

Everything you ever wanted to know about Sewage in Charmouth and the River Char

On 28th April 2022, members of the Lower Char Community Project and the River Lim Monitoring Group visited the Charmouth Sewage Treatment Works (STW) to find out how Wessex Water handles our sewage and to learn about the impact of sewage spills into the river and at Charmouth beach, which have been reported widely in the press recently. This is what we learnt from Andy Mears (Permitting Manager at Wessex Water and Harry Walker, the onsite engineer):

Like most sewers in England, Charmouth's sewage system is a 'combined system' and carries both sewage and surface water from roofs and drains. The Charmouth sewage system handles all the sewage and surface water from the village and nearby area covered by mains drainage (houses in the Marshwood Vale and surrounding villages all have domestic septic tanks and are not on the mains sewage system).



Harry Walker explains how Charmouth's Sewage Treatment Works works

Under normal circumstances, sewage and surface water (together called wastewater) is all treated at the Sewage Treatment Works on Catherston Lane, (north of the field used for the Monday market). Some of it flows downhill direct to the Works in two pipes (gravity sewers) from Charmouth and Catherston and the rest first flows to the Newlands Bridge Pumping Station, from where it's pumped back up to the Works (in a rising main).

Once it's been treated, it then flows in a pipe that ends 1.25km out to sea off Charmouth beach (called a long sea outfall).

Under normal circumstances, at the Sewage Treatment Works the wastewater is first screened (passed through a 6mm metal grid) to remove wetwipes, sanitary products, plastic bags, mobile phones and other things that we flush away that are not biodegradable. Grit is also removed. The wastewater is sampled here as it comes into the Works and just before it leaves.

Then it's pumped into one of four enormous settlement and aeration tanks (called Sequencing Batch Reactors) which contain a culture of naturally occurring, active bacteria (a bit like a yoghurt starter culture). These bacteria then get to work on the organic solids (our shit) and digest the organic matter and break down waste into harmless substances. This is called the 'activated sludge process'. They are helped by having large amounts of air pumped into the tanks so that they can work faster and more effectively. (A similar process occurs in a domestic septic tank, but there's very little oxygen available in a septic tank, so the process is anaerobic and works much more slowly, with lower overall treatment levels.)

This whole process is governed by the Urban Wastewater Treatment Directive, which has effluent standards requiring Water Companies to remove a high proportion of polluting matter from the sewage. The polluting matter is a problem, especially if discharged into a river, because (just like in the tanks) the bacteria that digest it use a lot of the oxygen in the water – meaning there isn't enough oxygen for fish and other waterlife.)

The activated water process separates the wastewater out into very clean looking water (called supernatant) and solids in a layer of sludge.

The sludge is taken away twice a week to Poole or Yeovil in tankers to be 'digested' and turned into fertiliser. Methane – a useful biofuel – is generated during the process. The supernatant is piped out to sea. Although the supernatant has been treated by standard sewage treatment processes, bacterially it's far from sterile. That can only be achieved by using membranes, chemicals or UV radiation to treat it further and currently that very expensive treatment isn't available at Charmouth. (It's normally only used for water that's then returned very close to designated bathing waters.)



Sludge at the bottom, supernatant on top

Where the water is pumped out to sea, it gets so diluted that it's deemed unlikely to cause any health or other problems. The bathing water quality at Charmouth is tested by the Environment Agency (EA) and is consistently judged to be 'Excellent' quality. But our experience and EA warnings confirm that water quality is significantly reduced after storm overflows (see below).

What's removed from the sewage at the Sewage Treatment Works?

The sewage treatment process has to reduce the Biological Oxygen Demand and the Chemical Oxygen Demand (that is the amount of organic solid matter in the water) by 70-75%. It also has to reduce the pH level of the wastewater and reduce levels of:

- **ammonia** (which mainly comes from our urine, the urine of livestock and some other chemicals)
- **nitrogen** (which mainly comes from fertiliser runoff, leaky septic tanks and manure)
- **phosphorus** (which mainly comes from our faeces and household detergents and from agricultural runoff). While the problem with detergents has been greatly reduced by manufacturers, 'eco-friendly' detergents generally have far fewer harmful chemicals, toxins and pollutants than standard products.

