The River Gwash and sewage pollution for 2021 to 2026

Peter Hammond

October 2026

BACKGROUND

This report was produced in response to an enquiry from Feargal Sharkey about sewage pollution in the River Gwash. It documents a rapid review of wastewater discharges by Anglian Water to the Gwash and connected water bodies for 2021 onwards. Given the limited time available, it is far from exhaustive but hopefully will identify some useful preliminary conclusions as well as avenues that need more attention.

The Gwash rises outside the village of Knossington in Leicestershire, near the western edge of Rutland and is about 39 km (24 m) long. It flows into the west end of Rutland Water reservoir which was formed by damming the valley at Empingham.

Rutland Water is a designated Site of Special Scientific Interest, a RAMSAR site and Special Protection Area. A constant release of water from the reservoir into the lower Gwash at its eastern end is by gravity via an underground pipe. The Environment Agency and Anglian Water legally require this constant compensation flow to maintain the Gwash around Tolethorpe Hall, Ryhall and Stamford.

The Gwash is joined by a tributary, the North Brook, at Empingham and itself joins the River Welland east of Stamford. It makes sense, therefore, to deal separately with the upper and lower sections of the River Gwash west and east of Rutland Water.

There are multiple outfalls that potentially discharge untreated and/or treated sewage directly or indirectly to the River Gwash (Table 1). For a number of reasons, there are omissions from the analysis:

- Catmose Vale Rd CSO has never been recorded as discharging untreated sewage.
- An EDM monitor for the Ryall pumping station storm overflow seems never to have been installed and its permitto discharge was withdrawn in December 2023.
- Oakham STW, which discharges to a tributary of Barleythorpe Brook (another input to the River Gwash and Rutland Water), is not analysed beyond 2023 because of data quality issues.

Locations of storm overflows of untreated sewage affecting the Gwash are shown in **Fig.** 1.



Figure 1: location of 7 storm overflows directly or indirectly affecting the River Gwash

Annual spill hours for each overflow are given in Table 1 for 2021-2026 during which untreated sewage was discharged to the River Gwash for over 7,869 hours.

TABLE 1 ANNUAL SPILL HOURS

NGR	Storm overflow	Spills to	2021	2022	2023	2024	2025	2026	TOTAL
SK8385306428	Braunston STW	Gwash	54	26	10	160	31	-	281
SK9192014460	Cottesmore STW	North Brook	835	461	481	10	0	-	1,787
TF0050009300	Great Casterton SPS	Gwash	2		2	237	20	265	526
TF0053009250	Great Casterton STW	Gwash	**1,720**	0	0	0	0	0	**1,720**
SK8070007820	Knossington STW	? stream	190	155	544	44	780	61	1,774
SK8861008190	Oakham SSO	Barleythorne Brook	385	731	476	-	-	-	1,592
SK8861008190	Oakham Inlet	Barleythorne Brook	0.3	86	294	-	-	-	-
TF0404010700	Ryhall STW	Gwash	238	12	78	1,002	296	283	1,909
(**red** unreliable data; **grey** incomplete analysis)		**TOTAL**	1,704	1,385	1,591	1,453	1,127	609	7,869

DATA SOURCES

Most spill data were downloaded from Anglian Water's website or obtained by EIR request – the latter route also used for sewage flow/treatment data. A few months' spill data in 2026 were downloaded from www.water-watch.co.uk where it is acknowledged that validation may result in amendment.

1. Rainfall data was purchased from www.visualcrossing.com.
2. The map in **Fig**. 1 was constructed with assistance from ChatGPT.
3. Permits and EA inspection reports for Braunston, Cottesmore, Great Casterton, Knossington and Ryhall STWs were downloaded from its Public Register.
4. Operator Self-Monitoring (OSM) and river quality monitoring data were obtained previously from the DEFRA online data archive and more recently from the EA's online Water Quality Explorer.
5. All analysis was undertaken by the author who is solely responsible for errors and omissions.

SUMMARY OF FINDINGS

A There is excessive Nitrate pollution in North Brook and lower Gwash but not upper Gwash

The Nitrate pollution in the area is well documented but it was a little surprising to see such a difference between the upper and lower stretches of the Gwash - probably due to differences in local geology, wastewater loading and the effect of Rutland Water.

B 6,629 hours (84%) of untreated sewage discharge were non-compliant and potentially illegal

Table 2 contains the proportion of annual spill hours that occurred in less than heavy rainfall or before permitted capacity was reached resulting is non-compliance and potentially illegality.

TABLE 2 PERCENTAGE OF ANNUAL SPILL HOURS THAT WERE **NON-COMPLIANT**

	2021	2022	2023	2024	2025	2026	Overall %
Braunston STW	64.1	19.0	95.5	31.6	96.5	-	46.0
Cottesmore STW	79.6	90.4	84.5	0.0	-	-	83.3
Great Casterton SPS	-	-	-	82.5	35.2	100	89.0
Knossington STW	92.9	60.7	99.6	7.8	92.3	100	90.0
Oakham STW	100	73.3	84.6				
Ryhall STW	62.9	31.3	54.0	85.2	98.5	99.9	85.0

During 2021 to 2026, at least 6,629 hours (84%) of all raw sewage discharge occurred during less than heavy rainfall or before an STW or SPS was at capacity and so were non-compliant with the EA's heavy rainfall methodology (explained here) and/or its discharge permit and therefore were potentially illegal.

C There are many examples of excessive treatment rates way above permitted storm capacity when a spill does not occur even in circumstances where rainfall is consistent with the EA's heavy rainfall methodology

The issue is whether to avoid a spill by excessive treatment throughput and potentially produce inferior effluent still good enough to satisfy weak permit limits for quality. This approach reduces the long-term average spill frequency and could erroneously give the impression of spill reduction due to remedial action. Alternatively, should a potentiallt damaging spill be allowed to happen or last longer and give a more "honest" account of inadequate performance that needs to be addressed by Anglian Water?

D Key findings for individual assets 2021 onwards

D1 Braunston STW (population equivalent about 350)

- The campaign group Friends of the Gwash (FOG) has unpublished monitoring data that could reveal more about the state of the upper Gwash.
- 130 (46%) of 281 spill hours from an inlet storm overflow were in less than heavy rainfall and potentially illegal. Such discharge undergoes no settlement and is simply passed through a 6 mm by 6 mm screen to remove larger sewage detritus.
- Often, during heavy rainfall, **NO** flow is passed forward at the inlet for treatment and may be discharged illegally to the River Gwash. Telemetry data are needed to confirm this.

D2 Cottesmore STW (population equivalent over 4,200)

- 1,488 (83%) of 1,787 spill hours were in less than heavy rainfall and potentially illegal.
- Storm capacity has been increased in recent years.
- A dramatic reduction in spill frequency coincides with a significant increase in sewage throughput and therefore the quality of the treated effluent needs to be addressed.
- In 2021, there was a continuous spill of 28 days of which only about 7 occurred in heavy rainfall. Moreover, the flow data in January, February, June and July look to be inaccurate.
- In 2022, there was a similarly long continuous spill coinciding with intense rainfall and a total loss of effluent flow monitoring.
- Are the data losses indicative of meter failure or actual no flow due to sewage dumping?

D3 Great Casterton SPS/STW (population equivalent about 420)

- 468 (90%) of 526 spill hours were in less than heavy rainfall and potentially illegal.
- There are elementary errors in the calculation of long-term average spill frequency – a future metric that is planned for monitoring spill reduction.
- The final effluent is regularly at over 200% of the 3.7 l/s capacity which could mean the quality of the treated effluent is much poorer than it might be otherwise.
- There are 2 so-called "NO-SAMPLE/NO FLOW" OSM claims that appear to be questionable.
- There is a suspicious drop in final effluent flow almost to zero over Jan 9-10 2024 while the EDM identifies a spill. Is this a faulty flow-meter or a dump of untreated sewage?
- There is a 6-week gap (Jun-Jul 2023) in effluent flow. This needs further investigation.
- In 2023, there are periods of high treatment throughput during heavy rainfall rather than storm discharge via the grass plots. Is this a ploy to reduce spilling frequency or a management decision to treat more possibly to an inferior standard?
- Total rainfall for 2022 was low, about 500 mm, but with some freak storms. Even then Great Chesterton did not spill but continued treatment at over 250% of the permitted overflow rate.
- The EDM detected spill data in 2021for the STW, totaling over 1,700 hours, look most unlikely when compared to the treatment flow and rainfall.

D4 Knossington STW (population equivalent 360)

- 1,597 (90%) of 1,774 spill hours were in less than heavy rainfall and potentially illegal.
- Responds to rainfall and discharges treated effluent at 120% to 160% of the permitted overflow rate. Anglian Water has claimed that it receives only wastewater and no surface runoff. The only other conclusion is that groundwater is entering sewers via cracks and leaky joints. Perhaps Anglia Water should address possible groundwater ingress.

D5 Oakham STW (population equivalent over 12,000)

- 1,324 (83%) of 1,592 spill hours were in less than heavy rainfall and potentially illegal.
- **All** spills at Oakham STW in 2021 were non-compliant and potentially illegal.
- The unreliability of data for 2024 and 2025 meant no detailed analysis was possible.
- Anglian Water is addressing nitrogen pollution in 2026 and phosphate in AMP8 (2025-30).

D6 Rythall STW (population equivalent over 2,500)

- 1,624 (85%) of 1,909 spill hours were in less than heavy rainfall and potentially illegal.
- Google Earth aerial views for 15 years to 2021 show a deterioration in general upkeep.
- EA site inspection report of 7/7/2025 has photographs of extensive moss growth in bio-filter beds and on-site sewage spill suggesting the site is in an even worse state than in 2021.
- Suspicious spill data for 2021 suggesting poor installation of the EDM device in its first year.
- In Nov/Dec 2025 more than 1,100 tiny spills totaling 200 hours of which just 9 are compliant.
- Additional issues are AW's data mix of strings and numeric date definitions in a random fashion for spill start-stop times as well as an inconsistent approach to European and North-American date format. So it is a tedious process to correct AW's data into a usable format.

DETAILED ANALYSIS

River Gwash nitrate levels upstream/downstream of its confluence with the North Brook

The average "Nitrate as N" concentration in the River Gwash in the period 2021-26 is shown in **Fig**. 2. Upstream of the confluence with the North Brook, the average is at most 3.9 mg/l across 6 locations.



Figure 2 Average Nitrate as N concentrations in the River Gwash 2021 to 2026

The North Brook has a much higher average (9.3 to 14.3) at 3 locations and downstream of the confluence with the North Brook the River Gwash average ranges from 8.7 to 19.7 at 4 locations. Clearly, the North Brook and the eastern arm of the River Gwash are exposed to nitrate levels well above the accepted excessive level of 5 mg/l.

High levels of nitrate generally in the area are well known and associated with agricultural runoff. The lower levels in upper Gwash may be due to it being fed by springs from the Lincolnshire limestone aquifer. The North Brook and lower Gwash are on heavy clay soil and exposed to more wastewater.

BRAUNSTON STW

Braunston STW serves a small population of about 350[1] and discharges to the River Gwash.

Braunston Village has had an active campaign group, FOG (Friends of the Gwash), for several years undertaking river quality monitoring. Minutes of FOG's meetings are available on the parish council village website e.g., https://www.braunston-pc.gov.uk/uploads/2025-11-13-minutes.pdf?v=1768237826 .

FOG has reported that Anglian Water described Braunston STW as receiving both surface water runoff and wastewater but Knossington as receiving just wastewater resulting in storm overflow discharges primarily at Braunston and not Knossington. This does not seem to be supported by the rainfall, sewage flow and spill data (see later section on Knossington STW).

According to each permit issued between 2019 and 2026, Braunston STW has an inlet storm overflow with a pass forward rate of 8.11 l/s. Therefore, any excess sewage above 8.11 l/s arriving at the works is permitted to be discharged to the Gwash after passing through a 6mm by 6mm screen. However, Braunston STW frequently passes forward in excess of 8.11 l/s, often up to 10 l/s. The EA has criticized Anglian Water for exceeding the permitted DWF (dry weather flow) at Braunston STW.

The quality parameters and associated limits on Braunston STW's treated sewage (final effluent)

[1] Our Drainage and Wastewater Management Plan, Anglian Water, 2023

TABLE 3

Parameter	Limit (mg/l)	Type	Condition(s)	Compliance
BOD	15	spot	not in storm	LUT
BOD	30	spot	in storm	LUT
Amm N	20	spot	not in storm	LUT
Amm N	40	spot	in storm	LUT
Susp solids	40	spot	not in storm	LUT
Susp solids	80	spot	in storm	LUT

LUT= look up table. There is no Phosphate limit.

2021

The annual overview chart for 2021 below (and every chart thereafter) shows several variables:

- the rate at which sewage is passed forward at the inlet to the works (**brown** curve)
- spill intervals at the inlet (**black** horizontal segments)
- hourly rainfall (**green** curve)
- intervals (**blue** segments) when the rainfall is sufficiently heavy for a spill to be compliant with the EA's heavy rainfall threshold methodology (set here at 20 mm per 24 hrs of the previous 48 hrs or 4mm in any hour of the previous 24).

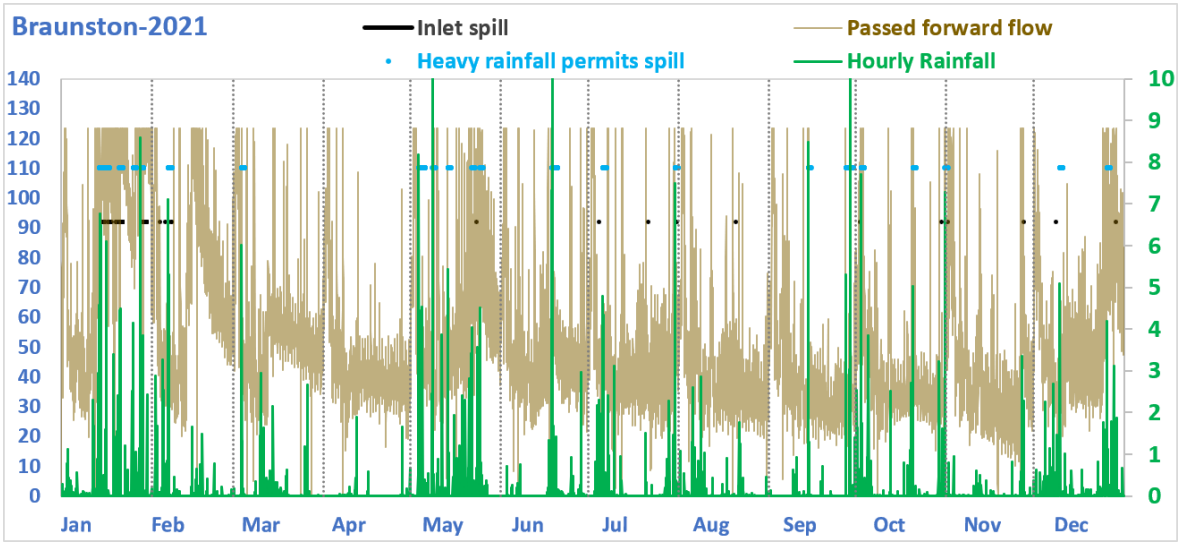


Figure 3: 2021 annual overview for Braunston STW

Of the 54.2 spill hours, 64.1% (35 hours) were not compliant with the EA's heavy rainfall methodology and possibly illegal. Although Braunston WRC's minimum pass forward flow is 8.11 l/s, it often passes forward as much as 10 l/s during spills.

By way of contrast, in Jan'21, there are times when **no flow** is passed forward for treatment (e.g., Jan 14, 16, 19, 21, 28 and 29) during or immediately after heavy rainfall.

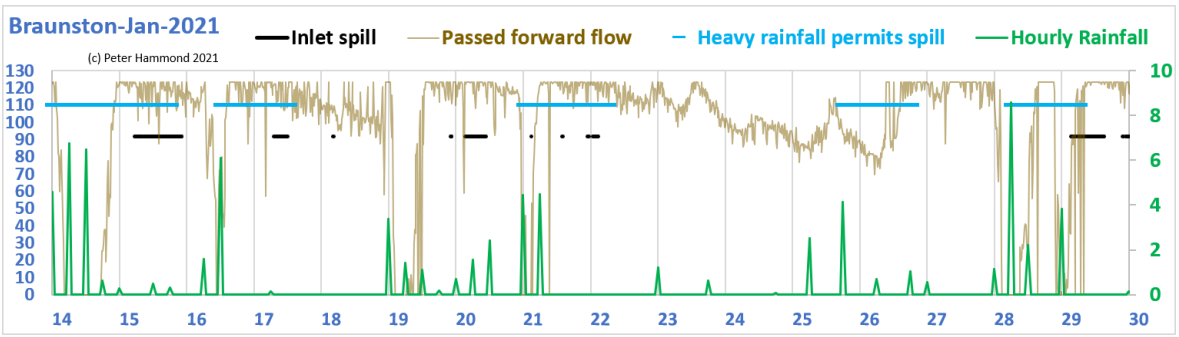


Figure 4: Jan 2021 chart for Braunston STW with total loss of treated effluent on Jan 14,16,19,21,28,29

This could be associated with a meter error or it could mean that ALL untreated sewage has been dumped illegally at the inlet weir to the River Gwash. To investigate this further, an EIR request for all telemetry exchanges between the works and Anglian Water's control centre would have to be made.

