

# CASE STUDY



from  
Southern  
Water.

## Using constructed wetlands to treat groundwater driven storm overflows

### Background

The River Lavant is a chalk stream that rises at East Dean and flows through the parishes of Charlton, Singleton, West Dean and Lavant into Chichester.

Lavant Wastewater Treatment Works (WWTW) serves a population of approximately 2600 people from these parishes. The sewage network draining to the WWTW is situated in a chalk catchment, with high groundwater levels that infiltrate into the network during wetter months of the year.

During high groundwater periods, the infiltration can cause:

- Pressure on the sewage network, causing it to become overwhelmed. This results in disruption to local communities due to the noise and emissions of preventative measures such as tankering and over pumping.
- Over pumping itself, though critical to prevent internal and external flooding and loss of service, can pollute the watercourse that the excess water is pumped into.
- Storm overflow releases despite a lack of recent heavy rainfall, often referred to as 'dry spills'.

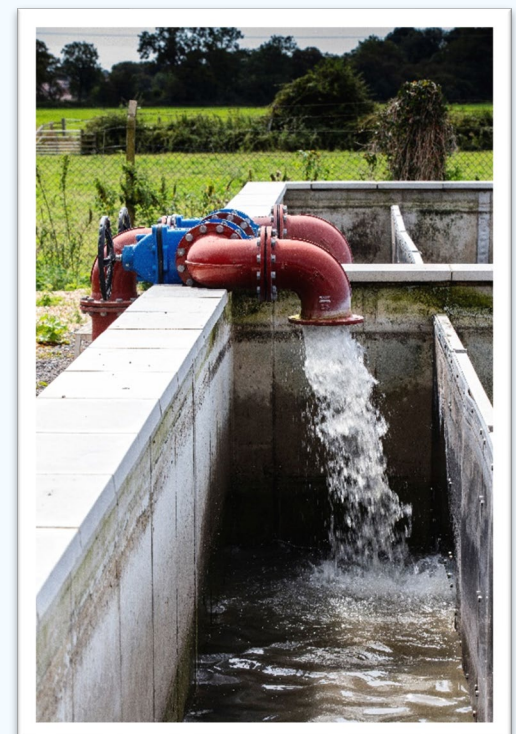


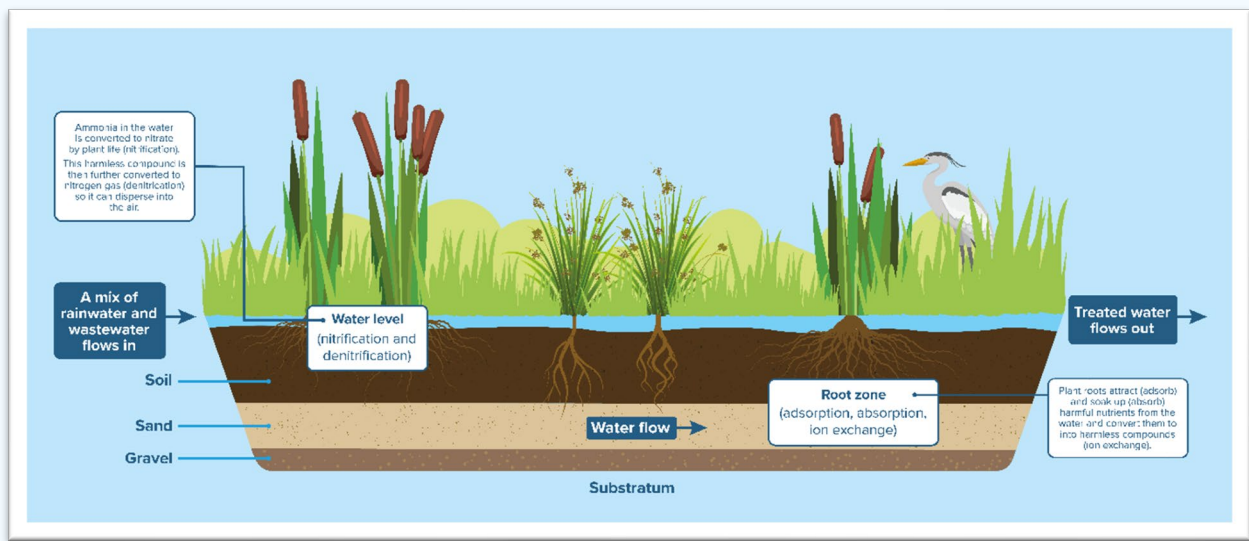
Groundwater forcing its way into the sewer system

## What is a constructed wetland?

Wetlands are used as a secondary treatment for stormwater and groundwater before it's released through [storm overflows](#) into rivers and seas. This means that the water coming out of the storm overflows is pre-treated and will have less of an impact on the environment.

A constructed wetland can be used in various parts of the wastewater treatment process. They form part of a natural landscape and support biodiversity, making them preferable to traditional concrete storm tanks. Where storm tanks only hold the excess wastewater flow, wetlands absorb, hold and treat the water, as well as slowly releasing it back into the environment.





