs – Sustainable Drainage Systems

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1. INTRODUCTION

1.1. PURPOSE OF INVESTIGATION

On the 15th and 16th of February 2020, RCT was impacted by an extreme weather event which was named ‘Storm Dennis’ by the Met Office. Due to the extent and impact of the event, the LLFA opted to undertake a formal investigation.

The storm resulted in widespread residential and commercial flooding within the Rhondda Cynon Taf County Borough Council area. This report will focus on Flood Investigation Area RCT11 (further referred to as RCT11) which is comprised of areas adjacent to the River Taf within Pontypridd Town.

The reason behind RCT’s investigation is in response to the duties of the local authority regarding Section 19 of the Flood and Water Management Act 2010, which states:

1. “on becoming Aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate:
 - a) “Which risk management authorities have relevant flood risk management functions and,
 - b) Whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in the response to the flood.”
2. “When an authority carries out an investigation under subsection (1) it must (a) publish the results of its investigation, and (b) notify any relevant risk management authority”¹

The purpose of the investigation is to determine which RMAs have relevant flood risk management functions and which functions have been exercised in response to the flood event in question.

Specific details of Storm Dennis, such as rainfall analysis are covered within a separate overview report that covers the wider RCT area. The report is titled ‘Storm Dennis February 2020 – Overview Report’ and will be referred to as ‘FRM – Storm Dennis – Overview Report’².

¹ Flood and Water Management Act 2010 – Section 19 - <https://www.legislation.gov.uk/ukpga/2010/29/section/19>

² [Flood Investigation Reports | Rhondda Cynon Taf County Borough Council \(rctcbc.gov.uk\)](https://www.rctcbc.gov.uk/flood-investigation-reports)

1.2. SITE LOCATION

The area investigated within this report covers the town of Pontypridd, located in the central sector of the county borough, to the south of Abercynon.

Pontypridd is situated within the River Taf catchment which flows north to south through the centre of RCT11. The confluence of the River Taf and River Rhondda is located at the southern point of RCT11.

The investigation area itself is confined to the base of valley where residential and commercial development has been built on the floodplain of the River Taf on both the eastern and western riverbanks, as illustrated in Figure 1.

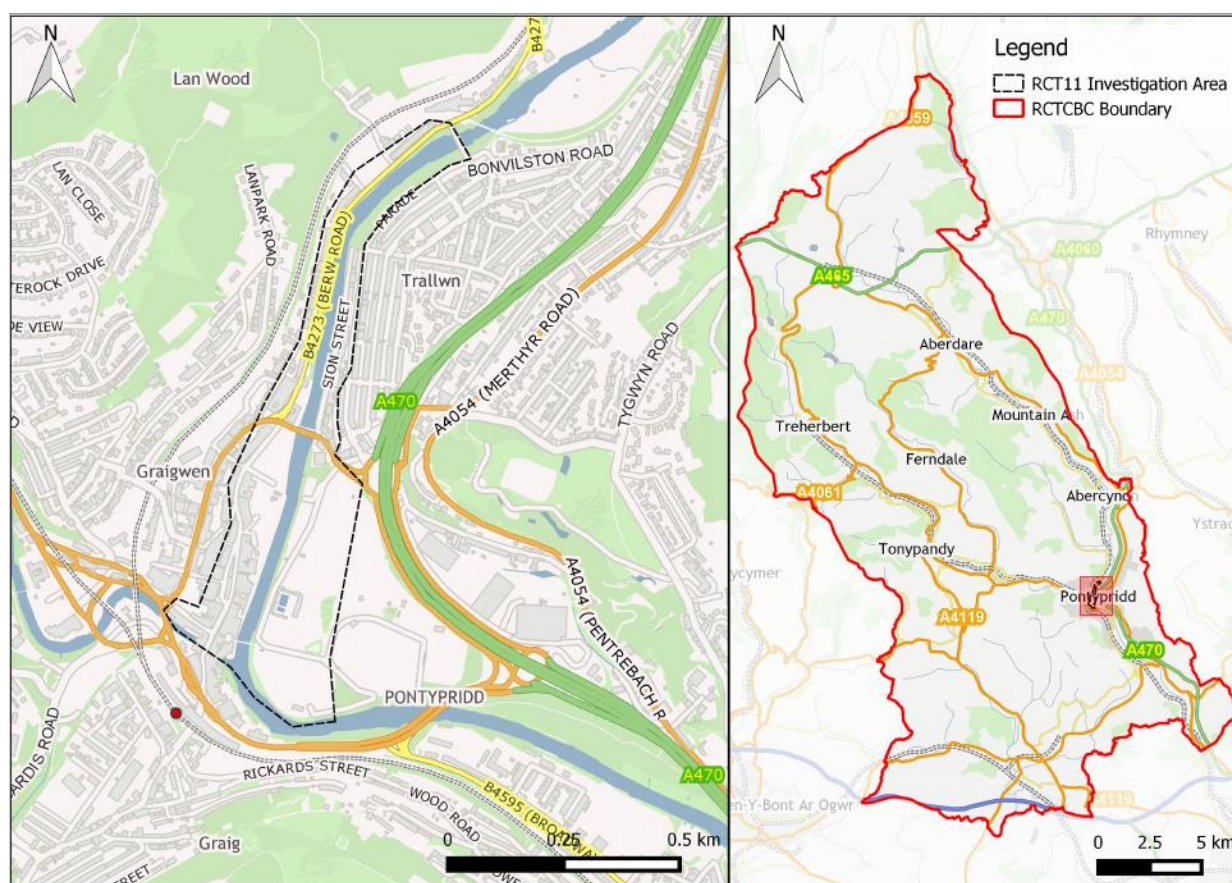


Figure 1: Flood Investigation Area RCT11 Location Plan

According to the Welsh Government's CaRR, Pontypridd is ranked 49th for surface water flood risk and 147th for main river flood risk in Wales.

NRW's Flood Risk Assessment Wales (FRAW) maps indicate that there are areas of low to high flood risk from both the main river and surface water and ordinary watercourse sources within the investigation area. This is illustrated in Figure 2, which is an excerpt from the FRAW maps.

The highest risk posed to people and properties within RCT11 is broadly associated with the River Taf, with low to high fluvial flood risk observed along the length of the watercourse, particularly at the confluence of the River Taf and Rhondda. Flood risk from surface water and ordinary watercourse sources is also noted across parts of the investigation area, although not as widespread or severe, as illustrated in Figure 2. Areas adjacent to the main river may be at risk of both surface water and main river flooding, as illustrated within RCT's FRMP³.

