South Gloucestershire Council

Section 19 Flood Investigation Report

South Yate Flooding 24 November 2024

Executive Summary

Statutory Duty

Section 19 of the Flood and Water Management Act 2010 (FWMA) states that, on becoming aware of a flood which meets certain predetermined criteria, the Lead Local Flood Authority (LLFA) must, to the extent that it considers necessary or appropriate undertake a formal flood investigation in order to determine the relevant flood risk management authorities that should have been involved in the event and how they exercised their functions during and after the event. The LLFA also should investigate which flood risk management actions have been (or should be) taken to mitigate future flood risk and publish a final report. This report should be shared with all relevant risk management authorities.

Flood Event

On the evening of the 24th of November 2024, a significant flood event occurred in South Yate, which resulted in a major incident being declared. The worst affected locations were the residential streets of Slimbridge Close, Littledean, Maisemore, Shire Way, Cherington, Blaisdon, Woodchester, and Harescombe. In total, 34 properties suffered internal flooding.

Multiple residents who were affected by the flooding reported that flood waters originated from the railway line that runs to the immediate south of this area. They reported that water flowed off the railway line in multiple locations, overwhelming existing drainage systems and entering properties.

It is understood from discussions with Network Rail that the railway itself experienced significant flooding on the 24th of November resulting in the mainline being shut for several days afterwards.

The flood event coincided with Storm Bert crossing South Gloucestershire over the 23rd and 24th of November bringing with it strong winds and intense rainfall. As a result, significant surface water flooding was reported across the County.

This report covers the flooding incident on the 24th of November 2024 in South Yate and has identified all flooded properties within the area that we have been able to determine or brought to our attention. Based on the criteria set out in our Local Strategy this single report covers the requirement for Section 19 Flood Investigation Reports.

Revision	Date	Details	Author	Checked and Approved by
1	20/03/2025	1st Draft	Scott Jones	Barry Wyatt
2	08/04/2025	Final Draft	Scott Jones	Barry Wyatt

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1. Introduction

1.1 Context

Section 19 of the Flood and Water Management Act 2010 (FWMA) states that, on becoming aware of a flood which meets certain predetermined criteria, the Lead Local Flood Authority (LLFA) must, to the extent that it considers necessary or appropriate undertake a formal flood investigation in order to determine the relevant flood risk management authorities that should have been involved in the event and how they exercised their functions during and after the event.

The LLFA also should investigate which flood risk management actions have been (or should be) taken to mitigate future flood risk and publish a final report. This report should be shared with all relevant risk management authorities.

1.2 Criteria

It has been agreed that a formal investigation is required following a flood event when any of the following criteria is met:

- Serious injury(ies) or fatality(ies) because of flooding
- Internal flooding of 10 residential properties from an unknown source or multiple sources of flooding
- Internal flooding of multiple industrial or commercial properties
- Flooding of critical infrastructure
- Flooding to an environmental or heritage designated site if that flooding could affect the long-term designation of the site
- Repeated flooding to the same receptor(s)

1.3 Consultees

The following bodies were consulted regarding this flood event:

Risk Management Authorities

Risk Management Authorities are defined in the FMWA and are given different areas of responsibility depending on their role. They have a duty to co-operate and with each other and to share data where necessary to better deliver flood risk management to benefit communities.

- South Gloucestershire Council – Overall responsibility as the LLFA.

Emergency Services

- The Avon & Somerset Fire and Rescue Service were involved in the response to the flood incident, operating and providing pumps.

Other interested parties

- Network Rail, who own the railway to the south of the areas impacted by the flooding.
- Property owners / landowners who were affected by the flooding.
- Wessex Water, who own and maintain the public surface water sewer network that serves this part of Yate.

2. Risk Management Authority Responsibilities

The roles and responsibilities of the main bodies involved in flood risk are described below. For a more detailed description please refer to our Local Flood Risk Management Strategy (2022 – 2027).

2.1 South Gloucestershire Council

South Gloucestershire Council has several different roles before, during and after a flood event. As the LLFA we have a role to develop flood risk strategies and to investigate and record details of flood events, and to maintain a register of structures and features that could have a significant impact on flood risk.

We also have a role to consent works on ordinary watercourses and regulate works done by others. As the Highway Authority we are required to ensure that all local highways are drained of surface water and where necessary maintain highway drainage systems.