2022

The annual overview for 2022 is shown in **Fig**. 5. Of the 26.3 spill hours, about 19% (5 hours) were non-compliant with EA's heavy rainfall methodology and potentially illegal.

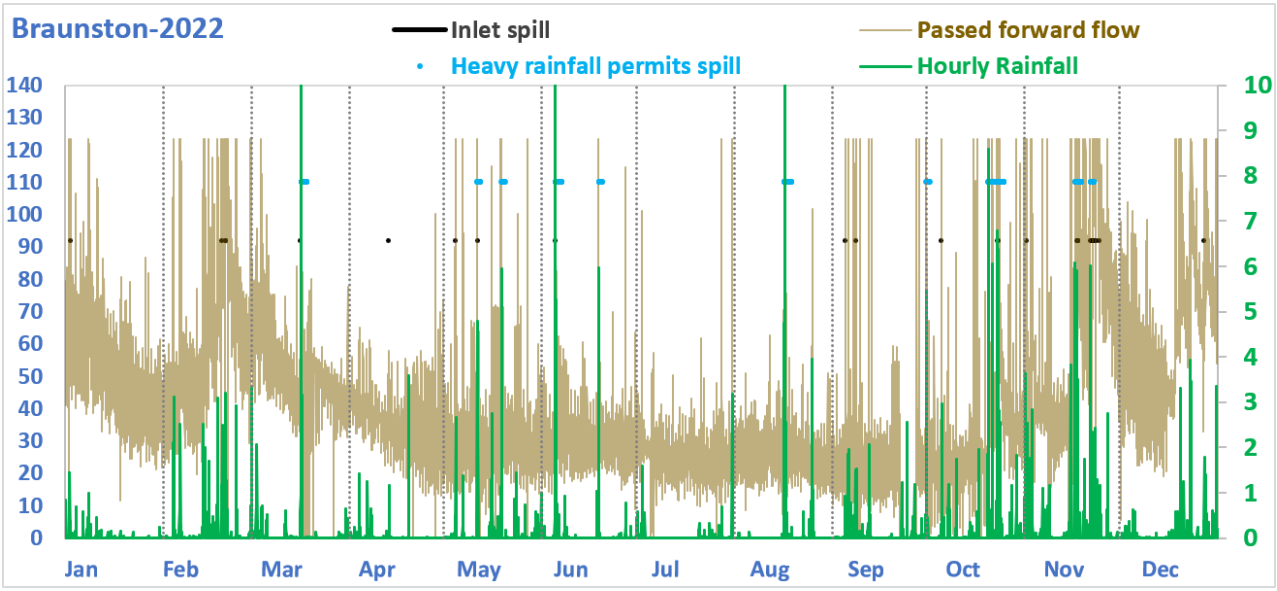


Figure 5: 2022 annual overview for Braunston STW

As with 2021, there are occurrences of complete loss of pass forward flow at the inlet (Nov 18, 21, 22 and 23) when either there was a meter error or all untreated sewage was dumped illegally at the inlet weir to the River Gwash (**Fig**. 6).

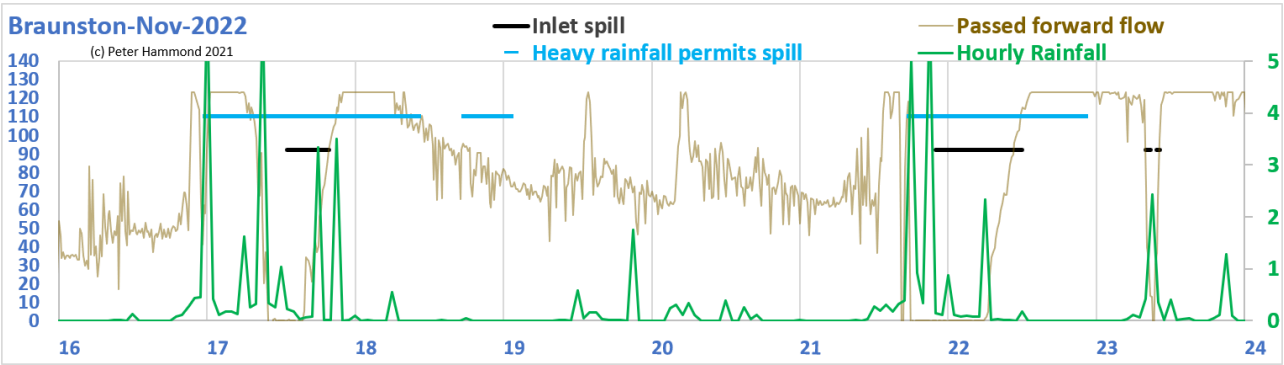


Figure 6: Jan 2021 chart for Braunston STW with total loss of treated effluent on Jan 14,16,19,21,28,29

2023

The annual overview for 2023 is shown in **Fig**. 7. Of the 10.1 spill hours, about 95.5% (10 hours) were non-compliant with EA's heavy rainfall methodology and potentially illegal.

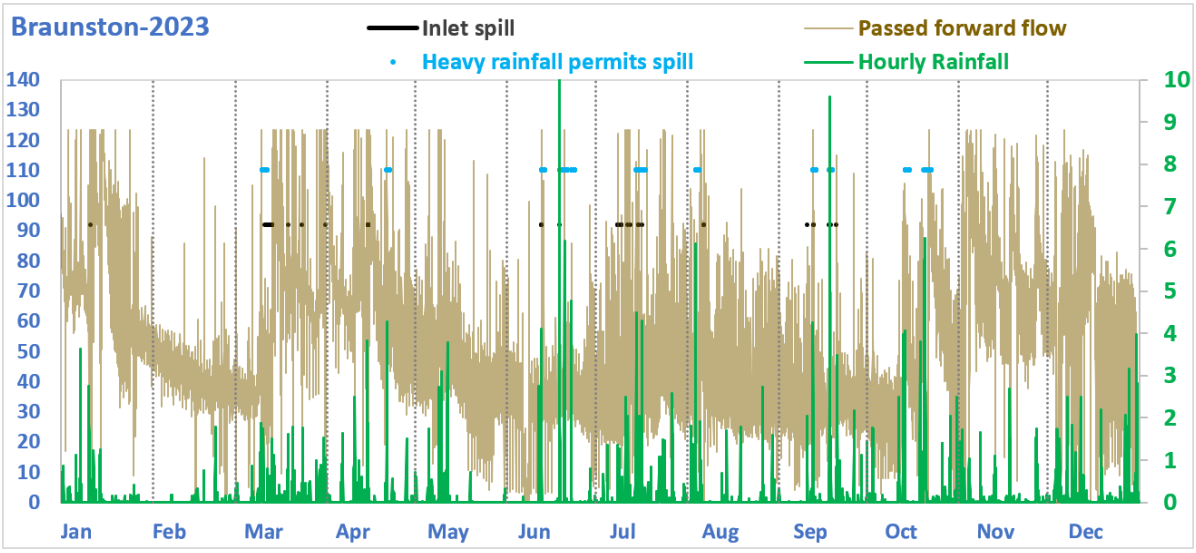


Figure 7: 2023 annual overview for Braunston STW

Furthermore, there continues to be complete losses of pass forward flow at the inlet weir during periods of high rainfall and in the case below even without the EDM recording a spill.

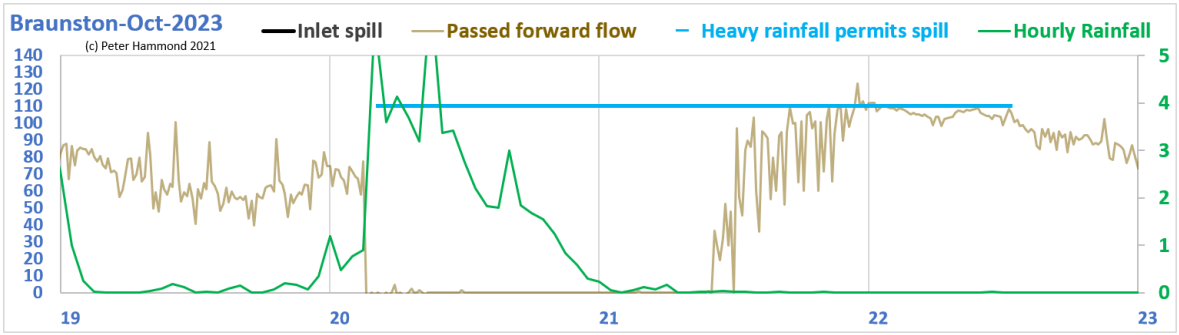


Figure 8: Braunston STW 2023 with no passed forward flow for most of October 20-21

2024

The annual overview for 2024 is shown in **Fig**. 9. Of the 160 spill hours, about 31.6% (51 hours) were non-compliant with EA's heavy rainfall methodology.

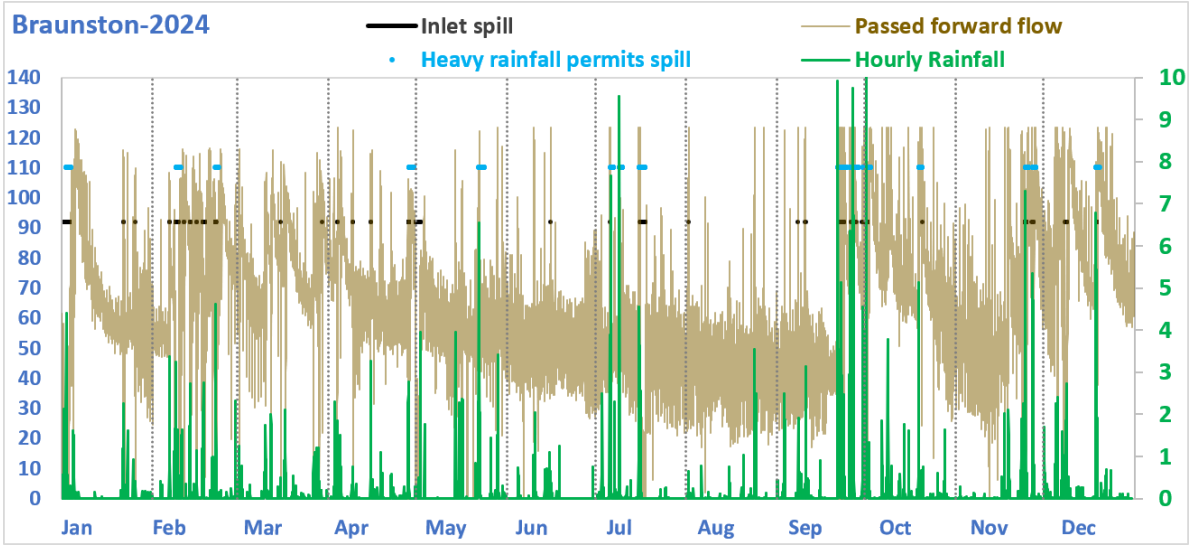


Figure 9: 2024 annual overview for Braunston STW

There appears to have been a significant increase in the frequency of complete losses of pass forward flow during 2024 which was much wetter than 2021 to 2023.

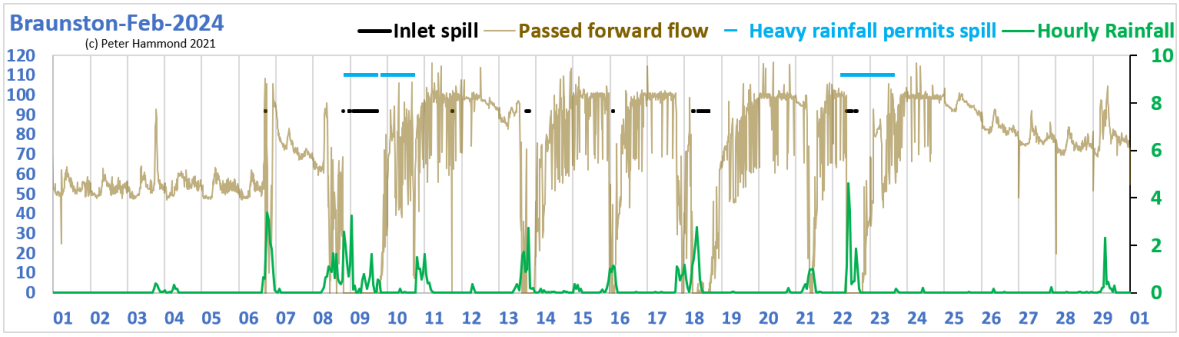


Figure 10: Braunston STW 2024 with complete losses of passed forward flow on Feb 8,9,13,18,22.

2025

The annual overview for 2025 is shown in **Fig**.11. Of the 30.8 spill hours, about 96.5% (30 hours) were non-compliant with EA's heavy rainfall methodology.

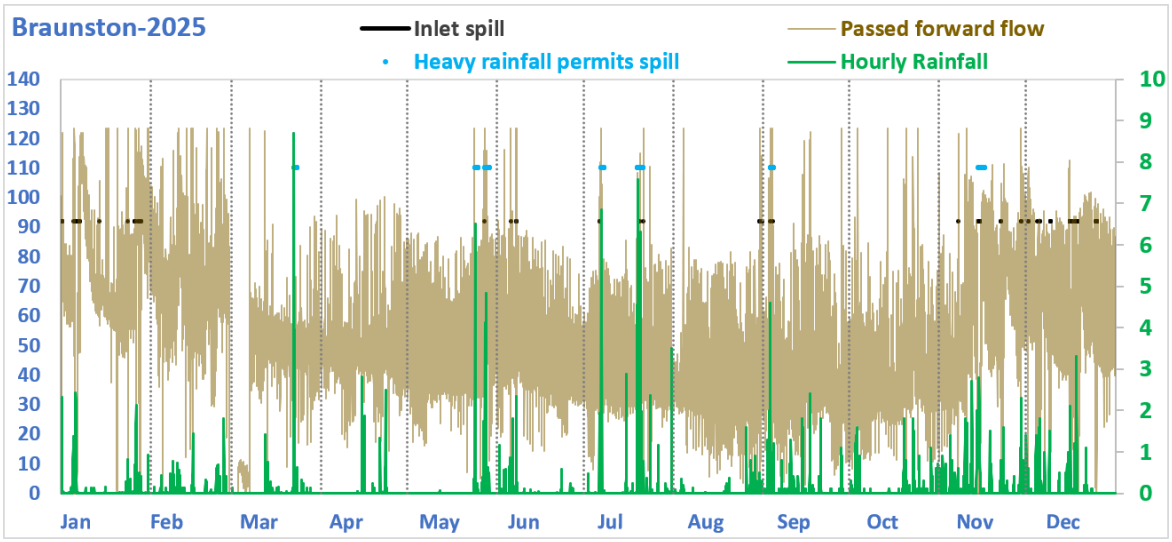


Figure 11: 2024 annual overview for Braunston STW

There are yet more "no flow" occurrences at the inlet weir during heavier spells of rainfall in January, November (**Fig** 12) and December (**Fig.** 13).

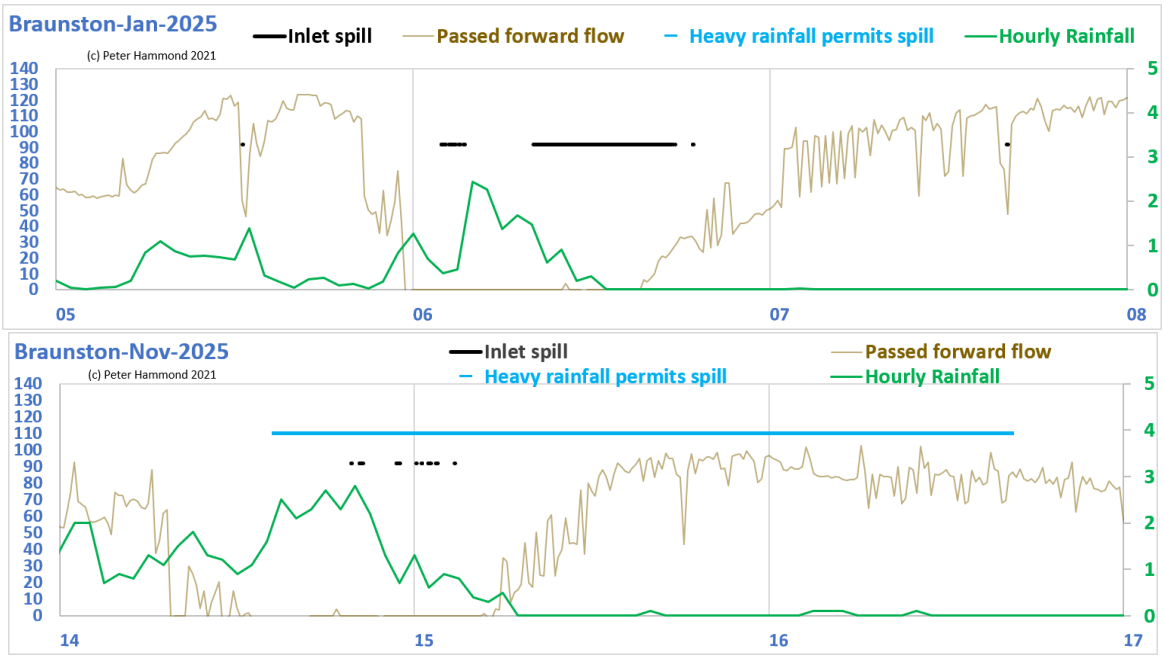


Figure 12: significant periods of no passed forward flow at the inlet occur in 2025

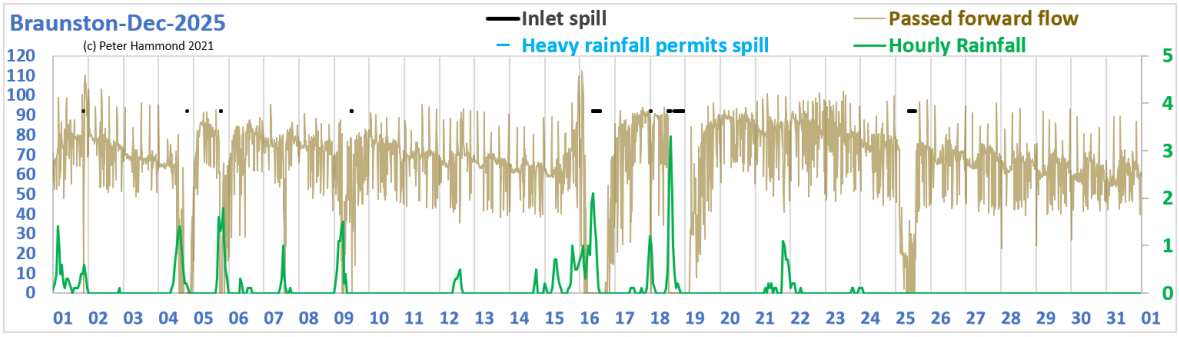


Figure 13: Braunston STW 2025 with complete loss of passed forward flow on Jan 5,6; Nov 14,15; Dec 4,5,16,18,25.

