In 2021/2022/2023 United Utilities (UU) was rated 4*/3*/4* and it awarded CEO bonuses. WASP analysis suggests that 35 UU STWs made illegal sewage spills on 571 days in 2021-22. Should the ratings be downgraded and the executive bonuses be clawed back?

Peter Hammond, Windrush Against Sewage Pollution (WASP), 09/10/2024 (version 3)

SUMMARY

In its annual Environment Performance Assessment exercise (EPA)[1], the Environment Agency (EA) gave United Utilities (UU) its top rating of 4* in both 2021 and 2023, and 3* in 2022. The EPA uses multiple metrics to assess water company performance, but surprisingly discharges of untreated sewage, despite being monitored since 2019, will not be in the EPA before 2026[2].

WASP's analysis of data provided by the EA for 2021-2022 suggests the following:

United Utilities

- made illegal sewage spills on 571 days at 35 STWs serving a population of 1M (**Table 1**)
- obstructed investigation of 37 STWs serving 2.5 M by omitting essential data (**Table 2**)
- provided such unreliable event duration monitoring (EDM) data for 47 STWs serving 2.2 M that WASP could not disentangle all legal and illegal sewage spills (**Table 3**)

The EPA rating contributes to Ofwat's negotiation with water companies of customer price increases and refunds. It also influences the pay of senior company executives. For example, UU's remuneration scheme[3] says that 50% of the bonuses is in shares deferred for 3 years so that "*comprehensive and legally enforceable malus and clawback clauses*" can "*withhold or recover payments in a number of circumstances".* These circumstances include "*serious reputational damage"* that, for example, might arise if accusations of law breaking and obstructing investigation are proven.

WASP's analysis suggests that UU may have repeatedly broken the law, obstructed investigation and submitted unreliable data to the Environmental Regulator. Yet, the EA assessed UU as 4*, or "industry leading", in 2 of the last 3 EPAs.

On Sept 26th 2024, on BBC Newsnight[4], Secretary of State, Steve Reed, was repeatedly asked

"How many times will [water companies] be allowed to illegally dump sewage into rivers before their bonus is taken away?"

Eventually, his answer was "*Well it may be zero"*.

In light of evidence presented here, WASP suggests the Secretary of State at DEFRA should

- request the EA to review its EPA ratings
- instruct United Utilities to claw back executive bonuses
- replace EDM devices with more reliable flow meters that measure spill volume

[1] https://www.gov.uk/government/publications/water-and-sewerage-companies-in-england-environmental-performance-report-2023/united-utilities-epa-data-report-2023

[2] https://www.gov.uk/government/publications/water-and-sewerage-companies-in-england-environmental-performance-report-2022/water-and-sewerage-companies-in-england-environmental-performance-report-2022 Chair's foreword.

[3] https://www.unitedutilities.com/globalassets/z_corporate-site/pr24/supplementary-documents/uuw72.pdf

[4] https://x.com/BBCNewsnight/status/1838683232143077593

CONTENTS

TABLE 1: 35 UU STWs may have illegally spilled sewage on 571 days

				Illegal spill days		
STW	**NGR location**	**Watercourse**	**Pop served**	**2021**	**2022**	**TOTAL**
Long Preston	SD8306057620	Long Preston Beck	674	12	79	**91**
Newbiggin	SD2675168941	Deep Meadows Beck	1,841	32	52	**84**
Runcorn	SJ5412083830	Manchester Ship Canal	65,004	46	22	**68**
Leigh	SJ6581099000	River Glaze	73,785	33	21	**54**
Ingleton	SD6868072620	River Greta	1,866	37		**37**
Clapham	SD7444068690	River Wenning	687		23	**23**
Hyde	SJ9379094840	River Tame	79,294	22		**22**
Macclesfield	SJ8961078200	The River Bollin	68,916	16	6	**22**
Dalston	NY3796051170	River Caldew	1,324	10	8	**18**
Grasmere	NY3392006840	Grasmere Lake	2,428	17		**17**
Shap	NY5581015780	Shap Beck	1,186	14		**14**
Rossendale	SD7957020610	River Irwell	58,215	12		**12**
Grindleton	SD7569044770	West Clough Brook	487		12	**12**
Stretford	SJ7806093180	River Mersey	24,403		11	**11**
Seascale	NY0403000930	Irish Sea/Whitriggs Beck	1,713		11	**11**
Dovenby	NY0895032850	Dovenby Beck	140	6	3	**9**
Madeley	SJ7700045090	River Lea	5,192	9		**9**
Coniston	SD3072097050	Church Beck	715	8		**8**
Ainsdale	SD3203011100	Fine Janes Brook	9,738	8		**8**
Kendal	SD5170090790	River Kent	31,091	7		**7**
Allerby	NY0892039130	Brunsow Beck	223	5	2	**7**
Penrith	NY5525029570	River Eamont	18,002	2	2	**4**
Alsager	SJ7891056790	Brook	12,490	1	3	**4**
Lindale	SD4234280672	River Winster	676		3	**3**
Braystones	NY0076005070	Irish Sea	10,088	2		**2**
Rochdale	SD8816012370	River Roch	154,621		2	**2**
Saddleworth	SD9929004310	River Tame	16,665	2		**2**
Preesall	SD3481046870	WYRE ESTUARY	5,663	2		**2**
Wigan	SD4817012020	River Douglas	201,260	2		**2**
Barnoldswick	SD8785048010	Stock Beck	10,826	1		**1**
Blackburn	SD6047029410	River Darwen	125,038	1		**1**
Whaley Bridge	SK0125083220	River Goyt	6,400		1	**1**
Silloth	NY1087054120	Solway Firth at Silloth Bay	2,966		1	**1**
Middleton/Overton	SD4304057960	Lades Pool	1,706	1		**1**
Nether Kellet	SD5018068160	Nether Beck	545		1	**1**
(NGR=National Grid Reference)		**TOTAL**	**995,867**	**308**	**263**	**571**

These STWs operated by United Utilities appear to have made illegal spills of untreated sewage to 34 different watercourses including several which are within, or are themselves, Special Sites of Scientific Interest, Special Areas of Conservation, RAMSAR sites and popular tourist locations:

Drigg Coast, Mersey Estuary, Morecombe Bay, Ribble Estuary, Sefton Coast and Wyre Estuary

Lake Coniston and Grasmere in the Lake District

Of the 571 days with potential illegal discharges of untreated sewage by United Utilities:

77 (13 %) involved “dry” spills (with no or negligible rainfall)
471 (82%) involved “early” spills (with treatment below permitted storm overflow rate)
23 (4%) involved spills that were both “early” and “dry”

TABLE 2: 37 UU STWs with incomplete data so obstructing WASP and EA investigations

Stw	NGR	Watercourse	Population served
Davyhulme	SJ7480096460	Manchester Ship Canal	760,834
Bolton	SD7655004690	River Irwell	319,754
Birkenhead	SJ3292089490	Mersey Estuary	169,881
Stockport	SJ8652089820	River Mersey	155,918
Bury	SD8004007810	River Irwell	152,011
Oldham	SD8937004430	Wince Brook	143,559
Fazakerley	SJ3958096340	River Alt	140,621
Eccles	SJ7496097150	Salteye Brook	97,297
Bromborough	SJ3471085640	Mersey Estuary	78,826
Sale	SJ7677092920	Stromford Brook	69,765
Barrow	SD2200068190	Walney Channel	64,280
Northwich	SJ6374074160	River Weaver	53,188
Warrington North	SJ5804086890	River Mersey	43,839
Skelmersdale	SD4817412024	River Douglas	38,507
Winsford	SJ6544067440	River Weaver	31,091
Westhoughton	SD6500003660	Trib Of Hall Lee Brook	26,406
Horwich	SD6264010763	Pearl Brook	25,959
Wilmslow	SJ8413082320	River Dean	22,881
Tyldesley	SJ6959099000	Hindsford Brook	22,316
Helsby	SJ4815275072	Hornsmill Brook	18,948
Worsley	SD7215002750	Little Hulton Stream	18,489
Biddulph	SJ8867058860	Biddulph Brook	16,787
Mossley	SD9732000880	River Tame	11,496
Weaverham	SJ6115075180	River Weaver	6,882
Mere Brow	SD4240018870	Tarleton Runner	4,178
Tarporley	SJ5633061240	Wettenhall Brook	2,650
Longtown	NY3751068430	River Esk	2,134
High Bentham	SD6589069140	River Wenning	1,951
Great Broughton	NY0706030500	River Derwent	1,730
Kirkby Lonsdale	SD6152077880	River Lune	1,630
Hellifield	SD8475856288	Hellifield Beck	1,375
Kirkbampton	NY3025057020	Burghmoor Beck	727
Brough	NY7892014180	Swindale Beck	696
Gisburn	SD8190049520	River Ribble	434
Strines	SJ9701187101	River Goyt	419
Orton	NY6291007680	Chapel Beck	303
Weeton	SD3828034840	Trib Of Main Dyke	225
(NGR=National Grid Reference)		**TOTAL**	**2,507,998**

The STWs in Table 2, serving a population of over 2.5 million, have a pair of storm overflows for discharging untreated sewage, typically one at the inlet and one on the storm tank(s).

Unfortunately, the individual spills recorded by Event Duration Monitoring (EDM) were not linked to the overflow involved in UU's data. Hence, permit conditions specific to each overflow could not be applied. This obstructed WASP's checking of compliance with permit conditions and presumably that of the Environment Agency.

WASP has reconstructed a few cases, for example, showing that Bury STW may have released over **350 million litres of untreated sewage**, 140 Olympic Pools, in July 2022.

The omission of overflow labelling was referred to the EA who passed on data received from UU as part of its national 3-year investigation of water companies. The EA reassured WASP that

> *"the EDM data provided include all sites and data that have been provided to us by WaSCs with only those sites under active investigation removed" (WaSC = Water and Sewerage Company)*

TABLE 3: 47 UU STWs with EDM data not reliable enough to disentangle all legal & illegal spills
(column 6 contains the number of illegal spill days if the data were assumed reliable)

STW	NGR	Watercourse	Population Served	Issue	Illegal spill days if data reliable
Urmston	SJ7287093990	Manchester Ship Canal	31,577	ext	256
Altrincham	SJ7504090440	Sinderland Brook	42,846	ext	223
Ribchester	SD6516034401	River Ribble	1,146	malfunction	210
Warrington South	SJ5870085580	Manchester Ship Canal	221,719	ext	124
Colne	SD8703039470	Colne Water	21,408	ext	83
Burnley	SD8285035120	Pendle Water	106,021	ext	75
Carlisle	NY3847056520	River Eden	82,561	ext	75
Kirkby Stephen	NY7717010460	River Eden	2,270	ext	73
Waddington	SD7230043050	Bashall Brook	825	ext	72
Barton	SD5147035720	Barton Brook	4,572	ext	68
Blindcrake	NY1494034380	Gill Beck	156	ext	68
Settle	SD8080261962	River Ribble	4,200	poor quality	64
Dukinfield	SJ9326096730	River Tame	64,388		59
Horton-In-Ribblesdale	SD8071572125	River Ribble	260	ext	50
Great Orton	NY3332054490	Roughton Beck	191	false +; ext	50
Clitheroe	SD7262040390	Pendleton Brook	17,574	false +/-	49
Chapel-En-Le-Frith	SK0481082020	Black Brook	6,609	false +; ext	46
Glazebury	SJ6768095920	River Glaze	26,801	ext; false +	45
Whalley	SD7200036400	River Calder	4,661	ext; false +	43
Nether Peover	SJ7340573665	pond into Crow Brook	303	false +	43
Armathwaite	NY5107046370	River Eden	570	false +	43
Glossop	SK0058094910	River Etherow	34,785	ext	41
Gosforth	NY0782002750	Hare Beck	1,057	ext	39
Audley	SJ7953051750	Audley Brook	8,109	false -	38
Langwathby	NY5590034100	River Eden	1,167	ext	35
Crewe	SJ6664057110	River Weaver	90,000	false +/-	34
Ellesmere Port	SJ4320074650	Thornton Brook/R Gowy	65,737	EDM issue	34
Lancaster	SD4570058710	River Lune Estuary	76,402		31
Ambleside	NY3722003890	River Rothay	2,660	EDM issue	31
Longton	SD4687025280	Tarra Carr Gutter	13,792	false -; ext	0
Betley	SJ7500048200	Mere Gutter	966	ext	21
Croston	SD4797018660	River Yarrow	21,908	false -; ext	15
Chorley	SD5638217462	River Yarrow via Chor	55,606	false +; ext	14
Mobberley	SJ7834080290	Mobberley Brook	2,718	poor quality	10
Formby	SD2971005900	River Alt	23,335		9
Hyndburn	SD7562033370	River Calder	111,506	false +; ext	4
Woolton	SJ4495087460	Trib of Netherley Brook	61,912	??	2
Liverpool	SJ3321092640	Mersey Estuary	473,490	EDM issue	0
Salford	SJ7924097981	Manchester Ship Canal	93,620	missing EDM	0
Widnes	SJ4851082920	River Mersey Estuary	76,378	EDM data	0
Ashton-Under-Lyne	SJ9300097140	River Tame	43,555		0
Kidsgrove	SJ8284055210	Kidsgrove Stream	25,097	false +	0
Knutsford	SJ7680079910	Birkin Brook	13,546	false +; ext	0
Garstang	SD4788042750	River Wyre	13,250	EDM quality	0
Millom	SD1922079410	Duddon Estuary	7,250	false -	0
Hawkshead	SD3552197931	Black Beck	340	false +/-	0
Plumbland	NY1394040300	River Ellen	285		0
		TOTAL	**1,959,131**		**2,177**

NGR=National Grid Reference;
ext=extended spill intervals

The EDM data for these STWs confirmed some legal spills. But, there were many false positives, false negatives and extended intervals. The latter may combine individual spills into one with subintervals where spills were unlikely. Therefore, the EDM data is not reliable enough to disentangle all legal and illegal spills. These 47 STWs serve a population equivalent of 2.2 million. If reliability is ignored, the data suggest more than 2,000 illegal spilling days occurred.

DATA SOURCES AND METHODOLOGY FOR DETERMINING LEGAL AND ILLEGAL SPILLING

Rainfall

The daily rainfall data was purchased from the website https://www.visualcrossing.com/weather-data.

Sewage treatment and individual spill start and stop times recorded by EDM devices

When previously presented with EIR (Environmental Information Regulation) requests by WASP to supply sewage treatment and EDM data, UU typically refused and cited the EA's ongoing investigation that began in late 2021. More recently, the EA provided WASP with data received from UU as part of the same EA investigation.

UU's refusal to provide data has been challenged by several NGOs through appeals to the Information Commissioner's Office and the First Tier Tribunal. As a result, UU has been forced to co-operate and provide the data requested.

Permitted vs unpermitted spills of untreated sewage

The EA's permits governing discharges of untreated sewage from STWs typically include clauses stating that such spills are permitted, and hence legal, provided they are due to rainfall (or snowmelt) and that, throughout the spill, treatment is maintained at or above a specified storm overflow rate. Otherwise, the spills are unpermitted and hence illegal.

Rainfall threshold

The European Court of Justice has previously used the phrase "exceptional circumstances" in relation to permitted sewage spills. Judging by the EA's own records of unpermitted spilling, it is unclear to WASP if the EA has previously employed a specific rainfall threshold consistently.

There appears to be an assumption now that the EA uses a threshold of 0.25 mm of rainfall both on the day before and on the day of a spill to determine if a spill is within permit. National Resources Wales, the Welsh environmental regulator, has recently introduced a requirement of 4mm in any hour of the previous 24 hours for a spill to be permitted. WASP has typically employed a conservative approach, requiring no rainfall on the day before nor on the day of a spill for it to be within permit.

Continued sewage treatment during a spill

The EA allows an 8% error for certified flow meters. Therefore, WASP uses 92% of the stated storm overflow rate for the minimum treatment threshold or capacity before spills can start and while they continue if they are to be considered within permit and hence legal. Some very recent revisions to EA permits appear to be weakening this to require only a high percentage (e.g. 95%) of treatment flow records to be above the threshold throughout the spill.

If the sewage treatment data is measured at the final effluent outfall rather than at the entry to full treatment, then WASP uses a much lower threshold, often as low as 50%. Size and "plumbing" complexity of an STW can influence estimation of an appropriate threshold.

Dry and early spilling

The terms "dry spill" or "early spill" are generally used now for illegal spills that contravene the rainfall or sewage treatment related conditions related to permitted discharges of untreated sewage. Of course, some spills can be both early and dry.

EXAMPLES OF WASP'S DETAILED ANALYSIS

SECTION 1: STWs which may have illegally discharged untreated sewage

This section begins with an example of sewage treatment and EDM data of high accuracy and reliability from Wigan STW. This STW was chosen to enable comparison with others where the data quality is inferior or much more variable.

1.1 Wigan STW

Population served: 201,260 Storm tank overflow: 1,933 l/s Storm Tank Min: 45,000 m^3
Spill frequency reason: Not asset maintenance - Hydraulic capacity

2021

Annual spill hours Storm Tank: 727 EDM: 100% Illegal spilling days: 2 (early)

Annual spill hours derived from individual spill data add obtained from the EA were 727. This differs from that on the EA website of company submissions (671 hrs). The minimum storm tank size is more than 3 times that required by the EA to cope with 2 hrs at the storm tank overflow rate (13,917).

The annual overview chart for Wigan STW for 2021 is given in **Fig**. 1.