We are a Category 1 Responder under the Civil Contingencies Act 2004 and therefore have a responsibility, along with other organisations for developing emergency plans, contingency plans and business continuity plans to help reduce, control or ease the effects of an emergency in South Gloucestershire.

As a Local Planning Authority, we have a responsibility to consider flood risk and drainage in our strategic land use planning and the development of our Local Plan, as set out under the National Planning Policy Framework. We are the ‘decision maker’ on flood risk and drainage for planning applications for development, taking into consideration technical advice from other risk management authorities as consultees (statutory).

Lastly as a landowner we are responsible for the maintenance of Council owned assets which have a role in flood risk management. These include community open spaces, drainage ditches, gullies, trash screens and culverts across South Gloucestershire.

2.2 Lower Severn Internal Drainage Board

The Lower Severn Internal Drainage Board (IDB) is responsible for managing water levels, within rhines, in the Avonmouth and Severnside area, and manages pumping stations to convey rhine flow across catchments. The low-lying land in this area is generally flat and is characterised by the Rhines, streams and ditches that discharge into the Severn Estuary. The flood event being considered is not within the Lower Severn IDB area.

2.3 Environment Agency

The Environment Agency (EA) is designated a Risk Management Authority and is responsible for managing flooding from main rivers (such as the River Avon and the River Frome) and tidal flooding (such as from the Severn Estuary) and have a responsibility to provide a strategic overview for all flooding sources and coastal erosion.

2.4 Wessex Water Plc

As the sewerage undertaker serving South Gloucestershire, Wessex Water is also designated a Risk Management Authority and is responsible for surface water drainage from development via adopted sewers and for maintaining public sewers into which a significant amount of the highway drainage connects in urban areas.

2.5 National Highways

National Highways is responsible for managing highway drainage from the motorways and major trunk road network in England, including the slip roads to and from trunk roads. Within South Gloucestershire this includes the M4, M5, M48, M49, M32 and A46 (south of M4). National Highways are not included in this review.

2.6 Riparian Landowners

Anyone who owns land which is adjacent to a watercourse or land which has a watercourse running through it has certain legal responsibilities to maintain the watercourse unobstructed. Where a watercourse marks the boundary between adjoining properties, it is normally presumed the riparian owner owns the land up to the centre line of the watercourse.

The LLFA must also take an overseeing role to ensure that all flood risk is being managed appropriately.

In small, localised groundwater and surface water flooding incidents which do not reach the threshold level to trigger a flood investigation by the LLFA under Section 19, the Local Authorities will work in partnership to consider the appropriate action.

All RMAs have a duty to co-operate and to share information in relation to their flood risk management functions.

3. Site Information

3.1 Location

The town of Yate is located approximately 19km northeast of Bristol. The residential areas of South Yate that were affected by flooding on the 24th of November are Slimbridge Close, Littledean, Maisemore, Shire Way, Cherington, Blaisdon, Woodchester and Harescombe. Their location is shown in Figure 1 and Figure 2.

The Great Western Mainline, which is operated by Network Rail is located to the immediate south of this area with several properties on Slimbridge Close backing onto the railway. The railway runs on an embankment behind Slimbridge Close and Littledean and so is at a higher level than the properties.

There is a narrow-wooded area between the railway line and both Shire Way and Littledean. This area of open space is owned and maintained by South Gloucestershire Council. In addition, Goldcrest Park, which is also owned by South Gloucestershire Council is located to the east of Slimbridge Close. The park is on higher ground compared to the properties.

There is also a Network Rail maintenance yard located off Shire Way.