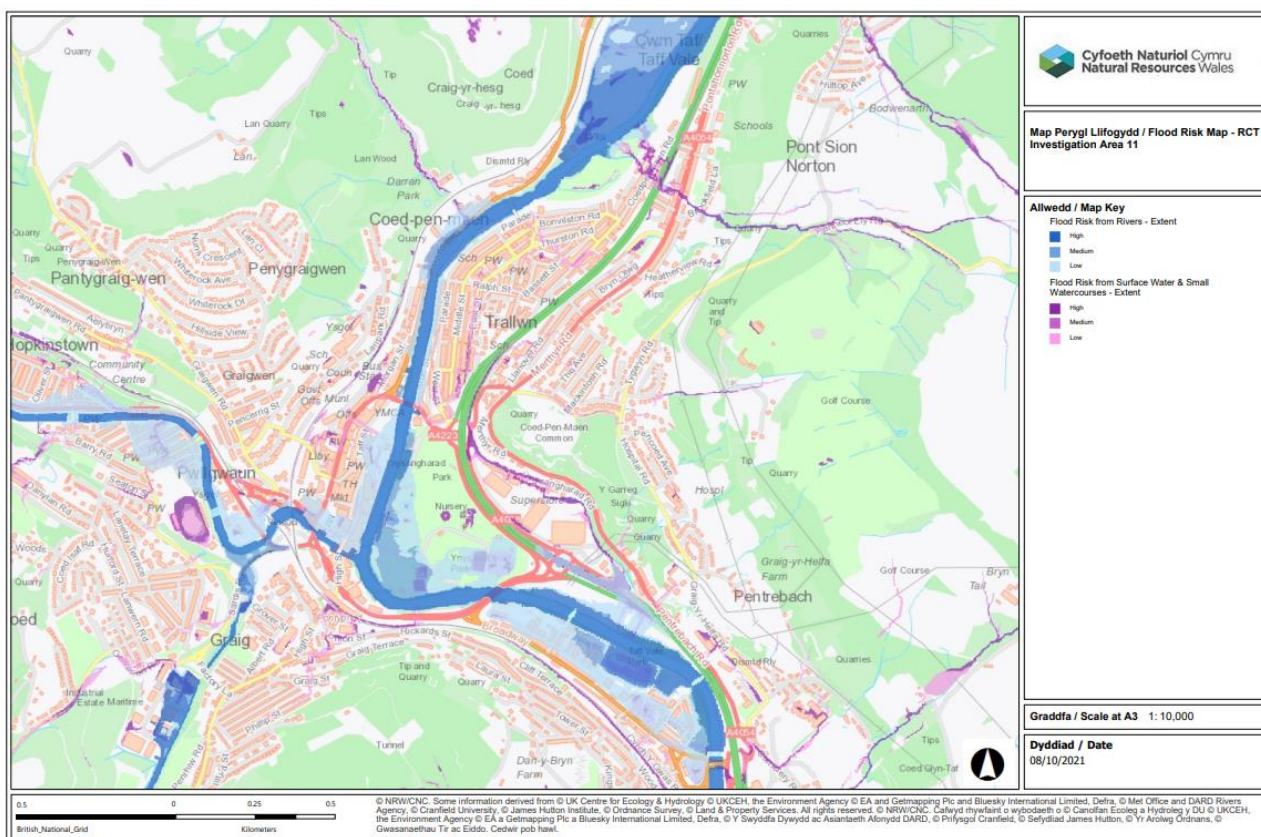


Figure 2: Natural Resources Wales' FRAW map for rivers and ordinary watercourse and surface water flood risk at RCT11. Contains Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved

³ [RCT'S Flood Risk Management Plan \(rctcbc.gov.uk\)](http://rctcbc.gov.uk)

1.3. DRAINAGE SYSTEM

The surface water drainage systems that serve investigation area RCT11 are that of the highway drainage network designed to manage the surface water within the highway and public surface water sewer and combined sewer networks operated by Dŵr Cymru Welsh Water.

1.4. INVESTIGATION EVIDENCE

To support the investigation, a range of qualitative and quantitative evidence has been gathered from numerous sources, the summary of which is listed below within Table 1.

Table 1: Investigative evidence gathered in preparation of this Storm Dennis Section 19 report

Source	Data
Residents	Photos, videos, statements, email correspondence, public engagement survey responses
Responders' statements	Local responders' statements
CCTV Surveys	Internal surveys of the local drainage networks
Met Office Data	Weather Warning information (see FRM – Storm Dennis – Overview Report)
Rain Gauges	RCT and NRW operated rain gauge information (see FRM – Storm Dennis – Overview Report)
Natural Resources Wales	River Level and Flood Warning data
RCT Flood Risk Management Plan	Site specific information and data for each electoral ward in RCT
Communities at Risk Register	Flood risk ranking and scores for all flood types based on community data in Wales
Flood Investigation Report (Redstart's FIR)	A summary of the source-pathway-receptors, culvert capacity assessment and hydraulic modelling work undertaken by Redstart. The Flood Investigation Report was commissioned by RCT prior to writing the Section 19 report.

Evidence sourced from the 'Flood Investigation Report', commissioned by RCT, will be further referred to as 'Redstart's FIR' throughout this report.

1.5. PUBLIC ENGAGEMENT

Following the initial flooding event that occurred on the 15 and 16th of February during Storm Dennis, flood risk officers from RCT's Flood Risk Management department were deployed to areas across the borough to investigate reports of internal flooding by residents. Residents engaged with the Flood Risk Management team to help determine the initial impacts caused by the flooding event and to investigate the potential source(s) and pathway(s) of flood water. Due to the volume of calls received by RCT's Out of Hours department, visits were prioritised to those areas experiencing significant internal flooding to residential properties.

To support the flood investigations, a public engagement exercise was undertaken between the 4th and 25th of January 2021 by Redstart, on behalf of RCT. The aim of this exercise was to engage with local residents who were affected by the flood event to capture details on how they were impacted, the source and movement of flood water within the area, how receptors were impacted as well as drawing on local knowledge to query how local conditions could have exacerbated the event. This data is useful to help the LLFA better understand and validate our assessment of the flood event to support the investigation under Section 19 of the FWMA.

2. FLOODING HISTORY

2.1. PREVIOUS FLOOD INCIDENTS

Historical flood information and residents accounts captured by RCT's Flood Risk Management officers following Storm Dennis indicate that the majority of properties within the investigation area had not experienced internal flooding from the River Taf in over 40 years prior to Storm Dennis. The flooding experienced during Storm Dennis was noted as the most significant flood incident to impact Pontypridd since the floods of December 1979.

Previous incidences of surface water flooding to the highway and external extents of properties have been recorded across the investigation area during smaller scale storm events, in particular along Sion Street, Berw Road and Taff Street. Many of these incidences have been deemed the result of blocked highway drainage infrastructure. These events are not known to have impacted properties, although anecdotal information supplied by residents at Sion Street reported minor internal flooding to properties had occurred prior to February 2020 due to surface water ingress.

2.2. FLOOD INCIDENT

The flooding that occurred on the 15th and 16th February 2020 was a result of an extreme rainfall event, designated by the Met Office as ‘Storm Dennis’. The rainfall event affected the majority of RCT and caused widespread flooding to communities.

Specific details of Storm Dennis, such as rainfall and river level analysis are covered within a separate overview report that covers the wider RCT area, referenced ‘FRM – Storm Dennis – Overview Report’².

Post event inspections undertaken on the days following the storm event by RCT’s Flood Risk Management team and RCT’s Public Health, Protection and Community team identified 80 residential properties and 78 non-residential properties as internally flooded within the investigation area.

A summary of the source(s) and pathway(s) of flooding within RCT11 during Storm Dennis have been outlined in Table 2 and further described throughout this section.

Table 2: Summary of the source(s), pathway(s) and receptor(s) affected during Storm Dennis within RCT11

Source(s)	Pathway(s)	Receptor(s)
The primary source of flooding for this incident was the River Taf overtopping its eastern and western banks at multiple locations throughout the investigation area.	Main river flood water conveyed onto several streets including Berw Road, Taff Street and Mill Street on the western embankment, and Sion Street and Ynysangharad Park on the eastern embankment, before entering the front and rear of several residential and commercial properties.	The overtopping of the River Taf resulted in internal flooding to at least 158 receptors, including 80 residential properties across Berw Road and Sion Street, and 78 non-residential properties, primarily located at Taff and Mill Streets. Ynysangharad Park and footbridge were also impacted by the overtopping of the River Taf.
Intense rainfall and subsequent surface water runoff from the surrounding area.	Surface water was observed along several highway networks within the investigation area. This is considered to have contributed to the main river flooding throughout RCT11.	Surface water is considered to have exacerbated the flooding experienced at many internally flooded properties throughout RCT11 during Storm Dennis.