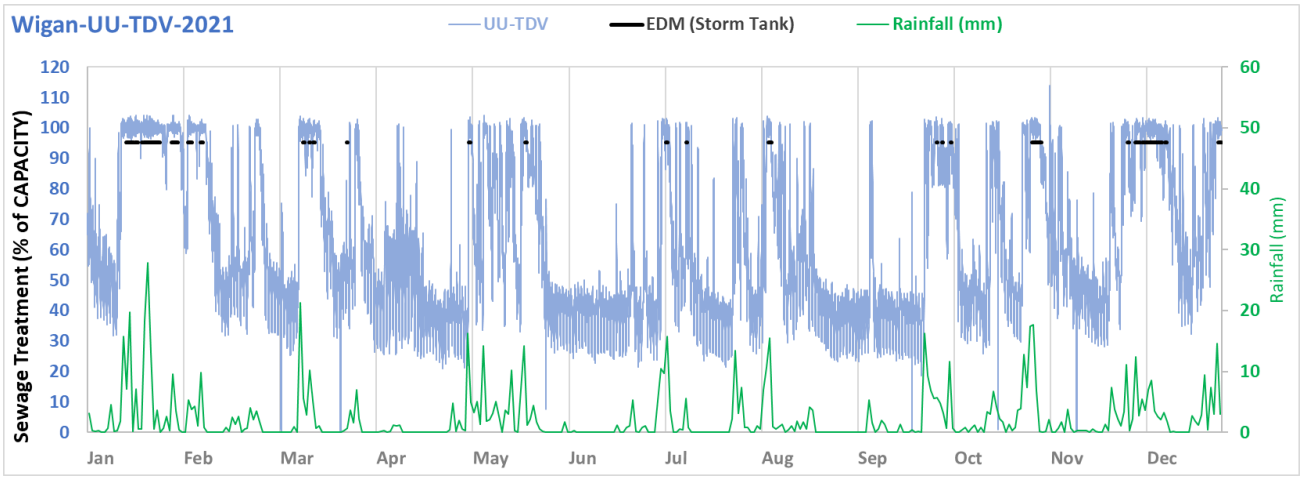


Figure 1: 2021 overview for Wigan STW: sewage treatment (UU-TDV) and EDM detection at storm tanks

By zooming in on a single month (**Fig**. 2), the clean, crisp separation of EDM detected spill intervals is even more obvious.

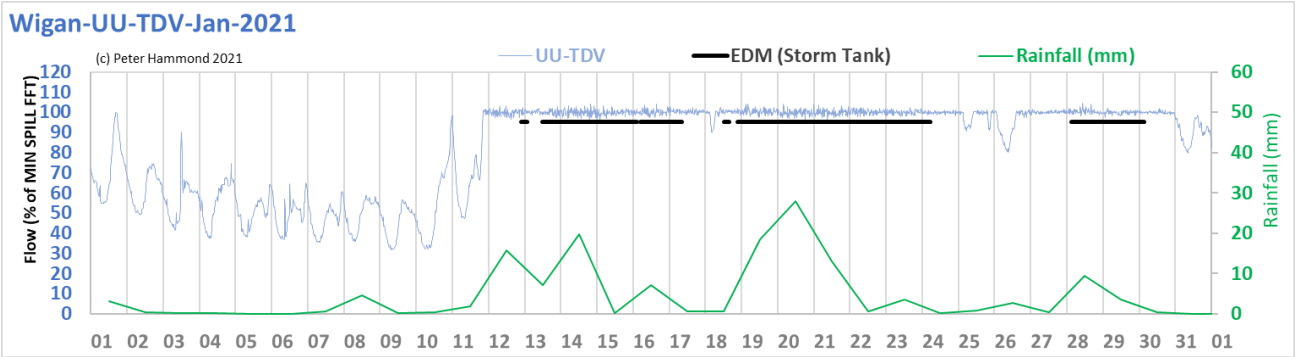


Figure 2: sewage treatment flow (UU-TDV), EDM at storm tank & rainfall for Jan 2021 at Wigan STW.

When rainfall induced expansion of inflow reaches 92% of capacity, the treatment rate flattens while excess sewage above capacity, the storm overflow rate, is diverted to the storm tanks. This continues until the storm tanks fill and spill to the receiving watercourse as indicated by the horizontal black segments which are positioned vertically at 92% in the charts to support visual confirmation of achieving the permitted treatment level.

The gaps between individual spill intervals, while the treatment flow remains flat, likely coincide with storm tank content being recycled back through the works for treatment and allowing further excess flow to be diverted to the storm tanks but without spilling.

Throughout each spill interval in January 2021 (**Fig**. 2), the sewage treatment rate and the rainfall are consistent with permitted spilling from the storm tanks. Hence, they are legal.

Wigan STW continues in this "legal" spilling manner in 2021 until November when the following happens (**Fig**. 3).

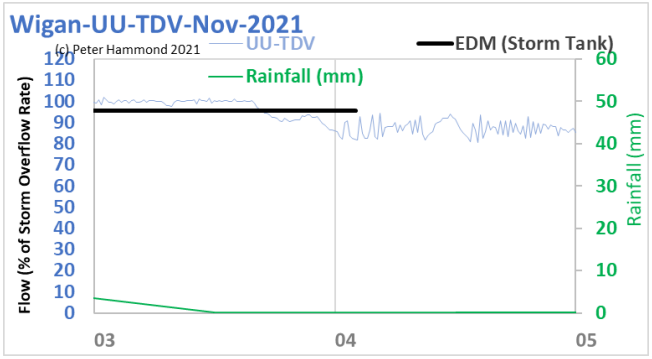


Figure 3: WASP's analysis suggests illegal "early" spilling on November 3rd and 4th at Wigan STW

Towards the end of the spill over November 3rd-4th, the treatment rate falls below the 92% capacity level and so on both days the spilling is "early" and hence illegal.

2022

No data was provided for 2022.

1.2 Newbiggin STW

Population served: 1,841 Storm tank overflow: 35 l/s Storm Tank Min: 64 m^3

Newbiggin STW discharges to the Deep Meadows Beck (Hart Carrs Beck on some maps) which quickly flows into Morecombe Bay which is a RAMSAR site, a Special Area for Conservation, Special Protection Area and SSSI. It is of "*outstanding importance for numerous species of passage, breeding and wintering waterbirds*" (https://rsis.ramsar.org/ris/863).

2021

Annual spill hours: 3,878 EDM: 199=100% 32 illegal spilling days: 18 dry 13 early 1 both
Spill frequency reason: Not asset maintenance - Hydraulic capacity

The annual overview for Newbiggin STW for 2021 is shown in **Fig**. 4.

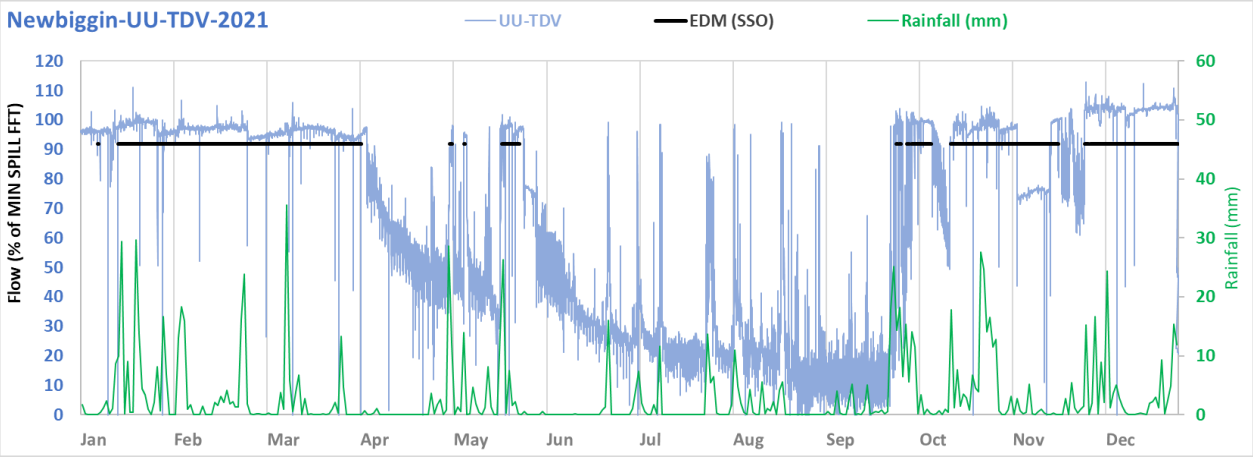


Figure 4: 2021 overview for NewBiggin STW: sewage treatment (UU-TDV) and EDM detection at storm tanks

The storm tank spills generally occur when sewage treatment (UU-TDV) is above 92% of the storm tank overflow rate, apart from a brief period in May and a longer spell in November (**Fig**. 5) when WASP's analysis suggests there were 14 days with early spilling.

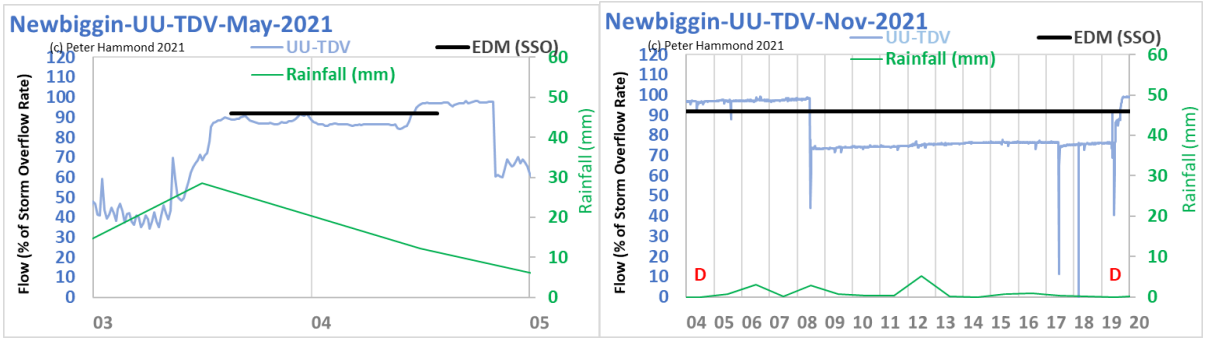


Figure 5: WASP's analysis suggests illegal "early" spilling at Newbiggin on 14 days (Mar 3-4; Nov 8-19)

The analysis also suggests there was illegal "dry" spilling on 19 days (Jan 31; Feb 8,9,12,13; Mar 6,7,19,20,21,31; Apr 1,2,3; Jun 29; Nov 4,19,22; Dec 21).

2022

Annual spill hours: 3,878 EDM: 100% 52 illegal spilling days: 45 early 7 both

The annual overview for Newbiggin STW for 2022 is shown in **Fig**. 6.

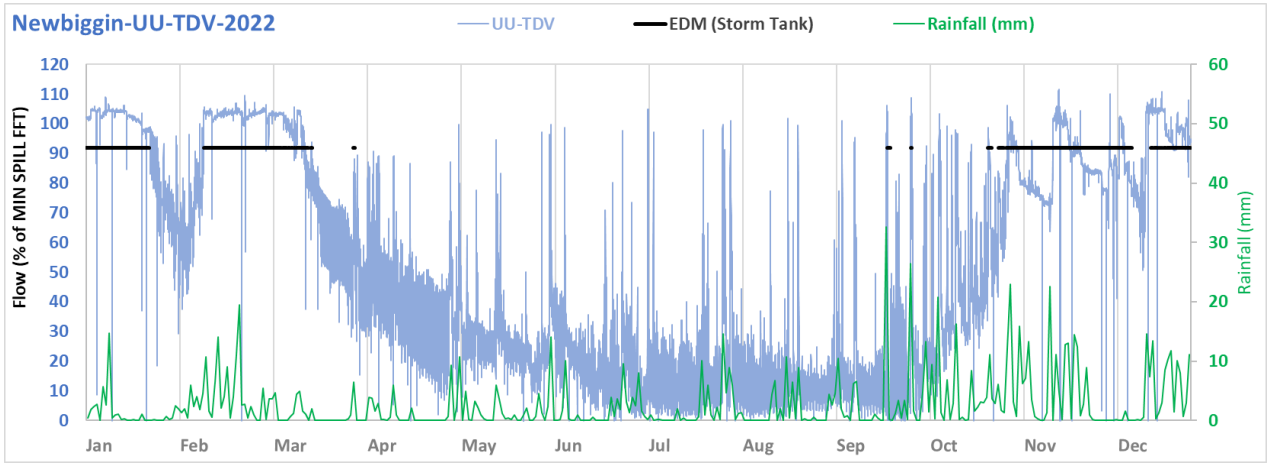


Figure 6: 2022 overview for NewBiggin STW: sewage treatment (UU-TDV) & EDM data for storm tanks

In the first half of the year, the spills are generally within permit, except for a couple of dry spilling days and 6 days with early spills (**Fig.** 7).

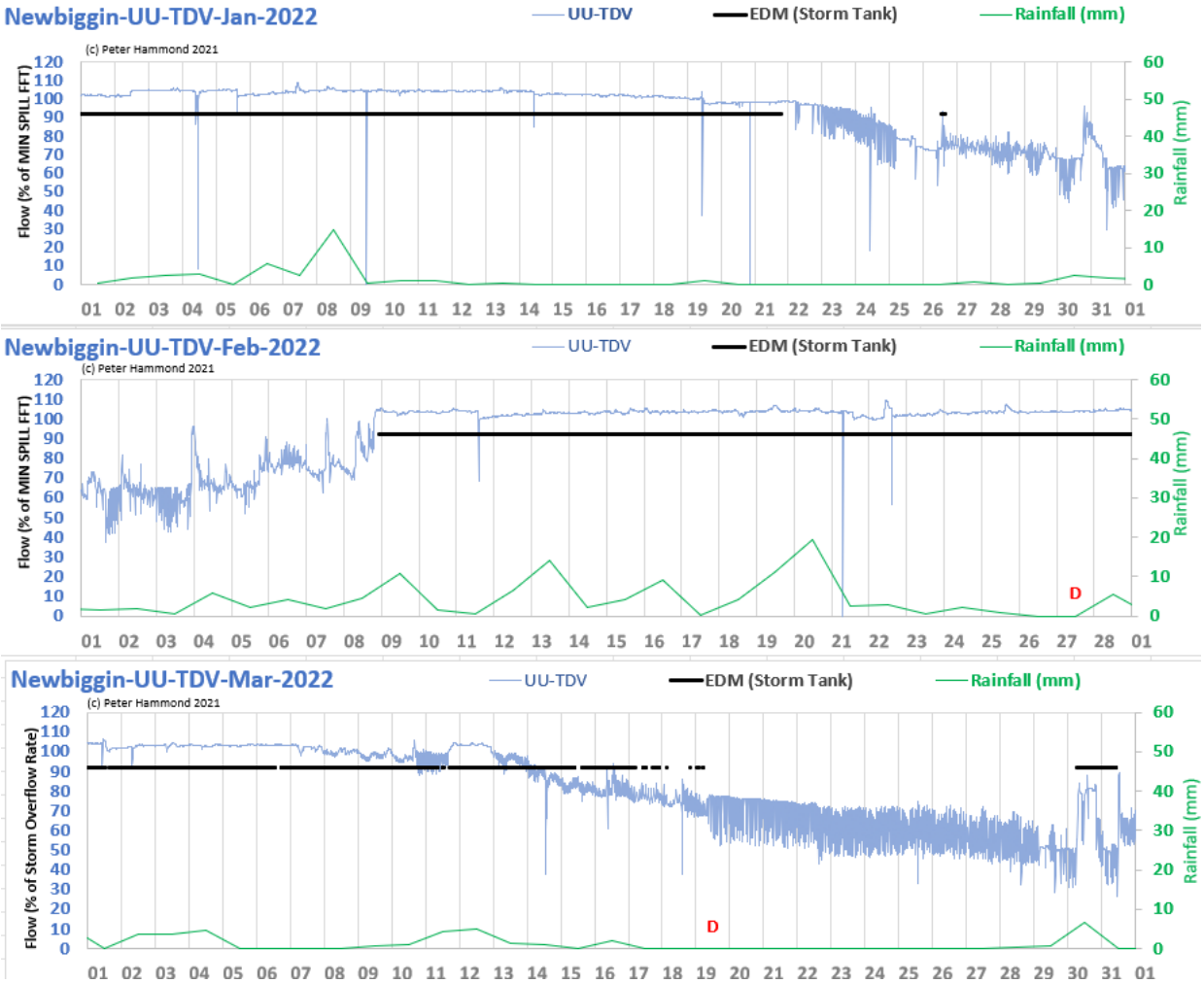


Figure 7: WASP's analysis suggests there were 10 illegal spill days at Newbiggin STW (early: Jan 26, Mar 14-18, 30-31; both dry & early: Feb 27, Mar 19)

More frequent illegal spilling occurred towards the end of 2022 (**Fig**. 8).