Figure 1 – Location Plan

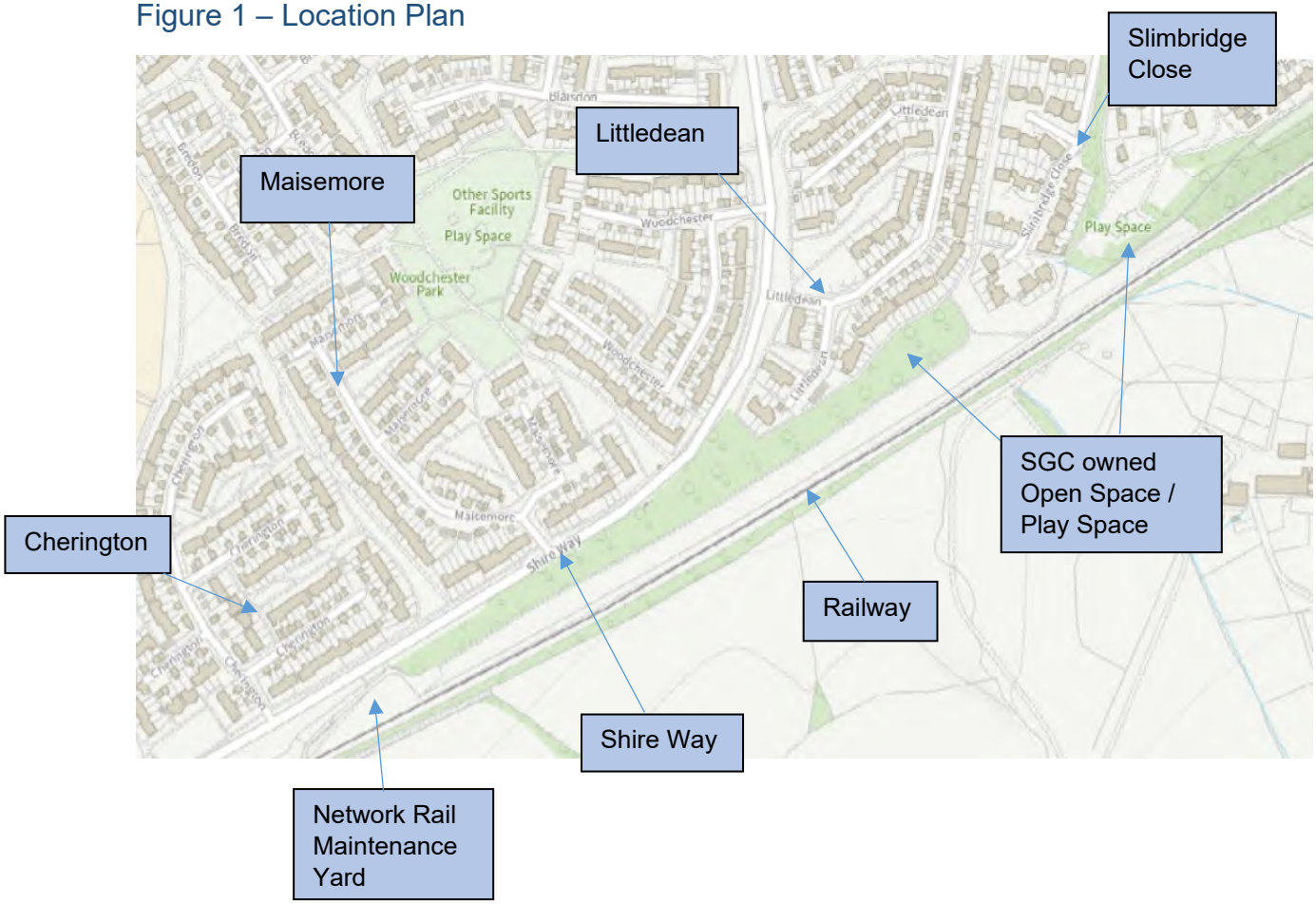
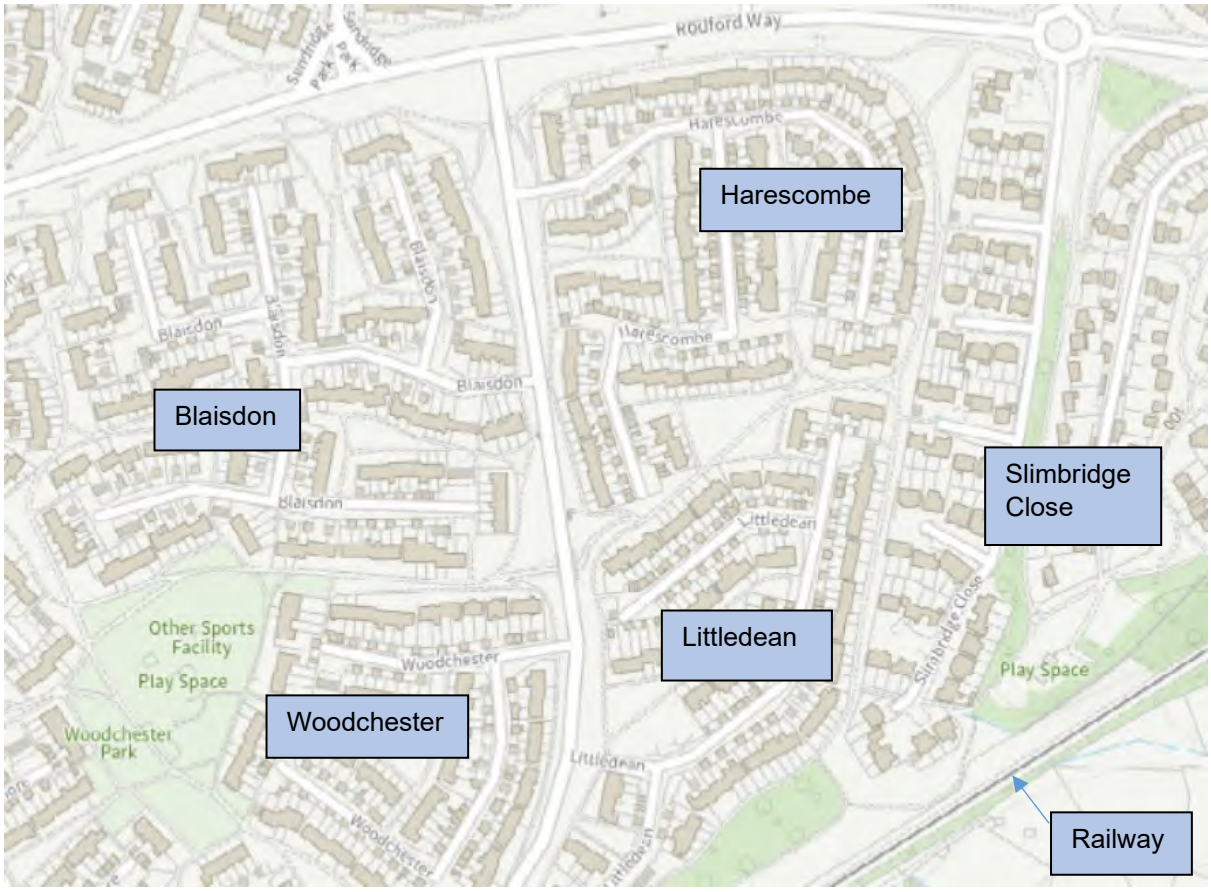