Cottesmore STW

Cottesmore STW serves a population equivalent of about 4,200 and discharges to the North Brook which joins the Gwash at Empingham. The EA rated North Brook as Poor for fish in 2019 and 2022.

From Table 1 earlier, the annual spill hours from Cottesmore STW underwent a rapid reduction and even elimination from 2023.

NGR	Storm overflow	Spills to	2021	2022	2023	2024	2025	2026	TOTAL
SK9192014460	Cottesmore STW	North Brook	835	461	481	10	0		1,787

A possible explanation is the addition of an extra storm tank between 2021 and 2023 as can be seen in the historical aerial views generated in Google Earth Pro (**Fig**. 13).



Site plan from 2021 EA permit



Earthwatch aerial view May 30th 2021



Earthwatch aerial view March 25th 2022



Earthwatch aerial view May 1st 2025

Figure 14: Aerial views of Cottesmore STW showing a large storm tank under construction in 2022

The 2021-2026 chart below of the daily volume of treated effluent leaving Cottesmore STW shows a noticeable increase of throughput during rainy spells from the end of 2023 when spills are no longer recorded.

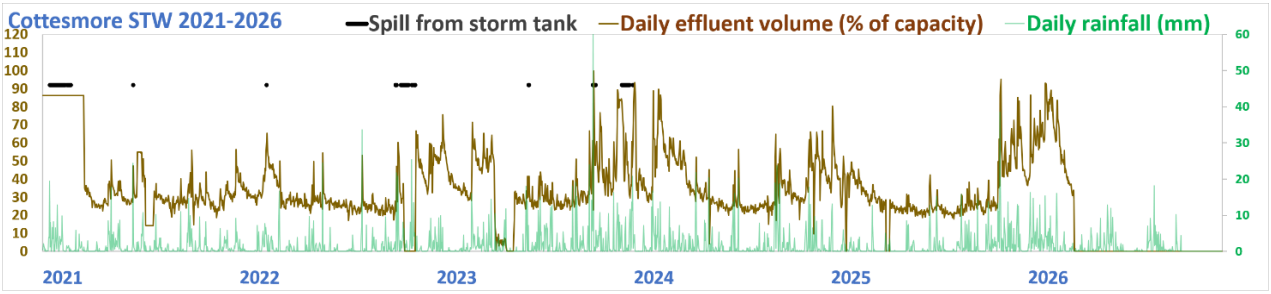


Figure 15: daily treatment volume has increased in the past 2 years while sewage spills have been eliminated

Hence another issue to address is if the rate of sewage treatment was increased at the end of 2024 in order to reduce or avoid discharges of untreated sewage at times of high rainfall?

2021

The annual 2021 overview chart for Cottesmore STW is shown in **Fig**. 16. The only spills detected appear to be in January and February when the sewage treatment flow remains "artificially" constant at about 86% of storm capacity during a period of intense rainfall.

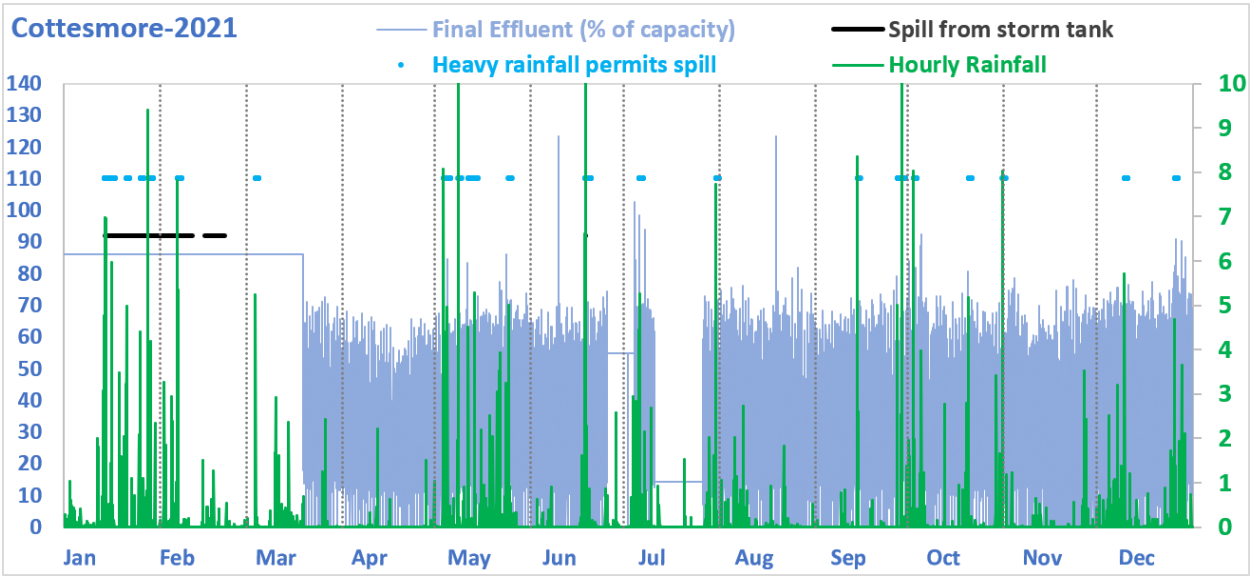


Figure 16: 2021 annual overview chart for Cottesmore STW

Usually, such behaviour corresponds to a flow-meter failure which could be the case given the additional complete losses of flow data in June and July, one of which is itself a permit breach in being more than 14 days in succession. In any case, the first spill in Jan-Feb lasted some 28 days without a break of which about 7 days' worth were in permitted heavy rainfall. The other 21 days' worth were non-compliant and hence potentially illegal.

2022

The 2022 annual overview chart for Cottesmore STW is shown in **Fig**. 17.

As with 2021, in 2022 Cottesmore reacted to a period of intense rainfall by losing final effluent monitoring and simultaneously discharging untreated sewage for a long period – in this case, a continuous spill of 15 days or so.

In all, of the 461 hours' spilling in 2022, 417 (90.4 %) were non-compliant with the EA's heavy rainfall methodology and possibly illegal.

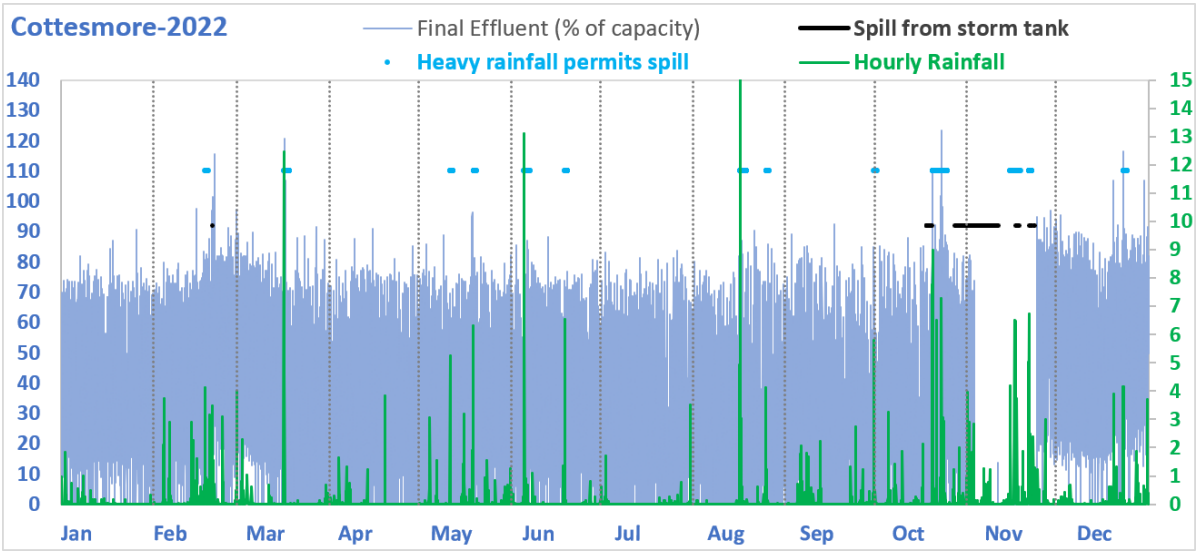


Figure 17: 2022 annual overview chart for Cottesmore STW

2023

Echoing 2021 and 2022, the 2023 annual overview chart (**Fig**. 18) shows total loss of effluent flow monitoring as well as some non-compliant spilling - of 480 hours, 406 (96.5%) hours were non-compliant with respect to heavy rainfall and possibly illegal.

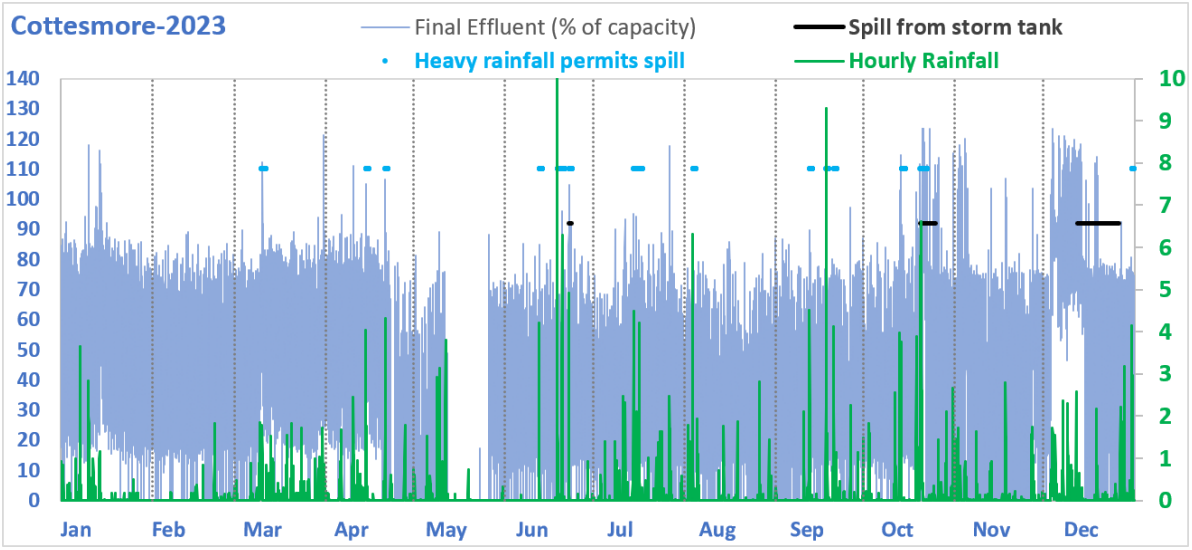


Figure 18: 2023 annual overview chart for Cottesmore STW

2024

Only 10 hours of untreated sewage discharge were detected at Cottesmore STW in 2024, despite it being an unusually wet year.

2025

No untreated sewage discharges were reported at Cottesmore STW in 2025. That is a little surprising since an EA report of a visit to Cottesmore STW on 16th October 2025 includes a photograph of, and a complaint about, a storm tank retaining sewage debris.

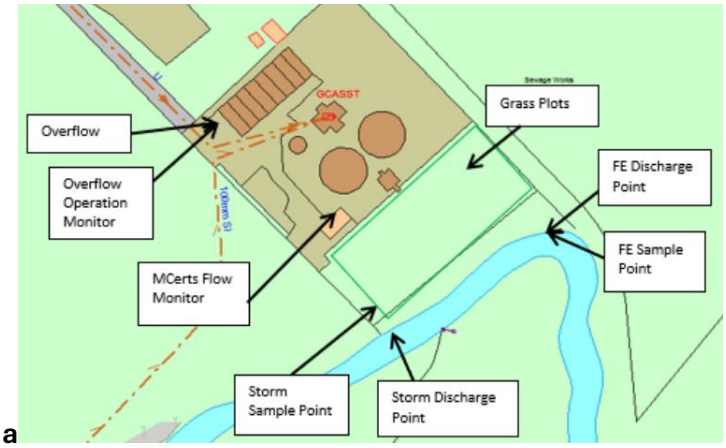


Figure 19 right: sewage debris in an unemptied storm tank

One possible explanation is that there was a diversion of untreated sewage that did not result in a spill and the tank was never cleaned out with the potential for a "toxic shock" effect of septic sewage when the next spill to the River Gwash occurred.

GREAT CASTERTON SPS AND STW

Great Casterton SPS receives flow from Great Casterton village (population about 420) shown as two dotted lines in Fig. 20a and pumps it forward to the STW treatment process. According to the Anglian Water (AW) annual EDM reports to the EA, grass plots are used to "treat" the storm discharge from the STW for which an EDM device was fitted in Mar'21. The SPS was not fitted with an EDM until Dec'23

a 

b 

Figure 20: **a)** from permit ASENF10358/V002; **b)** Google Earth view May 30th 2021.

The EA's annual EDM reports by Anglian Water (AW) for 2021 to 2025 are summarized in the table below. For 2026, EDM detected spill start-stop times were obtained from the website https://water-watch.co.uk/map?site=AWG-AWS00487. The long-term average annual spill frequency seems to suffer from some odd and elementary arithmetic calculations.

	Great Casterton SPS			Great Casterton STW		
	spills	hours	long-term average spill frequency (? Correction)	spills	hours	long-term average spill frequency (? Correction)
2021	-	-	-	74	1719.9	-
2022	-	-	-	1	0.25	37 (? 75/2)
2023	1	1.5	-	0	0	24.67 (? 75/3)
2024	26	236.3	6.75 (? 26/1)	0	0	25 (? 75/4)
2025	7	10 (20)	16.5 (33/2)	0	0	0.25 (?75/5) or 0.25 if reject 2021 data so 1/4
2026	23	265.2	18.7 (?56/3)	0	0	

The analysis shown later of final effluent flow suggests the STW EDM produced totally erroneous data in 2021 with probably no spills except for Feb'21, the month before the EDM was fitted. The EA never seems to check for false positive, false negative spill reporting or the long-term average spill frequency. The latter is important as it is proposed as a metric for future monitoring of spill reduction.

There are 3 forms of discharge from the Great Casterton site:

treated effluent
storm sewage from the STW via the grass plots;
storm sewage (? emergency) from the SPS.

The storm discharge with the most potential for pollution is the SPS storm discharge which appears to spill more than the STW. Moreover, the final effluent is regularly over 200% of the 3.7 l/s capacity which could mean the quality of the treated effluent is poor. There is no mention in the permit of a screen for either storm overflow before discharge to the grass plots or river Gwash. The EA's Public Register refers to a permit for Great Casterton SPS (AWNNF356) but says no document was published and cites the report of the 2025 visit. It is unclear at which point the "sewage in an emergency" is discharged.

Final effluent sampling and operator self-monitoring results

The limits on Great Casterton STW's treated sewage (final effluent) and storm discharge are as follows:

Parameter	Limit (mg/l)	Type	Condition(s)	Compliance
BOD	40	spot sample	effluent	LUT
Amm N	12	spot sample	effluent	LUT
Susp solids	60	spot sample	effluent	LUT
Susp solids	200	storm sewage	storm	MAX

LUT= look up table. There is no Phosphate limit.

On checking the OSM spot sampling results for the final effluent for Great Casterton, there appears to have been no non-compliance for 2021-2025.