While the STW can remove some of these chemicals, to remove most of them requires specialist treatment plants which we don't have at Charmouth. But, as with harmful bacteria, this is a much bigger problem when wastewater is discharged into a river. As ours goes out to sea and gets heavily diluted, it's deemed to be less of a problem.

Wessex Water have supplied us with further information about chemicals potentially found in wastewater – [the datasheet is here](#) and on our website at www.riverchar.org/data It notes that:

“Following further guidance from the EA and the European Chemicals Agency, an extensive list of new and emerging chemicals which pose a potential risk to soils, groundwater and surface water has been identified.”

Wessex Water is to begin monitoring more than 35 new and emerging substances at their three large treatment works in Saltford, Avonmouth and Bowerhill (but not at Charmouth).

Further information on new and emerging chemicals can be found in The Environment Agency's 'Chemicals in the Water Environment' 2021 Report, [which is here](#) and also on our website at www.riverchar.org/data

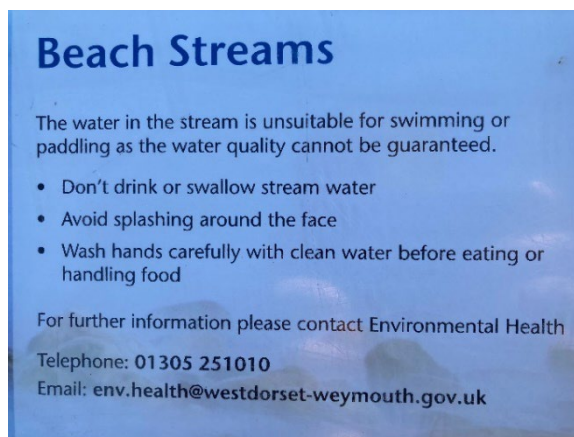
What happens when there's a storm?

Heavy rain falling on pavements and roads flows into road drains and then into the river. This will carry some pollution with it. More importantly, rain falling on our roofs and driveways will flow into the combined sewer and end up at the Sewage Treatment Works.

A storm overflow operates during heavy rainfall when the sewerage system can be overwhelmed by the amount of surface water. The overflow prevents sewage from backing up into your house and flooding it. These storm overflows operate automatically (it's not a question of Wessex Water 'deciding to dump sewage' – it's simply that the system fills up and overflows, like water over a weir).

The Charmouth Sewage Treatment Works can handle up to 35 litres of wastewater per second (on a normal dry day the flow is about 14 litres/second). If the flow goes over 35l/s, then the excess is screened, bypasses the treatment tanks and is piped straight out to sea with the cleaned water that *has* been through the tanks.

There are storm overflows at Newlands Bridge Pumping Station, by Mill Bridge (the next river bridge, 200 yards west along The Street) and at the Sewage Treatment Works. In all cases, during heavy rainfall the combined sewage and surface water are still screened to remove non-biodegradable solids. At the pumping station, screening is through a coarser mesh and the overflow then discharges straight into the river (which is why there's this sign at the beach). At the Works, the overflow is mixed with treated water and carried out to sea in the long sea outfall pipe.



The sign on the Information Board at Charmouth Beach

These overflows happen in heavy rain on average about 15 times a year at the Newlands Bridge Pumping Station (a very few are actually from a Combined Sewage Overflow near the next river bridge – Mill Bridge – 200 yards west) and about 60 times a year from the Sewage Works. Clearly the overflows from the pumping station are worse because the untreated sewage goes into the river, down to Charmouth pool and then across the beach, which is why it's extremely unwise to swim or go in the river after heavy rain. On the plus side, the sewage is very heavily diluted by all the rainwater that it's mixed with.

If there were to be really heavy storms (creating a flow of more than 177 litres per second) and the Sewage Works overflow couldn't all go down the pipe and out to sea, two large holding tanks would need to fill before any discharge occurs into the river nearby. No-one can remember these being used and they have a fine crop of wild garlic. The monitor on the tanks' outfall may not be working properly: Wessex are checking it now.