On review of Table 2, the primary source of the recorded flooding within RCT11 was the main river, the River Taf, overtopping its eastern and western embankments at several locations during the storm event. The impacts of the overtopping were exacerbated by intense rainfall and subsequent surface water flows throughout the investigation area.

During the early hours of Sunday 16th of February 2020, RCT received several calls from residents and business owners at Pontypridd reporting the overtopping of the River Taf at multiple locations and the ingress of water into several properties. Several flow paths were observed as properties adjacent to the main river on both the eastern and western embankments experienced significant internal flooding from both the front and rear.

The primary flow paths observed north of Bridge Street remained confined to areas immediately adjacent to the River Taf. Berw Road, on the western embankment, and Sion Street, on the eastern embankment, suffered severe flooding following the overtopping of the River Taf (Figures 3 and 4). A total of 82 receptors, including two commercial properties, were internally flooded across both streets, with reported flood depths of up to 1.8 metres. Post-event inspections also identified significant mud and debris deposition, along with the displacement of several cars along both highway networks.



Figure 3: Image of the River Taf overtopping its eastern embankment onto Sion Street during the early hours on Sunday 16th February 2020 during Storm Dennis (image provided by resident)



Figure 4: Flooding at Sion Street following Storm Dennis (Image: BBC News)

Anecdotal information provided by residents indicate that the River Taf overtopped its embankment at several locations along both streets, however it was noted that the overtopping initially occurred in those areas without concrete retaining walls. The resultant fluvial flooding contributed to the partial collapse of retaining walls (Classified as Non-Flood Defence (NFD) Structures) at several locations further downstream during the storm event (Figure 5 and 6).



Figure 5: Collapsed river wall (NFD) on Berw Road following Storm Dennis (captured by RCT's Flood Risk Management team on 17th February 2020)

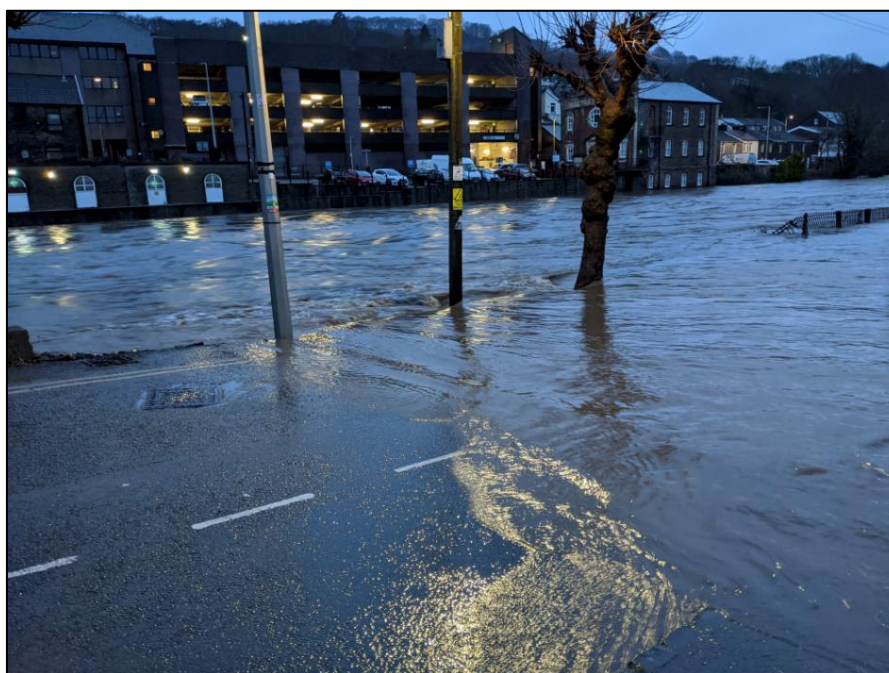


Figure 6: Collapsed river wall at the southern end of Sion Street, near Bridge Street, during Storm Dennis (image provided by resident)

Water ingress through the fronts of properties on Berw Road and Sion Street were confirmed as the primary pathways of flooding, however, residents also noted the surcharging of private drainage networks also contributed to the flooding of some properties.

South of Bridge Street, the River Taf also overtopped both its eastern and western banks, resulting in significant flooding to Pontypridd Town Centre and Ynysangharad Park. A total of 75 commercial properties on Taff Street and Mill Street (Figure 7), in addition to the National Lido of Wales at Ynysangharad Park, were internally flooded as a result of the overtopping (Figures 8). A footbridge connecting Taff Street and Ynysangharad Park was also damaged during the event.

As illustrated in Figure 9, the River Taf overtopped immediately adjacent to Gas Road Car Park, resulting in the internal flooding of nearby properties as fluvial flows conveyed into the rear basements of buildings on Taff Street. Further south, flood water entered properties from both the rear and the front as fluvial flows conveyed over 100 metres from the River Taf onto Taff Street and Mill Street. Flood depths of up to 1 metre were recorded throughout Taff Street and Mill Street as flood water accumulated for several hours at localised low points.



Figure 7: Flooding to commercial properties on Taff Street following Storm Dennis (Image: BBC News)



Figure 8: Image showing the flood damage to the National Lido of Wales at Ynysangharad Park following Storm Dennis (Image: Jonathan Lawrence/WalesOnline)

In addition to the main river flooding, intense rainfall and resultant surface water flows exacerbated flooding across Pontypridd during Storm Dennis. This was particularly evident in areas not immediately adjacent to the River Taf, such as Mill Street, where surface water pooled for several hours after the storm event.

The indicative flow paths and points of overtopping within the investigation area are illustrated in Figure 9.

