

Sewers and Sewage Treatment Works

Q&A

June 2015

This briefing has been produced to help explain how waste water is managed by the water companies during times of heavy rain and flooding. It also includes how this is regulated by permits to reduce the impact on the environment.

Many communities affected by flooding have concerns that the sewerage systems do not have sufficient capacity to cope with existing and future increases waste water from new developments. This briefing outlines how the capacity of sewage treatment works is assessed.

What do sewers carry?

Not all sewers deal with sewage. There are three types of main sewerage systems:

Foul waste water sewers take sewage from properties through a network of pipes directly into Sewage Treatment Works (STW) before it is discharged into natural watercourses.

Surface water sewers take rainwater from roofs and surfaces that run off to highway drains discharging directly into watercourses without any treatment.

Combined sewers take both foul and surface water to STW. These are predominantly in London.

Whilst foul and surface water sewers should be entirely separate, rainwater can and does enter the foul sewers from both the surface (e.g. via a manhole cover in a flooded road) and when it has entered the ground (e.g. by infiltrating through cracks or joints in the pipes). Foul sewers are not designed to be completely water tight and can deal with a proportion of surface water entering the network without causing any problems.

What happens to the waste water when it gets to the STW?

In normal conditions, all of the waste water received at a STW is screened and passed through a number of stages of treatment, before being discharged to a watercourse as final treated effluent. The Environment Agency set out in an environmental permit the quality standards that the final treated effluent is required to meet. STWs discharge final treatment effluent continuously.

What happens in a storm?

During times of heavy or prolonged rain STWs can receive significantly more water from the sewer network. The exceptional flows mean that all of the waste water cannot be treated in the normal way.

Most STWs have large storm tanks that fill up with the excess flows. These store the extra waste water long enough for the increased flows to subside. During smaller storms, the waste water is sent back through the STW for full wastewater treatment.

If the storm event is so big that the storm tanks become full, the STW sends flows through a designated storm outfall to the watercourse to relieve pressure on the sewerage system and avoid sewage backing up and flooding homes. This process of releasing flows into the watercourse is referred to as a storm sewage discharge, or 'storming'. These discharges are legal when they happen under the correct conditions.

The impact of storm sewage discharges on the environment is normally low. The sewage itself is highly diluted by rainwater and most of the solids settle out in the storm tanks before the sewage is discharged. The receiving watercourse dilutes the waste water because of the high river flows following heavy rain.

What conditions are put on storm discharges?

A STW has to fully treat a certain amount of flow it receives before it can legitimately discharge storm sewage. This amount is specified in the permit or based on the designed capacity of the STW. The Environment Agency does not permit STWs to make a storm discharge due to problems with the sewage treatment process, meaning the STW is unable to fully treat the amount of waste it is required to. The Environment Agency will investigate if this type of storm discharge happens.

Typically, a STW is only allowed to discharge storm sewage due to heavy or prolonged rainfall, snow melt, or in response to an emergency. Because storm sewage discharges take place in exceptional events, there are no time or volume limits, or seasonal conditions placed on storm discharges. Water companies are not required to tell the Environment Agency when they discharge storm sewage in compliance with their permit and where there is no environmental impact.

Water companies should report discharging outside of permit conditions and if storming is causing pollution or environmental harm, such as the growth of sewage fungus in the receiving watercourse.

Are discharge permits reviewed?

The Environment Agency review permits to discharge, including those with storm consents, when there is a need. They may carry out a review because the water company has identified a need to change their operation. Alternatively, the Environment Agency may carry out a review because it is concerned about the environmental impact of the STW.

The Environment Agency also reviews the discharge permit when a STW is upgraded. The review usually leads to the Environment Agency requiring the final treated effluent to meet higher quality standards. If the amount of normal flow to the STW is increasing, the amount of flow the it is required to treat will also increase.

How is the capacity of a STW reviewed?

Water Companies are responsible for ensuring their assets have sufficient capacity. Incoming flows of foul water will change according to a number of factors including development in the sewerage catchment; changes in trade discharges; uptake of water saving measures, climate change impacts from infiltration.

Assessing the capacity of a STW is complex. It is based not only on the flow of foul water it can treat but also its' ability to treat the strength or 'load' of the waste to the water quality standards required.

STWs are designed and upgraded to be able to accept and treat some increases from the current normal flow to predicted future normal flow. This is referred to as 'headroom' and is expressed as a percentage. At the larger STW, measurements of the final effluent flow are taken daily to ensure that the discharge complies with the standards required by the permit. This data can be used to look at trends which could imply that a STW is nearing capacity.

Detailed assessments using computer models are carried out where appropriate by the water companies. The STW will be modelled so that the theoretical capacity of the site is known. This is based on the size and type of treatment equipment on site. The flow and load arriving at the site is compared with the theoretical capacity and verified using actual sample data of the final effluent produced by the STW.

This type of process modelling assessment can be used to look at the capacity of a STW over time by predicting the impact of flow and load into the future, based on known planned development within the sewerage catchment. This process modelling approach to looking at treatment capacity also allows water companies to pin point exactly where in the treatment process upgrades will be required and when.

Where water companies are concerned that capacity and headroom will not be sufficient in the future, they raise their concerns with the planning authorities and seek funding from Ofwat through the Asset Management Programme (AMP) to upgrade their STW ahead of the development being built.

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