However, there are 2 so-called "NO-SAMPLE/NO FLOW" OSM instances in the 5 years and both appear to be questionable i.e. there clearly is flow and in one case the no flow appears to happen hours after the sample was attempted:

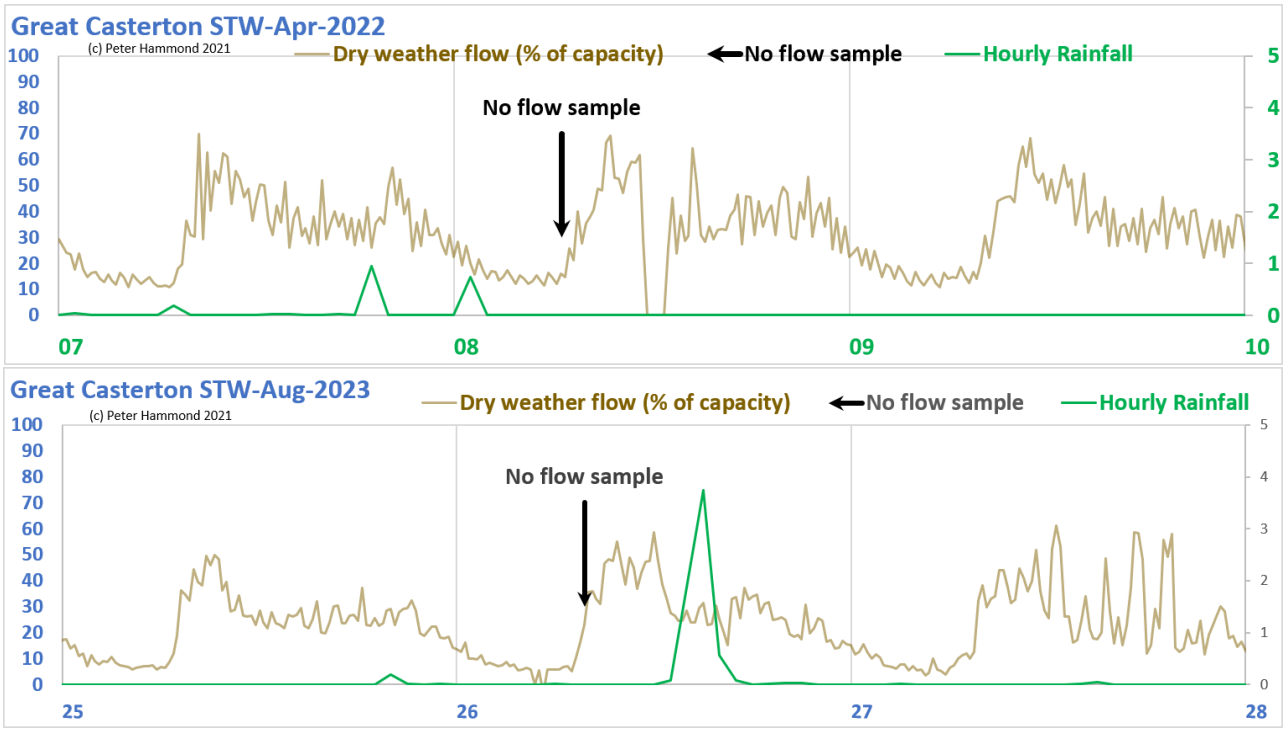


Figure 21 : examples of NO SAMPLE/NO FLOW claims at Great Casterton that are not supported by flow data

It may be perfectly explainable but Anglian Water has historically made significantly more NO SAMPLE/NO FLOW claims than any other water company.

2021

The annual overview for 2021 is shown in **Fig** 22. The EDM detected spill interval data totaling over 1700 hours look most unlikely when compared to the treatment flow and rainfall.

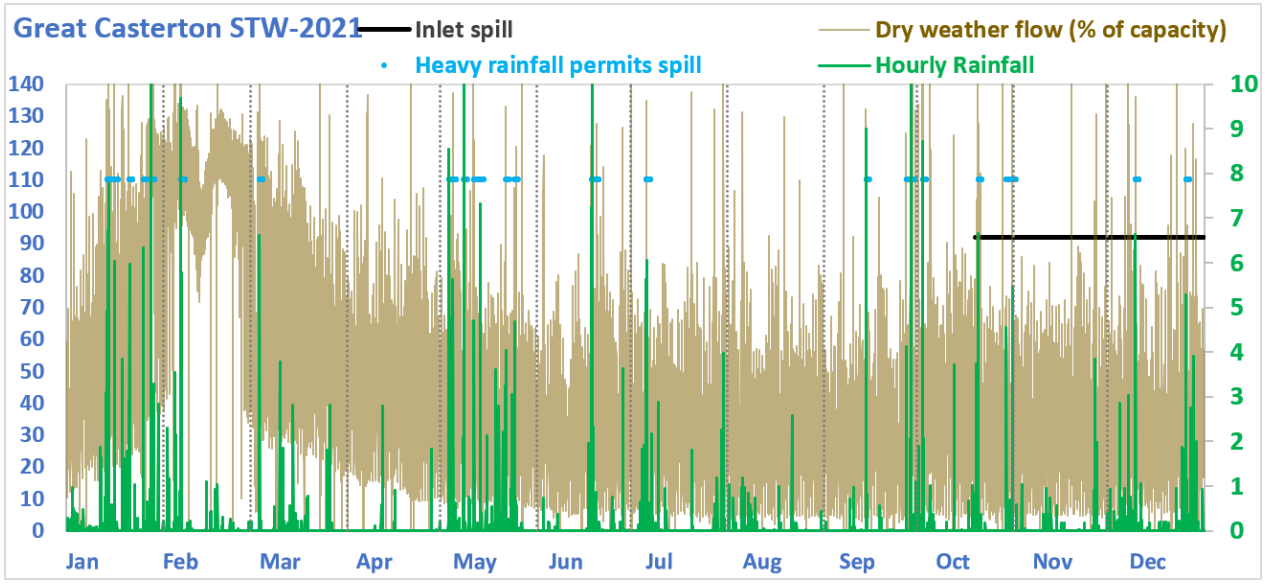


Figure 22: 2021 annual overview chart for Great Casterton STW showing unlikely spills in Oct-Nov

The spill data for last 3 months of 2021 should be ignored and set aside as unreliable. That said, there is a likely period of sewage dumping in most of February judging by the flattened treatment data and incidence of heavy rain.

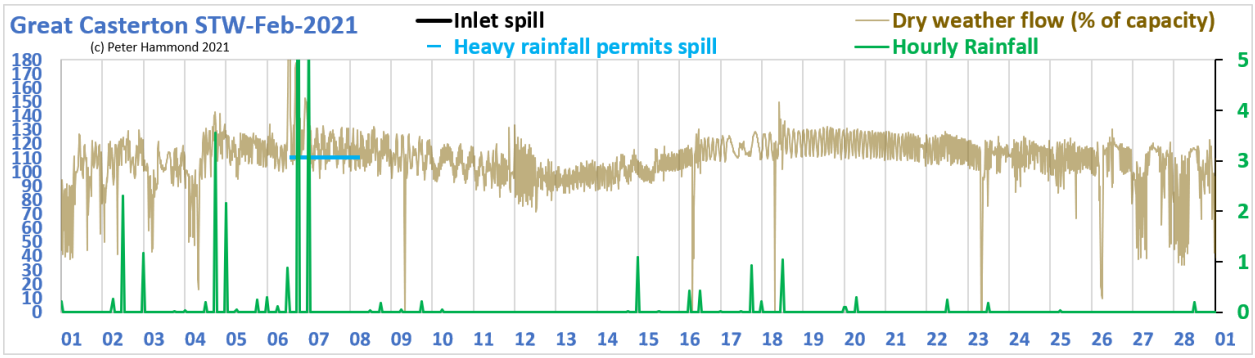


Figure 23: Feb'21 chart for Great Casterton STW showing possible missed spill or at least diversion to storm tank

2022

The annual overview for 2022 is shown in **Fig 24**.

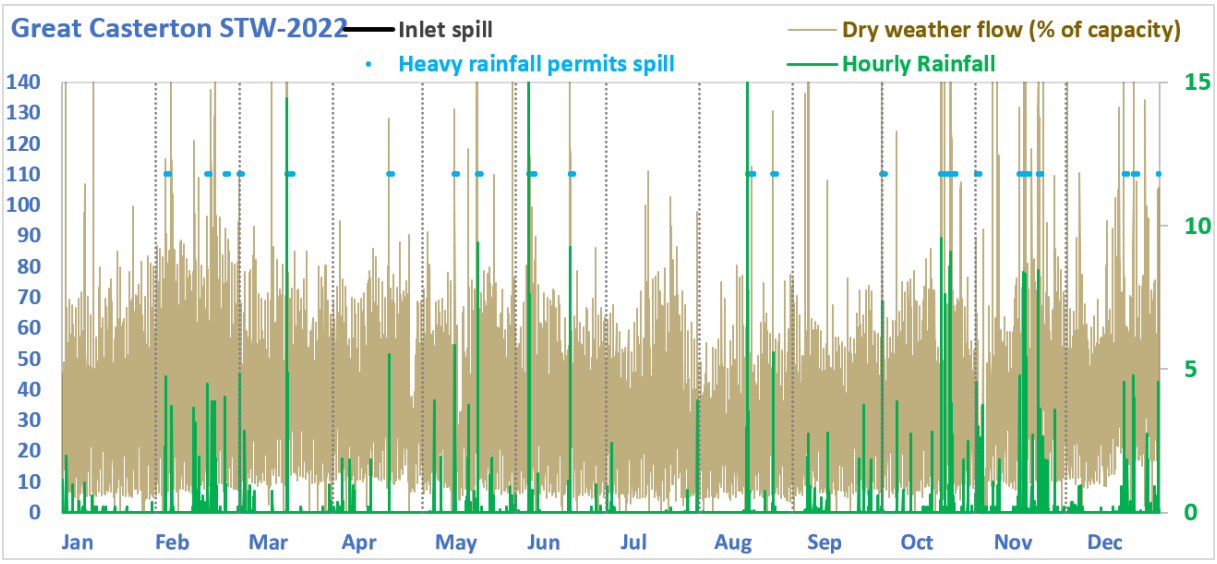


Figure 24: 2022 annual overview chart for Great Casterton STW

For the whole of 2022, the local rainfall was only about 500 mm. However, there were some freak storms and even then Great Chesterton STW did not spill. For example, see the chart below for August 2022 where on one day the hourly rainfall was 40 odd mm at one point and for several days, the hourly rainfall was sufficiently high to permit spills of excess influent above 3.7 l/s – BUT the works did not spill via its storm tanks. Instead it continued treatment at over 250% of the permitted spill capacity.

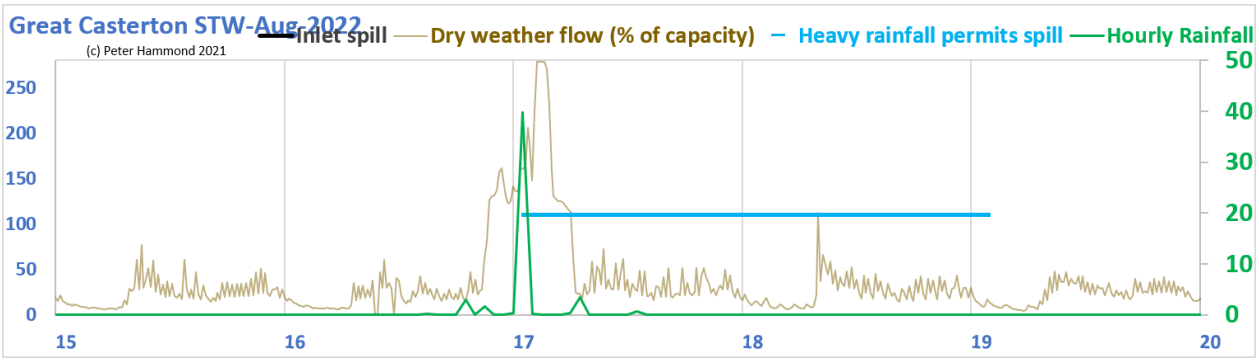


Figure 25: August 2022 chart for Great Casterton STW showing excessive throughput during heavy rainfall

November 2022 includes yet more examples of the same excessive throughput with no spill detected.

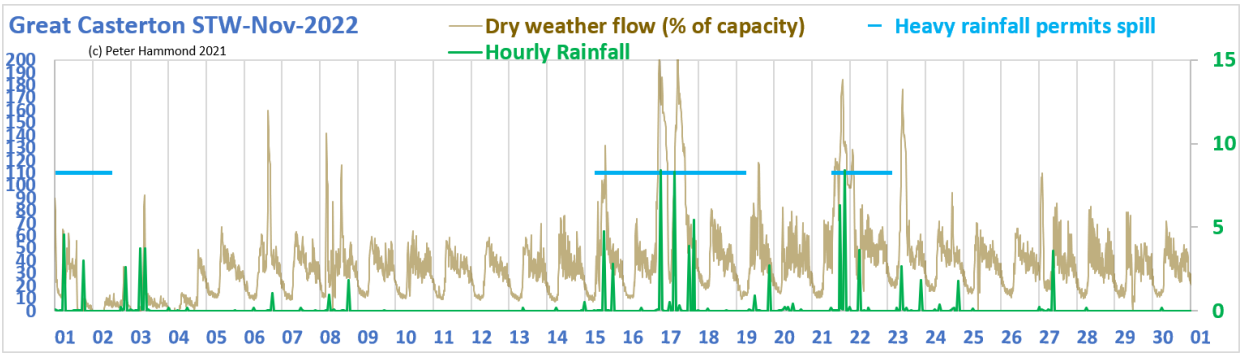


Figure 26: November 2022 chart for Great Casterton STW showing excessive throughput during high rainfall

2023

The annual overview for 2023 shows a 6-week data loss (Jun/Jul) and suspiciously low rate of final effluent leaving the STW (December). The absence coincides with a period of very heavy rainfall, so it is important to establish whether the gap is a meter failure or complete loss of treatment for 6 weeks so that all storm sewage was discharged to the Gwash illegally.

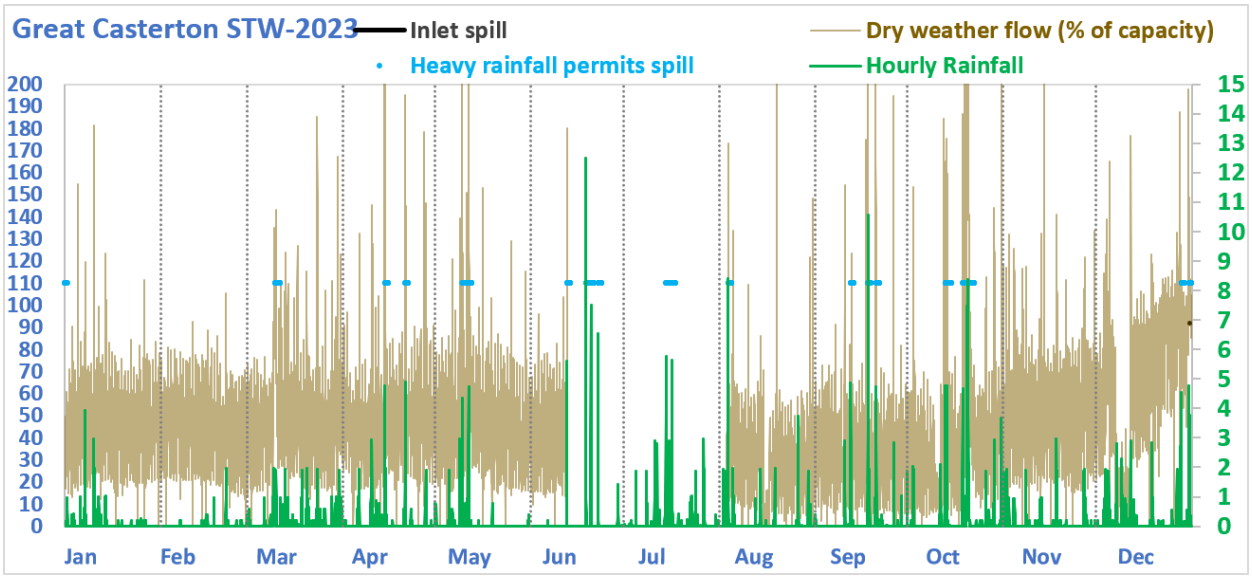


Figure 27: 2023 annual overview chart for Great Casterton STW

In addition, there are similar periods of high treatment throughput during heavy rainfall rather than storm discharge via the grass plots. Is this a ploy to reduce spilling frequency or a management decision to treat more possibly to an inferior standard. The quality targets for the final effluent may be achievable with faster/greater throughput but levels of phosphate output, which are not monitored, may be worse. October 2023 is another monthly example of the high throughput:

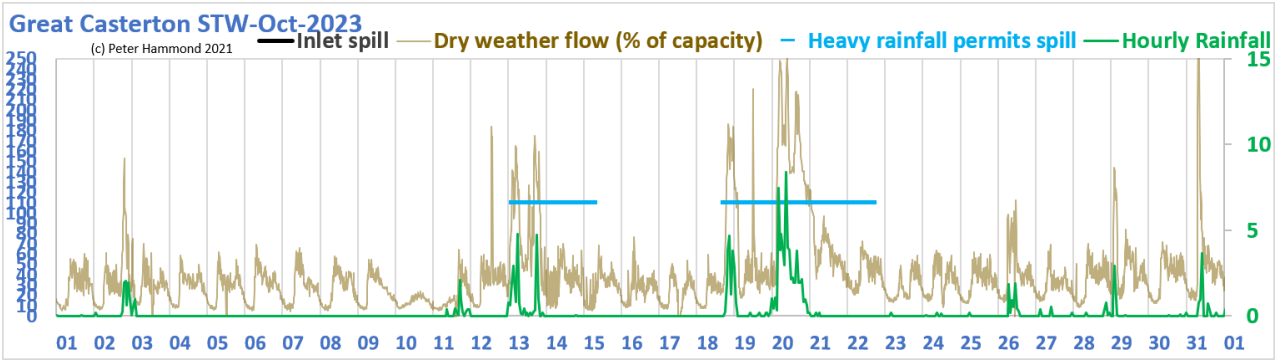


Figure 28: October 2023 chart for Great Casterton STW showing excessive throughput during high rainfall

2024

The EA visited Great Casterton STW on October 16th 2025 (see report) and commented:

> *Please investigate and inform me of the root cause of the recorded dry day spills that were recorded 8th 9th 10th 13th 14th 15th 16th and 17th of January 2024*

The monthly chart for January 2024 clearly shows the spills referred to by the EA.