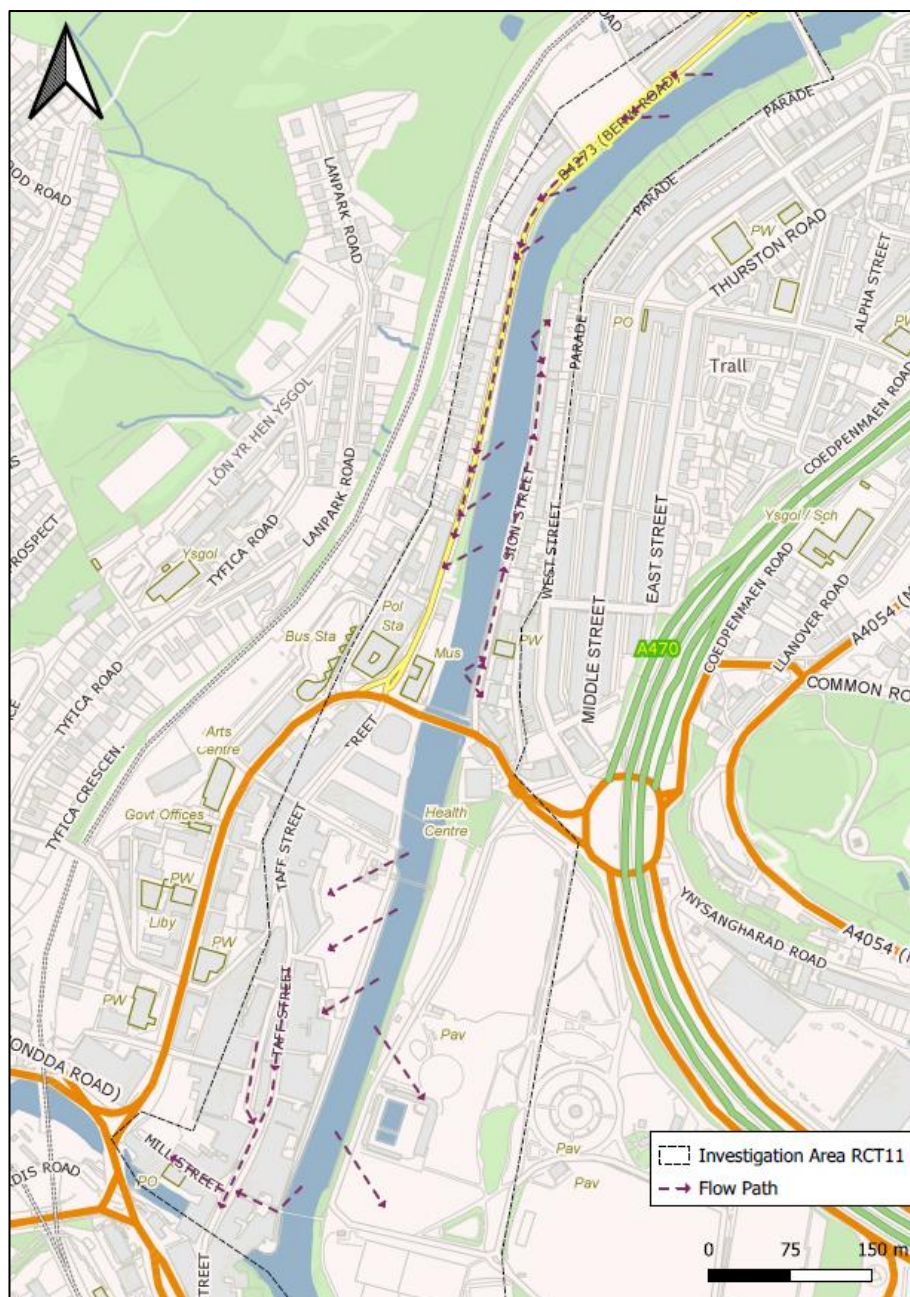


Figure 9: Indicative flow paths observed at RCT11 during Storm Dennis

2.3. RAINFALL ANALYSIS

See RCT's 'Overview Report' of Storm Dennis, reference 'FRM – Storm Dennis – Overview Report'², for a detailed analysis of the rainfall and ordinary watercourse response.

3. POSSIBLE CAUSES

3.1. CULVERT CONDITIONS

There is no evidence from this investigation to suggest that culverted ordinary watercourses within investigation area RCT11 significantly contributed to the recorded flooding of properties in RCT11 during Storm Dennis.

As such, the condition of culverted ordinary watercourse infrastructure within the investigation area has not been investigated as part of this investigation.

3.2. ORDINARY WATERCOURSE CONDITIONS

There are no ordinary watercourses within the investigation area. As such, ordinary watercourse conditions have not been investigated as part of this investigation.

3.3. MAIN RIVER

The designated main River Taf flows in a southwesterly direction through Pontypridd. Areas on both the western and eastern embankments of the River Taf were impacted during Storm Dennis.

3.3.1. MAIN RIVER LEVELS AND FLOOD WARNINGS

The hydrograph in Figure 10 illustrates the significant rise in the River Taf's levels in response to rainfall between the 14 and 17th of February 2020. River level data was captured at NRW's Pontypridd river level gauge, located adjacent to Nile Street approximately 600 metres southeast of the investigation area.

NRW issued a 'Flood Alert' (indicating possible flooding) for the entirety of the River Taf at approximately 13:30 on the 15th of February; at which point the main river was over 2 metres in depth and continuing to rise at Pontypridd station. At approximately midnight on the 16th February the River Taf began to rise again, reaching a peak river level of 5.32 metres at 04:45 on the 16th of February; the highest level recorded for the River Taf at Pontypridd since 1970.

The green bar displayed on the hydrograph shows the typical level of the River Taf at the Pontypridd station, ranging between 0.4 and 1.3 metres. The river level was above this green line for over 48 hours, highlighting the severity of the storm event and its unprecedented nature. At its peak, the River Taf at Pontypridd was almost four meters higher than its average level.

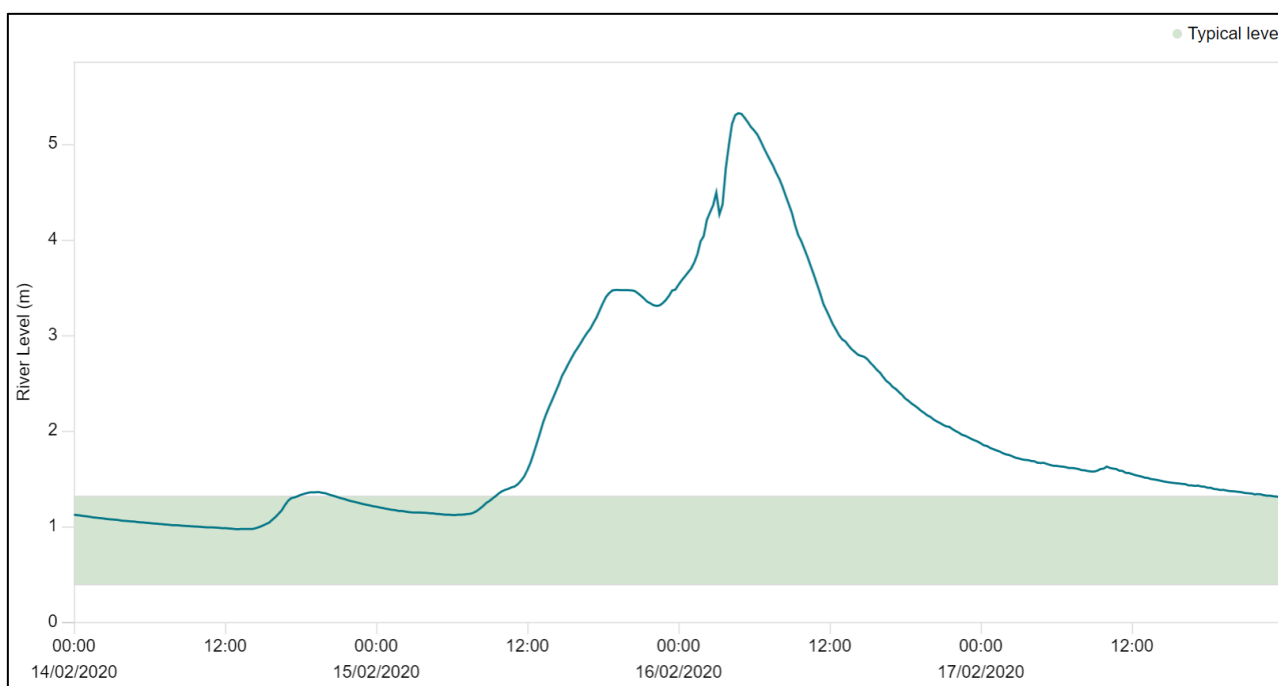


Figure 10: The River Taf levels at Pontypridd station between the 14th and 17th February 2020 (Natural Resources Wales)

Investigation area RCT11 falls within NRW’s Pontypridd Flood Warning Area. The Flood Warnings issued by NRW, and associated river levels, for the River Taf at Pontypridd during Storm Dennis are shown in Table 3.

Table 3: Flood Warnings issued by NRW for the River Taf at Pontypridd during Storm Dennis

Flood Warning Type	Location	Start Time	River Level (m) at Pontypridd
Flood Alert	River Taf	13:27 15/02/2020	2.178
Flood Warning	River Taf at Pontypridd	20:48 15/02/2020	3.443
Severe Flood Warning	River Taf at Pontypridd	06:33 16/02/2020	5.039

NRW issued a ‘Flood Warning’ alert (indicating flooding is expected) for the River Taf at Pontypridd at 20:48 on the 15th February, prior to the overtopping of the main river. A ‘Severe Flood Warning’ alert (indicating Community-wide severe flooding and possible risk to life) for the River Taf at Pontypridd was issued by NRW nine hours later at 06:33 on the 16th February; at which point the River Taf was 5.039 metres in height, 0.285 metres lower than its peak level. According to residents, significant main

river flooding to properties had already commenced at several locations along the River Taf by this time, including at Pontypridd.