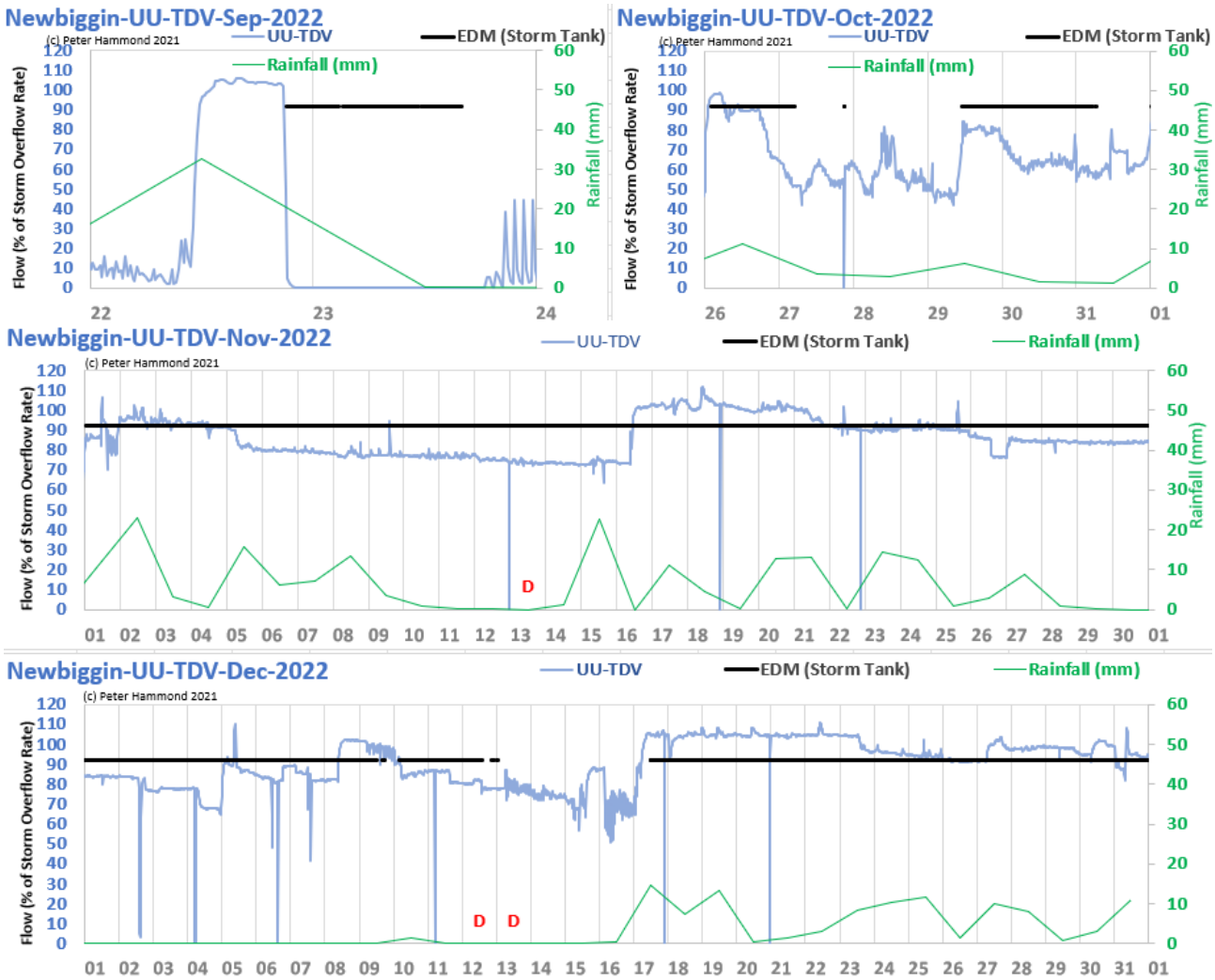


Figure 8: WASP's analysis suggests there were 42 illegal spill days at Newbiggin STW at the end of 2022 (early: Sep 22,23,Oct 26-27, 29-31,Nov 1,5-16,26-30,Dec 1-13,31; dry and early: Nov 13,Dec 12,13)

1.3 Grasmere STW

Population served: 2,428 Storm tank overflow: 68.8 l/s Storm Tank Min: 64 m^3

Grasmere STW discharges to Grasmere Lake, one of the smaller lakes in the Lake District and famous for its association with the poet William Wordsworth.

2021

Annual spill hours: 1,444 EDM:100% 17 illegal spilling days: 1 dry; 13 early; 3 both.
Spill frequency reason: Not asset maintenance - Hydraulic capacity

The 2021 overview for Grasmere STW is shown in **Fig**. 9.

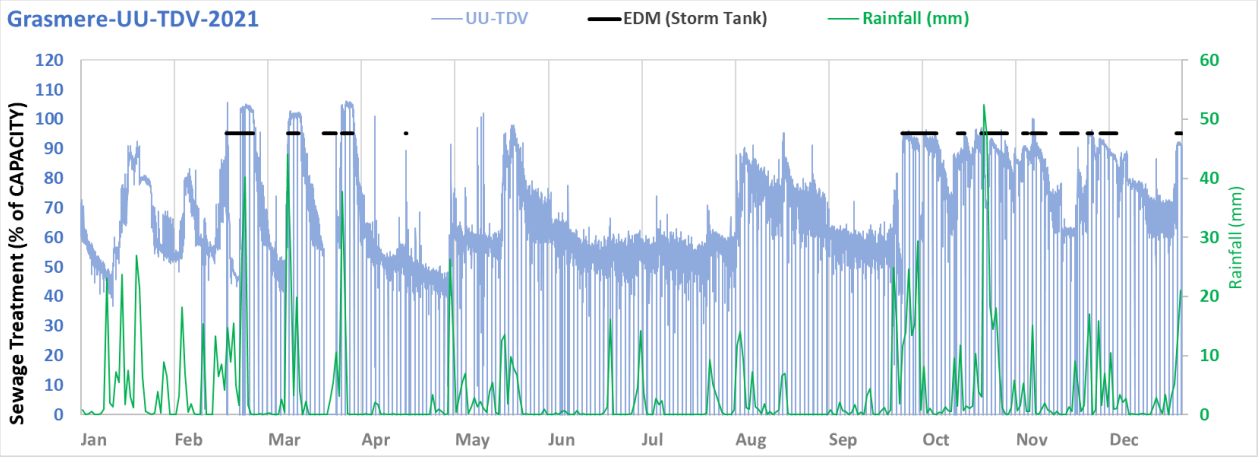
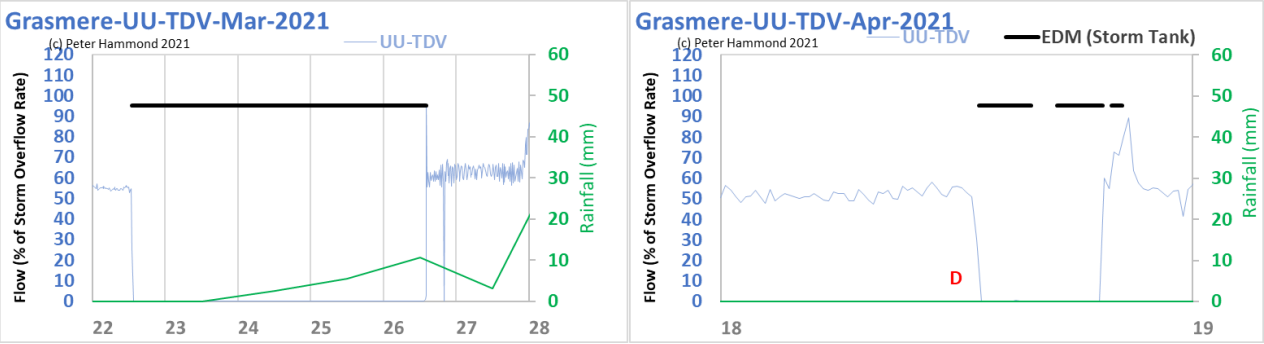


Figure 9: 2021 overview for Grasmere STW: sewage treatment (UU-TDV) & EDM detection at storm tanks

Mostly, the spills in Feb-Apr occur when the sewage treatment rate is above 92% of the storm tank overflow rate – there is also a complete loss of treatment flow data for 5 or so days in March. Spills later in the year coincide with less than the required sewage treatment rate for compliance.

The annual EDM return by UU to the EA for Grasmere STW was for 1,348 hours covering 90 spills in terms of the EA counting system. The EDM detected individual spill data provided by UU and the EA correspond to 1,444 hours covering 2,142 spills over 94 days. WASP believes there were at least 17 days in 2021 with early spills from Grasmere STW (**Fig**. 10).



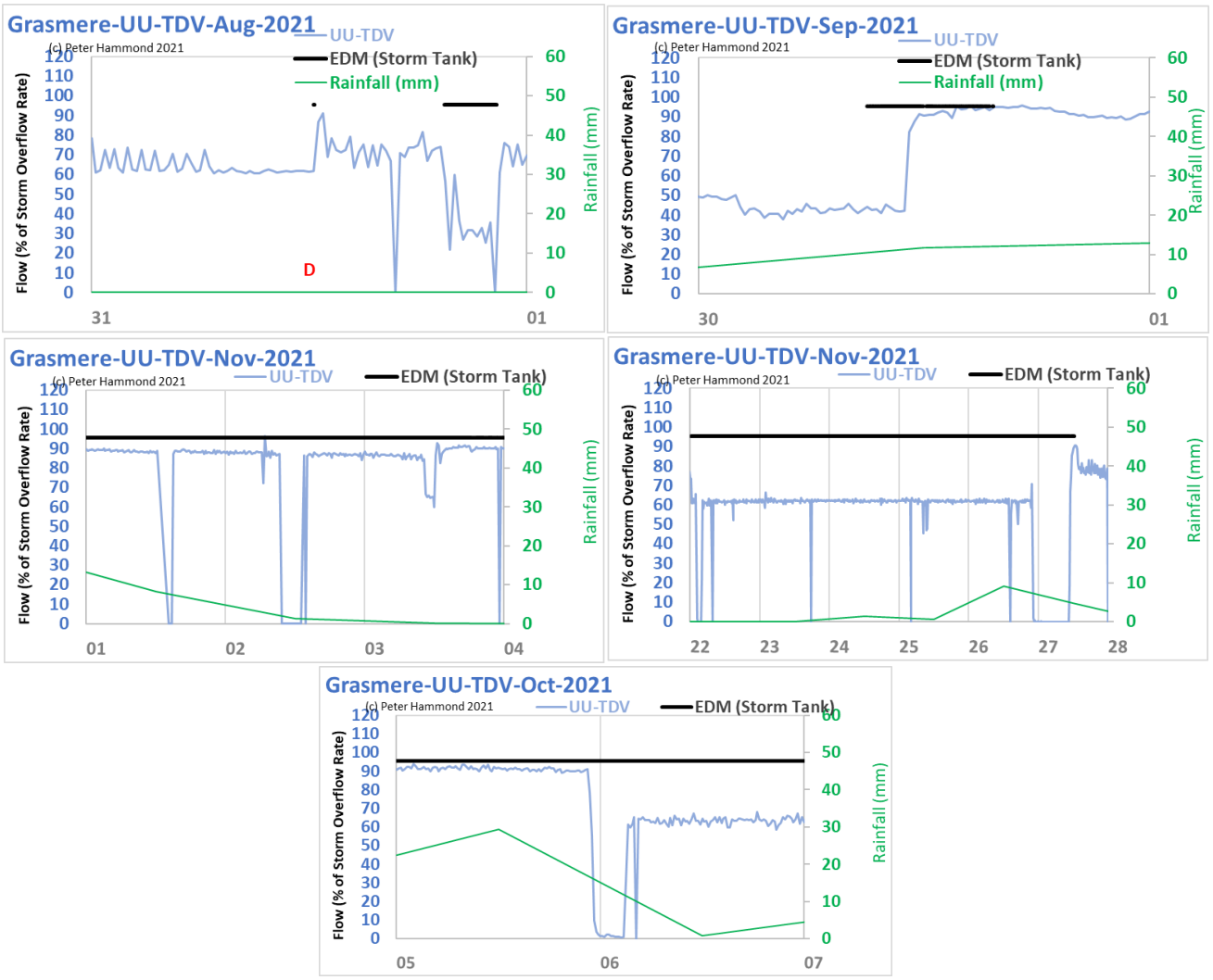


Figure 10: WASP's analysis suggests 17 days with illegal early spills from Grasmere STW in 2021
(Mar 22-26; Apr 18; Aug 31; Sep 30; Nov 1-4, 22, 26-27; Oct 5-6.

1.4 Coniston STW

Population served: 715 Storm tank overflow: 18.87 l/s Storm Tank Min: 64 m^3

Coniston STW discharges to Lake Coniston, the third largest lake by volume in the Lake District and famous for its association with the philosopher and artist John Ruskin, the novelist Arthur Ransome's *Amazons and Swallows* and the water speed record attempts of Sir Malcolm Campbell.

2021

Annual spill hours: 2,770 EDM: 100% 8 illegal spilling days: 3 dry 5 early 0 both
Spill frequency reason: Not asset maintenance - Hydraulic capacity

The 2021 overview for Coniston STW is shown in **Fig**. 11.

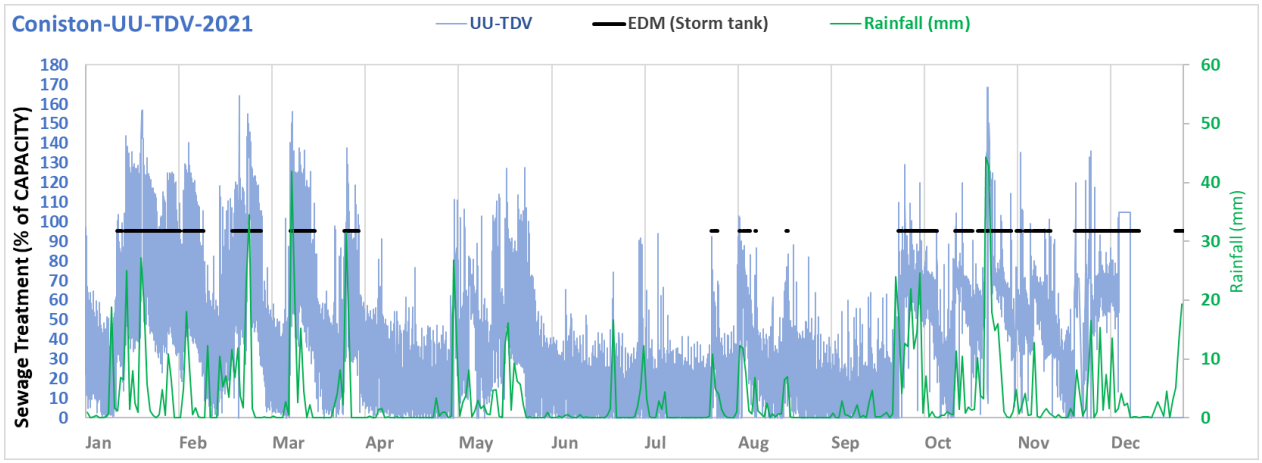


Figure 11: 2021 overview for Coniston STW: sewage treatment (UU-TDV) & EDM data for storm tanks

The summary EDM spilling hours of 2010 submitted by UU to the EA are consistent with the detailed EDM spill data that UU provided to WASP (**Fig**. 11) in the first six months of the year but in the second half of the year they appear less consistent. Therefore, as with 2018, either the EDM data is not entirely reliable or there are early spills in the second half of the year.

The sewage treatment and EDM data appear to be consistent with some early spilling in July and September (**Fig**. 12)

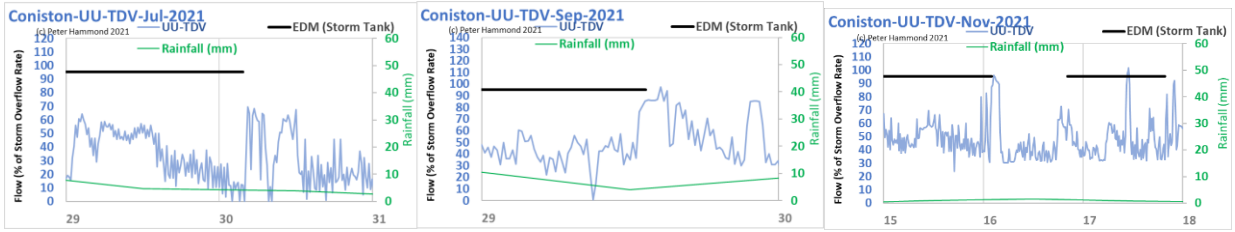


Figure 12: 5 likely early spills at Coniston STW (Jul 29-30; Sep 29; Nov 15,17)

In addition, the data suggests there were 3 dry spills.

1.5 Macclesfield STW

Population served: 68,916 Storm tank overflow: 711 l/s Storm Tank Min: 6,570 m^3

Macclesfield STW discharges to the River Bollin which is a major tributary of the River Mersey. It rises from springs in Macclesfield Forest at the western end of the Peak District. Although the EDM was commissioned in 2019, the 2021 EDM report to the EA mentions "*installation set-up/design issues*" compared to "*Not asset maintenance - Hydraulic capacity*" in 2022 and "*Performance - Other maintenance / capital works (e.g. jetting)"* in 2023.

2021

Annual spill hours: 1,444 EDM: 0% (?) 16 illegal spilling days: 8 dry; 8 early; 0 both.
Spill frequency reason: Not asset maintenance - Hydraulic capacity

The 2021 overview for Macclesfield STW is shown in **Fig**. 13.

