

## **Pulborough's sewerage and drainage**

Dr Andy Tilbrook

Deputy Dean (retired), Faculty of Engineering, Science and the Built Environment, London South Bank University.

Immediate Past Chairman, Planning & Services Committee, Pulborough Parish Council.

August 2019

### **1. Background**

The geology of Pulborough is fairly simple. A layer of topsoil, no more than 2 to 3 feet deep, overlies a layer of greensand and further down, at a typical depth of 12 to 15 feet, lies a very thick layer of Wealden clay. This results in drainage water that has no easy access to streams, rivers or the River Arun floodplain lying close to the surface for a considerable period of time. Further north, in much of the catchment area of the River Arun, the clay is at or close to the surface increasing the speed of the rainwater runoff inevitably heading for the river. Heavy winter rain towards Horsham results in a rise in the level of the Arun at Pulborough some 24 hours later. The river is tidal at Pulborough and a combination of heavy rain, spring tides and a storm surge in the English Channel will inevitably bring a large rise in the river level.

There are two main drainage/sewerage problem areas in Pulborough, a North-South region running close to the A29, and an East-West system running to the south of the A283. These areas have quite different manifestations of the same problem, which is drainage water flowing at times into the sewerage system in unanticipatedly large quantities.

### **2. North-South issues (A29 and bounding areas)**

#### **2.1 South of Pigeon Gate Bridge – Spiro Close area**

In this part of Pulborough Parish there were no significant problems before 2007 when the Spiro Close estate, Pulborough Medical Centre and Tesco supermarket were constructed. The completion soon afterwards of the Riverside estate further north just across the railway added to problems.

There is a sewage pumping station situated beside the A29 between the old police station and the entrance to the Spiro Close estate.

Sewage from all of the Codmore Hill estates north of the railway crosses the railway near Pigeon Gate Bridge on the A29 and then the pipe runs southwards through the gardens of London Road before turning at number 23 London Road to flow under the A29 road to the pumping station. Sewage from areas south of the railway flows in a different system to the pumping station and then the two systems together are pumped eastwards along the south side of the Recreation Ground to Moat Lane, down to Lower Street area and on to the Wickford Bridge works.

There is a stream that rises along the south side of the railway to the north of New Place Nurseries and feeds a lake situated at the very western end of the New Place estate. A

stream from this lake flows southwards behind the current Harwoods garage, turns westwards, past a balancing pond area, to flow under the A29, the Spiro Close estate and under the railway to be piped past Old Place and the Mill Pond to pass beside the pumping station. It then heads further westward to join the River Arun north of Park Mound.

Prior to the construction of the Spiro Close estate this was an open stream. When the estate was built the stream was culverted which meant that rain water flowing down the hills from both the north and south had no easy access to the stream, and now stays in the ground far longer. This is evidenced by frequent backups of sewage at the police station, and the fact that the two houses to the south of the police station have very high water levels in their back gardens more or less permanently. The house immediately south of the police station has a well in the back garden which nearly always has a water level very close to the surface (the garden slopes downwards to the west); and the house south of this has a garden where it is not possible to dig a hole without it filling with water.

Further south of these houses lies the entrance to Bell Close and Wren Close, which has a manhole cover that is a point where the drainage system and the sewerage system are connected (meeting between John Challoner, Southern Water, Brian Donnelly, HDC councillor, and Andy Tilbrook, Pulborough Parish Council, in 2013). This connection is there to allow excess flow in the sewerage system to flow into the drainage system. However, because there is so much drainage water trapped in the subsoil what is happening is that the excess of drainage water flows into the sewerage system, leading to back-ups in the sewerage system. This led to Southern Water having to put flow at the police station into bowsers and take it away, to a major failure of the sewerage system in Chestnut Close around 2010, and to Tesco having severe back-ups of flow in the wet winter of 2013/14.

A BT manhole cover close to the Collonades office building on London Road has also been seen to be overflowing with water at times of heavy rain.