NRW have acknowledged within their 'Flood Incidence Response Review'⁴ that the operation of the Flood Warning service "came under significant pressure during February and at times became overwhelmed" resulting in flood warnings being issued late (after the onset of flooding) or not issued at all. At this location (RCT11), this is in reference to the 'Flood Warning' and 'Severe Flood Warning' alerts issued at Pontypridd.

Improvements to their flood forecasting and warning services are being internally investigated by NRW and where feasible implemented to deliver the recommendations outlined within their Flood Incident Response Review⁴.

3.3.2. MAIN RIVER FLOOD RISK

As outlined in Section 2, the overtopping of the River Taf resulted in the internal flooding of 158 receptors, with properties up to 100 metres inland reporting internal flooding directly as a result of the overtopping.

Figure 11 is an excerpt from NRW's Flood Risk Assessment Wales (FRAW) mapping exercise which depicts the main river flood risk extents for the 'Defended' scenario, i.e., with the presence of flood defence assets. The darker shading identifies areas at higher risk of flooding (more frequent/less extreme rainfall events) and lighter shading showing the lower risk areas (less frequent/more extreme rainfall events).

The flooding that occurred within RCT11 during Storm Dennis is largely consistent with the modelled outputs of NRW's FRAW map (Figure 11), with the majority of the affected properties falling within an area of low main river flood risk. Notably, a small area of Berw Road, in addition to Ynysangharad Park, are identified at medium risk of main river flooding.

A low risk of flooding means that an area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) each year; meanwhile, a medium risk of flooding signifies a yearly chance of flooding between 1 in 100 (1%) and 1 in 30 (3.3%). Considering Storm Dennis was estimated as in excess of a 1 in 200 annual probability (Q200) flood event, the area of flooding during Storm Dennis aligns with those depicted by the low flood risk extents (Figure 11).

⁴ [February 2020 Floods in Wales: Flood Incident Management Review \(cyfoethnaturiol.cymru\)](https://www.nrw.gov.uk/February-2020-Floods-in-Wales-Flood-Incident-Management-Review)

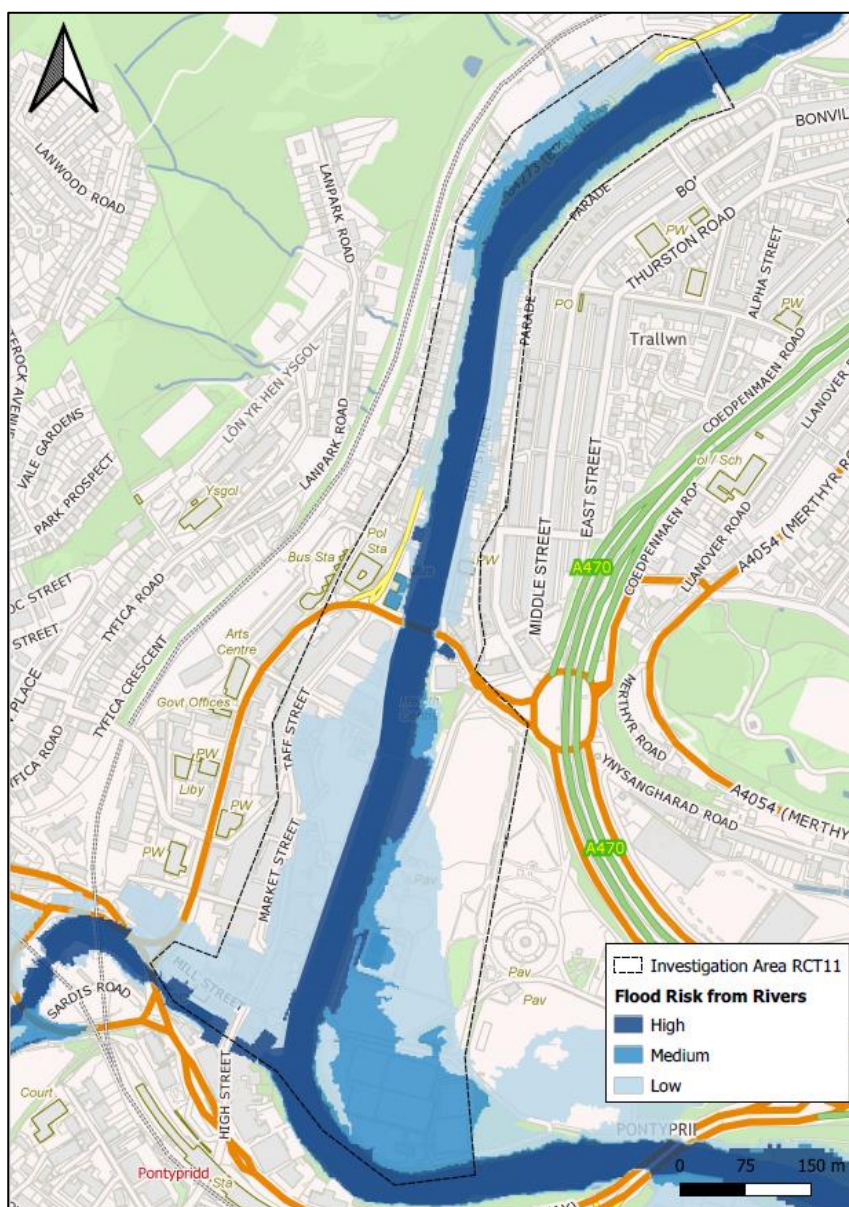


Figure 11: NRW's FRAW map for River sources at RCT11. Contains Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved.

3.3.3. MAIN RIVER FLOOD DEFENCES

As illustrated in Figure 12 (demarcated by a bold red line), there are approximately 400 metres and 300 metres of formally designated flood defence infrastructure along the eastern and western banks of the River Taf at RCT11, respectively. This infrastructure is operated and maintained by NRW.

According to NRW, flood defence infrastructure throughout Pontypridd town centre and Sion Street provides a standard of protection up to a 1 in 100 annual probability flood event (Q100) to several properties within the investigation area (black hatched area in Figure 12). There are no formal flood defenses under the operation and maintenance of NRW on the western river embankment at Berw Road, any pre-existing highway walls are considered NFD Structures.