Figure 2 – Location Plan



3.2 Flood Risk

According to Environment Agency (EA) flood maps this area of South Yate is shown to be in Flood Zone 1. Land within Flood Zone 1 has a low probability of flooding from rivers and the sea.

However, according to the EA Risk of Flooding from Surface Water (RoFSW) maps the area is shown at being at Low, Medium and High risk of surface water (pluvial) flooding. Figure 2 below shows the surface water flood risk for this area.

The RoFSW map is an assessment of where surface water flooding may occur. This happens when rainwater lies on or flows over the ground, instead of draining away through the normal drainage systems or soaking into the ground. The RoFSW map shows flooding that is likely to occur because of rainfall with a 3.3% or 1 in 30 (High), 1% or 1 in 100 (Medium) and 0.1% or 1 in 1000 (Low) chance of happening in any given year.

Figure 3 – Surface Water flood risk map

3.3 Existing Drainage Systems

There is an extensive public surface water sewer system serving this part of South Yate. This system is owned and maintained by Wessex Water who are the statutory sewerage undertaker for South Gloucestershire.

It is understood that the public surface water sewer system acts under gravity and discharges into an unnamed ordinary watercourse to the west of Yate by Beech Hill / Say's Wood. This unnamed ordinary watercourse is a tributary of the River Frome.

There is highway gullies located within the carriageway are the responsibility of South Gloucestershire Council to maintain as the Highway Authority. The highway gullies serve to drain surface water off the highway. Surface water collected by the highway gullies is discharged into the public surface water sewer.