The failures in the drainage system also manifest themselves in times of normal heavy rain when there is overflow through a drain at junction of Bell Close and the A29 and manhole covers both north and south of Tesco and flowing in the direction of where the stream used to be.

The inability of the system to cope in this area has a knock-on effect as there is then a reduced capacity to cope with flows from the estates in Codmore Hill.

## **2.2 North of Pigeon Gate Bridge – Codmore Hill Area**

The area of the Riverside estate, and the Codmore Hill area of Pulborough north of Pigeon Gate bridge has its own problems.

One issue has been that the drainage/sewerage pipeline that flows south down the eastern side of the A29 from the area of Sainsbury supermarket is laid at too shallow an angle (meetings between Martin Jones, Southern Water, Paul Clarke, HDC councillor, Andy Tilbrook Pulborough Parish Council, 2014) – so in times when there is little rainfall solid matter does not flow smoothly through the pipelines, and tends to build up. When there is

subsequent heavy rain, and material is then forced southwards, this leads to blockages just north of Pigeon Gate bridge.

The Riverside estate has had frequent problems with back-ups of sewage particularly in the pipeline that flows on the west and north side of Pigeon Gate bridge. At its worst, in early 2016, the system backed up to the point where raw, untreated sewage flowed up from manhole covers above this pipe, and across the footpath where children walk to our local primary school. In 2018 the pipe systems in this area were upgraded to handle the flow from the new Brookfield estate. In July 2019, before any of the 120+ Brookfield houses were occupied, there was another overflow.

There were also failures in the system several times in 2013/2014 in the area of the Sainsbury supermarket, which had backups of flow in the rear of their facilities. In 2014 the sewerage/drainage pipelines failed, and Southern Water then repaired the pipe and installed a liner. The pipeline there is a narrow (an operative told me it was 6 inch diameter), reinforced concrete pipe installed in the 1930s.

This narrow 1930s pipe runs down the A29 road to Pigeon Gate bridge and has not been enlarged despite the building of the Stane Street Close, Oddstones, Masons Way and Riverside estates. Only in 2018 has there been enlargement at the very end where the Brookfield estate will feed into it. Even with this enlargement, I am deeply suspicious that the system will not cope with the Brookfield estate outflows.

It is not my place to decide what the solutions to the problems might be but I am very concerned that any extra development in the Codmore Hill area will only increase the number and quantity of sewage incidents in this area of the village.

### **3. East-West issues**

The floodplain of the river Arun, south of Pulborough, does what it says on the tin and floods during times of heavy rain, particularly from late autumn to early spring in many (not all) years and sometimes more than once a year. When the flood plain is full, surface water from the higher land to the north of the A283 cannot flow through the normal drains into the river. At these times drainage water can fill the sewerage system, and a significant number of properties in the south of the village suffer backup of sewage until water levels in the flood plain reduce,

In the area of Swan Corner either side of the A29 bridge there have been problems since the river embankments were constructed in the 1960s. Previously the water meadows from Stopham down to Amberley and beyond flooded frequently but relatively shallowly and the water flowed away quickly (see correspondence in Parish Council files 1967/68). The original plan was for the embankments to increase the amount of useable agricultural land. Now the priorities have changed to protecting the communities downriver, mainly Arundel and Littlehampton, by holding water here and to protect the environment.

The embankments are now built to allow a three-stage accumulation of water designed to avoid floods downriver. The area from Stopham to the embankment on the west side of Fowl Mead, the field at the bottom of Barn House Lane, floods first and relatively often.

When that section is full the water overflows the embankments into the meadows of Fowl Mead and other fields between the village and the higher ground of the RSPB reserve, commonly called Pulborough Brooks.

When that is full the water overflows into Amberley Brooks. This third level does not often happen more than once a year.