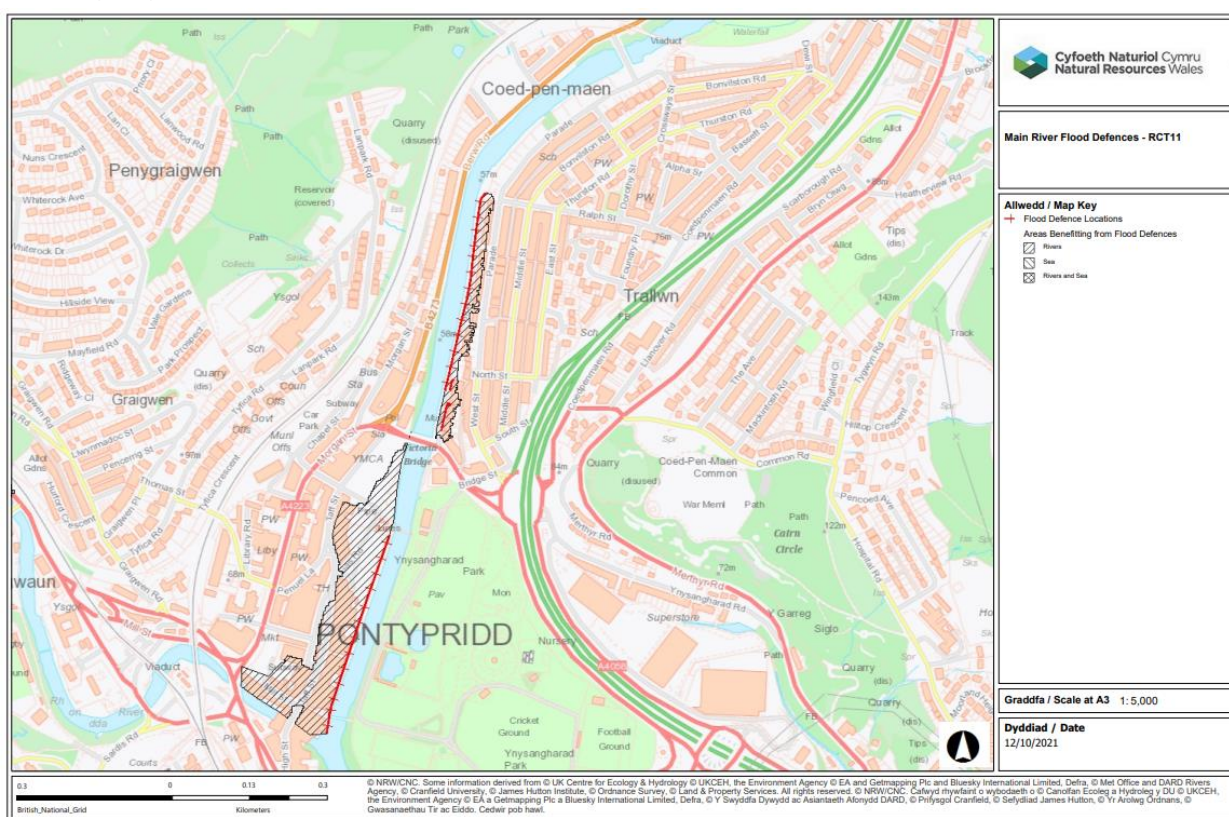


Figure 12: Natural Resources Wales’ map for Main River Flood Defences and areas benefiting at RCT11. Contains Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved.

The current indicative design standard of protection (SOP) for flood defences on a main river is 1 in 100 annual probability (Q100) flood event plus, for new defences, an allowance for climate change. This is stated within the Welsh Government’s National Strategy for Flood and Coastal Erosion Risk Management which encourages main river flood alleviation schemes to provide a SOP up to Q100⁵. It is thereby inferred that the existing flood defence infrastructure at RCT11 is in accordance with current indicative standards.

⁵ [National Strategy for Flood and Coastal Erosion Risk Management in Wales \(English\) \(gov.wales\)](https://gov.wales/national-strategy-for-flood-and-coastal-erosion-risk-management-in-wales)

As stipulated above, some sections of RCT11 benefit from formally designated main river flood defences which provide a SOP up to a 1 in 100 annual probability (Q100) flood event, however Storm Dennis was estimated as being in excess of a 1 in 200 annual probability (Q200) flood event, therefore the unprecedented risk in river levels within the Taf during the storm event resulted in the overtopping of assets up to Q100 SOP.

NRW's 'Flood Incidence Response Review' does in fact outline that no flood defences failed in the lower Taf region and that the flooding was the result of river flows exceeding the construction design standard⁴.

3.4. HIGHWAY DRAINAGE CONDITIONS

Several streets throughout RCT11 were observed to be flooding as a result of the overtopping of the River Taf during Storm Dennis. These fluvial flows deposited mud, silt and debris across the investigation area which are assumed to have entered the highway drainage system, leading to blockages and a reduction in the hydraulic capacity of the surface water network. Accompanied by intense rainfall and significant surface water conveyance, it is considered that the highway drainage infrastructure in the affected regions of RCT11 became overwhelmed during the storm event.

CCTV inspections undertaken in the months following the storm event confirm this, with surveys completed on Mill Street identifying settled deposits of silt and debris within the highway drainage network. Figure 13 depicts the operational condition of the highway drainage at Mill Street prior to its cleansing. A cross-sectional area loss of 60% was observed due to silt accumulation within the network.

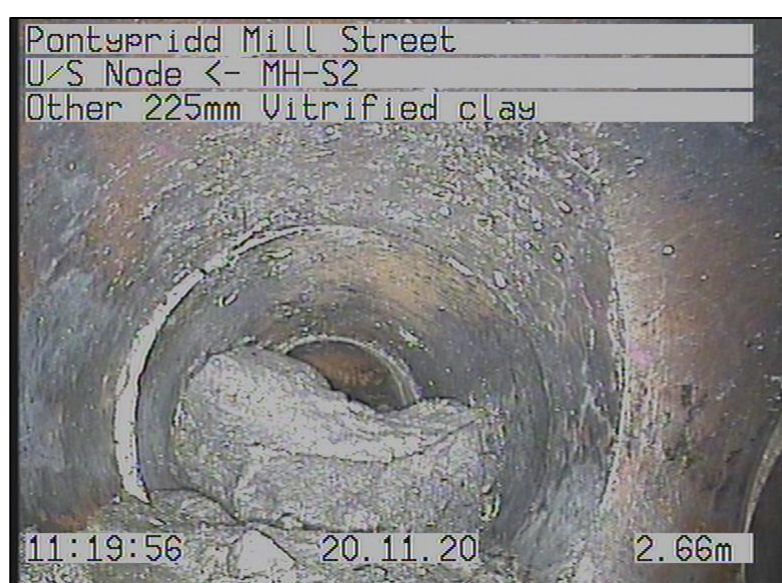


Figure 13: Photo of silt accumulation within the Mill Street surface water drainage network prior to cleansing operations

Highway drainage is not designed to manage overland flows from private areas, parks or open space, nor is it designed to accommodate fluvial flows that may arise during storm events. In this instance, the capacity of the highway drainage in RCT11 was exceeded as a result of both main river and surface water flows entering the network. The maintenance condition of the highway drainage infrastructure is not considered to have significantly impacted the flooding experienced during Storm Dennis.

3.5. DŴR CYMRU WELSH WATER APPARATUS

There is no evidence from this investigation that DCWW apparatus contributed to the flooding that occurred during Storm Dennis within investigation area RCT11.

DCWW reported no issues within RCT11 during Storm Dennis and it is not believed that any DCWW infrastructure was damaged during the storm event. Whilst DCWW have concluded that their assets performed well during Storm Dennis, the majority of drainage infrastructure within the investigation area is comprised of combined sewer networks which are likely to have become overwhelmed during the storm event for the reasons outlined in Section 3.4.

3.6. SURFACE WATER

Whilst surface water is not considered to have been the primary cause of flooding at any locations within RCT11, surface water is considered to have contributed to and exacerbated the main river flooding observed across the investigation area.

On review of NRW's national surface water and ordinary watercourse flood map (Figure 14), the extent of flooding from pluvial sources is minimal, with only small, localised areas of high to low flood risk observed along parts of Taff Street, Mill Street and Ynysangharad Park within the town centre. Despite the FRAW map indicating little to no surface water and ordinary watercourse flood risk across RCT11, surface water conveyance was observed along several highway networks and pedestrian footways within Pontypridd Town Centre. The conveyance of surface water within RCT11 has been attributed to intense and persistent rainfall resulting in the accumulation of runoff towards localised low points.