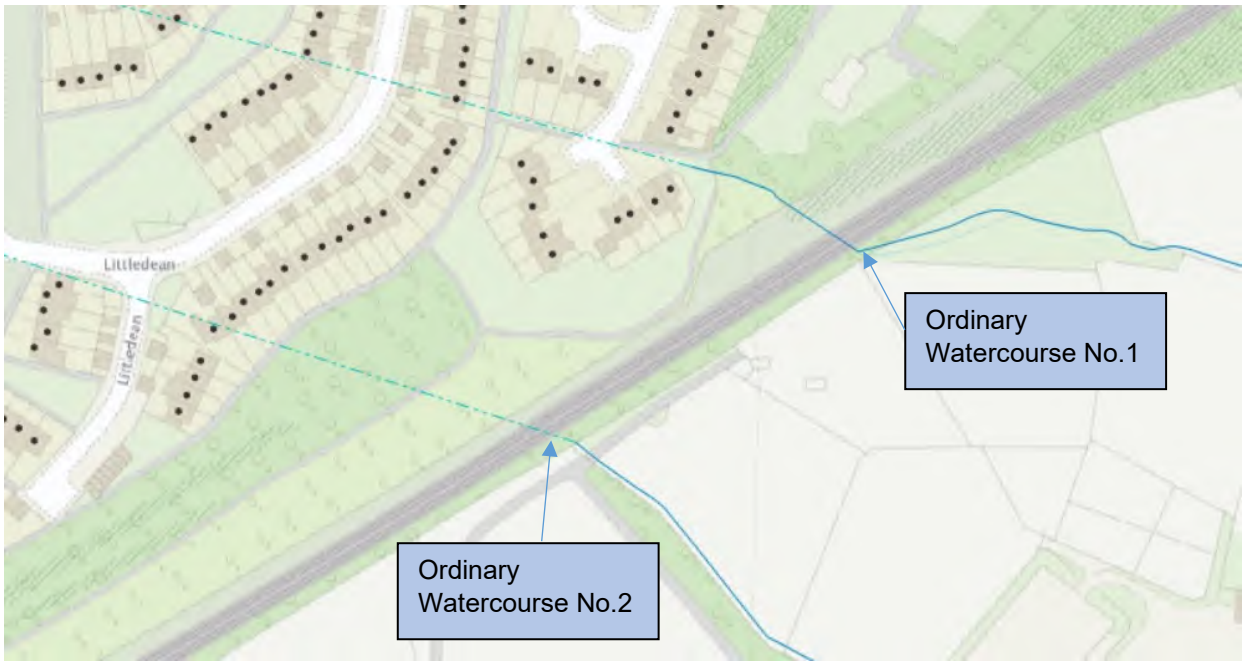
3.4 Ordinary Watercourses

Two unnamed ordinary watercourses pass under the railway line through culverts. Both ordinary watercourses rise in the fields to the east of the railway and flow in a north westerly direction. Their location is shown in Figure 4.

The first ordinary watercourse enters railway land through a 450mm diameter pipe. We understand from discussions with Network Rail that a percentage of railway drainage discharges into the culvert. Once the watercourse has passed under the railway line it eventually enters the public surface water drainage system.

The second ordinary watercourse also enters railway land through a 450mm diameter pipe. Once the watercourse has passed under the railway track it crosses the area of wooded open space between the railway and the back of the rear gardens of properties on Littledean via a culvert. This land is South Gloucestershire Council owned and as such ownership and maintenance responsibility for this length of culvert falls to the Council as riparian owners. This watercourse also enters the public surface water system.

Figure 4 – Location of Ordinary Watercourses



4. Previous Flooding

4.1 Summary

According to records one property in Littledean flooded approximately 15 years ago. The cause of the flooding was to do with the culvert that runs through the narrow-wooded area between the railway and the rear gardens of properties on Littledean. This culvert conveys one of the unnamed ordinary watercourses that rises to the east of the railway and flows into the public surface water sewer system (see Section 3.4).

Upon investigating the flood event it was discovered that a manhole cover had fallen or been dropped into the manhole chamber. This caused a blockage in the culvert and led to water surcharging out of this system. The issue was rectified (manhole cover removed from chamber) and there have been no reports of flooding issues since.

South Gloucestershire Council also has several reports of surface water flooding on a section of Shire Way by the Network Rail Maintenance Yard. The reports suggest that surface water runoff flows off the yard and out onto the highway. This then contributes to standing water on the carriageway, which is also at times exacerbated by highway gullies on Shire Way being blocked by debris associated with leaf fall.

