

Langham WRC flow calculations

Information from AWS

Anglian Water has been working to find a solution to the issues of flow compliance at Langham WRC and the effects arising from the development of 46 homes at School Road Langham and future growth identified in the emerging Local Plan.

There are two issues identified in the Infiltration Reduction Plan that affect Langham WRC and the catchment it serves:

- Surface Water ingress into the foul network infrastructure which uses capacity that should otherwise be used for foul water flows
- Groundwater infiltration in the foul only network

Anglian Water have written an Infiltration Reduction Plan and are carrying out work to reduce infiltration. They have submitted a pre-application to the Environment Agency to request the new limits that would apply to an increased dry weather flow from 420 m³/d to 500 m³/d at Langham WRC.

Improvement work planned / carried out by AWS and estimated volumes reduced after these improvements in the network:

	Litres per second	Hourly Volume (litres)	notes
Surface water removed (downpipes and highway gullies) not including surface water sewer cover opened to drain flood water	1.19	4284	Detailed calculations provided by AWS
Total surface water removed (including work on surface water sewer)	9.39	33,804	Includes work on surface water sewer – volumes reduced are estimates and more uncertain as not every rainfall event would have required sewer cover opened to drain flood water
Sealing manhole covers			Not possible to provide calculations as this is reducing groundwater ingress to the system

WRC volume calculations

Langham WRC is at 101.9 % of its permitted volume (the Q90).

Water Recycling Centre (WRC)	Measured 90%ile flow as a percentage of Permitted DWF					
	2015	2016	2017	2018	2019	2020
Langham (Essex)	94.1	91.2	85.2	99.0	90.0	101.9

Permitted DWF is 420 m³/d. The measured Q90 in 2020 is 428 m³/d.

Therefore improvement work to reduce infiltration needs to release 8 m³/d to bring the WRC back into compliance, and protect water quality in the receiving watercourse, before considering volumes required by further development.

EA uses estimation of volume from a house as: 2.3 people per house x 140 l (0.14 m³/d). Slightly different (larger) than AWS but we don't add in infiltration.

10 houses will generate 3.2 m³/d

46 houses will generate 14.8 m³/d

The AWS figures for surface water removed (not including surface water sewer estimates) are shown in the table below, with two additional columns for volume. Weatherspark information states that 7.7 days per month in Essex are rainy so about 25% of the days in each month. The last column D in the table is an estimate of the average volume released over the year, using an assumption of rainfall occurring for half of each rainy day.

	Column A	Column B	Column C	Column D
	Litres per second	Hourly Volume (litres)	Daily volume when raining (m ³)	Daily volume – average over a year (m ³)
Surface water removed (downpipes and highway gullies) not including surface water sewer cover opened to drain flood water	1.19	4284	103	13

Conclusions

Weatherspark information states that 7.7 days per month in Essex are rainy so about 25% of each month. It has also been assumed that rainfall occurs for approximately half of the time for each rainy day. Therefore estimated volumes released by the AWS works are 13 m³/d.

All volumes are estimates – based on estimated flows from AWS calculations and assumptions for rainfall.

The calculations in the table above for volume indicate that improvements planned to reduce infiltration should be sufficient to bring the works back into compliance plus there should also be sufficient capacity released to process the flows arising from some of the consented development. Reductions in flows from improvements to the surface water sewer and to groundwater (by sealing the manholes) is not included but gives more confidence around this.

The WRC has had one year of exceeding the permit flow in 2020, and is expected to in 2021 when data is available for that year. One additional year of exceedance will lead to an enforcement position on the WRC, so ongoing flow monitoring and the release of measured flow data by AWS is essential to make sure that the improvements lead to enough capacity released to accommodate new development without a risk of enforcement or risk to the environment. To make adequate allowance for uncertainty and some consented windfall development, we therefore recommend that half the consented development to be built / occupied until it is demonstrated that further capacity is available. Figures and assumptions can be reviewed once all the post improvement data is available.