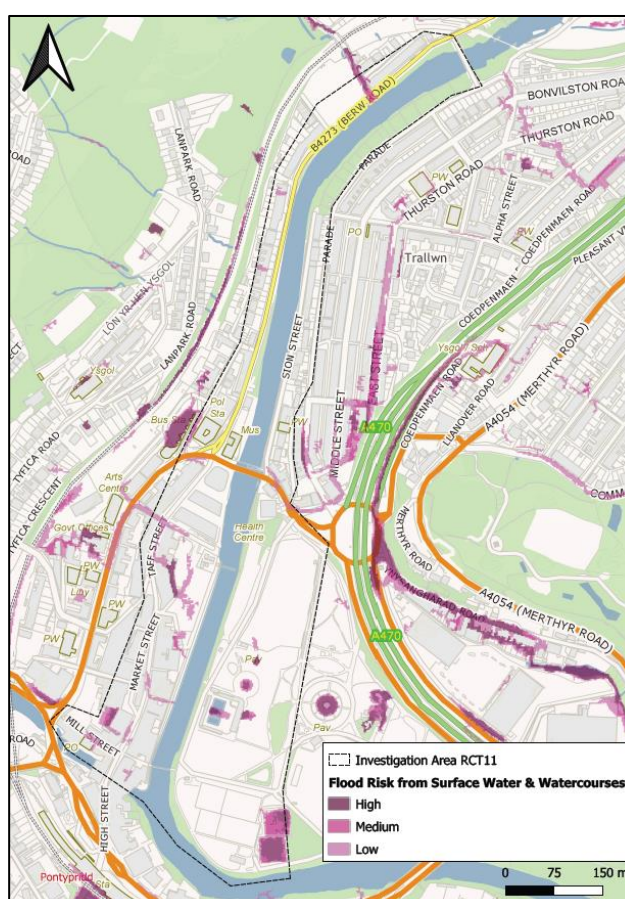


Figure 14: NRW's FRAW map for Surface Water and Ordinary Watercourse flood sources at RCT11. Contains Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved.

3.7. ACCESS STRUCTURES

No access structures were identified during the asset investigations within the area, as such 'access structures' have not been considered within this report.

3.8. SUMMARY OF POSSIBLE CAUSES

The above sections have identified and described the possible causes of flooding within investigation area RCT11 during Storm Dennis which occurred on the 15th and 16th of February 2020. A summary of the identified source(s) and possible cause(s) of flooding (issue) has been outlined below in Table 4.

Table 4: Summary of source(s) and possible cause(s) of flooding in investigation area RCT11 during Storm Dennis (15-16th February 2020)

Ref No	Asset (Source)	Issue	Asset Owner	Type of Flooding
1	River Taf	Unprecedentedly high river levels within the River Taf resulted in the main river overtopping its banks at several locations and flood water conveying into several properties.	Natural Resources Wales	Main River
2	River Taf	Unprecedentedly high river levels within the River Taf resulted in the main river overtopping its banks at several locations and flood water conveying into several properties.	Private Landowner(s)	Main River
3	Surface water drainage network across RCT11	Intense rainfall across RCT combined with the overtopping of the River Taf severely overwhelmed highway drainage infrastructure, resulting in the accumulation of surface water on several streets throughout the investigation area.	Rhondda Cynon Taf CBC Highway Authority	Surface Water

4. RISK MANAGEMENT AUTHORITY ACTIONS

A Welsh Risk Management Authority is defined in Section 6 of the Flood and Water Management Act 2010 as NRW; a LLFA, a district council for an area where there is no unitary authority, or a highway authority wholly in Wales; an internal drainage board for an internal drainage district that is wholly or mainly in Wales; a water company that exercises functions in relation to an area in Wales. As the LLFA, RCT has the responsibility to coordinate the management of flood risk and the interaction of Risk Management Authorities across Rhondda Cynon Taf.

An overview of the relevant Risk Management Authority in relation to flood type is provided in Table 5. For further details of the roles and responsibilities of individual Risk Management Authorities in managing flooding, refer to the Welsh Government's National Strategy for Flood and Coastal Erosion Risk Management, Section 4 'Roles and Responsibilities'⁵, and RCT's 'FRM – Storm Dennis - Overview Report'².

Table 5: Risk Management Authority with relevant functions to manage risk from different flood types

Type of Flooding	Risk Management Authority
Flooding from Main River, reservoirs and the sea (including coastal erosion).	Natural Resources Wales
Flooding from ordinary watercourses, surface water and groundwater	Lead Local Flood Authority
Flooding from water and sewage systems	Water Companies (Dŵr Cymru Welsh Water)
Flooding from the highway	Highway Authority
Flooding from the highway (motorways and major trunk roads)	Welsh Government Trunk Road Agency

Risk Management Authorities have direct flood risk management functions under the Flood and Water Management Act 2010, as well as the Water Resources Act 1991, Land Drainage Act 1991 and the Highways Act 1980. Through analysis of the flooding that impacted RCT11, the flood risk management functions exercised or proposed to be exercised by relevant RMAs were recorded pursuant to Section 19 of the Flood and Water Management Act 2010, which states:

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

- a) Which risk management authorities have relevant flood risk management functions and,
- b) Whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in the response to the flood.”

Through the investigation process, the source(s) and possible cause(s) of flooding in RCT11 during Storm Dennis have been previously identified and summarised within Table 4. The Risk Management Authorities responsible for managing that flooding have been listed in Table 6 below, along with a series of recommendations put forward by the LLFA.

Table 6: Recommendations provided by the LLFA to be considered by the relevant Risk Management Authority identified in response to the source(s) of flooding in RCT11 (as per Table 4).

Ref No	Asset (Source)	Asset Owner	Type of Flooding	Relevant Risk Management Authority	Recommendations
1	River Taf	Natural Resources Wales	Main River	Natural Resources Wales	R1A NRW to “complete detailed investigative analysis work to understand the mechanisms of flooding in areas known to have flooded from main rivers”, including the River Taf at Pontypridd. Aligns with recommendation ‘Action FD2’ within NRW’s Flood Incident Management Review.
					R1B NRW to investigate the standard of protection provided by flood defences at RCT11 and “consider improvements to NRW flood alleviation schemes and structures on a prioritised basis”. Aligns with recommendation ‘Action FD3’ within NRW’s Flood Incident Management Review.

					R1C	NRW to review its flood warning service provision, especially for extreme events. This will form part of NRW's Flood Warning Service Review Implementation Programme and aligns with the recommendations set out in their 'Flood Incidence Management Review'.
2	River Taf	Private Landowner	Main River	Natural Resources Wales	R2A	NRW to work with the landowner(s) to assess and review the risk of flooding from the River Taf at locations known to have overtopped during the event but are currently 'undefended', to identify the viability of risk management options.
3	Surface water drainage network across RCT11	Rhondda Cynon Taf CBC Highway Authority	Surface Water	Highway Authority and Lead Local Flood Authority	R3A	The Highways Authority to jet and cleanse the highway drainage network and action repairs accordingly.
					R3B	The LLFA and Highway Authority to evaluate surface water management options to alleviate pluvial flooding at locations across the investigation area.

4.1. LEAD LOCAL FLOOD AUTHORITY

In review of Ref 3 in Table 6, the LLFA has been determined as a relevant Risk Management Authority in relation to the surface water flooding which occurred in investigation area RCT11 during Storm Dennis.