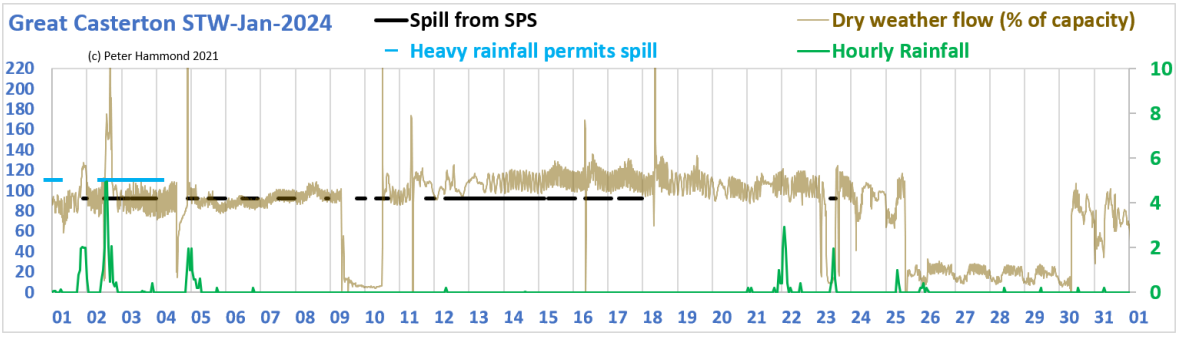


Figure 29: January 2024 chart for Great Casterton STW

Of the 223.5 SPS spill hours in Jan'24, 222.2 hours were non-compliant with the EA's heavy rainfall methodology. Of the 19 days involving some SPS spilling, 11 involved dry-day spills lasting 153.8 hours.

There is a suspicious drop in final effluent flow over Jan 9-10 2024. Is this a faulty flow-meter or a dump of unteated sewage. The EA reported no sign of adverse impact upstream and downstream of the site. It may be a better idea to undertake some GoPro filming of the riverbed to get a better idea of possible adverse effects.

2025

Although 2025 was a relatively dry year, the Great Casterton area did witness several heavy storms. These can be seen in the annual overview chart (**Fig**. 30).

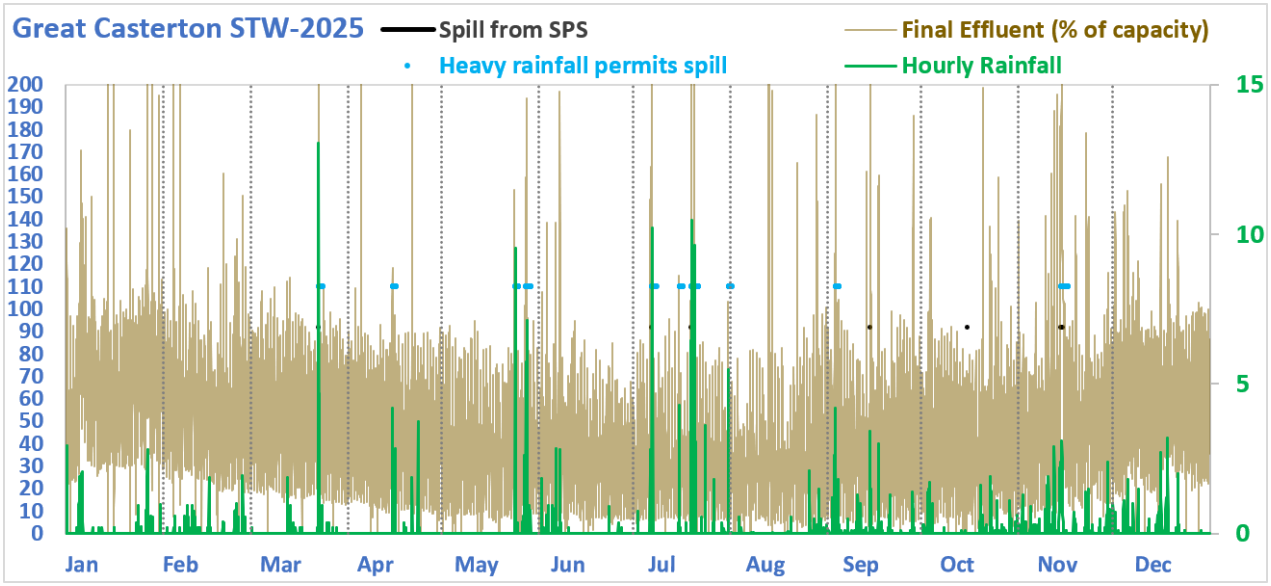


Figure 30: 2025 annual overview chart for Great Casterton STW

The final effluent discharge rate is often much higher than the permitted storm capacity of 3.5 l/s. That is, although the rainfall was sufficient to permit a storm discharge from the STW, none was made or the spill was shorter than it was permitted to be. Instead, much higher rates were passed on to the treatment process. This can be better seen in specific monthly charts (**Fig**. 31).

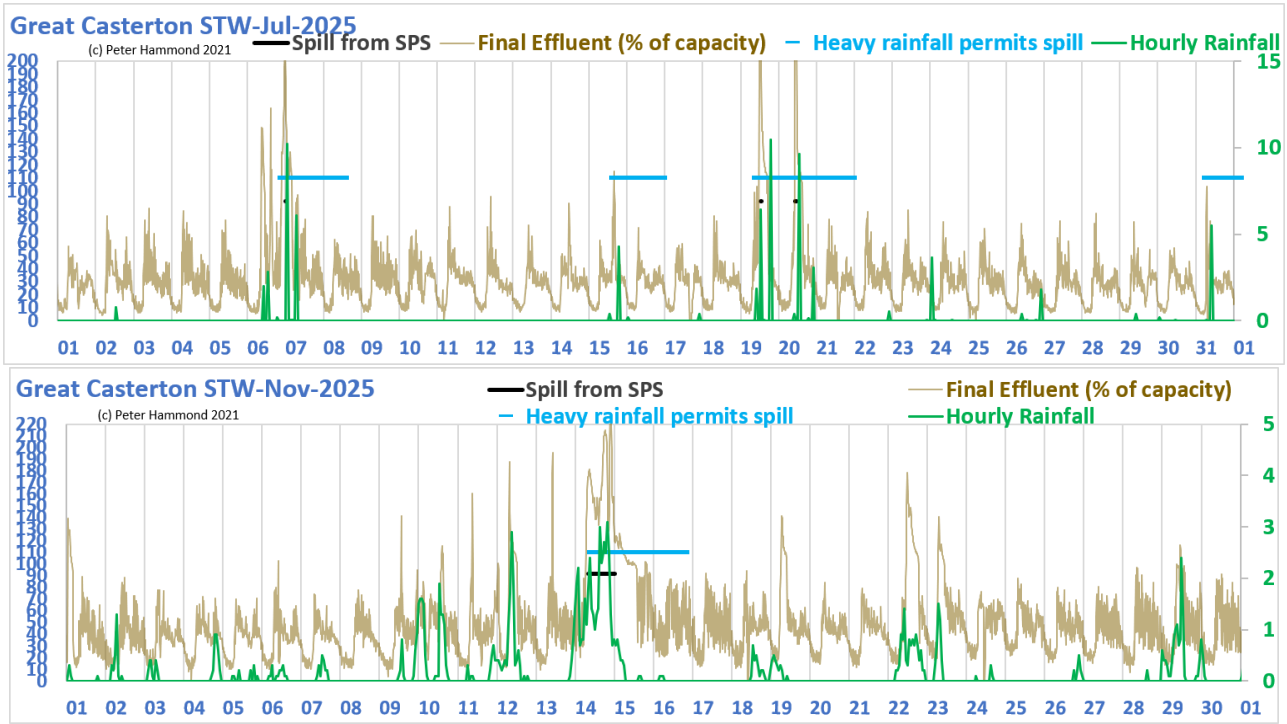


Figure 31: examples of high rates of treatment despite

The issue is whether it is better to increase treatment throughput and potentially produce inferior effluent but also reduce the STW's long-term average spill frequency and give the impression of spill reduction? Or, should a spill be allowed to happen or last longer to give a more "honest" account of inadequate performance that will then need to be addressed?

2026

The annual overview chart for 2026 up to October is shown in **Fig.** 32.

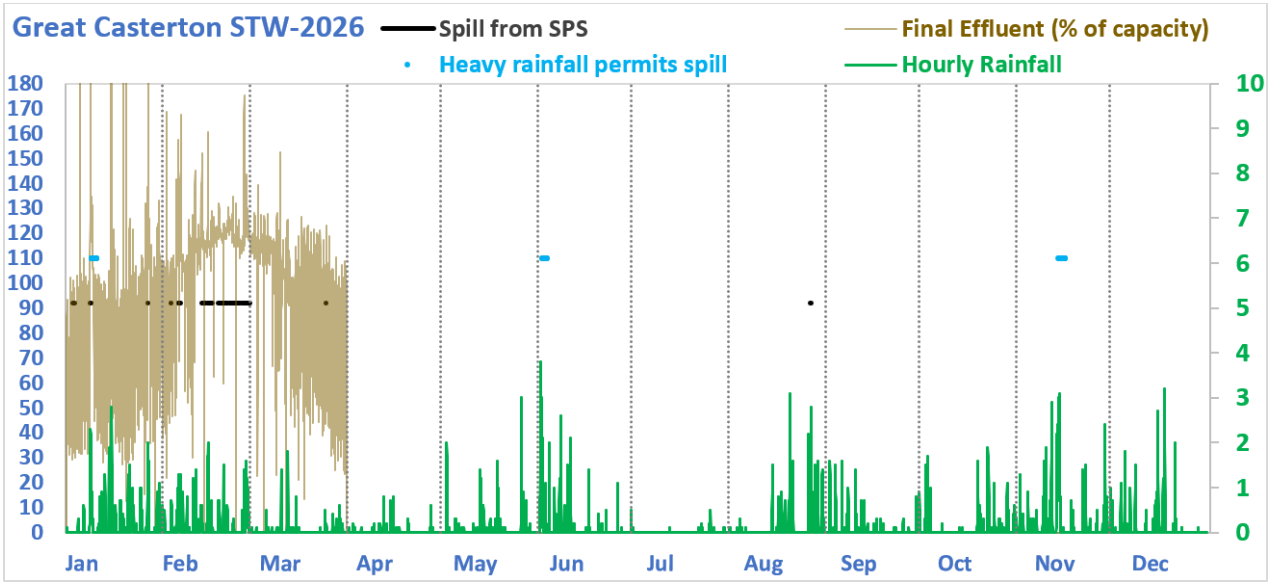


Figure 32: 2026 annual overview chart for Great Casterton STW

Clearly, the final effluent rate is well above the capacity level (100% to 140% of 3.7 l/s). The January and February monthly charts suggest that the vast majority of the 260 or so spill hours over 20 days are non-compliant with the EA's heavy rainfall methodology.

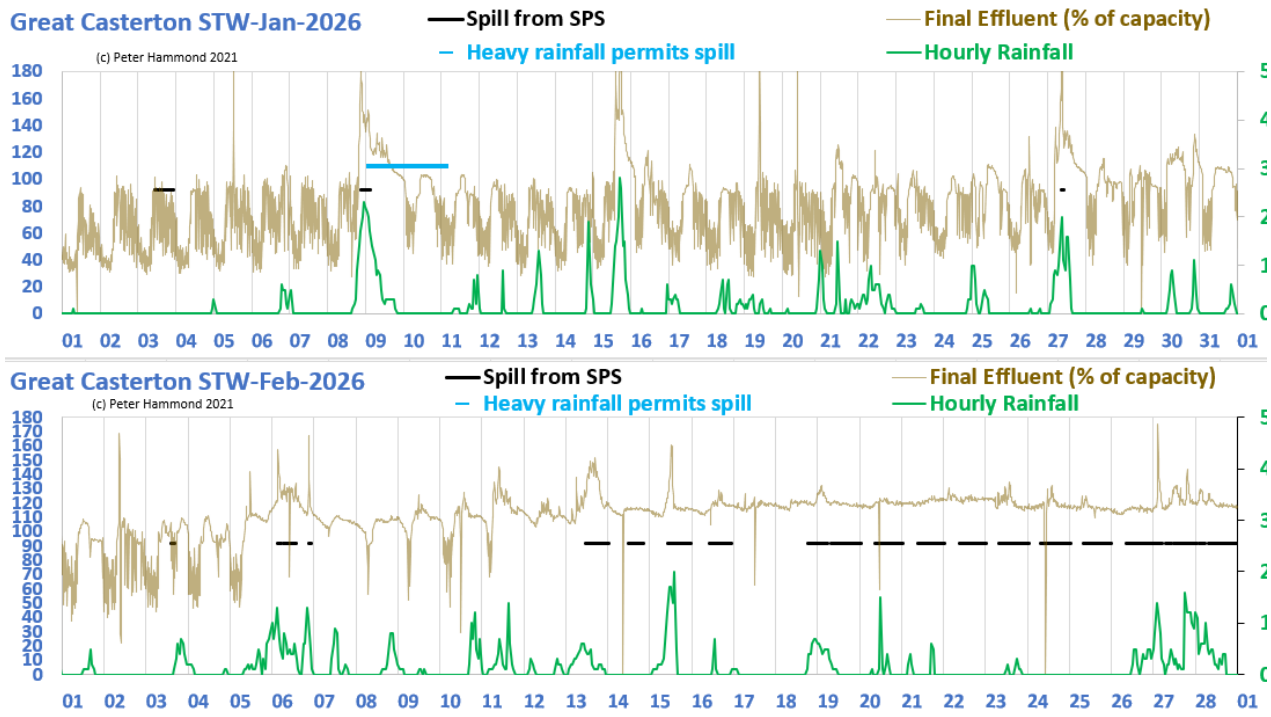


Figure 33: examples of spills at Great Casterton STW occurring during less than heavy rainfall

In contrast, only 2 dry-day spills (Jan 3rd and Feb 25th) are identified by the EA's very conservative "less than 0.25 mm rainfall on the day and day before the spill" approach.

KNOSSINGTON STW

Knossington STW serves a small population of about 360 and discharges to an unnamed stream joining the River Gwash not far from its source. The final effluent quality parameters for Knossington

STW are very generous e.g., 25 mg/l for Amm N. Anglian Water's OSM monthly spot sample results for Amm N. levels in Knossington STW's final effluent have not exceeded 10.6 since April 2021 and have an average value of less than 0.3 mg/l.



Final effluent quality parameters for Knossington STW

Parameter	Limit (mg/l)	Type	Condition(s)	Compliance
BOD	40	spot	effluent	Look up table
Amm N	25	spot	effluent	Look up table
Susp solids	60	spot	effluent	Look up table

According to minutes of the Friends of the River Gwash, Anglian Water is reported to have said that Braunston STW receives surface water runoff to sewers as well as wastewater whereas Knossington receives just wastewater resulting in storm overflow spills primarily at Braunston. This does not seem to be supported by the rainfall, sewage flow and spill data. For example, the 2025 and 2026 annual overview charts for Knossington STW (Fig. 34) clearly show much increased treated effluent and spills of untreated sewage during periods of rain.