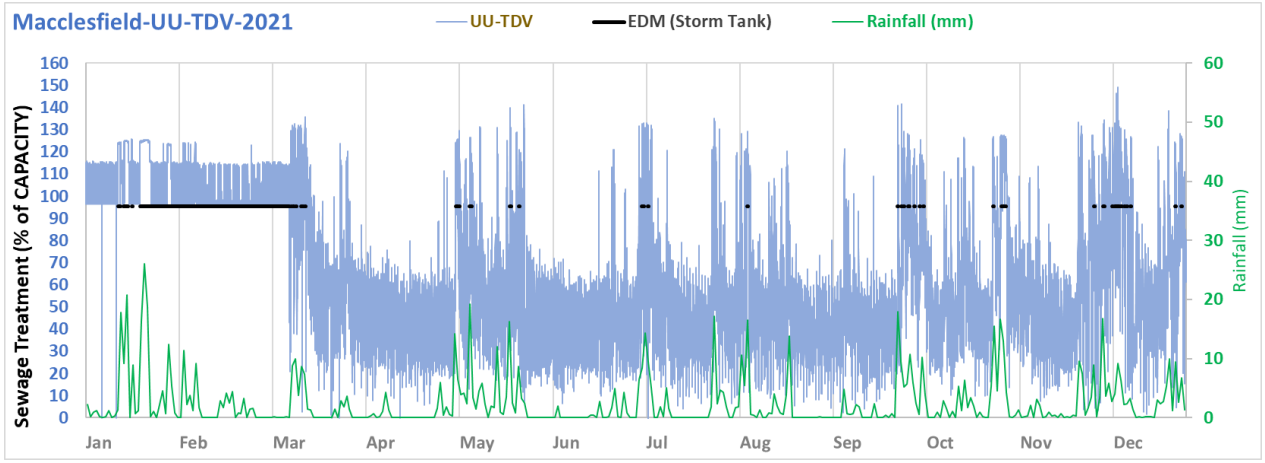


Figure 13: 2021 overview for Macclesfield STW: treatment flow (UU-TDV) & data for EDM at storm tank

The EDM intervals are crisply defined in Jan-Oct and occur only when sewage treatment rate is above the required permit level (**Fig**. 14). So there are no early spills but there are 8 illegal dry spills.

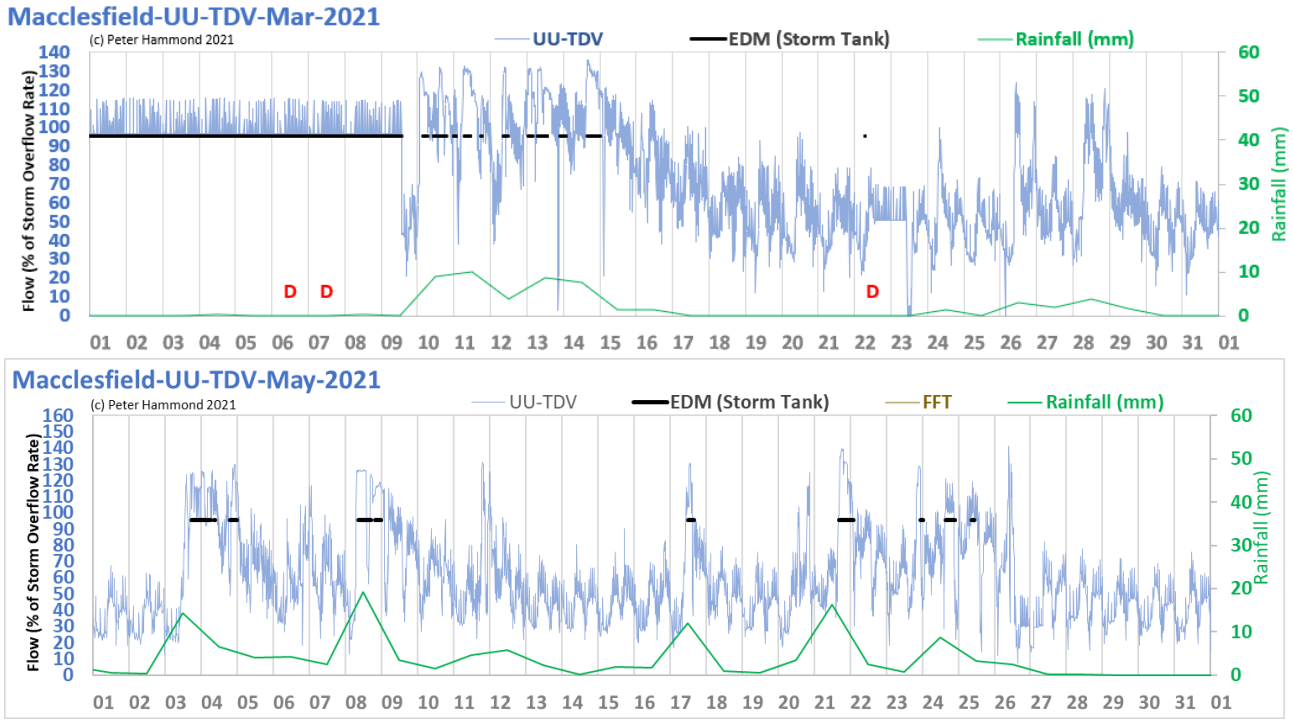


Figure 14: well demarcated EDM intervals identifying spills within permit (apart from 3 dry spills in March)

Unfortunately, in November and December, there are 8 days when the EDM intervals coalesce and include illegal “early” spilling (**Fig**. 15).

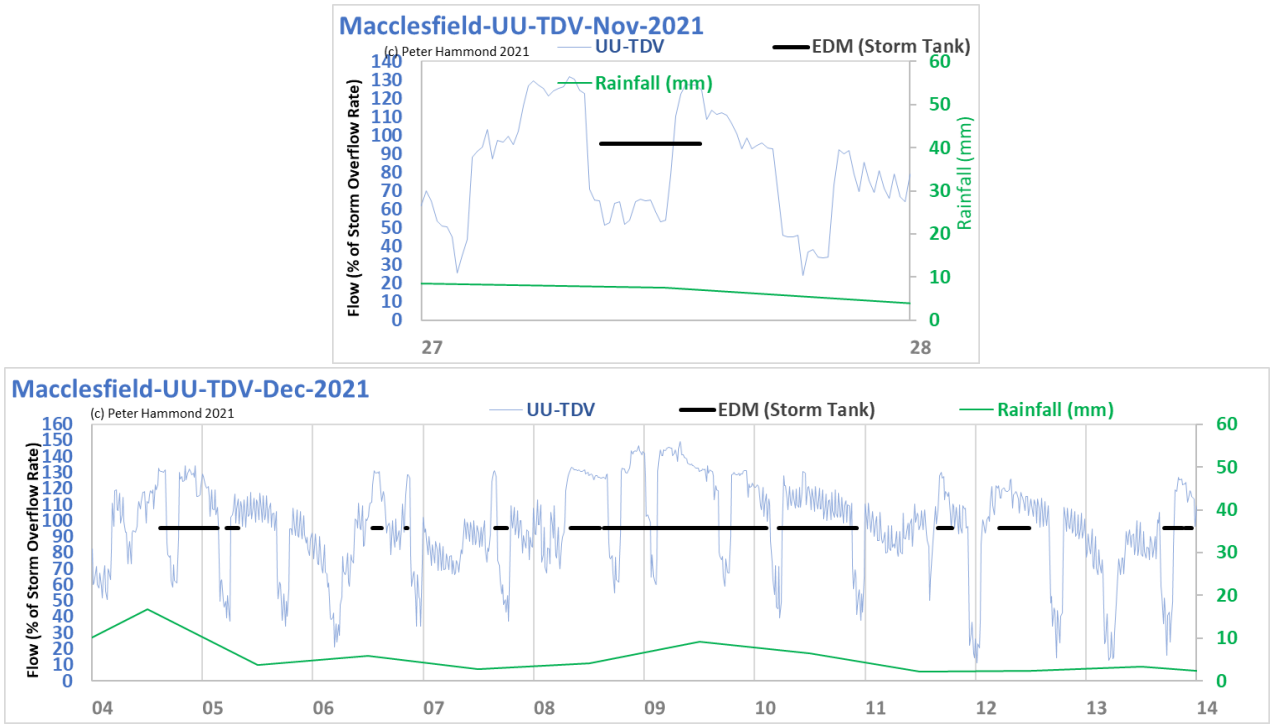


Figure 15: WASP’s analysis suggests there were 8 days with illegal early spills at Macclesfield STW in 2021 (Nov 27; Dec 4-5, 7-10, 13)

2022

Annual spill hours: 144 EDM: 100% 6 illegal spilling days: 0 dry; 6 early; 0 both.
Spill frequency reason: Not asset maintenance - Hydraulic capacity

The 2022 overview for Macclesfield STW is shown in **Fig**. 16.

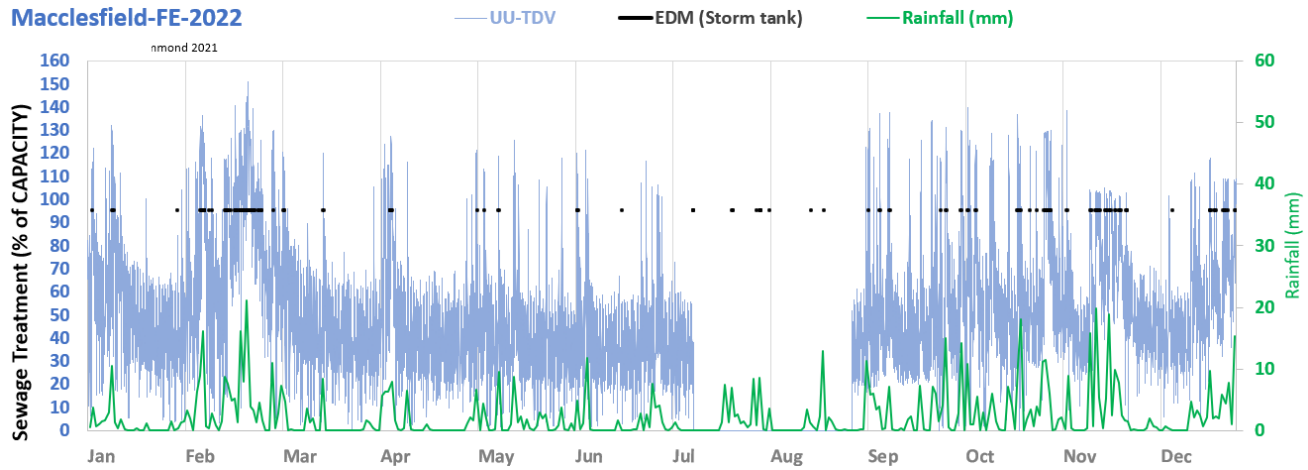


Figure 16: 2022 overview for Macclesfield STW: sewage treatment (UU-TDV) & EDM storm tank data

The occasional early spilling that had started in late 2021 continues into the beginning of 2022 and there are 6 illegal early spilling days in the first half of 2022 (**Fig**. 17). In the second half of 2022, the spills are all within permit.

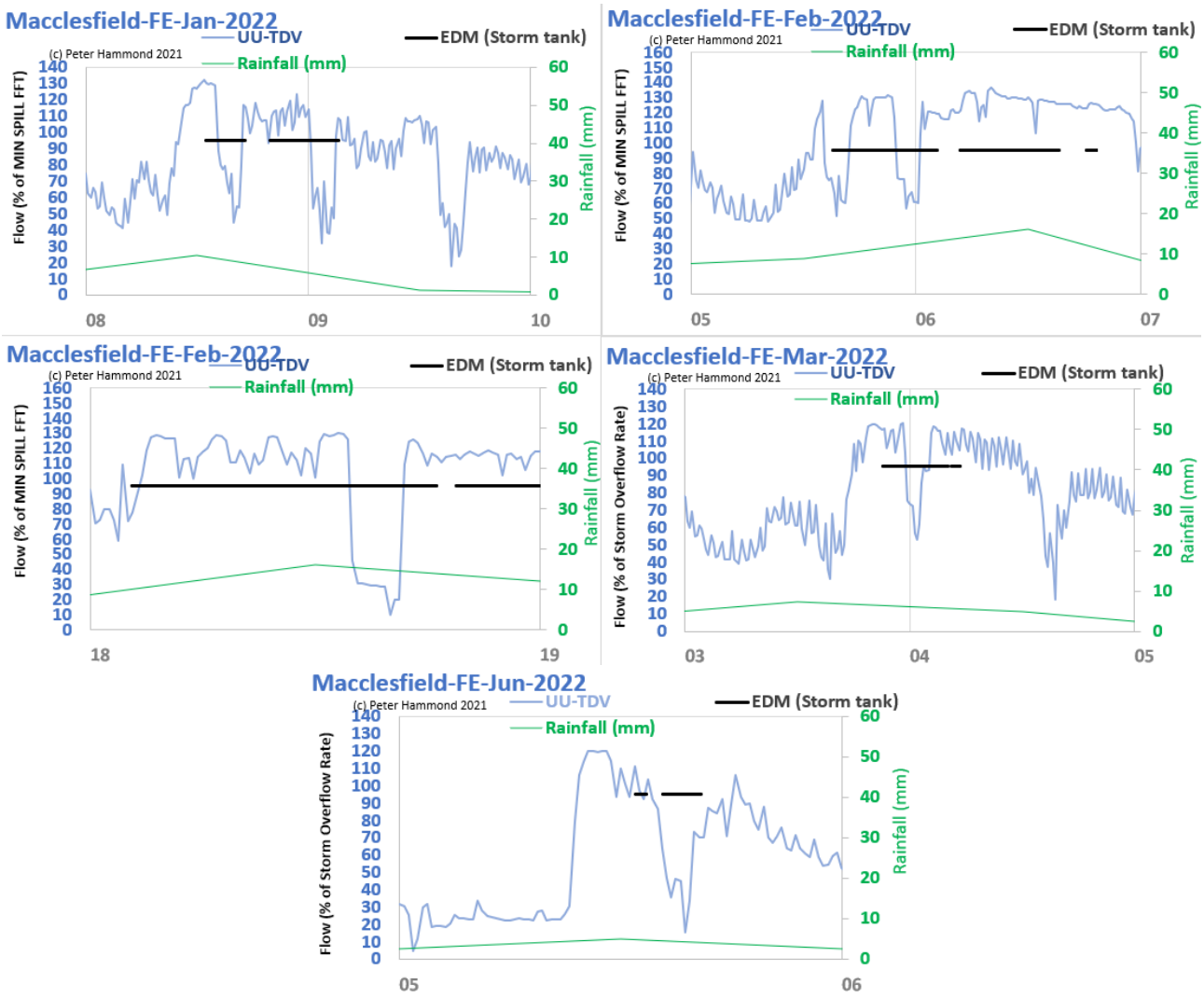


Figure 17: WASP's analysis suggests there were 6 early spilling days at Macclesfield STW in 2022 (Jan 8, 9; Feb 5, 18; Mar 4; Jun 5)

1.6 Runcorn STW

Population served: 65,004 Storm tank overflow: 625 l/s Storm Tank Min: 3,432 m^3

The storm tank minimum size that is stated in the EA permit (3,432 m^3) is considerably smaller than the usual requirement (4,500 m^3) to hold 2 hrs sewage inflow at the storm overflow rate.

It was tempting to place Runcorn STW in the category of unreliable EDM data in Table 2 as there are many short EDM spill intervals with an extended tail. However, the extensions typically coincide with continued rainfall and treatment data that is compatible with continued spilling rather than a return to dry weather diurnal treatment flow patterns.
There are spills in 2021, for example in May and December, that begin spilling when the treatment flow is just above the storm overflow rate and then extend into regions where the flow has dropped below the threshold for legal spilling (**Fig**. 18).

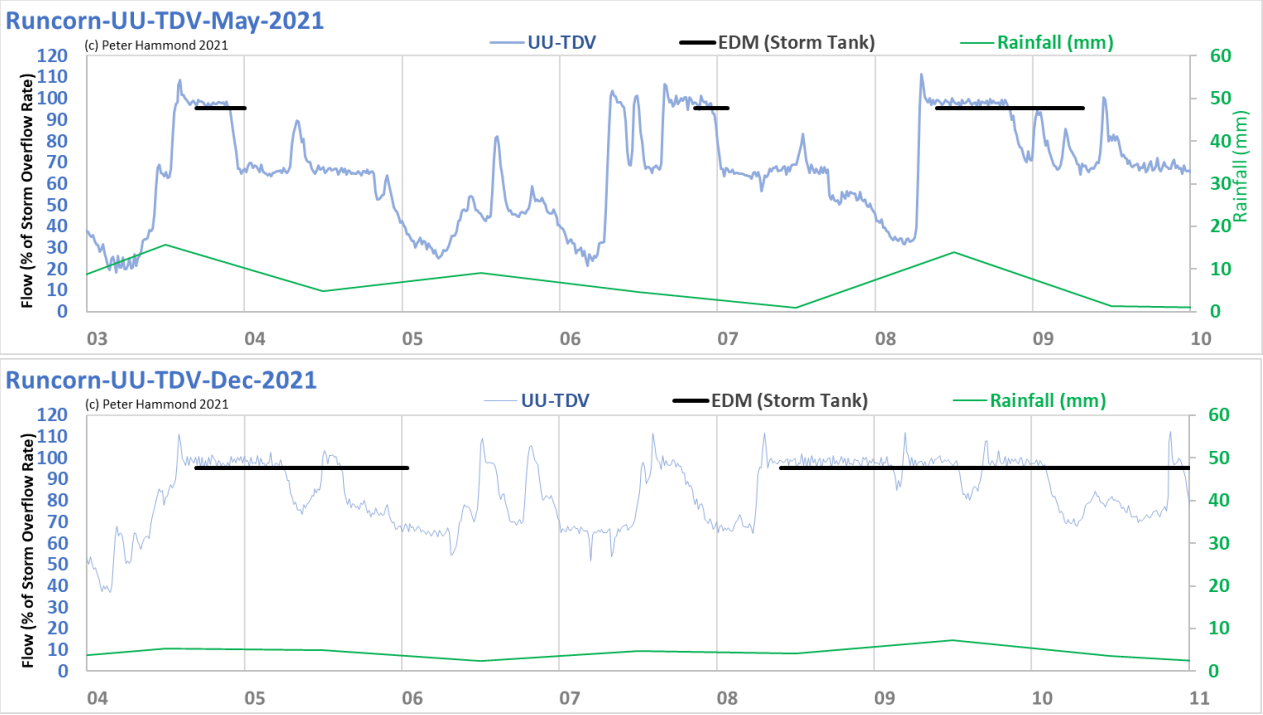


Figure 18: spills in May and December that start within permit but extend into regions where the treatment rate is below the storm overflow rate and giving 7 days with unpermitted early spills (May 2,7-9; Dec 5,9-10)

2021

Annual spill hours: 925 EDM: 100% 46 illegal spilling days: 0 dry; 46 early; 0 both.
Spill frequency reason: Not asset maintenance - Hydraulic capacity

WASP's analysis suggests there were at least 46 illegal spilling days in 2021 (**Fig**. 19).