However, it must be noted that South Gloucestershire Council does not hold records of any previous extensive flooding affecting this part of Yate.

4.2 Railway Flooding

Network Rail has a problem with flooding routinely affecting the railway line at the Chipping Sodbury tunnel, which is approximately 2.5km to the east of the affected residential areas in South Yate.

The tunnel was built in 1901, but it and the section of track nearby suffers during wet weather. The resulting flooding that affects the railway causes the main line to be closed and this can occur several times during the year particularly during the winter months.

Network Rail have previously undertaken drainage improvement works to try and alleviate the flooding affected the railway in this location. This has included the installation of a lagoon in 2018 as part of a flood alleviation scheme designed to improve the resilience of the railway line to flooding. However, flooding still impacts the railway line at Chipping Sodbury tunnel.

5. Flood Incident

5.1 Background

On the evening of the 24th of November 2024, significant flooding occurred to residential areas of South Yate. The worst affected locations were Slimbridge Close, Littledean, Maisemore, Shire Way, Cherington, Blaisdon, Woodchester and Harescombe where internal property flooding was reported. In total 34 properties flooded internally with significant damage also reported to gardens, outbuildings and vehicles.

5.2 Flood / Weather Warnings

The flood event that affected South Yate coincided with Storm Bert crossing South Gloucestershire over the weekend of the 23rd and 24th of November.

A Yellow Met Office Weather Warning was issued on the 21st of November for much of southwest England covering the period between 06:00 Saturday (23rd) and 23:45 Sunday (24th). The warning raised the risk of heavy rain associated with Storm Bert and predicted rainfall accumulations of 50 to 75 mm to fall widely during this time.

The Flood Forecasting Centre (FFC) also released a Flood Guidance statement for England and Wales that raised the risk of significant river and surface water flooding in parts of England and Wales on both the Saturday (23rd) and Sunday (24th) due to the expected heavy rain associated with Storm Bert.

5.3 Rainfall Data

Intense rainfall occurred across South Gloucestershire over the course of Saturday the 23rd and Sunday the 24th, which was associated with Storm Bert. This followed an abnormally wet autumn. To help understand the cause of the flooding on the 24th of November, rainfall data from the nearest available rainfall gauge has been reviewed.

South Gloucestershire Council has a rainfall gauge located on the roof of its Council Offices on Badminton Road in Yate. The rainfall gauge is approximately 2.4km from the areas of South Yate that were affected by the flooding

Over the weekend of the 23rd and 24th of November a total rainfall amount of 60.6mm was recorded as Storm Bert crossed the County.

- Saturday the 23rd = 17.4mm.
- Sunday the 24th = 43.2mm.

To give this some context the total rainfall experienced over the weekend of the 23rd and 24th of November was approximately 60% of the total rainfall recorded by the gauge for the month of November as a whole (98.00mm of rainfall recorded).

The total rainfall figure recorded for November (98.00mm) by the rainfall gauge is also greater that the average amount of rainfall expected for November (average is 89.00mm) according to Met Office data.

In the week preceding the flood event there had also been rainfall with approximately 14mm recorded on Monday the 18th of November and a further 8.4mm recorded over Tuesday the 19th of November.

The rainfall experienced over the 23rd and 24th of November and that from the preceding week fell on already saturated ground due to the abnormally wet autumn that had occurred. Over the course of September, a total rainfall amount of approximately 210mm was recorded. For October, a total rainfall amount of 110mm was recorded.

Again, to give this some context the average rainfall expected according to Met Office data for September is 64.31mm and 85.53mm for October. A quick analysis shows that there was over 3 times the amount of rainfall in September (210mm) than the expected average (64.31mm) and almost 1.5 times more rainfall in October (110mm) than the expected average (85.53mm).

The high rainfall levels experienced over Autumn in South Gloucestershire would have led to the natural ground being heavily saturated and to river catchments being extremely wet. With the arrival of Storm Bert and the associated intense rainfall hitting already saturated ground and wet catchments it resulted in widespread surface water (pluvial) and river (fluvial) flooding as drainage systems were overwhelmed.

5.4 Event Summary

According to residents between 16:30 and 17:30 on Sunday the 24th of November water was first observed to be flowing off the railway line at multiple locations. Residents have stated that the flow of water off the railway line was like a ‘torrent’ and that it lasted for several hours into the evening. The flood waters reached a depth of 2 feet in some locations according to reports received from residents.