Finally, there can very occasionally be an emergency overflow caused by a pump failure or blockage in the sewerage system.



So how does sewage end up on the beach?

This is not an easy question.

Photos supplied by Andy Mears show that discharge from a storm overflow looks like cloudy water (rather like the stormy river water it's discharging into). It doesn't look like raw sewage and is heavily diluted by the rainwater. It's hard to see how this kind of overflow could end up as floating sewage at the sea's edge. We have also taken photos of the storm overflows at Newlands Bridge and Mill Bridge in operation (May 2022) and these can be seen on our website.

So, how does foul smelling raw sewage get onto the beach sometimes? There are various possibilities and all of them may be true at different times.

1. It may not always be sewage. Runoff from the fields upstream can cause foam, suds and scum on the surface of the water. Seaweed washed ashore can form into clumps and start to rot. When it does, hydrogen sulphide can be generated, which is the same smelly gas produced by raw sewage.
2. It may have come along the coast, for example from Lyme Regis.
3. There might have been an emergency at the pumping station (broken pump or blockage) causing a spill in normal conditions that was not heavily diluted by stormwater. Wessex Water tell us these are very rare events and, when reported or alerted through their telemetry, WW "attend immediately to deal with the emergency".
4. Very rarely it can happen that so-called mixed liquor (sludge rather than the clear supernatant that is released normally) from one of the treatment tanks in the Sewage Treatment Works is accidentally released out down the 1250m outfall pipe and then washed back inshore by the tide. WW tell us that, "The mixed liquor is a very light-weight sludge and would almost certainly be dissipated and diluted long before it reached the shoreline in any visible form".

If you do experience an incident like this, Wessex Water's Streamclean team and their sewerage operations teams can take samples if needed. Take photographs, use your nose and call their emergency number: 0345 600 4600. You should also call the Environment Agency on their hotline: 0800 80 70 60.

Further details:

- There were 12 spills from Newlands Bridge Pumping Station in 2020 and 13 in 2021.
- Spills at the Sewage Treatment Works (discharged via the long sea outfall pipe) typically number 50-60 per year.
- The screen at the Newlands Bridge Pumping Station is a 15mm screen (rather than the 6mm screen at the Works. This could be upgraded *relatively* cheaply (app. £50,000-£100,000) but has not been requested by the Environment Agency. **(If you ever see or find sewage litter or sewage solids in the river or on the beach, please tell us.)** WW tell us that The draft Environment Bill specifies provision of 'fine screens' at all sites by 2050.
- There are five potential ways to address spills at the Newlands Bridge Pumping Station. (See the next section for details).

What are the plans for improvement generally?

Defra is currently consulting on its plans to require water companies to end all releases from storm overflows by 2050 (unless it can be shown that these releases cause “no local adverse ecological impact”).

Wessex Water have now installed Event Duration Monitors plan to ensure that all four storm overflows in our area. (But, according to [the Wessex Water map](#) the two principal overflows in Charmouth already have monitors installed.)

While Wessex Water intends to invest £150m between 2022 and 2025 to address “intermittent discharges” and hopes to reduce the number of hours of storm overflow discharges by approximately 25%, little, if any, of this investment is likely to come to Charmouth. Plans to create nature-based treatment solutions at 28 storm overflows will be limited to sites where groundwater infiltration is the primary cause of the overflow (not the case in Charmouth).

What are Wessex Water's plans for Charmouth?

WW will complete a SOAF (Storm Overflow Assessment Framework) study by 31st March 2023 and have offered to send us a copy when it's ready. Stage 1 of the study confirms that the spills are coming from a system that is operating correctly, and not from a system with faulty equipment or maintenance issues. Specifically, infiltration (groundwater leaking into sewage pipes) is not a significant problem in the Charmouth catchment. A hydraulic model of the sewerage system has also been built as part of Stage 1. This model will be used to generate options for achieving spill frequency reductions.