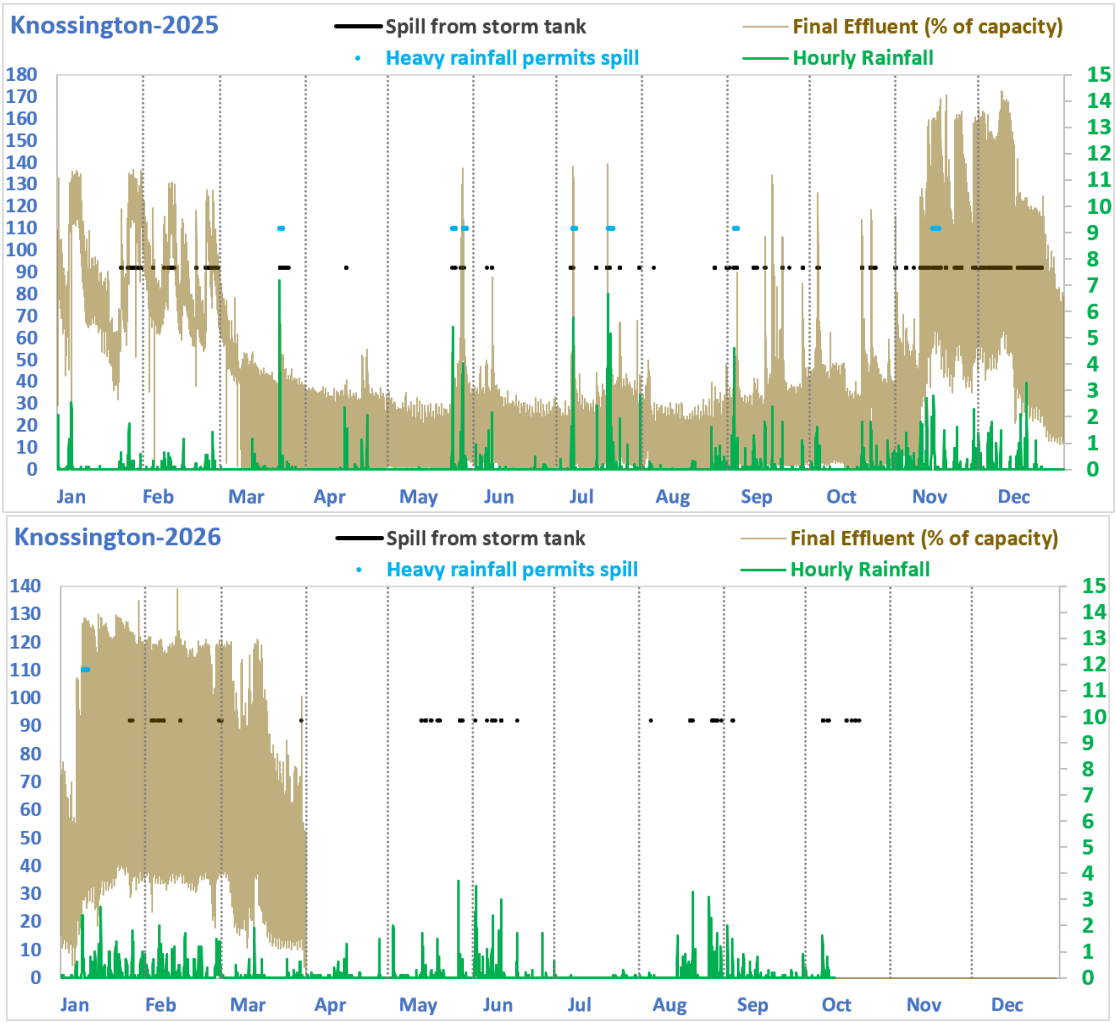


Figure 34: 2025 and 2026 annual overview chart for Knossington STW showing effects of rainfall

Knossington STW has an inlet storm overflow with a weir "capacity" setting of 3 l/s. Thus, spills of excess untreated sewage are permitted once the inflow is above 3 l/s. Yet the works often discharges at 120% to 160% of this rate. Anglian Water cannot claim this to be diluted by surface runoff having made the claim cited earlier. The only other conclusion is that groundwater is entering the sewers feeding Knossington STW via cracks and leaky joints. Perhaps Anglia Water could address groundwater ingress by lining the sewers.

The dry weather flow to a works, the size of the receiving watercourse and its design will influence the limits at which quality parameters are set in a permit to discharge wastewater. Given that the final effluent rate can reach 170% of the storm weir capacity then perhaps Knossington STW's dry weather flow and effluent quality limits should be revisited by the EA

Minutes of FOG meetings have expressed concern about its own sampling results of the River Gwash but unfortunately don't provide any detailed data to enable comparison with treatment flow, rainfall and spill data.

OAKHAM STW

Oakham STW serves the market town of Oakham and nearby villages of Barleythorpe, Egleton and Gunthorpe with a total population equivalent of over 12,000.

Oakham STW is permitted to discharge secondary treated sewage with phosphate removal, "3DWF" settled storm sewage, "6DWF" storm sewage at the inlet and sewage in an emergency. The treated effluent discharges into Rutland Water with storm (and presumably emergency) overflows discharging into the Barleythorpe Brook which joins the River Gwash before it flows into Rutland Water.

At the inlet weir, flows in excess of 230 l/s are discharged to the Gwash after screening. Grit removal occurs just before another storm separation weir which diverts flows in excess of 103 l/s to storm tanks (85 l/s in 2021). The most recent permit available for Oakham STW on the EA's Public Register (set in April'21, revoked in Mar'25 with no obvious replacement) includes a diagram of the site showing 4 individual storm tanks (**Fig**. 34a).

A recent site visit report by the EA mentioned *construction of a new storm tank which is located at the head of the site, and which will now settle discharges from the 6x DWF storm weir before it is discharged to the environment*. Anglian Water announced completion of the £1 million update in June 2025.

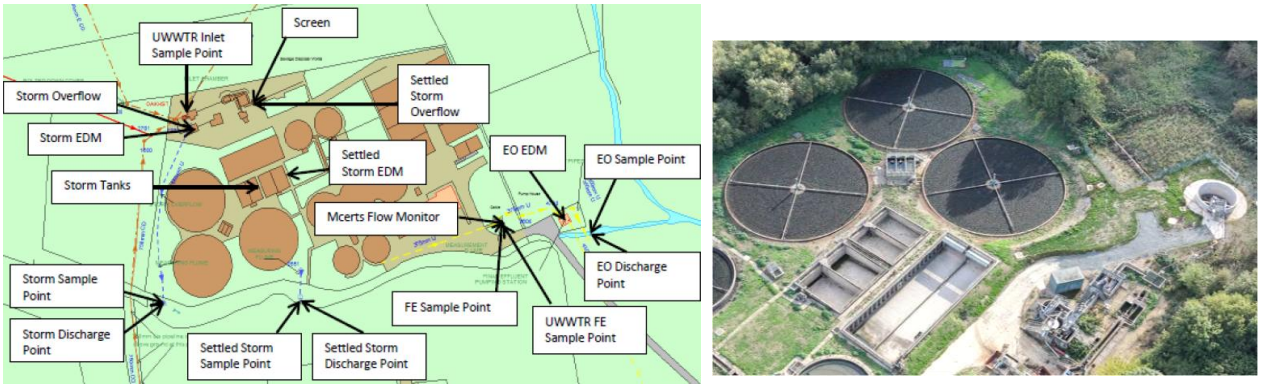


Figure 35: a) diagram from 2021 permit to discharge showing major features of Oakham STW; b) drone view of Oakham STW showing 4 rectangular storm tanks (left of centre) and a new circular storm tank (extreme right)

In comparing Google Earth Pro aerial views of Jan'99 and May'25 of the Oakham site there appear to be few above ground additions and changes in a 26 year period while the population served has doubled.



Figure 36: Google Earth aerial views of Oakham STW in January 1999 (left) and May 2025 (right)

Nitrogen removal is a major development to be completed in 2026 and Anglian Water has announced plans for a £13.9 million upgrade for new treatment, phosphate removal and increased flow capacity in AMP8 (2025-2030).

2021

The 2021 annual overview for Oakham STW is shown in **Fig**. 37. Of 385 hours of spills from the (4 rectangular) storm tanks, 258 hours (67.2%) were non-compliant with the EA's heavy rainfall methodology and so were potentially illegal.

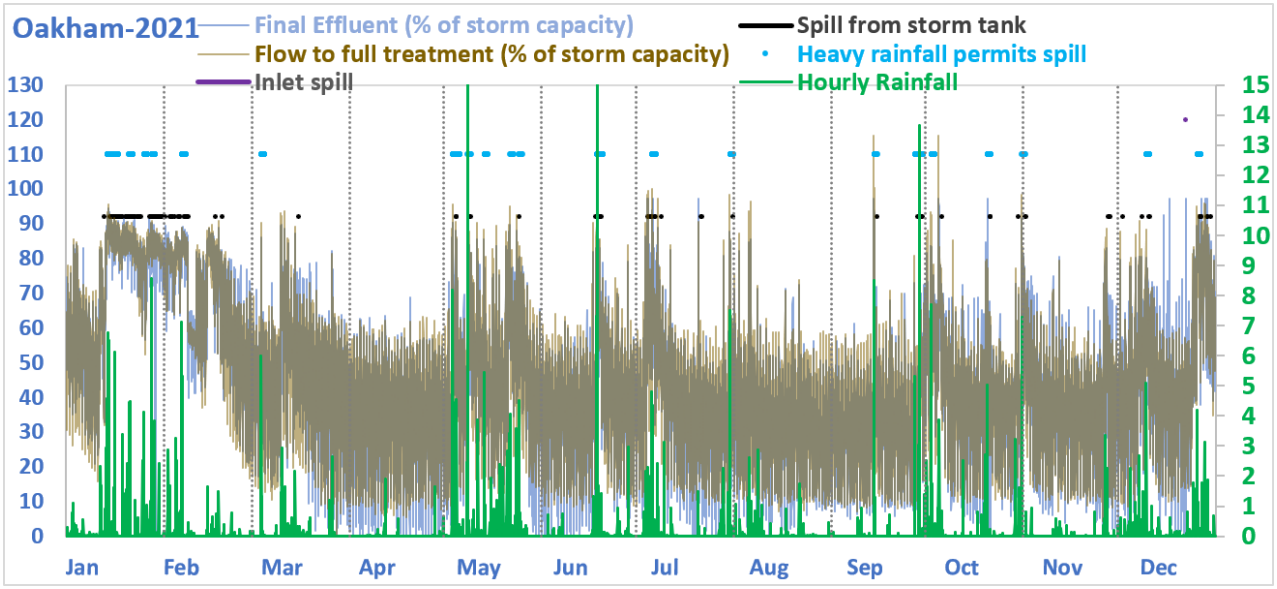


Figure **37:** annual overview chart for Oakham STW

Notice that the final effluent and flow to full treatment agree very well throughout the year.

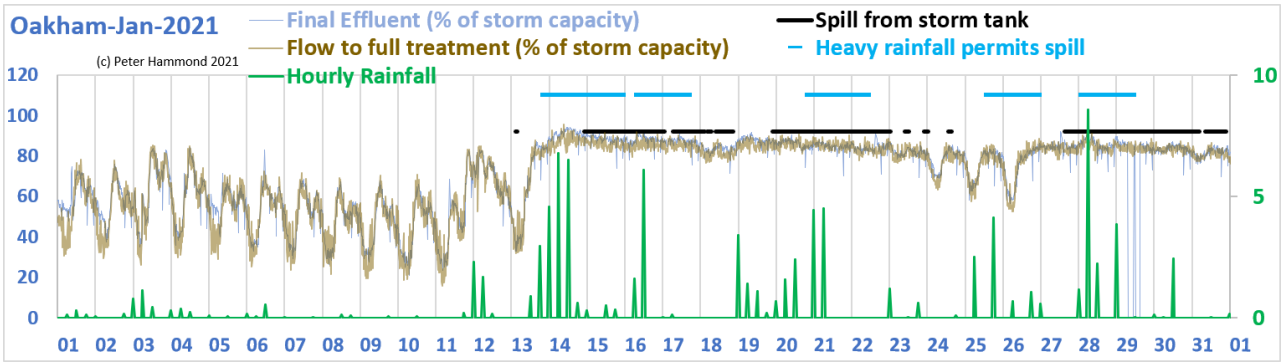


Figure 38: every spill in Jan'2021 occurred with flow to full treatment less than capacity and so illegal

Although the rainfall in January 2021 (**Fig** 38) was sufficiently heavy to permit some spills, all of the spilling is illegal because the flow to full treatment never reaches the capacity (or even the accepted 92%) of 230 l/s. Indeed, all spills at Oakham STW in 2021 were illegal for this reason.

2022

In 2022, the discrepancies between final effluent and flow to full treatment data are so severe that deciding whether spills occurred before flow to full treatment capacity was reached is impossible. For example, consider the monthly chart for September 2022 which suggests that during a very dry month the flow to full treatment and final effluent are hardly in synchrony.

In contrast, in November 2022 (**Fig**. 39), the second half of the month shows reasonable harmony between the two flows and the spills occur with flow to full treatment above the permitted capacity – except for a dramatic loss of flow on Nov 27th.

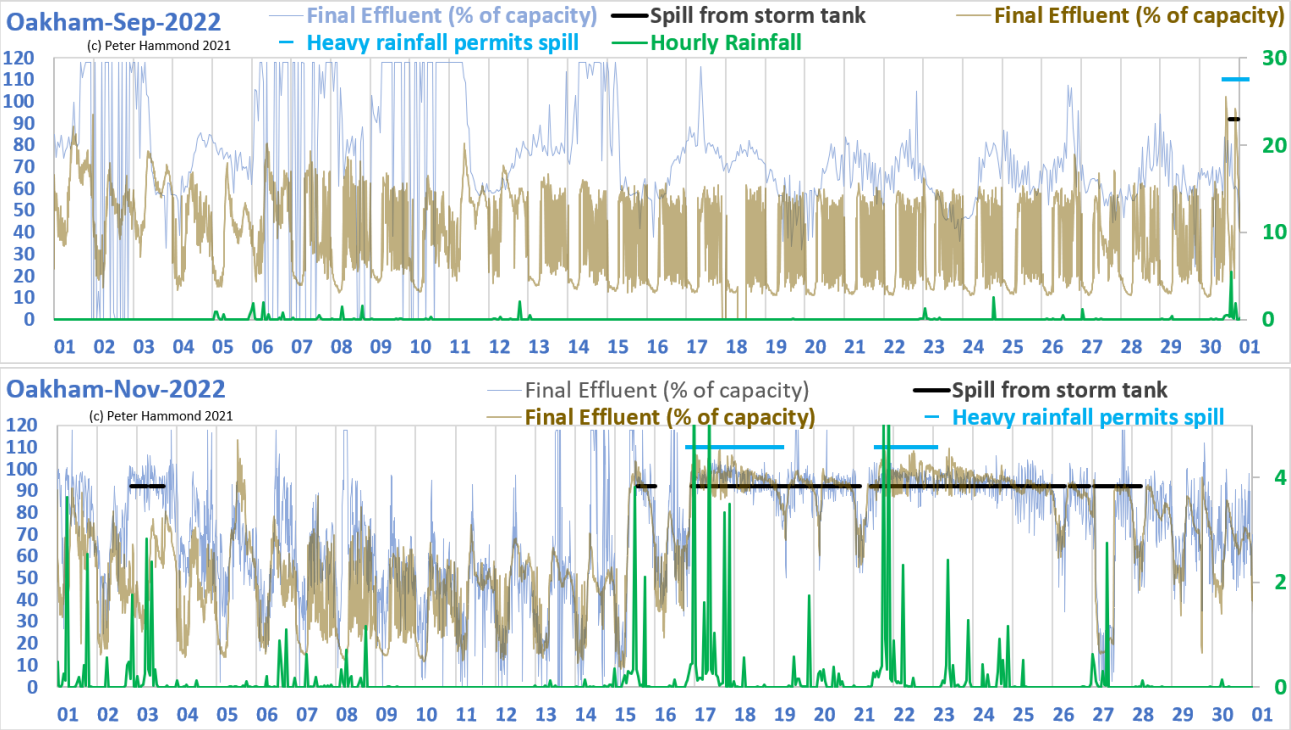


Figure 39: September and November 2022 monthly charts for Oakham STW showing the huge variation in correlation between final effluent and flow to full treatment

However, the spill data align sufficiently well with the flow data to enable consideration of compliance with the EA's heavy rainfall methodology. Of 730.5 spill hours at the storm tank weir, 535 hours (73.3%) are non-compliant and hence potentially illegal.

2023

For Oakham STW only 2023 final effluent data was provided. The 2023 annual overview chart in **Fig** 40 clearly shows a change in behaviour in October when even final effluent flow (never mind flow to full treatment) exceeds the permitted storm tank weir overflow rate during spills of untreated sewage.

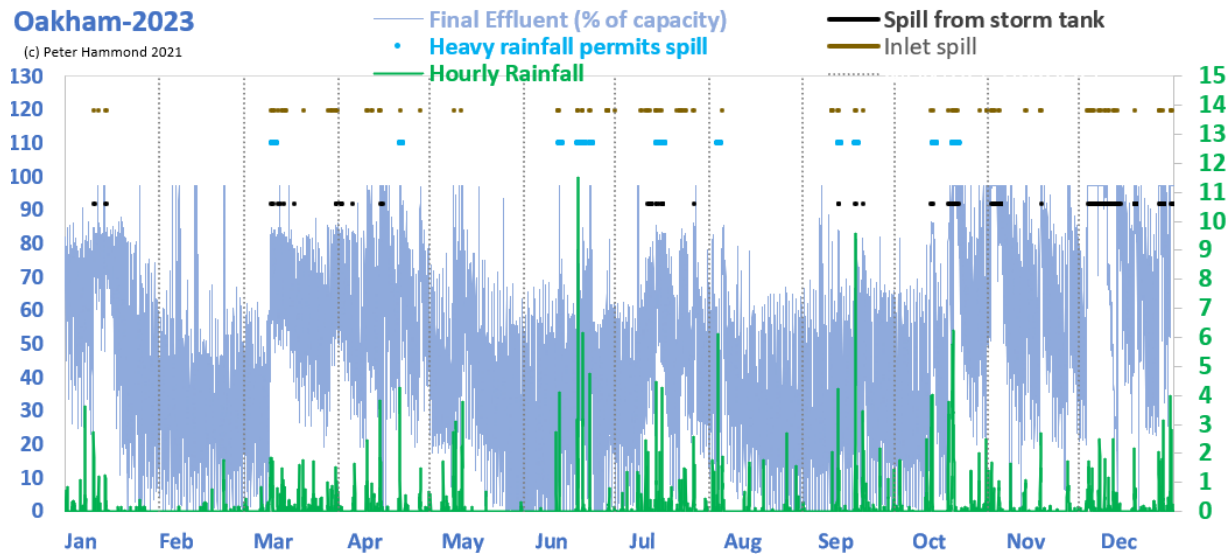


Figure 40: Annual 2023 overview for Oakham STW showing a clear behaviour change in mid October

This difference is even more obvious in the comparison of July and October (**Fig** 40). Although some days with spills coincide with permitted heavy rainfall, none of the spills in July occur when the treatment flow is sufficiently high. Of course, final effluent is likely to be lower than flow to full treatment. But consider the second half of October and most of December when the final effluent is sufficiently above the permitted storm tank overflow rate. The spill in December up to the 19th satisfy the capacity condition but not the heavy rainfall methodology. The spills on Dec 10 to 13 satisfy neither pass forward flow capacity or heavy rainfall and so are doubly illegal.