One of the reported flood flow paths was within the area of open space to the rear of Slimbridge Close by Goldcrest Park. A large volume of water was observed flowing off the railway line that eventually made its way down towards Slimbridge Close by following the route of the public footpath. The footpath comes into the top end of Slimbridge Close between the properties No.87 and No.88 Slimbridge Close.

The water caused widespread and significant flooding to Slimbridge Close as existing drainage systems were overwhelmed by the sheer volume of flood water. Internal flooding occurred to properties in Slimbridge Close and the flood waters also caused damage to gardens and vehicles. The flood waters associated with this flow path is also understood to have flowed into parts of Littledean, Harsecombe, Blaisdon, Shire Way and Woodchester causing flooding in these residential streets.

It was also observed and reported by residents that water was still flowing off the railway into Slimbridge Close down the footpath at the head of the cul-de-sac on the morning of Monday the 25th of November.

A second flood flow path was identified by affected residents through the wooded area of open space to the rear of properties on Littledean. It has been reported that the flood water rushed down from the railway line and went straight into properties and caused considerable damage to gardens.

A third flow path was observed coming off the railway line at the Network Rail Maintenance Yard on Shire Way. This flow of water was seen initially to be a gradual flow of water before it rapidly increased in volume. The water caused extensive flooding to Shire Way and led to internal property flooding. Eventually the flood water flowed into Cherington, which is at a lower level that the properties on Shire Way. This led to flooding in Cherington with internal property flooding being reported. Flood water associated with this flow path is also understood to have caused flooding in Maisemore.

According to Network Rail there was significant flooding to the railway line on the 24th of November, in particular the section of the line between the Chipping Sodbury tunnel and the Old Station Yard, which is to the east of the residential areas of South Yate that were also affected by flooding. The flooding to the railway line resulted in it being closed on the 24th and for several days after the event.

From Network Rail's observations it appears that over the course of the day (the 24th) a large volume of water from fluvial, pluvial and groundwater sources entered the railway cutting. By early evening this volume of water eventually overwhelmed the existing drainage and attenuation storage (lagoon) resulting in water flooding onto the track.

As the railway's gradient falls from East (Chipping Sodbury) to West (Westerleigh) the water began to flow down the track, which acted as a channel for the flood waters. The flood water eventually came out of the railway at the end of the next cutting, which is at Slimbridge Close, Littledean and Shire Way causing widespread flooding.

The RoFSW flood maps show the railway line to be at risk of surface water flooding and suggests that the track would act as a channel and convey flood water if significant flooding was to occur.

The table that can be seen in Figure 5 confirms the number of properties that reported internal flooding to the Council in each of the residential areas.

Figure 5: Number of properties that reported internal flooding

Residential Street / Area	**Properties affected by internal flooding**
Blaisdon	6
Cherington	9
Littledean	11
Slimbridge Close	8
	Total = 34

6. Conclusions

The investigation has reviewed the source of flooding that affected residential areas of Slimbridge Close, Littledean, Maisemore, Shire Way, Cherington, Blaisdon, Woodchester and Harescombe in South Yate on the 24th of November 2024.

Exceptional and intense heavy and prolonged rainfall associated with Storm Bert that occurred over the weekend of the 23rd and 24th of November is considered to be the primary cause of the flooding that affected the aforementioned areas. The storm followed on from an extremely wet autumn period in which record rainfall levels were recorded across South Gloucestershire.

The preceding period of wet weather had resulted in the natural ground across South Gloucestershire being heavily saturated. In addition, river catchments would have been extremely ‘wet’. With the arrival of Storm Bert and the associated intense rainfall hitting already saturated ground it resulted in widespread surface water (pluvial) flooding as drainage systems were overwhelmed and river (fluvial) flooding as watercourses overtopped.

The railway line in the cutting between Chipping Sodbury tunnel and the Old Station Yard experienced significant flooding on the 24th of November, which was caused by a combination of surface water (pluvial), river (fluvial) and groundwater sources. The flooding from these sources was due to the intense rainfall associated with Storm Bert and the cumulation of rainfall from the preceding weeks and months. This volume of water eventually overwhelmed the existing drainage infrastructure leading to significant flooding of the railway.