The result is that the water meadows by the southwest part of the village flood more often and deeper than they used to and a few properties in the area around Swan Bridge flood more often and more quickly than before the embankments. Floods happen in wet weather when the flow of water from drains needing to reach the river is at a maximum. The height of the water on the flood plain invades the pipes which then prevents the rain water entering those pipes exiting it into the river. Those pipes overflow into the sewerage pipes which then causes sewage blocks.

There is a further historic issue with the sewerage system to the south of the A283 Lower Street. Many years ago, because of poor navigation for barges, the river channel was moved further south and the old channel was filled with the excavated soil. When the sewerage system was installed in the 1930's part of it runs through the backfilled river channel. Over the years drainage water from the north has washed away part of the backfill, with the result that 92 metres west of Allfreys Wharf (correspondence with George Bryant, resident of this road) the sewerage line is at best sagging considerably, to the point where Southern Water's contractors cannot send a camera down it to image the inside of the pipe. This is jetted about every six months. It is suspected that some flow is escaping from this pipe and flowing into the river and Pulborough Brooks. This has been reported to the Environment Agency on a number of occasions.

In 2013-15 there were various cases of sewage overflows in the area of Little Dippers and Rivermead further to the east along this main. The result was a permanent contract for the main to be jetted every six months and this action has prevented any further reports of overflows.

#### **4. Other related issues**

The introduction of the Flood and Water Management Act 2010 has had a number of unintended, and undesirable outcomes.

The act passed responsibility for managing the drainage system from the water companies to local authorities. Lack of funds has meant that the drainage system is no longer monitored as often, and local authorities have a system that relies on being asked to deal with a problem when it occurs, rather than undertaking preventative measures to stop a problem occurring in the first place. The net effect has been to create an environment where it is easier for drainage water to flow into the sewerage system.

The act has resulted in the water companies not modelling the drainage system, but when asked for advice by local authorities assuming that 10% of the sewerage pipeline capacity is taken up by drainage water. This is wrong on two counts:-

It does not rain the same amount every day of the year. For Pulborough, Met Office records show that around 90% of rainfall occurs in around 30% of the days of the year. In times of normal heavy rainfall Southern Water's estimate of drainage water in the system is probably an underestimate by a factor of at least three. If a prudent estimate should cater for a 10-year storm then the underestimate is undoubtedly greater.

Southern Water use flow from their sewage treatment works to estimate the annual flow of drainage water. This year they were penalised by the regulator Ofwat for discharging foul waste into the environment too often. This exercise also showed that the company measures the amount of flow up to the capacity of the treatment works, but does not measure any excess beyond this. This again means that the amount of annual drainage water influx into the sewerage system is underestimated.

In a conversation (David Hurst, George Bryant, 8 Sept 2019) Mr Bryant said he had demanded and received a visit from an engineer to discuss the frequent problems (see page 4 above). That engineer said that it had been discovered that the wrong algorithm had been added to a computer programme so the system was being overloaded.

Southern Water were asked repeatedly in the period 2014 to 2016 to monitor the levels of material in the sewerage pipelines at key points in the village at times of heavy rainfall and peak sewage flow. They have failed to take these measurements then or since.

## **5. Summary**

From my personal observations on various occasions I have seen there are systemic failures in the management and modelling of Pulborough's drainage and sewerage systems which in isolation are probably not very significant. However, the cumulative effect of a number of different mistakes/failures/oversights leaves me with no confidence that the integrated and connected drainage and sewerage systems are being managed sensibly, and that the advice given by Southern Water to local authorities concerning the impact of new developments on the existing infrastructure is at all reliable. These issues must be addressed if Pulborough is to become a well-managed and safe community for both existing residents and new residents in new estates to live in.

I recommend to the Neighbourhood Plan Steering Group that they make it clear that any housing development north of Pigeon Gate bridge is likely to increase the number of sewage blocks and overflows in the system if a robust sewerage and water management system were not introduced.

It is not up to residents to dictate to Southern Water the details of what must be done but residents need to be reassured by them, after transparent investigation and cross-questioning, that the sewerage and drainage system does have capacity in the areas discussed above.

A Tilbrook  
August 2019