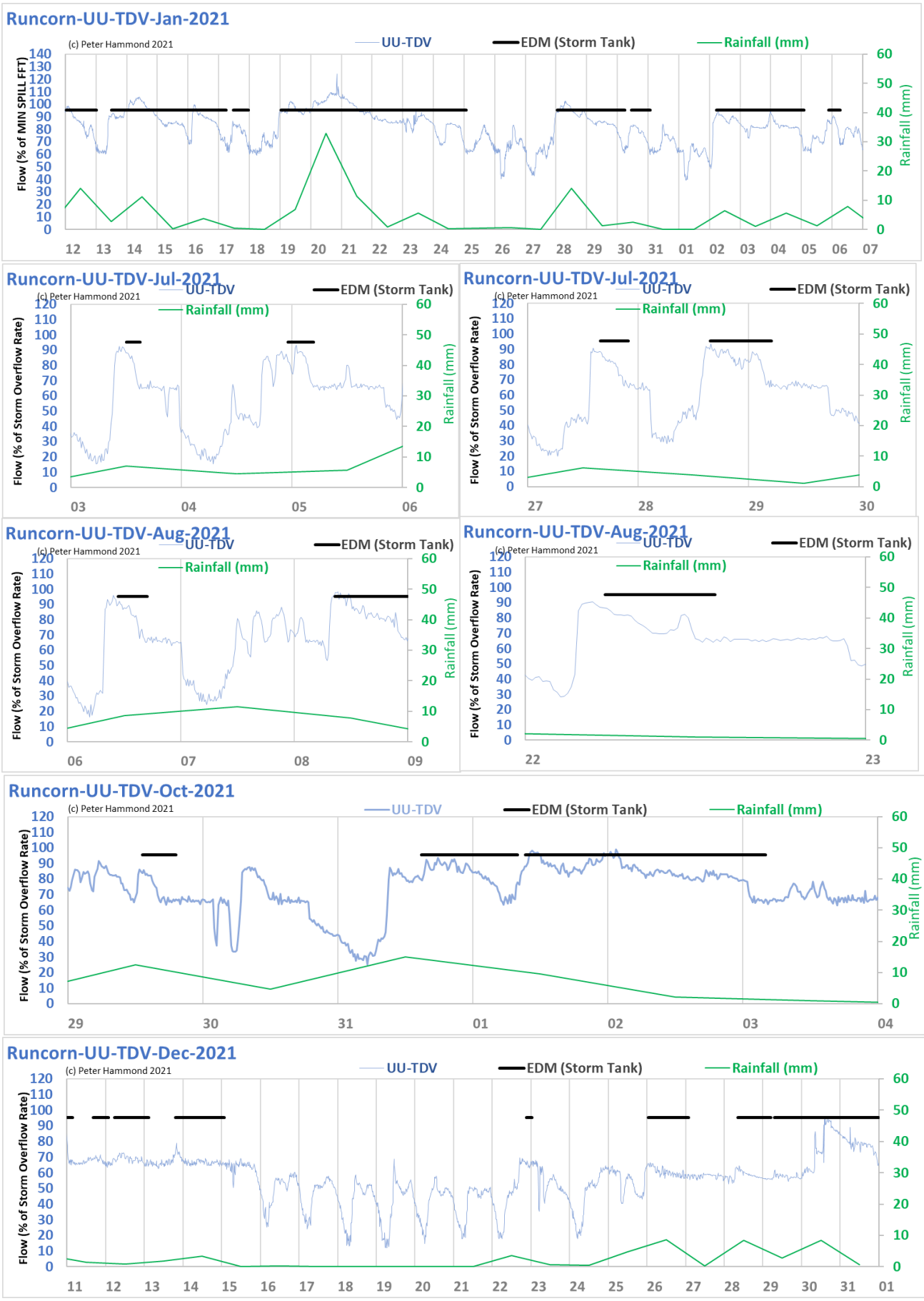


Figure 19: WASP's analysis suggests there were many illegal early spills at Runcorn STW in 2021 (Jan 12,15-17, 22-24, 28-31; Feb 2-6; Jul 3-5, 27-29; Aug 6,8,22; Oct 29; Nov 1-3; Dec 11-14, 22,26,28-31)

2022

Annual spill hours: 475 EDM: 100% 22 illegal spilling days: 0 dry; 22 early; 0 both.
Spill frequency reason: Not asset maintenance - Hydraulic capacity

As in 2021, there are spill intervals in 2022 which begin with a sewage treatment rate at/above the storm tank overflow rate but extend into regions with a treatment rate below the permitted threshold (**Fig**. 20).

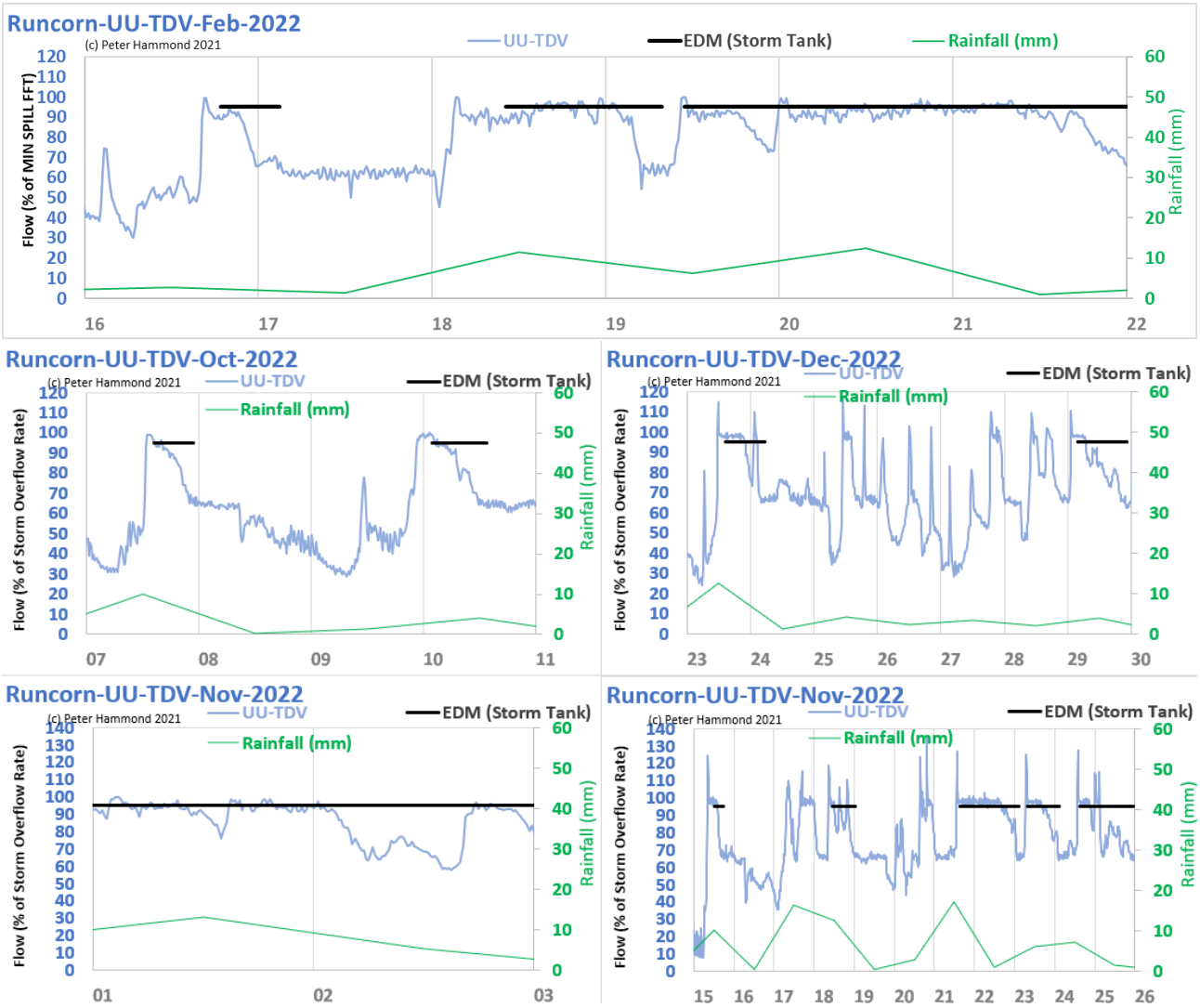


Figure 20: spills at Runcorn STW that start within permit but extend to unpermitted early spilling on 14 days (Feb 16,17,19,21; Oct 7,10; Nov 1,2,15,18,22,25; Dec23,29)

In addition, there are a further 8 days with potential early spilling (**Fig**. 21).

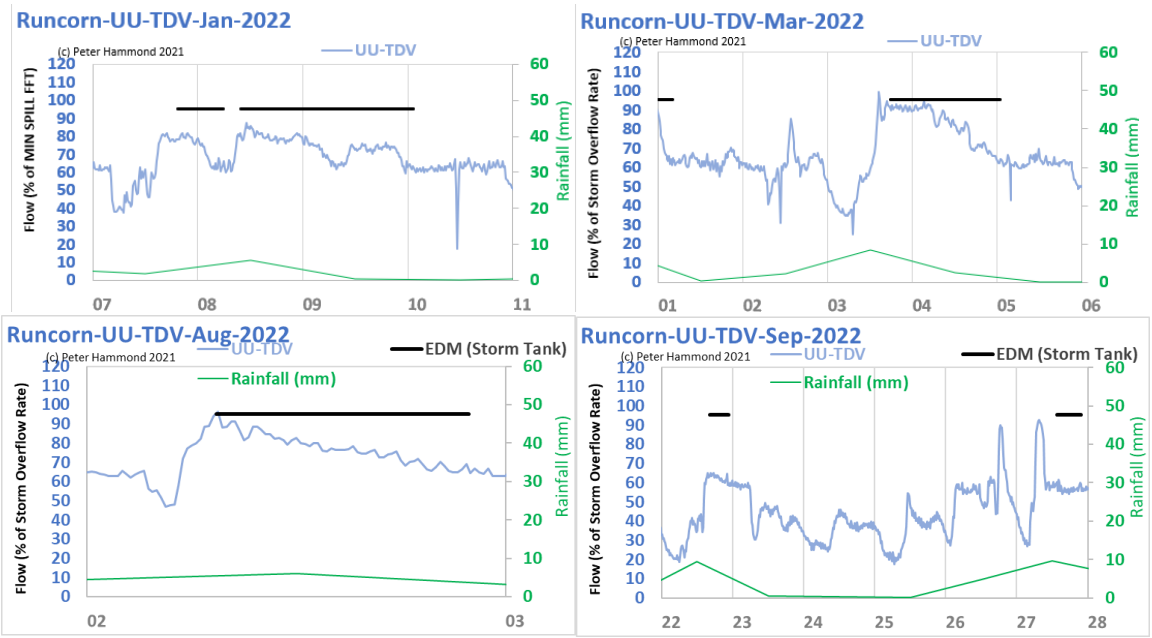


Figure 21: 8 days with possible early spills at Runcorn STW (Jan 7-9; Mar 1,4; Aug 2; Sep 22,27)

1.7 Stretford STW

Population served: 24,403 Storm tank overflow: 283.6 l/s Storm Tank Min: 1,946 m^3
Spill frequency reason: Not asset maintenance - Hydraulic capacity

Stretford STW discharges to the River Mersey

2021 No data provided by the EA

2022

Annual spill hours: 276.18 EDM: 100% 11 illegal spilling days: 0 (dry) 10 (early) 1 (both)

The annual overview chart for Stretford STW for 2022 is given in **Fig**. 22.

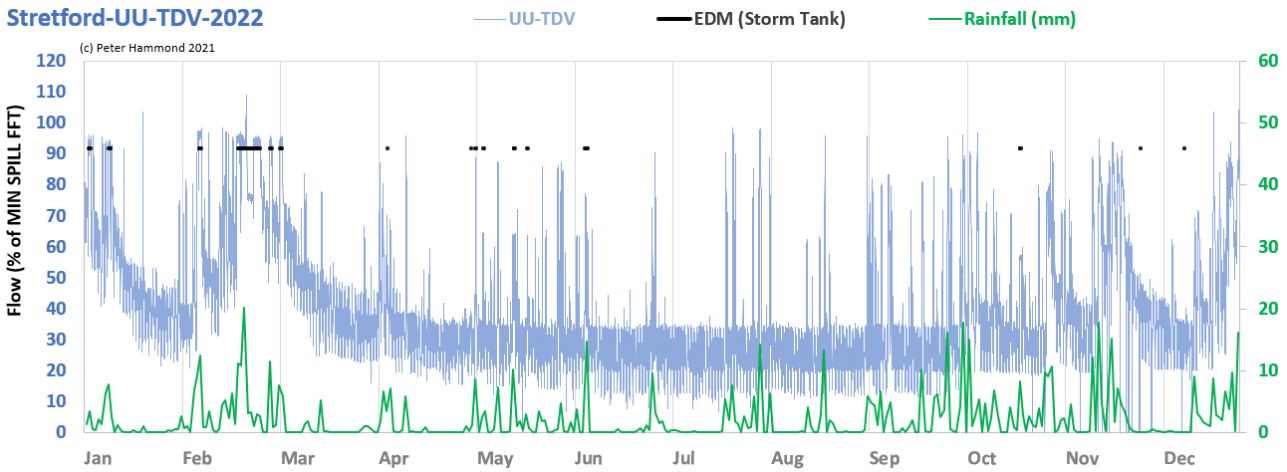


Figure 22: 2022 overview for Stretford STW: sewage treatment (UU-TDV) and spill from storm tanks

Early in 2022, Stretford STW's spills are generally within permit (**Fig**. 23).

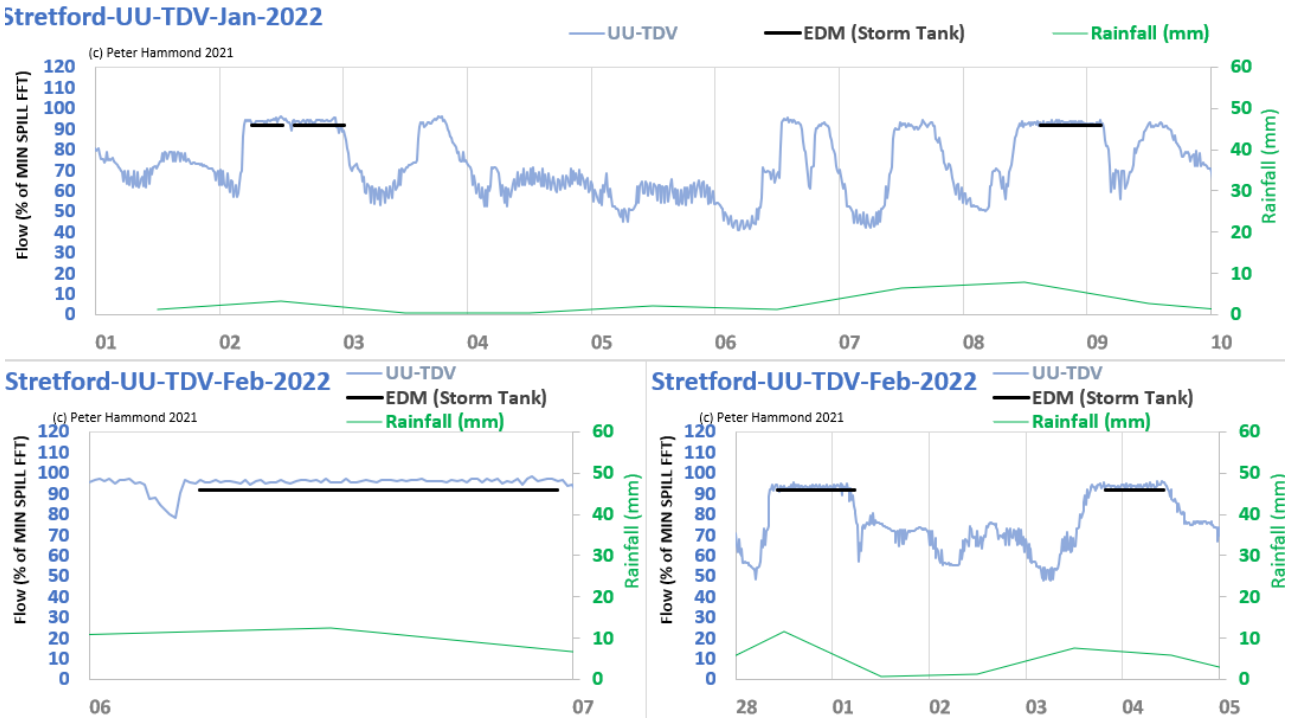


Figure 23: Examples of spills at Stretford STW in early 2022 which are within permit and hence legal

Later in 2022, there are days where there are illegal, early spills (**Fig**. 24). For example, there are 3 days with illegal early spilling sandwiched in between legal spilling in February.