## Our approach

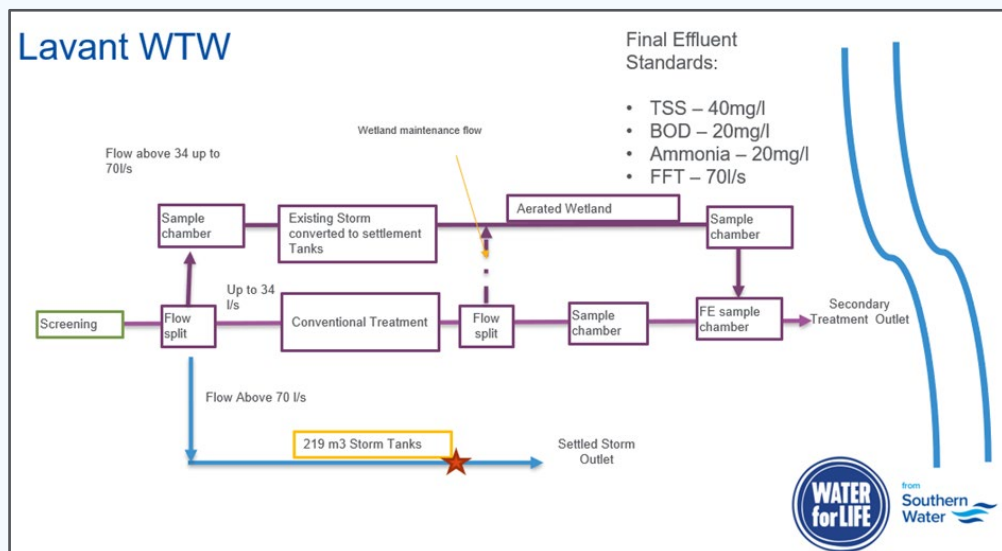
- **Sealing and relining:** We set out to seal nearly 3km of private pipework and nearly 8km of our own network with relining methods, as well as sealing almost 100 manholes.
- **Partnership working:** A lot of the sewer network is privately owned, so we must seek permission before undertaking repairs. This made collaboration an essential part of the project, and we worked with homeowners, business owners and local authorities to scale the project as much as possible.
- **Constructed wetland:** We constructed a wetland to hold and treat flows from the on-site storm tank. This has created more space in our system, reducing the impact of storm overflow releases and downstream flooding.

## The technical data

Many of our wastewater treatment works have permits to say we must treat a certain flow rate before being able to use storm overflow releases, this is known as the permitted Full Flow to Treatment (FFT).

Before we created the wetland, the FFT was 34 litres per second (l/s) with flows treated by a conventional trickling filter process. At times of high groundwater, flows exceeding the FFT are released after being 'settled' in a storm tank, which means solids have sunk to the bottom and will not be released.

The aerated wetland has been added downstream of the storm tank to treat flows above 34l/s. This means we can treat a further 36l/s to the current permitted effluent standards set by the Environment Agency. This increases the FFT from 34l/s to 70l/s, reducing dry spills and other groundwater related issues such as flooding.



## Wetland Data

Date	Permitted parameters			Non-permitted parameters			
	TSS mg/l	BOD mg/l	Ammonia mg/l	Total Nitrogen mg/l	Total Phosphorus mg/l	E.COLI (PRESUMPTIVE) number per 100 ml	ENTEROCOCCI (SPECIES) number per 100 ml
15/11/23	3.9	2.32	2.76	6.97	0.440	1300	250
13/12/23	2.9	2.23	1.7	5.21	0.401	7000	970
17/01/24	4.80	2.64	3.49	6.08	0.524	5000	1300
08/02/24	4.2	3.00	1.49	6.72	0.393	6000	3000
19/02/24	2.0	3.3	1.41	4.25	0.5	5000	670
04/03/24	2	2.18	0.884	5.77	0.401	11000	2300
21/04/24	2.75	4.5	1.03	5.74	0.490	50000	6600

## Conventional Treatment process data (Trickling Biological Filters)

Date	Permitted parameters				Non-permitted parameters		
	TSS mg/l	BOD mg/l	Ammonia mg/l	Total Nitrogen mg/l	Total Phosphorus mg/l	E.COLI (PRESUMPTIVE) number per 100 ml	ENTEROCOCCI (SPECIES) number per 100 ml
15/11/23	17	4.01	0.692	8.58	0.767	8000	3200
13/12/23	17.2	3.26	0.446	7.51	0.697	21000	3400
17/01/24	16.20	4.24	0.183	7.00	0.699	2000	1500
08/02/24	13.6	4.9	0.523	9.41	0.773	200000	3100
19/02/24	11.2	5.6	0.284	7.14	0.803	5000	1500
04/03/24	15.5	3.94	0.21	8.5	0.773	no result	no result
21/04/24	9.1	5.86	0.256	7.94	0.663	30000	2100

## Outcome

The wetland was completed in May 2023 in partnership with Natural Wastewater Systems, a specialist provider of wetland treatment systems.

The required Environment Agency (EA) permit discharge standards for Lavant WWTW are:

Total Suspended Solids (TSS)	40mg/l
Biochemical Oxygen Demand (BOD)	20mg/l
Ammonia	20mg/l





We've set up a monitoring programme for both the conventional and the wetland process streams to measure the above parameters, additional similar parameters, and bacteriological parameters commonly used to measure bathing water standards.

Results have shown good compliance with the required standards set by the EA, and that performance for both process streams is similar, and in some cases better for the wetland process.

As of July 2024, the wetland has treated 134 storm overflow releases that would have previously gone out into the environment of East Sussex as settled storm releases. This means the stormwater has been through an extra level of treatment before being released.

## Advantages

- Increased biodiversity, carbon off-setting, and social and economic value of the local area.
- Reduced impact of storm overflows and improved water quality in the River Lavant.
- Reduced over pumping and tankering operations in the area, resulting in less disruption for residents and less pollution to nearby waterways.

## Feedback

- We conducted tours of the wetland for the local Rivers Trust organisations as well as Surfers Against Sewage, who were all impressed by the results.
- The local community and parish councils are pleased with the results and are keen to see more wetlands deployed along the length of the Lavant valley, and in other areas of our region which experience storm overflows due to high groundwater levels.



## More information

[Pan Parishes Pathfinder](#)

[Constructed wetland Frequently Asked Questions](#)

[Clean Rivers and Seas Plan \(interactive map\)](#)

[July Task Force Update](#)