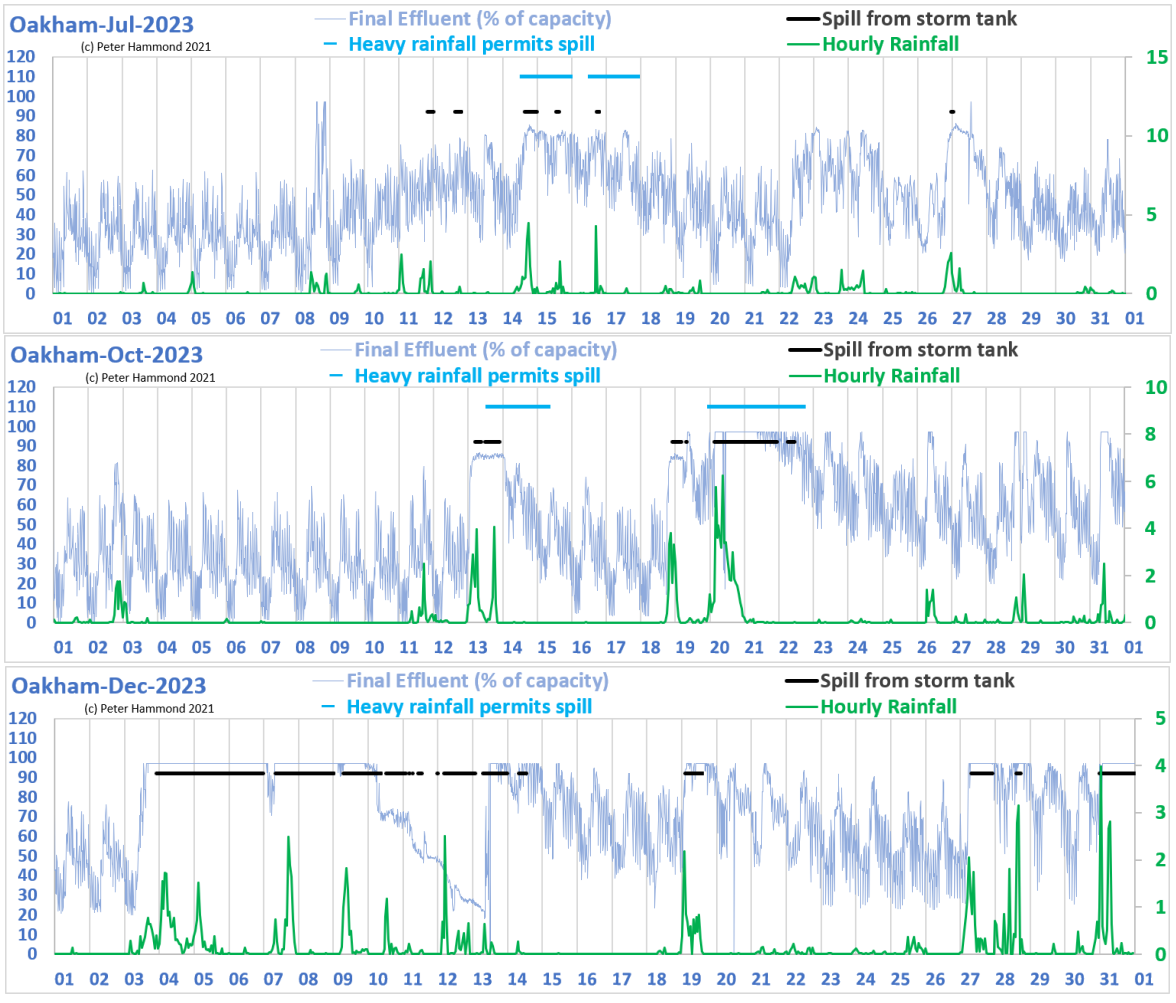


Figure 41: examples of compliant (e.g. Oct 20-22) and non-compliant (e.g. all December) spills

Of the 476 spill hours via the storm tanks in 2023, at least 403 hours (84.6%) are non-compliant with the EA's heavy rainfall methodology and hence are potentially illegal.

2024

The detailed spill data provided for 2024 does not distinguish between spills at the inlet weir and those via the storm tanks. Therefore, no analysis is possible.

2025

It is not possible to reconcile the detailed spill data provided for 2025 and the summary spill data submitted to the EA. Therefore, no analysis is possible.

RYHALL STW

Ryhall STW serves the villages of Bracebrough, Carlby, Essendine and Ryhall with a population equivalent of about 2,500. Over the 15 years to 2021, Google Earth aerial views show how the Ryhall site has been allowed to deteriorate with many disused rectangular tanks allowed to fill with vegetation and circular processing tanks allowed to accumulate green duck weed (**Fig**. 42).

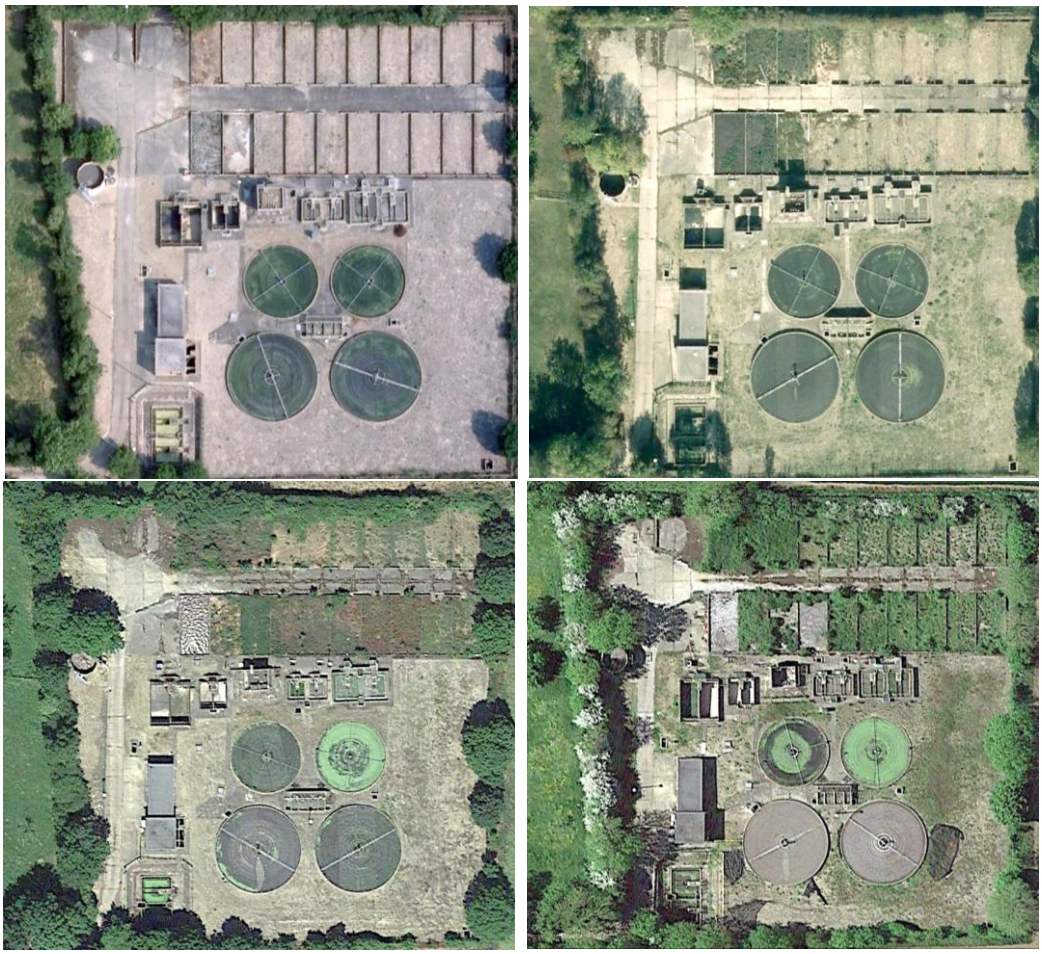


Figure 42: Google Earth views of Ryhall STW showing site deterioration between 2006, 2011, 2018 and 2021

This overall deterioration is supported by a EA site visit on 07/07/2025 lasting 55 mins. The EA officers included the photographs below (Fig 42) in its report which suggests the site is in even worse state than in 2021.



Figure 43: Biofilter bed with extensive moss growth (left); on site spillage by sludge tank (right)

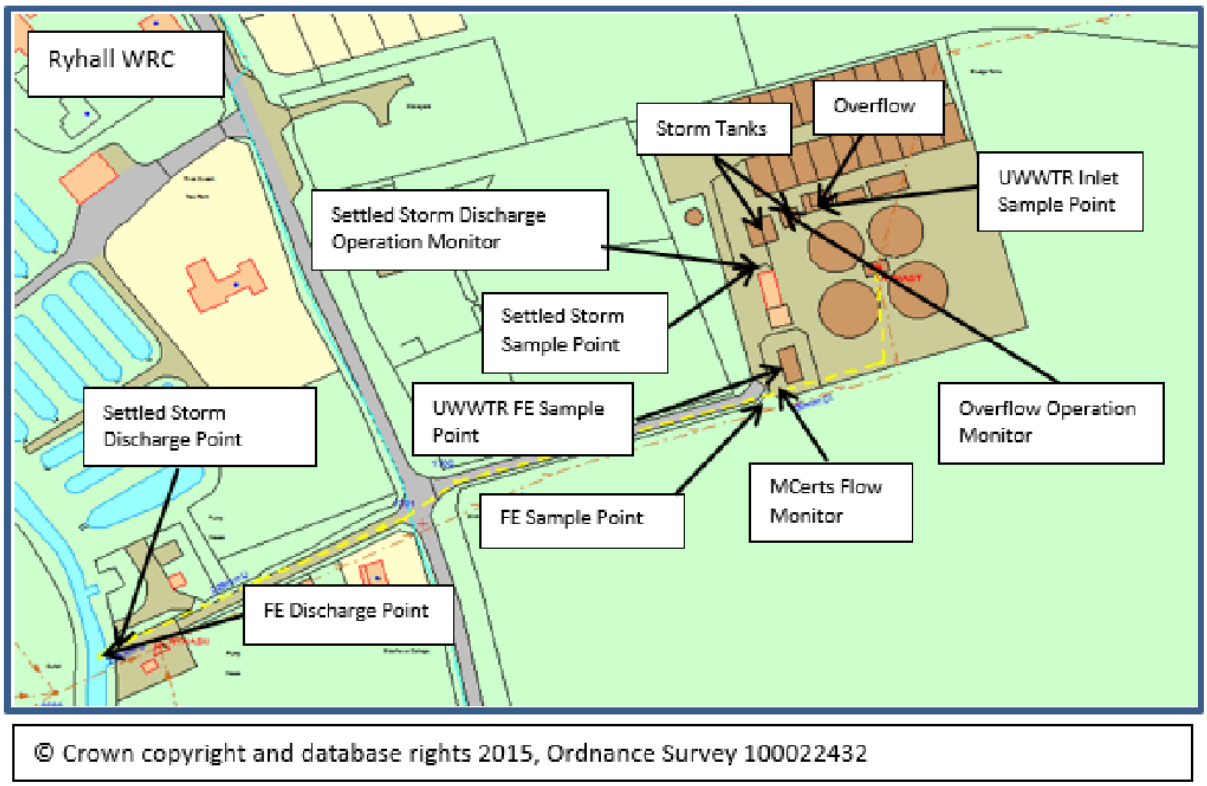


Figure 44: site layout as shown in EA permit for Ryhall STW

2021

There were 238 hours of spills recorded in 2021, almost all in May and June (**Fig.** 45) – which is unusual and typically outside the spilling season. There were some intense showers and the treatment flow was high briefly but the subsequent flow is not always consistent with the continued spilling. Given that the EDM was installed in 2021, it may be that some of these spills are false positives.

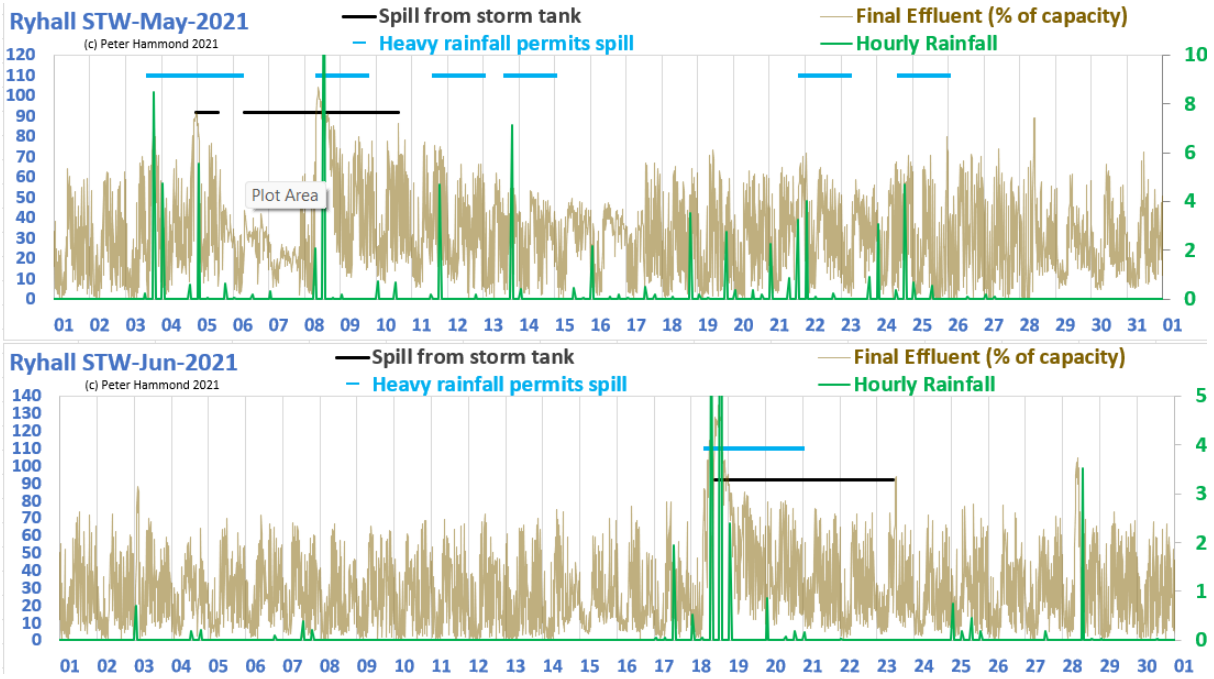


Figure 45: inconsistencies in flow, rainfall and EDM data suggesting some false positive spilling

2022

In 2022, only 12 hours of spills were detected by the EDM. Most were compliant with the EA heavy rainfall methodology and a small numbers of hours were early. Otherwise, there is little else to report.

2023

The annual rainfall in 2023 at was surprisingly greater than the wet year 2024, but the annual spill total was only 78 hours and of that 42 hours (54%) were non- compliant with EA heavy rainfall methodology.