Figure 24: 11 days in 2022 where spilling at Stretford STW was early
(Feb 21-23; May 4,6,7,16,17,20; Jun 8,23) and 1 both dry and early (Dec 14, not shown)

1.8 Dovenby STW

Population served: 140 Storm tank overflow: 10 l/s Storm Tank Min: 13 m^3

Spill frequency reason: No entry

Dovenby STW serves a very small population. It discharges to the Broughton Beck which flows into the River Derwent before it reaches the sea at Workington.

According to the EA's data, the storm tank size is far too small to receive 2 hrs of sewage at the storm overflow rate (72 m^3). This may explain why it spills so frequently for very short periods.

2021

Annual spill hours: 121.62 EDM: 100% 6 illegal spilling days: 0 (dry) 6 (early) 0 (both)

The annual overview chart for Dovenby STW for 2021 is given in **Fig**. 25.

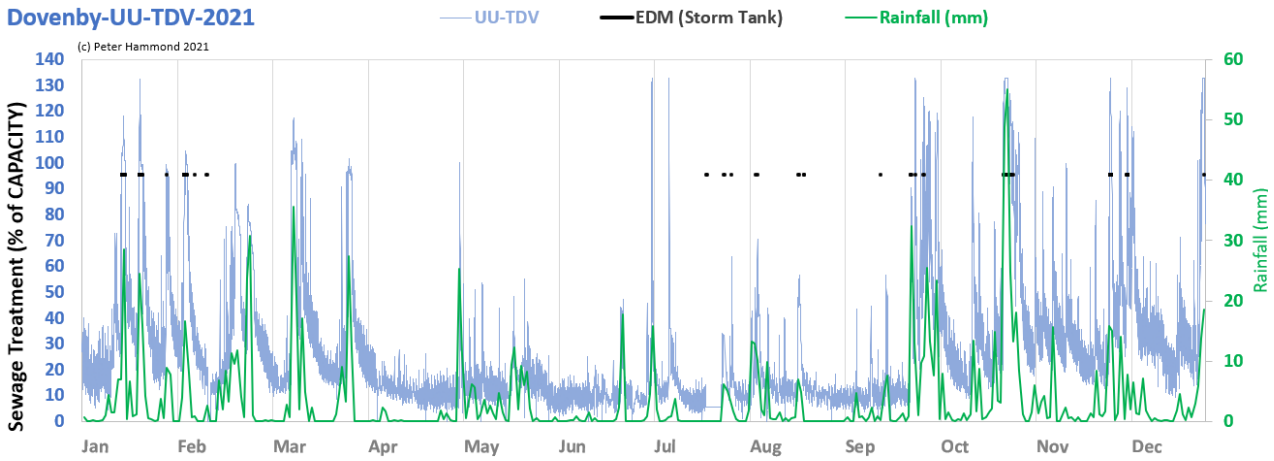


Figure 25: 2022 overview for Dovenby STW: sewage treatment (UU-TDV) and spill from storm tanks

Dovenby STW does make permitted discharges as can be seen in **Fig**. 26

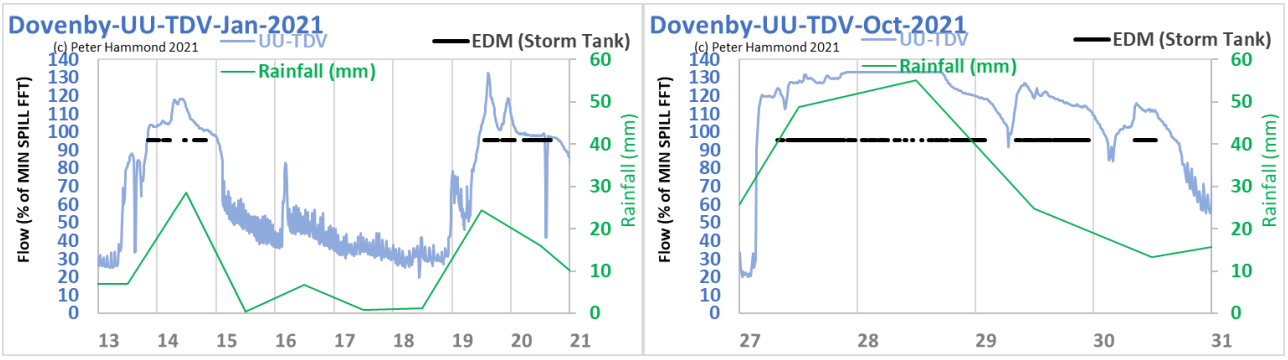


Figure 26: permitted discharges at Dovenby STW in January and October 2021

But there are also times when it discharges illegal early spills (**Fig**. 27).

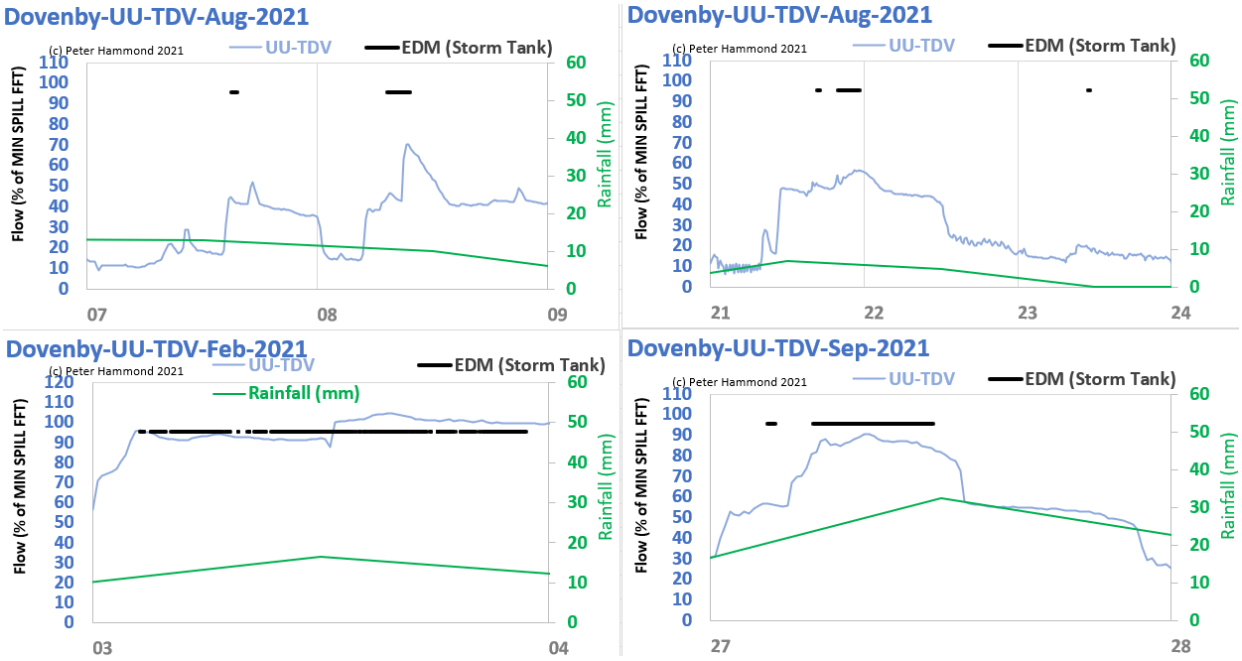


Figure 27: 6 days with unpermitted discharges at Dovenby STW in 2021

2022

Annual spill hours: 125.59 EDM: 100% 3 illegal spilling days: 0 (dry) 2 (early) 1 (both)

The annual overview chart for Dovenby STW for 2022 is given in **Fig**. 28.

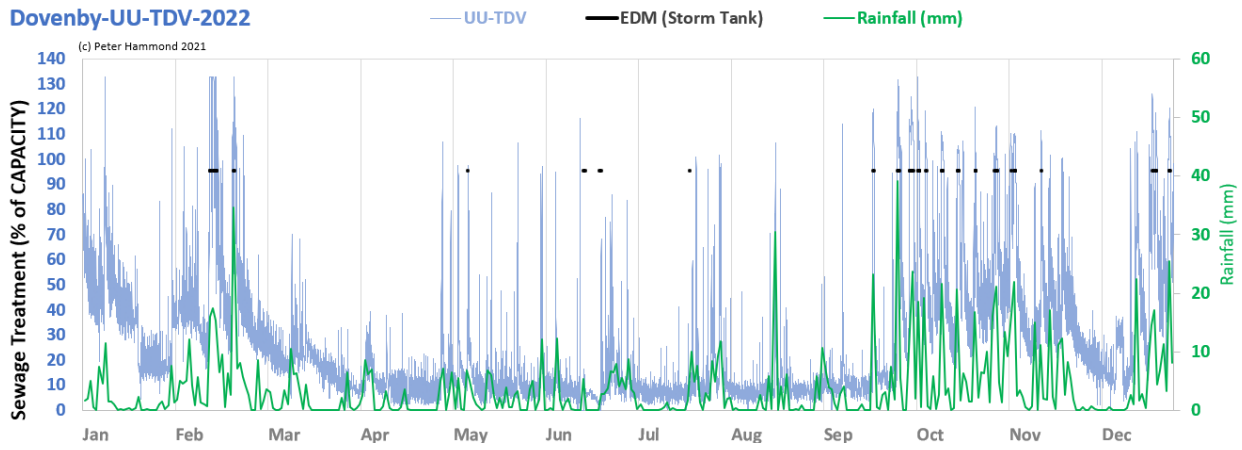


Figure 28: 2022 overview for Dovenby STW: sewage treatment (UU-TDV) and spill from storm tanks

The majority of spills in 2022 at Dovenby STW are within permit. Indeed, of the 31 days with spills, only 3 involve early spills and of those 1 is also dry (examples in **Fig**. 29).

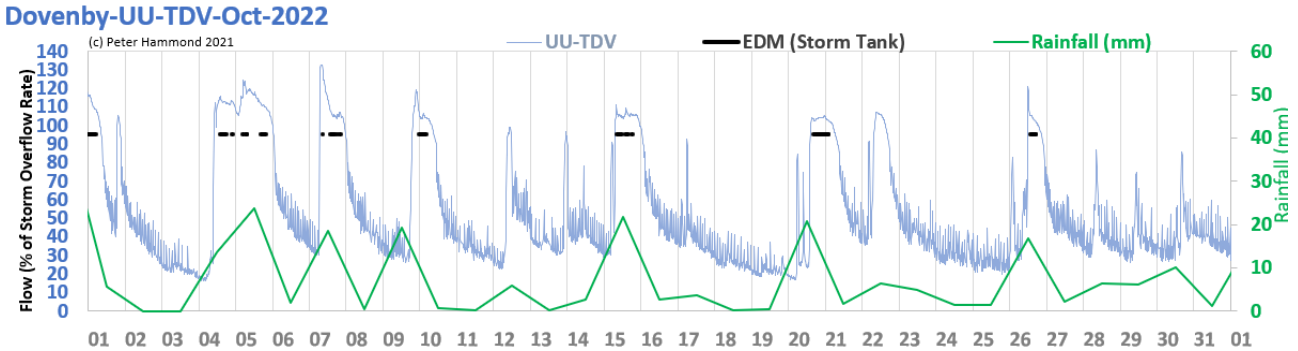


Figure 29: examples of permitted spilling at Dovenby STW in October 2022

There are only 3 days with illegal early spills and of those one is also a dry spilling day (**Fig**. 30).

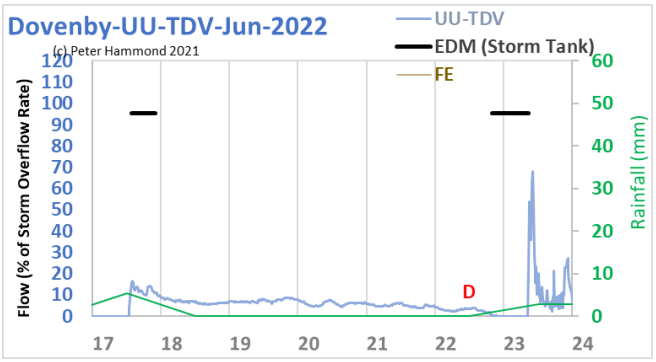


Figure 30: 3 days with early spills (one also dry) at Dovenby STW in October 2022

1.9 Dalston STW

Population served: 1,324 Storm tank overflow: 27 l/s Storm Tank Min: 298 m^3
Spill frequency reason: EDM fitted 2019; sensor failure in 2021 resolved in December.

Dalston STW discharges to the River Caldew which rises on the northern flanks of Skiddaw, in the Lake District, and flows in a northerly direction to join the River Eden.

2021

Annual spill hours: 430.87 EDM: 83% 10 illegal spilling days: 0 (dry) 10 (early) 0 (both)

The annual overview chart for Dalston STW for 2021 is given in **Fig**. 31.

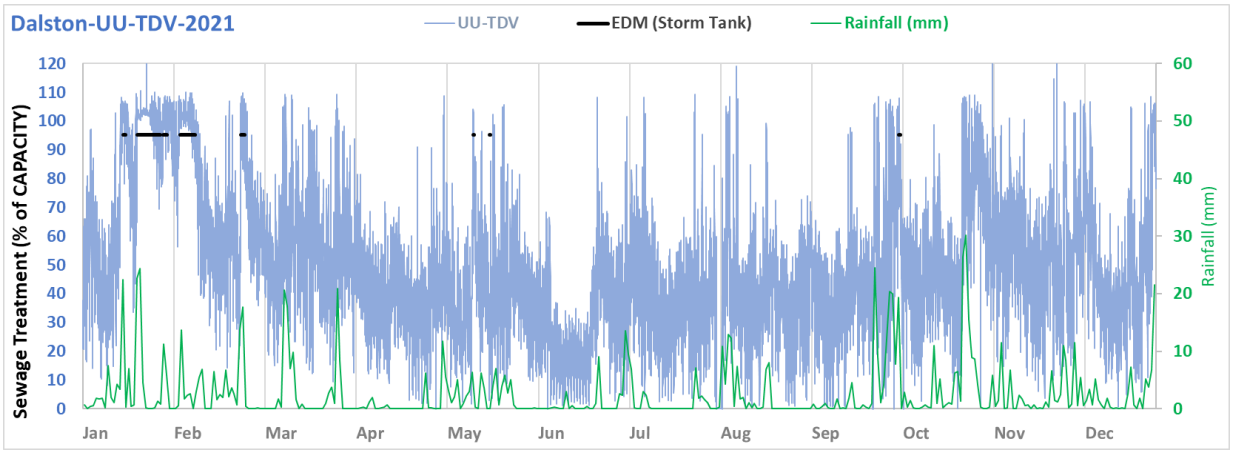


Figure 31: 2021 overview for Dalston STW: sewage treatment (UU-TDV) and spill from storm tanks

Despite the reporting of a sensor failure, the spills in January and February are within permit (except for 2 tiny early blips; **Fig**. 32).

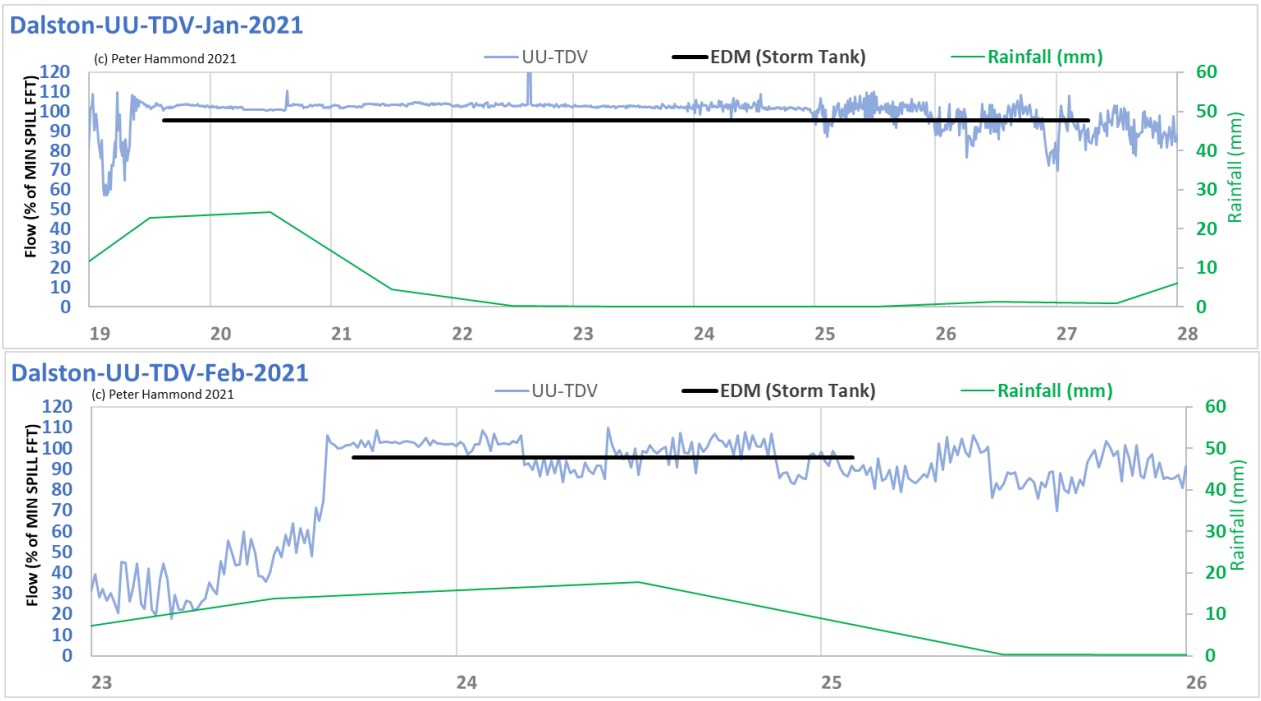


Figure 32: spills at Dalston STW in 2021 starting within permit but later breaching permit conditions on 4 days (Jan 26,27; Feb 24, 25)

There are further early spills on 6 days in Jan, May and October 2021 at Dalston STW (**Fig**. 33).