The options for the spills from the Sewage Treatment Works fall into three categories – separation, attenuation and improved treatment – and are likely to be:

- UV radiation to disinfect all wastewater passing through the STW. (**Treatment**)
- Installing pumps to allow excess wastewater to be held in the overflow tanks at the STW during a storm and then treated fully afterwards (rather than spilling into the long sea outfall). (**Attenuation**)
- Building additional new storage tanks. (**Attenuation**)
- Separating foul water (sewage) and surface water at source (i.e. at people's houses) so that, for example, rainwater landing on the roof is not piped into the mains sewage system but can be fed straight into the river. (**Separation**)
- Creating wetlands and reed beds so spills can be channelled into these areas to allow 'nature' to clean them up. A study needs to be undertaken to determine the size and design of a wetland solution. (**Treatment**)

According to Wessex Water, the options for the Newlands Pumping Station are:

- Pump more wastewater up to the Sewage Treatment Works. This would require new, larger pumps and possibly a new, larger rising main. The additional flow at the works could probably be accommodated without improvements there. (**Attenuation**)
- Provide storage at the pumping station. (**Attenuation**)
- Reduce the flow of wastewater higher up in the catchment (by encouraging householders to use raingardens, ponds, permeable surfaces and other Sustainable Drainage Systems (SuDs). This is an area that the Lower Char Community Project hopes to work closely on with Wessex Water and residents) (**Separation**)
- Treat the spills with UV disinfection. (**Attenuation**)
- Channel the spills via reedbeds/wetlands where the wastewater would be held for some time, cleaned naturally before dispersal into the river. (**Treatment**)

The 60+ annual STW overflows are unlikely to be a priority because they are currently taken 1,250m offshore and deemed to be quickly diluted there.

The 15 or so pumping station spills *ought* to be a priority because they spill into the river but they are not recorded with the main statistics because of a technicality and are below the trigger level of 40 per year.

Finally, there is a risk that the releases will be judged to cause “no local adverse ecological impact” – in which case they won't even have to be stopped by 2050. But that situation may change when the Environment Bill becomes law.

We will need to campaign vigorously to achieve the best possible result, which currently looks like:

1. UV radiation at the Sewage Treatment Works to clean up the 60+ annual spills that go out to sea.
2. A combination of actions for the pumping station to avoid the app. 15 spills annually that go into the river.

But further work needs to be done to understand the most effective solution in each case.

We can, however, support Wessex Water in terms of Separation and nature-based Treatment. At the meeting, we offered to work closely with Wessex Water to explore ways of encouraging homeowners to separate rainwater from foul water at source (for example through increased use of water butts and creating wet areas in their gardens, where possible.) This is a long-term process with very gradual impacts (redirecting the downpipes on one house makes only a tiny difference to overall flows) but, over time, can achieve cost-effective and sustainable improvements. WW is also hampered by the lack of legislation requiring builders to implement separation on new homes

For more on all this, see [Wessex Water's Storm Overflows Improvement Plan: 2022-2025](#) page 13.

We also offered to work closely with the company to explore ways of creating reedbed and other ways of absorbing excess wastewater flow at times of heavy rainfall. For more on this and Wessex Water's plan for nature-based treatment solutions (blue/green infrastructure), see [Wessex Water's Storm Overflows Improvement Plan: 2022-2025](#) starting on page 15. Again, Charmouth is not included in these plans and we would have to work hard to make a case for this.

Separately, as required by the Environment Agency, Wessex Water reports and accounts for spills differently during the 'bathing season', when there is a lower permitted spills limit. (WW stresses, however, that it runs its alert system all year round and at more sites than are covered by the Environment Agency.) Like Surfers Against Sewage we increasingly see that residents and visitors are swimming all year round, so that water quality is an issue all year round for people as well, obviously, as for wildlife that lives in the river and sea. We need to campaign to ensure that, whatever solutions are developed, they are equally effective during the winter months.

What about plastic on the beach?

There has been a lot of discussion in recent years about blue and black plastic nurdles and biobeads on the beach at Charmouth and Lyme Regis. Philip Strange was the first to draw serious attention to the problem and he has done a lot of work investigating it.