From the reports received it appears that the flood water behaved as that shown on the Risk of Flooding from Surface Water (RoFSW) maps. As detailed in the previous section the railway line has acted as a channel and flood waters have flowed down the railway line from the cutting at the Chipping Sodbury tunnel to the next cutting by Slimbridge Close where the water has then flowed off the railway and into the residential streets. The three identified flood flow paths that came off the railway line mirror the flow paths that are shown in the RoFSW maps.

The flood water that emanated from the railway and into the residential streets also overwhelmed the highway drainage and public surface water drainage systems serving these areas, resulting in the temporary impoundment of the flows. However, it should be noted that these systems were not designed to accommodate the volume of flood flows coming from the railway cutting.

7. Recommendations

As a result of this investigation report, several recommendations are made for further action. These are as a result of both initial site and desktop investigations, and the continuation of works or investigations already in progress. South Gloucestershire Council as the LLFA will continue to monitor and record all flood incidents that come to our attention and consider this within our Local Flood Risk Management Strategy (LFRM) action plan and future investment programme.

The recommendations made below by South Gloucestershire Council acting as the LLFA will need to be considered by the relevant authority or responsible property/landowners and prioritised accordingly within their existing and future investment programmes as the LLFA does not have the legal authority to require actions to be undertaken by others. While all flooding is taken very seriously, it is unlikely that all actions can be carried out immediately given capacity and funding constraints. Some actions may require further detailed investigations with the development of a robust business case to secure funding, prior to any detailed scheme design and delivery.

7.1 Recommended Actions

1. South Gloucestershire Council, Network Rail, the Environment Agency and Wessex Water to continue with its partnership work to investigate opportunities to deliver strategic flood risk alleviation schemes in the wider catchment to improve flood resilience.
2. Network Rail should ensure the efficient operation of the track drainage system and to investigate options to protect the resilience of the railway line from flooding in the future.
3. South Gloucestershire Council and partners will advise the affected communities as to appropriate measures to improve flood resilience to the properties that are shown to be at risk of surface water flooding.
4. South Gloucestershire Council will continue to ensure that the two ordinary watercourses as they pass through Council land are operating efficiently, by carrying out inspections and appropriate maintenance.
5. Wessex Water should ensure efficient operation of the public surface water system by continuing to implement its inspection and maintenance regime.
6. South Gloucestershire Council will continue to ensure the efficient operation of highway gullies (drains) by carrying out inspections and appropriate maintenance.

8. Next Steps

The next steps following this report will be for South Gloucestershire Council as the LLFA to ensure that the recommended actions are presented to the responsible Risk Management Authority. South Gloucestershire Council will consider their actions in line with other priorities and monitor delivery through regular reviews, whilst working in partnership with other Risk Management Authorities and the local communities affected.

There is an expectation from South Gloucestershire Council of itself and its partners that all authorities involved will cooperate and work together to improve the flood risk in the area affected by the flood event identified in this report by progressing the recommended actions. As the LLFA, South Gloucestershire Council has a responsibility to oversee the delivery of these actions.

A review of the actions will be carried out by South Gloucestershire Council as the LLFA to monitor progress and encourage delivery of recommended actions.

9 Disclaimer

The findings of the report are based on a subjective assessment of the information available by those undertaking the investigation and therefore may not include all relevant information. As such it should not be considered as a definitive assessment of all factors that may have triggered or contributed to the flood event.

Any recommended actions outlined in this report will be for the relevant responsible body or persons to assess in terms of resource implications, priority and cost/benefit analysis of the proposal. Moving forward, these may be included in the Action Plan linked to the Local Flood Risk Management Strategy or in the relevant risk management authority's future work programme as appropriate.

The opinions, conclusions and any recommendations in this Report are based on information provided to South Gloucestershire Council. The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the time of preparation and South Gloucestershire Council expressly disclaims responsibility for any error in, or omission from, this report arising from or in connection with those opinions, conclusions and any recommendations.

The implications for producing Flood Investigation Reports and any consequences of blight have been considered. The process of gaining insurance for a property and/or purchasing/selling a property and any flooding issues identified are considered a separate and legally binding process placed upon property owners and this is independent of and does not relate to the information in this report highlighting flooding to properties at a street level.

South Gloucestershire Council do not accept any liability for the use of this report or its contents by any third party.