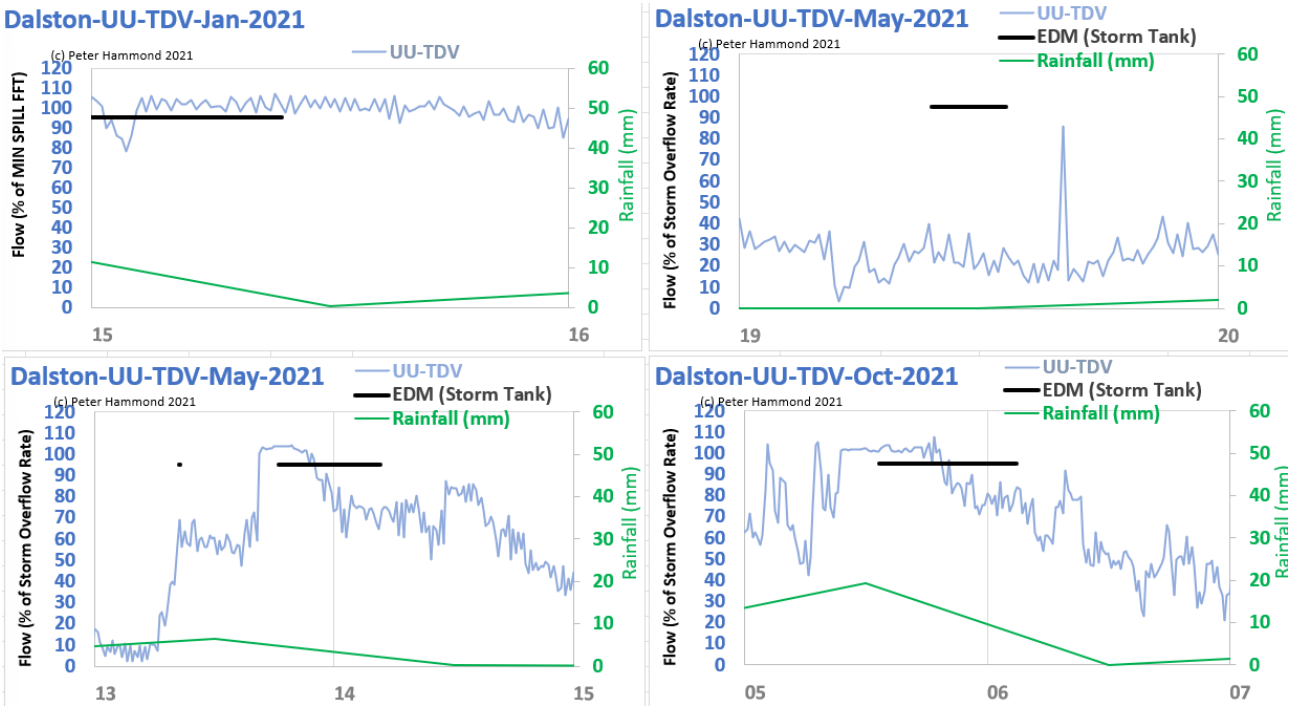


Figure 33: further early spills on 6 days at Dalston STW in 2021 (Jan 15; May 13,14,19; Oct 5,6)

2022

Annual spill hours: 98 EDM: 95% 8 illegal spilling days: 0 (dry) 8 (early) 0 (both)

The annual overview chart for Dalston STW for 2022 is given in **Fig**. 34.

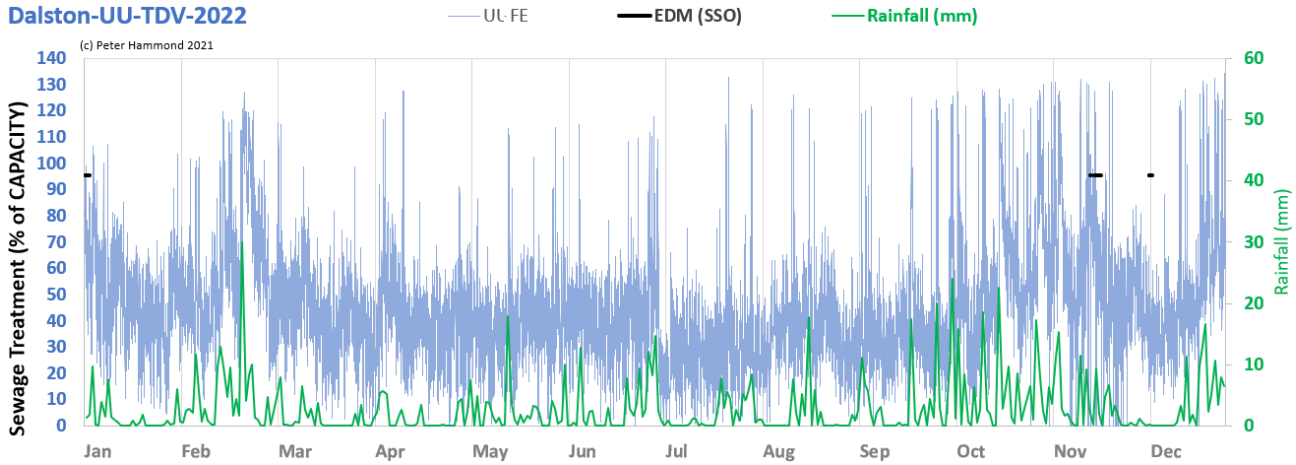


Figure 34: 2022 overview for Dalston STW: sewage treatment (UU-TDV) and spill from storm tanks

The annual spilling hour total was substantially reduced in 2022 (431) compared to 2021 (98). This is probably due to 2022 being a much drier year as the annual spilling total for 2023, a much wetter year, was 634 hours.

The number of days with early spilling was 8 (**Fig**. 35).

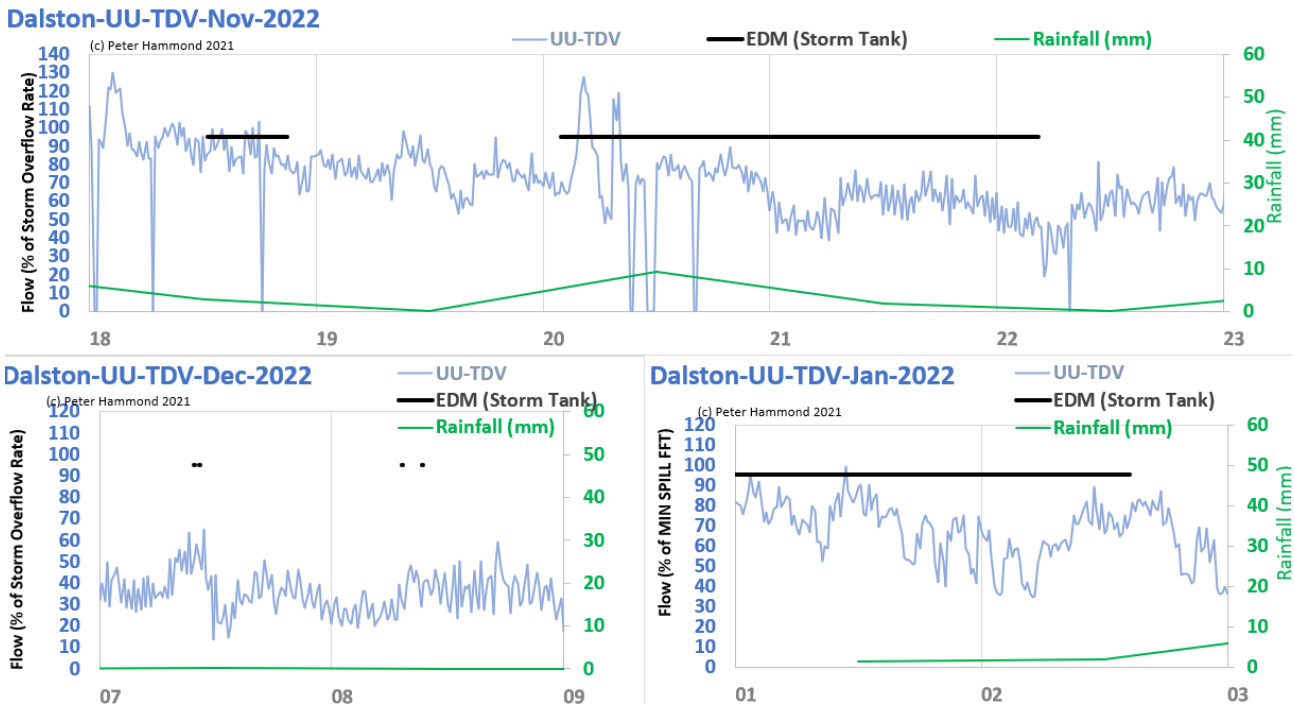


Figure 35: early spills on 8 days at Dalston STW in 2022 (Jan 1,2; Nov 18,20-22; Dec 7,8)

1.10 Ingleton STW

Population served: 1.866 Storm tank overflow: 21.5 l/s Storm Tank Min: 1,080 m^3

Spill frequency reason: "Not asset maintenance - Hydraulic capacity"

Ingleton STW discharges to the River Greta, a tributary of the River Derwent in the lake District. It flows through Keswick, linked with poets Samuel Taylor Coleridge and Robert Southey.

2021

Annual spill hours: 3,701 EDM: 100% Illegal spilling days: 17 (dry) 19 (early) 1 (both)

The annual overview chart for Ingleton STW for 2021 is given in **Fig**. 36.

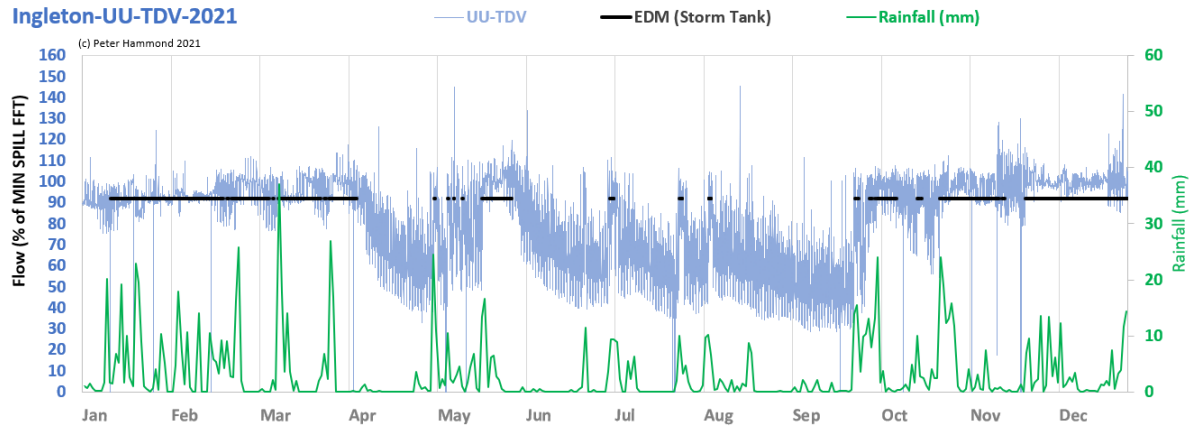


Figure 36: 2021 overview for Ingleton STW: sewage treatment (UU-TDV) and spills from storm tanks

Ingleton STW maintains capacity treatment level for many spills. Despite its storm tank capacity, analysis suggests it still makes 17 dry spills and many early spills (**Fig**. 37).

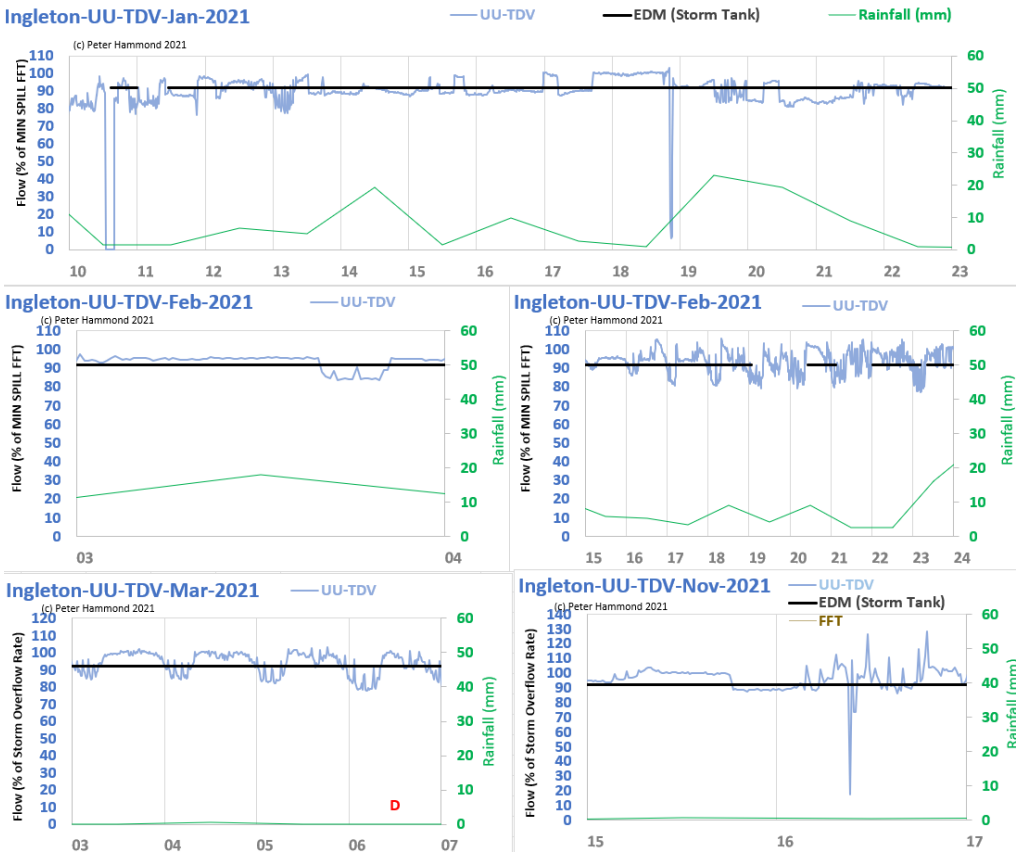


Figure 37: examples of potential early spills at Ingleton STW

SECTION 2: 37 STWs where incomplete data has obstructed WASP and EA investigation

Each of the STWs covered in this section, other than Davyhulme STW, was declared in the annual EDM data published by the EA as having a pair of storm overflows, one at the Inlet and another on the storm tank(s). Each overflow will typically have a storm overflow rate specified in the STW's permit to discharge issued by the EA as well as its own EDM device recording spills.

An inlet overflow is used to limit the rate at which untreated sewage enters an STW and excess above that rate is discharged to the watercourse usually with minimal intervention e.g., irt is screened for solids such as condoms, sanitary products and wet wipes. This is in contrast to an overflow on a storm tank where in theory some settlement of solid waste occurs before it fills and spills to a watercourse or its contents may be pumped back into the treatment process. N.B. The volume of excess untreated sewage discharged via the Inlet overflow is unknown.

The use of Inlet storm overflows varies considerably. For example, in the 2023 EDM datasets published on the EA website, the Inlet storm overflow numbers declared for each water company in England were:

Anglian (111), Northumbrian (109), Severn Trent (161), Southern (66), South West (229), Thames (40), United Utilities (172), Wessex (79) and Yorkshire Water (180).

WASP has been particularly interested in the use of Inlet storm overflows because when they are in operation, the volume rate of untreated sewage entering an STW should be that specified in the EA permit. Therefore, when the Inlet and storm tank overflows are simultaneously in operation, it is possible to estimate the volume of untreated sewage discharged via the storm tank overflow by subtracting the rate of sewage leaving an STW as treated final effluent from the Inlet storm overflow rate.

It was especially disappointing for WASP when it was realised that the EDM spill data provided by United Utilities to the EA, and thence to WASP, mixed the Inlet and storm tank spill datasets together without a distinguishing label. In contrast, for example, in a parallel analysis of Severn Trent spill data such labelling was in place and the volume of sewage spills could be estimated at some STWs. Some examples of the combined Inlet and EDM datasets are provided below.

Davyhulme STW is included as it is unclear why this STW had no spills declared for 2021 (no issue declared) and none for 2022 (telemetry failure) but spilled for over 1,400 hours in 2023 (Data collection - Confirmed exceptional weather).