Ryhall STW	2021	2022	2023	2024	2025
Annual rainfall (mm)	475	502	801	719	569

The 2023 annual overview chart for Ryhall STW is shown in **Fig**. 46

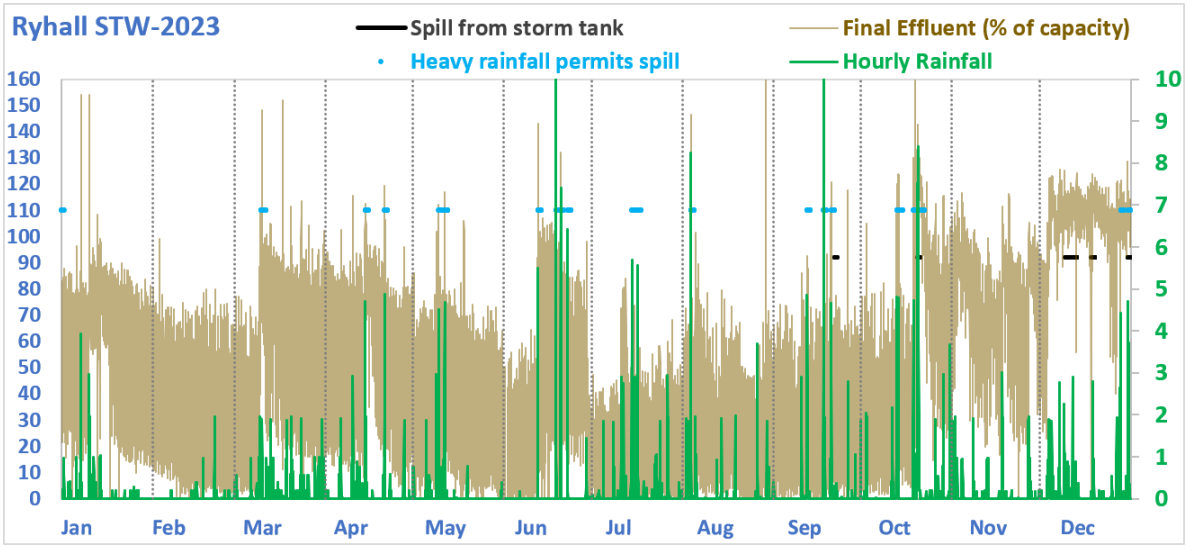


Figure 46: 2023 annual overview chart for Ryhall STW

October and December show contrasting non-compliance as illustrated in the charts below

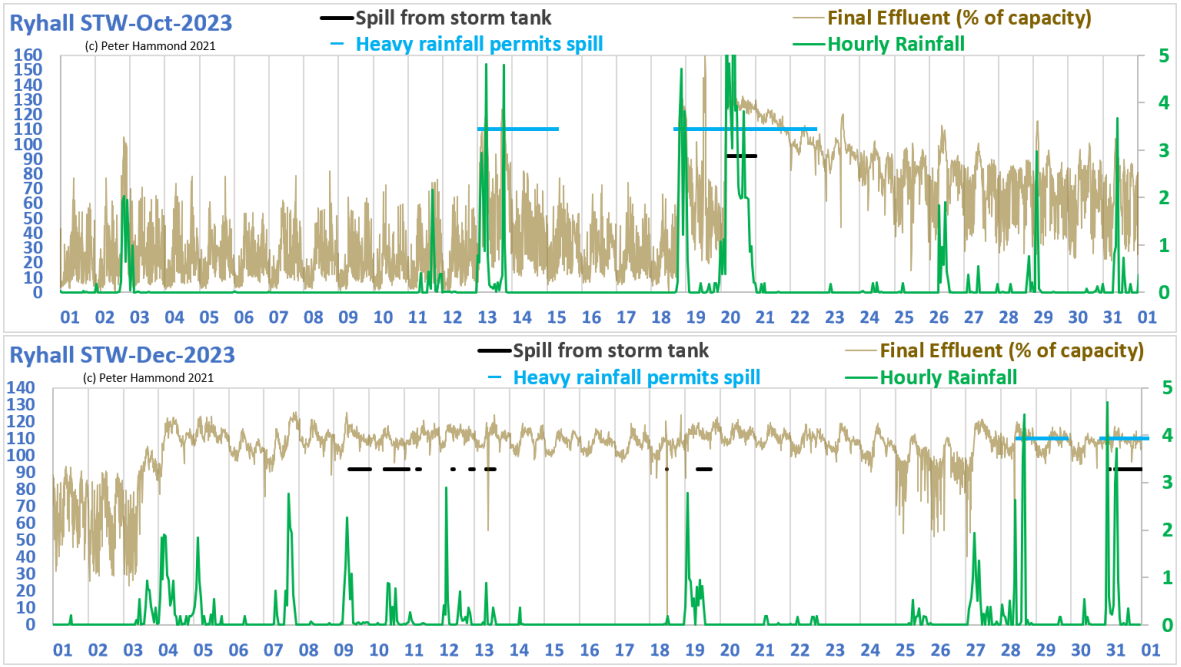


Figure 47: contrasting compliance (Oct 20) and non-compliance (Dec 9-13) in October and December 2023

October has 144 mm and December 104 mm of rainfall with 19 permitted hours and 41 unpermitted hours respectively. During an intense rainfall on October 20th and 19 hours of spilling, the final effluent rate rose to 130% of capacity.

2024

In 2024, there were over 1,000 hours of untreated sewage discharge, of which 854 (85.2%) hours were non-compliant with the EA's heavy rainfall methodology.

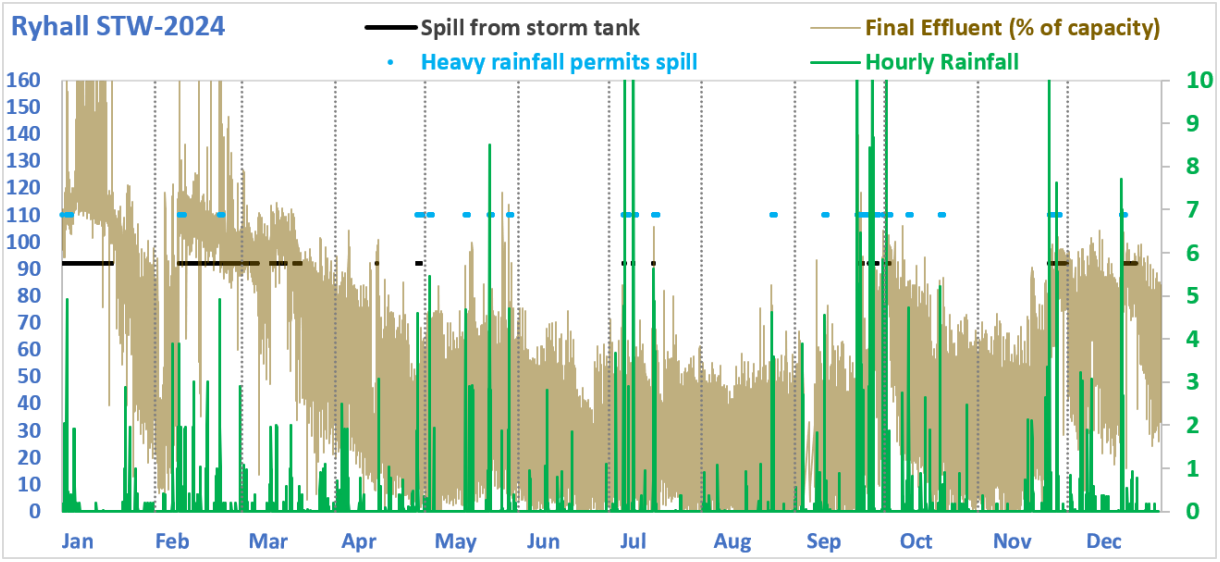


Figure 48: 2024 annual overview chart for Ryhall STW

But, in contrast with 2025, far fewer of the spills were "early". Indeed, the charts for January and February 2024, show the final effluent rate (not necessarily the flow to full treatment) to be well over 100% of the works' capacity.

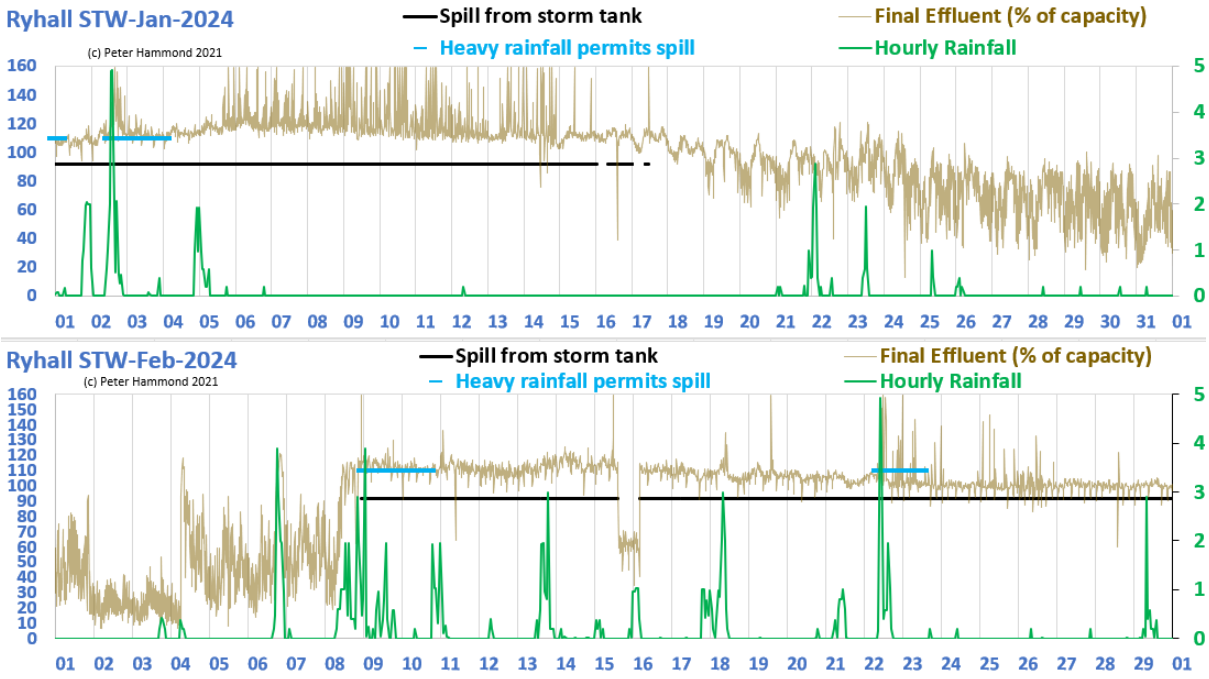


Figure 49: charts for Jan and Feb 2024 with several long spilling periods, mostly non-compliant

Nevertheless, the rainfall was rarely sufficient to permit so much spilling and most of the 762 hours were illegal. Later in the year, the opposite is true and the rainfall was often sufficient for spills to be compliant with the EA heavy rainfall methodology.

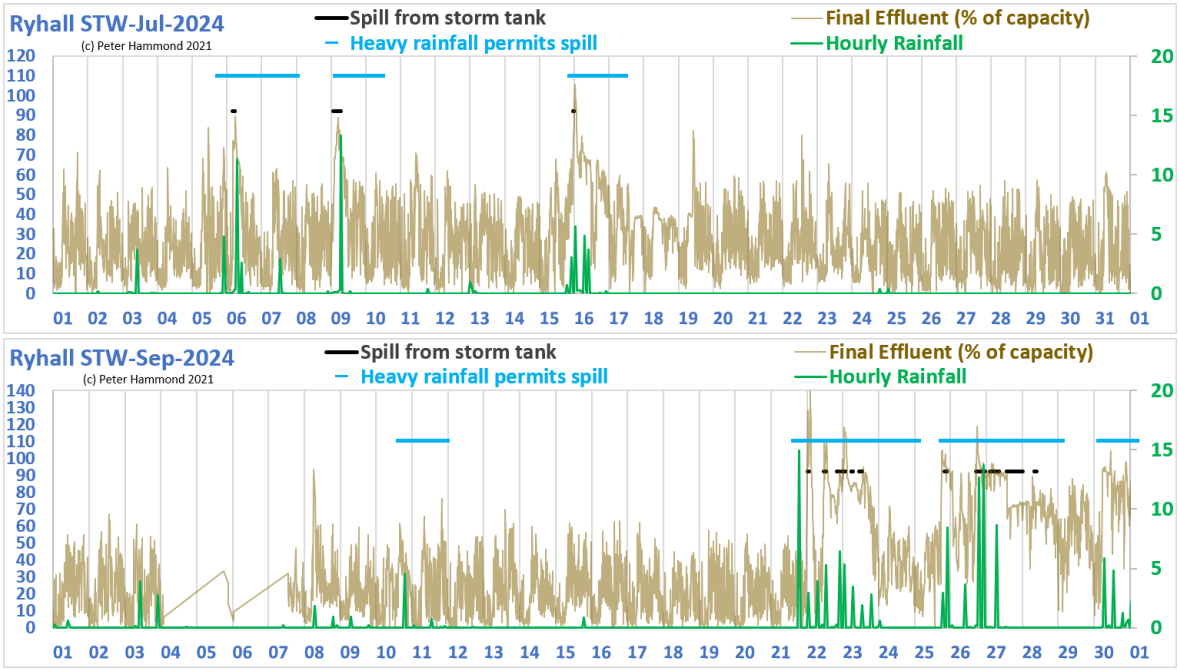


Figure 50: charts for July and September 2025 with all spills compliant with respect to heavy rainfall

2025

There is inconsistency in different sources for the 2025 spill data Ryhall STW. The monthly data on AW's website does not agree with the data on a third party site (water-watch) which is assumed to scrape data regularly form the AW site.

Additional issues are that AW's data mix of strings and numeric date definitions in a random fashion for spill start-stop times as well as an inconsistent approach to European and North-American date format. So it is a very tedious process to correct AW's spill data into a usable format.

The analysis here is restricted to periods when there appears to be consistency between hourly rainfall, 15-min treatment flow and spill interval data.

For example, the chart for January 2025 in **Fig**. 51 shows 67.9 hours of untreated sewage discharge which according to the EDM comprises 700 tiny intervals with an average length of 5 or 6 minutes.

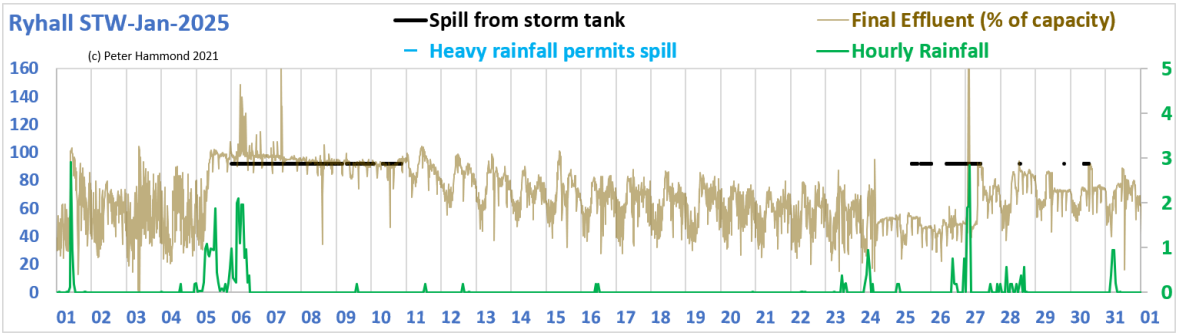


Figure 51: chart for Jan 2025 with non-compliant spills due to insufficient rainfall (jan 5-10) or "early" spills without above capacity treatment being sustained (Jan 25-27)

Clearly, all 67.9 hours occur in rainfall that is non-compliant with the EA's heavy rainfall methodology. Moreover, the discharges on Jan 25-27 coincide with an effluent flow that is about 50% of the works capacity and so are likely to be "early" as well as "dry" i.e. doubly non-compliant.

In November and December 2025, there are more than 1,100 tiny spills amounting to over 200 hours of which just 9 hours or so are compliant.

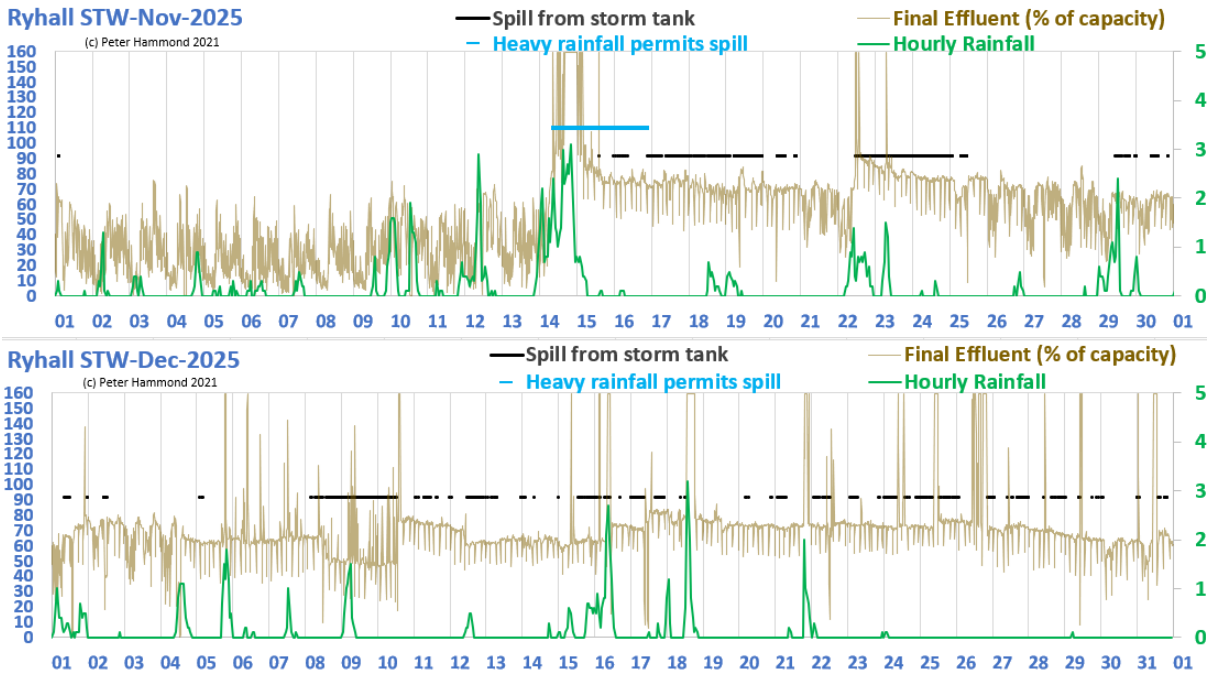


Figure 52: chart for Nov and Dec 2025 thousands of tiny spills being recorded