The LLFA exercised the following functions in response to the flooding at investigation area RCT11:

- Officers investigated the initial flooding and have produced this report in line with Section 19 of the Flood and Water Management Act 2010.
- Officers contacted residents affected by flooding to offer support and advice to assist in the recovery following the event.
- A public engagement exercise carried out by Redstart, on behalf of RCT as the LLFA, was undertaken in order to gain further local insight and anecdotal evidence to support the flood investigation.
- The LLFA has exercised its powers, under Section 13 of the FWMA, to request information and co-operation from the relevant risk management authorities (NRW and DCWW) in relation to their responsibilities as RMAs in response to Storm Dennis.
- RCT carried out an initial phase of repair works to rebuild the section of damaged retaining wall at Sion Street during Autumn 2021.
- The LLFA has set up a central Control Room to compliment the Council's Contact Centre and CCTV centre which is based at the Council's offices, to provide a comprehensive and informed response to the residents of RCT as appropriate during storm events.
- The LLFA, working in partnership with NRW, have expanded their interim Property Flood Resistance project offering expandable flood gates to those properties deemed at high risk of flooding from the main river, as per NRW's determination.

The LLFA also propose to exercise the following functions in response to the flooding at investigation area RCT11:

- The LLFA and LDA intend to clarify drainage asset owners and management responsibilities to make them aware of their personal risk. To ensure

landowners manage the risk in compliance with the relevant legislation, a team of Flood Enforcement Officers including legal support is to be appointed.

- The LLFA and LDA will work with landowners and property owners to manage their personal flood risk through local measures, such as property resilience and resistance measures.
- RCT propose to carry out a second phase of repair works to the section of damaged retaining wall at Sion Street. These works will involve repointing the brickwork and railing replacement to the RCT owned length of retaining wall. This work is expected to be completed in Summer 2022.
- As part of RCT's comprehensive review of the County Borough's most at risk communities, the LLFA are proposing to undertake a formal SFRA of the Lower Taf catchment area to better understand the overall risk from ordinary watercourse and surface water flooding in order to target investment to areas of highest risk. The SFRA also aim to encourage whole catchment measures, including working with natural processes, to alleviate flood risk in those areas of highest risk. **(R3B)**
- The LLFA will cooperate and collaborate with NRW to ensure a detailed study of the investigation area is completed and that appropriate actions to mitigate the impacts of river flooding are undertaken in accordance with NRW's Flood Incident Management Review.

4.2. NATURAL RESOURCES WALES

In review of Ref 1 and 2 in Table 6, NRW has been identified as the relevant Risk Management Authority in relation to the main river flooding from the River Taf during Storm Dennis.

NRW have exercised the following functions in response to the flooding at investigation area RCT11:

- NRW have carried out post event data collection including an assessment of the properties impacted by main river flooding and a survey of wrack marks, i.e. the marked high-water level.
- Following Storm Dennis, NRW undertook an inspection of the River Taf at Pontypridd to ensure it was clear of blockages.
- NRW specifically outline within their 'Flood Incident Management Review'⁴ that "more Severe Flood Warnings should have been issued based on the flooding impacts experienced" in the Lower Taf region. Utilising post event data and information, NRW have reviewed the Resultant Thresholds for the River Taf at Pontypridd Flood Warning Area. This is critical for assessing the performance, timeliness and accuracy of the warning service after a flood. **(R1C)**.
- NRW has introduced improved digital services to provide comprehensive flood risk, river level and rainfall information to households, businesses and communities across Wales. The improved service was launched in September 2020 on the NRW website and will, according to NRW, improve how live flood warning and water level data is shared before and during flood events. **(R1C)**
- Following the flooding events of February 2020, NRW published a review of its incident response to Storm Ciara and Dennis in October 2020⁶. This review contains several recommendations for improvements to their ways of working and services which NRW are in the process of implementing through an internal delivery programme.
- NRW have developed a detailed Implementation Programme to address the areas of improvement work required to deliver the recommendations of the Flood Warning Service Review carried out by NRW in 2018. Several of the recommendations directly link to the recommendations set out by NRW within their Flood Incident Management Review **(R1C)**.

⁶ [Natural Resources Wales / Our response to Storm Ciara and Storm Dennis](#)

NRW propose to exercise the following functions in response to the flooding at investigation area RCT11:

- Alongside NRW's commissioned Lower Taf modelling project, NRW are looking to complete an in-house modelling project specifically for the Pontypridd region which is programmed for completion by the end of 2022. **(R1A)**
- Following the completion of NRW's Pontypridd Flood Modelling Project, NRW propose to undertake an initial economic assessment of the viability of potential flood risk management options. Consideration should be given to areas at high risk of flooding from rivers on a prioritised basis. **(R1A, R1B)**
- Following the completion of NRW's in-house Pontypridd modelling project, NRW propose further threshold work and flood warning area amendments. **(R1A, R1C)**
- NRW will undertake a review of the modelled outputs and adopt changes to their maintenance program within the investigation area if required. **(R1A)**
- NRW will carry out future refurbishment of flood gates around the access footbridge to Ynysangharad Park, located to the south of Pontypridd Town Centre.

4.3. WATER COMPANY

Dŵr Cymru Welsh Water were not identified as a relevant authority in relation to the flooding at investigation area RCT11 during Storm Dennis. DCWW do not propose to undertake any actions in relation to the event within the investigation area.

4.4. HIGHWAY AUTHORITY

During the investigation into the flooding at investigation area RCT11 during Storm Dennis, the Highway was identified as flooding from both surface water runoff and main river flooding from the River Taf.

Ref 3 of Table 6 identifies the Highway Authority as a relevant Risk Management Authority in relation to the surface water flooding that occurred along the highway across RCT11.

RCT as the Highway Authority have exercised the following functions in response to the flooding at investigation area RCT11:

- The Highway Authority assisted with the emergency response during the event by supplying equipment and sandbags, some to individual properties and using sandbags to redirect flood water away from properties.
- The Highway Authority exercised their functions, under Section 100 of the Highways Act 1980, to arrange for all gullies and open drains in the highway to be inspected and cleansed following the influx of fluvial flood water to ensure the safety of the highway post event. **(R3A)**
- An estimated 47 metres of surface water drainage network length within RCT11 has been surveyed and cleansed following Storm Dennis to ascertain the condition of the network and to remove the identified silt and debris. **(R3A)**

RCT as the Highway Authority propose to undertake the following function in relation to the storm event at investigation area RCT11:

- The Highway Authority intend to increase their resource capacity by establishing a dedicated 'Pluvial Drainage Team' to focus entirely on the refurbishment and maintenance of RCT's existing and enhanced highway drainage infrastructure.

USEFUL LINKS/CONTACTS

Blue Pages – property Resilience - <http://bluepages.org.uk/>

Flood Re – Flooded Property Insurance Scheme - <https://www.floodre.co.uk/>

Natural Resources Wales – Check Flood Warnings - <https://naturalresources.wales/flooding/check-flood-warnings/?lang=en>

Natural Resources Wales - Long Term Flood Risk - <https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en>

Rhondda Cynon Taf CBC - Local Flood Risk Management Plan - <https://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Roadspavementsandpaths/FloodAlleviation/Floodriskregulations2009.aspx>

Rhondda Cynon Taf CBC - Local Flood Risk Management Strategy - <https://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Roadspavementsandpaths/FloodAlleviation/LocalFloodRiskManagementStrategy.aspx>

Rhondda Cynon Taf CBC – Sustainable Drainage – <https://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Roadspavementsandpaths/SustainableDrainage/SustainableDrainage.aspx>

Welsh Government - National Strategy for Flood and Coastal Erosion Risk Management - <https://gov.wales/sites/default/files/publications/2019-03/national-strategy-for-flood-and-coastal-erosion-risk-management-in-wales.pdf>

Welsh Water – How to Contact Us – <https://www.welshwater.com/en/Contact-Us.aspx>