One prominent source of biobeads is known to be the South West Water Sewage Treatment Works in Uplyme. Wessex Water doesn't use biobeads at the Charmouth Sewage Treatment Works, but the problem on our beach and at the river mouth is severe.

Much more information on the problem is available on our website at www.riverchar.org/plastics



What can I do?

It's clear from developments at Warleigh Weir that Wessex Water are (rightly) concerned about publicity and that vocal communities will be heard.

It's also clear that Wessex Water see themselves as 'leading the pack' compared to other water companies and are keen to keep it that way.

Finally it's clear that, unless the Government forces them to act much faster, they have neither the money nor the incentive to go any faster than their current strategy allows.

The Environment Agency has monitored the river since 1992 and found that water quality is sometimes worse after heavy rainfall. But this monitoring has now stopped.

As things stand, Wessex Water's Storm Overflow Assessment Framework study, when completed next year, is unlikely to recommend urgent change. The forthcoming Environment Act is likely to require very significant improvements, but the timescales are uncertain.

For anyone living in or near Charmouth, our best hope lies in concerted, collaborative action. If you're interested in river water quality, the likely impact of climate change on storms and flooding, sewage spills and creative solutions to these problems, please join your local River Char Community Project (currently [here for the Char Valley Parish Council project](#) and [here for the Lower Char project covering Charmouth](#). (We hope to amalgamate these soon.)

Together we can:

- monitor Wessex Water's spill alerts and historical spill data
- undertake regular water quality tests via the West Country Rivers' Trust CSI programme
- engage members of the community in rainwater separation schemes in their homes and gardens
- investigate innovative nature-based treatment solutions (like reedbeds) along the River Char.

Where can I find out more information?

Background info

[Storm overflow page](#) – FAQs and a briefing note on why they exist, impact and what can be done.

[Wild Swimming page](#) – Video explains the consideration and risks associated with wild swimming

[Warleigh Weir page](#) – Explains the ongoing investigation at Warleigh Weir with latest water quality data

[Combined sewers explained](#) – Environment Agency explain why storm overflows exist. [YouTube video](#)

Discharge data

[Historical data](#) on Drainage and Wastewater Management Plan portal (Storm Overflows/Performance) - Contains Event and Duration data for all monitored overflows from 2016-2020.

[Live data from Coast and RiversWatch](#) – Near real-time alerts where water quality may be affected by storm overflows.

[Historical spill data](#) – A spreadsheet gives spill counts for several years, provides a lot of background info, and has a page of starts/stops for 2021. Click on [this link](#), then on **Storm Overflows** (maps are available here), then click on **Performance** and finally you can download the EDM data as a spreadsheet.

Site specific discharge data – Available on request from Wessex Water

[National Event and Duration Monitoring Data](#) – Data for England for 2020

[Surfers Against Sewage Safer Seas and Rivers App](#) – Repeats information provided by Coastwatch for an Android and iOS app

Rainfall data

Site and time specific – Available on request from Wessex Water

Impact data

[Warleigh Weir water quality info page](#) – *E.Coli* and Intestinal Enterococci data from bathing water investigation

[Drainage and Wastewater Management Plan portal](#) – Performance spreadsheet contains impact data: where WW have carried out invertebrate surveys and where the SO is associated with a WFD Reason for Not Achieving Good status

[Bathing Water Profiles](#) – Historical and most recent bathing water samples for Faecal Indicator Organisms

[Environmental impact data from Catchment Data Explorer](#) – Historical water quality data for Water Framework Directive compliance

Investment planning approach

[Storm Overflow Assessment Framework](#) – Current process for assessing the costs and benefits associated with dealing with frequently spilling storm overflows

Investment Plans

[Drainage and Wastewater Management Plan](#) – Performance spreadsheet (under Storm Overflows/Performance/*) has investment plans associated with storm overflows

Andy Mears has also sent us the slides he showed us after our visit to the Sewage Treatment Works and these are available for anyone interested to look at.

Updated links, information and this report are on our website: www.riverchar.org