2.1 Davyhulme STW POSSIBLE ILLEGAL DIVERSION TO STORM TANKS

Population served: 760,834 (EA) Storm tank overflow: 8,264 l/s Storm Tank Min: 90,000 m^3
1.3 million (UU) ? 2nd overflow: 16,528 l/s

Davyhulme STW is UU's largest STW and discharges to the Manchester Ship Canal. In July 2024, it was the focus of a Supreme Court Action whose judgement said that UU was liable for polluting the Manchester Ship Canal with 'foul water' even 'if there has been no negligence or deliberate misconduct'.
Davyhulme STW is included in this section because there is some confusion about the various storm overflows from which it can discharge treated and untreated sewage. Data from the EA appears to

define a rate for an Inlet storm overflow. But no such overflow is mentioned in the EA permit or in the annual EDM data series published online. On the other hand, although UU did not provide the EA with EDM data corresponding to spills from the storm tanks, it did provide EDM data described as "EDM to Environment (no storage)" for both 2021 and 2022. This title suggests it may be in relation to spills for a storm overflow not involving the storm tanks, for example an Inlet storm overflow.

Fig. 38 shows the entry for Davyhulme STW from a dataset provided by the EE to WASP in May 2020 entitled **THM160685 - Storm tank size calculations for STWs in England**. There appear to be 2 storm overflow rates defined. The first, in column 5, defines the rate (82634 l/s) at which untreated sewage must be passed forward for treatment when there is diversion to, or discharge from, the storm tanks. The second rate, 16,528 l/s in column 8, is where an Inet storm overflow rate would normally be defined. The column is entitled "STW SCREENED STORM (CSO) PERMITTED PASS FORWARD RATE/OVERFLOW SETTING". There is no mention of an Inlet overflow in any of the permit variations that WASP has obtained for Davyhulme STW.

STW NAME	FINAL EFFLUENT PERMIT NO.	PE	SETTLED STORM (Storm Tank) PERMIT NO.	SETTLED STORM (Storm Tank) PERMITTED PASS FORWARD FLOW RATE / OVERFLOW SETTING (l/s)	STORM TANK PERMITTED VOLUME (m^3)	STW SCREENED STORM (CSO) PERMIT NO.	STW SCREENED STORM (CSO) PERMITTED PASS FORWARD FLOW RATE / OVERFLOW SETTING (l/s)	Permitted Max Flow to Storm Storage (l/s) (CSO setting - FFT setting)
DAVYHULME	016940143	760,834	016940143	8263.89	45,000 for Tanks 1, 2 & 3 via outlet 1, 45,000 for Tanks 4, 5 & 6 via outlet 1	016940143	16528	8264.1

Figure 38: entry from the STW Storm Tank size document provided to WASP in 2020 by the EA

2021

The 2021 overview for Davyhulme STW is shown in **Fig**. 39.

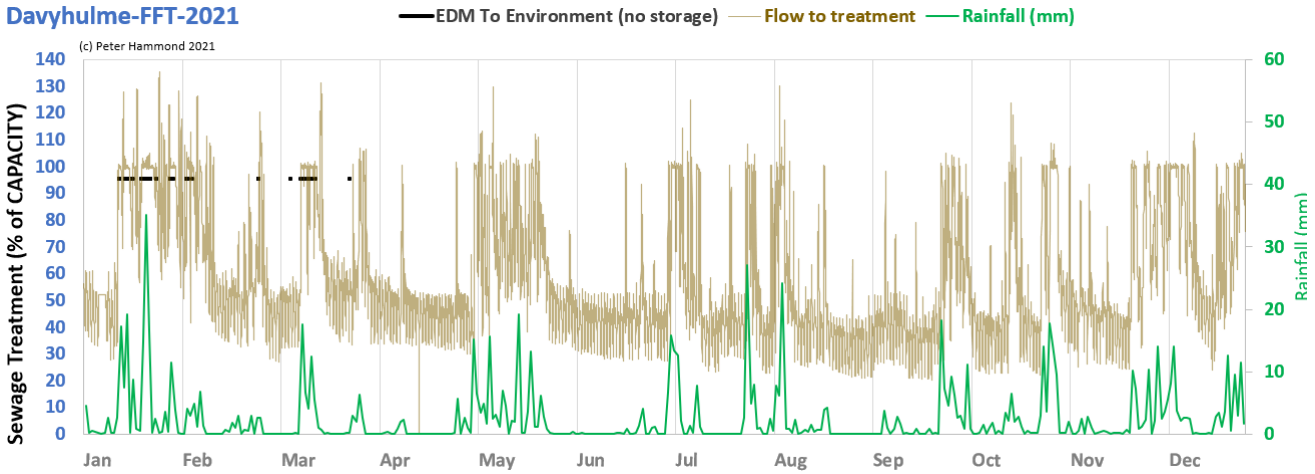


Figure 39: 2021 overview for Davyhulme STW for flow to treatment and EDM to Environment

The EDM data provided by the EA clearly is consistent with the rainfall and flow to full treatment data, although only for the few months it was provided. If this EDM data does correspond to an Inlet storm overflow then it should have been declared as such. If it corresponds simply to diversion of

untreated sewage to storm tank then it is inaccurately named. Either way, it appears to indicate breaches of permit conditions. This can be seen with closer scrutiny.

Figure 40 shows how on 6 days this EDM data recorded untreated sewage flow, possibly for an Inlet overflow or maybe for diverting flow to a storm tank.

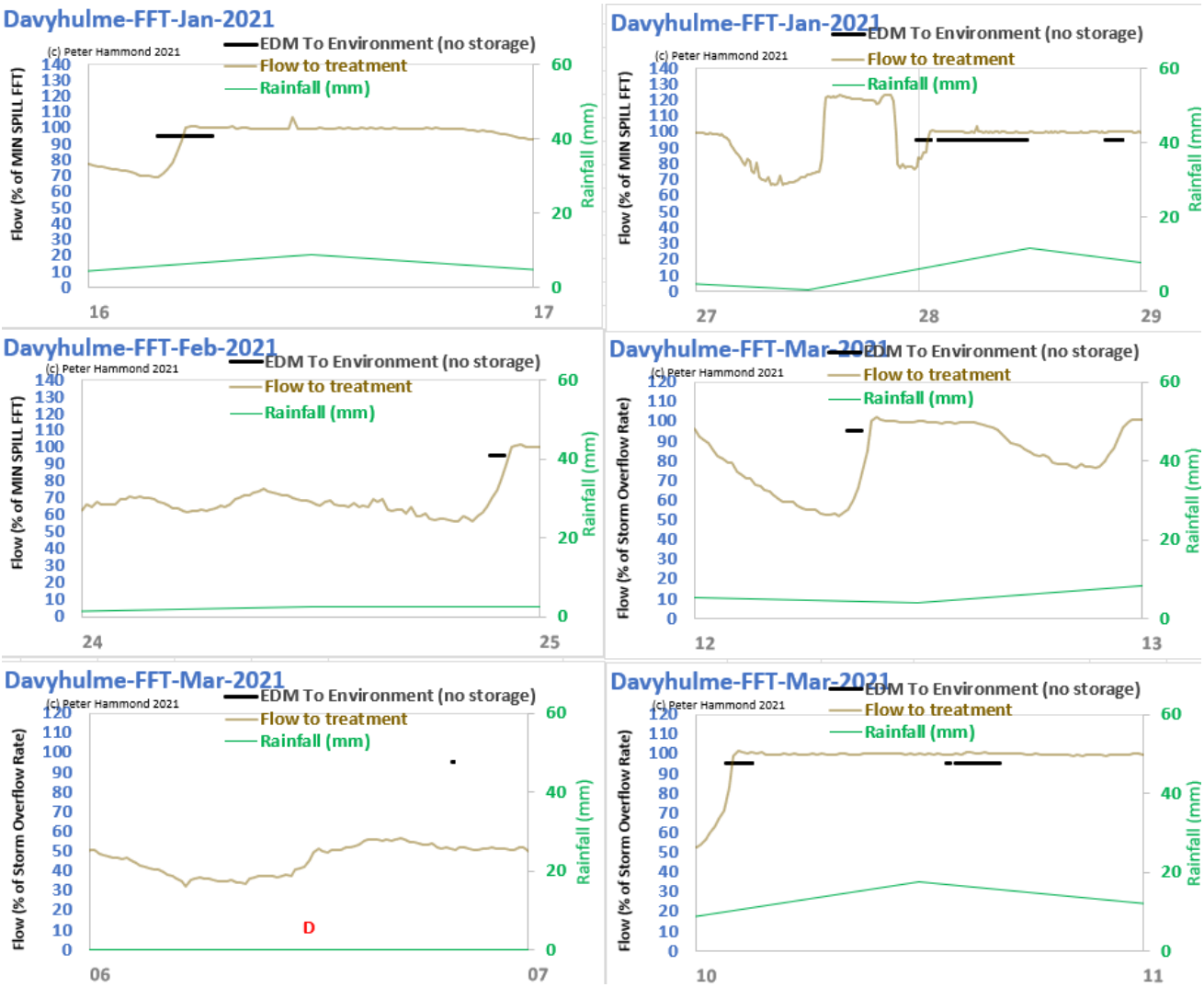


Figure 40: rainfall, sewage flow to full treatment and "EDM To Environment (no storage)" data

The Davyhulme STW permit contains the following clauses about storm tank usage

> (b) The storm tank storage capacity indicated must be fully utilised before a discharge occurs. It shall only fill when the flow passed forward exceeds the overflow setting indicated due to rainfall and/or snow melt and only with flows in excess of that figure and shall be emptied and its contents returned to the continuation sewer as soon as practicable.

If the EDM relates to diversion of flow to storm tanks (indicated by the black horizontal segments) then they occur before the flow reaches the permitted threshold and hence suggest that the permit condition above was breached on each occasion.

2.2 Bolton STW UNLABELLED INLET AND STORM TANK EDM DATA

Population served: 319,714 (EA) Storm tank overflow: 2,800 l/s Storm Tank Min: 22,587 m^3

Inlet overflow: 4,456 l/s

Bolton STW discharges to the River Irwell which rises at Irwell Springs on Deerplay Moor and eventually joins the River Mersey at Irlam.

2021 No data provided

2022

The 2022 spill hours in UU's annual submission to the EA were Storm Tank: 1,498 and Inlet: 348. These do not add to the 2,108 hours which is the sum of the 314 unlabelled, individual EDM detected intervals provided by the EA to WASP.

Ignoring overflow locations, the annual overview for Bolton STW for 2022 is as follows (**Fig**. 41).

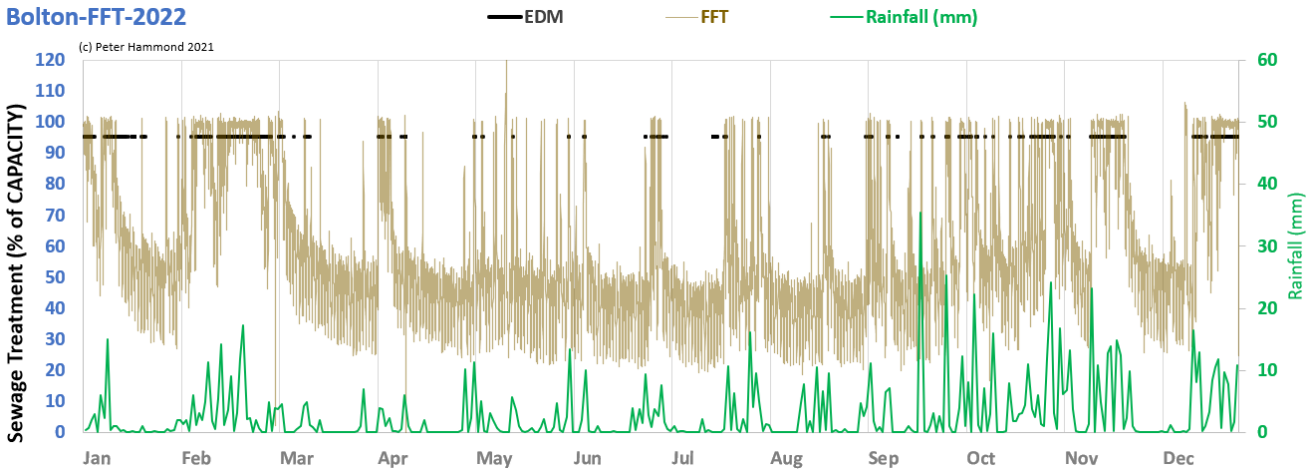


Figure 41: 2022 overview for Bolton STW: sewage treatment (UU-TDV) and spill from storm tanks

In order to use the EDM data to check permit compliance, the 314 intervals would first have to be partitioned into disjoint sets corresponding to the Inlet and Storm Tank overflows. Clearly, this would be a tiresome and possibly impossible task to undertake, especially galling given that UU has withheld the labels to frustrate investigation. For illustrative purposes, WASP has completed the partitioning for a few short time periods. For example, in January and February, it is possible to separate out some likely Inlet and Storm Tank overflow intervals (**Fig. 42**).

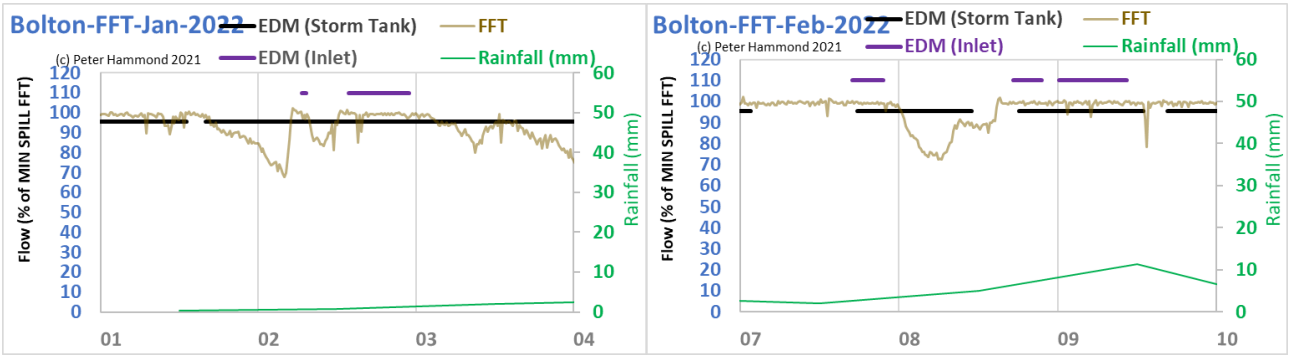


Figure 42: treatment flow, rainfall and Inlet/Storm Tank EDM intervals for selected time intervals

Firstly, it appears that the storm tank spills do not always coincide with a treatment rate that is above the permit threshold. So either the data are reliable and hence the spills/diversions are illegal or they are unreliable and the EDM data cannot support compliance checking. Secondly, the overlap between storm tank and Inlet EDM intervals can be used to estimate the volume of untreated sewage that was discharged. The overlap during the periods Jan 1-3 and Feb 7-9 is about 28 hours and corresponds to storm tank spills of more than 160 million litres or 64 Olympic swimming pools.

2.3 Barrow STW UNLABELLED INLET AND STORM TANK EDM DATA

Population served: 64,280 Storm tank overflow: 688 l/s Storm Tank Min: 6,345 m^3
Inlet overflow: 1,544 l/s

Barrow STW discharges to the Walney Channel.

2021

The 2021 spill hours in UU's annual submission to the EA were Storm Tank: 936 and Inlet: 469. These do not quite match the 1,418 hours which is the sum of the 250 unlabelled, individual EDM detected intervals provided by the EA to WASP. Ignoring overflow locations, the annual overview for Barrow STW for 2021 is as follows (**Fig**. 43).

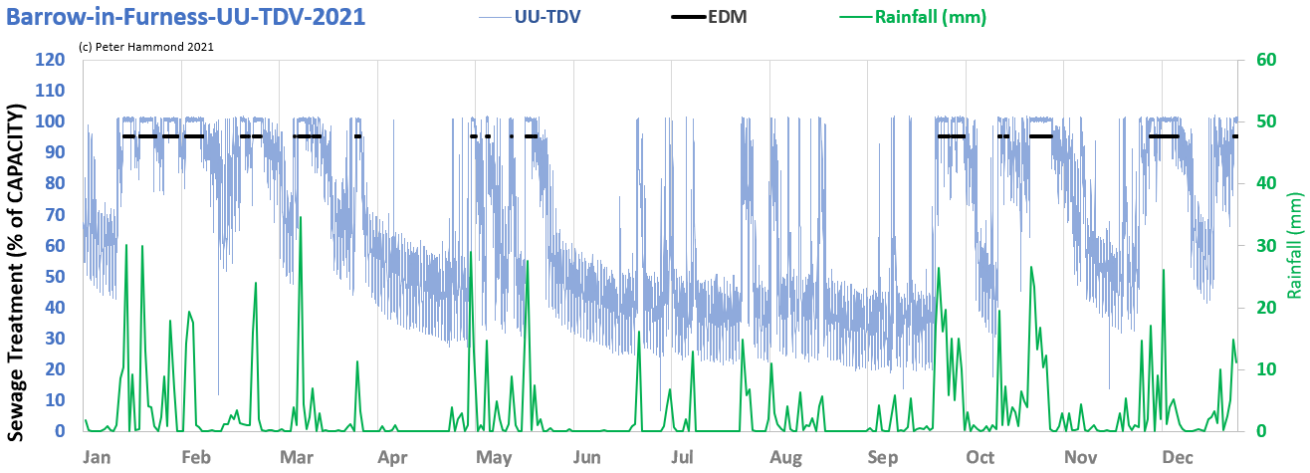


Figure 43: 2021 overview for Barrow STW: sewage treatment (UU-TDV) and unlabelled EDM data

In order to use the EDM data to check permit compliance, the 250 intervals would first have to be partitioned into disjoint sets corresponding to the Inlet and Storm Tank overflows. WASP has completed the partitioning for a few short time periods. For example, in May, it is possible to separate out some likely Inlet and Storm Tank overflow intervals (**Fig. 44**).

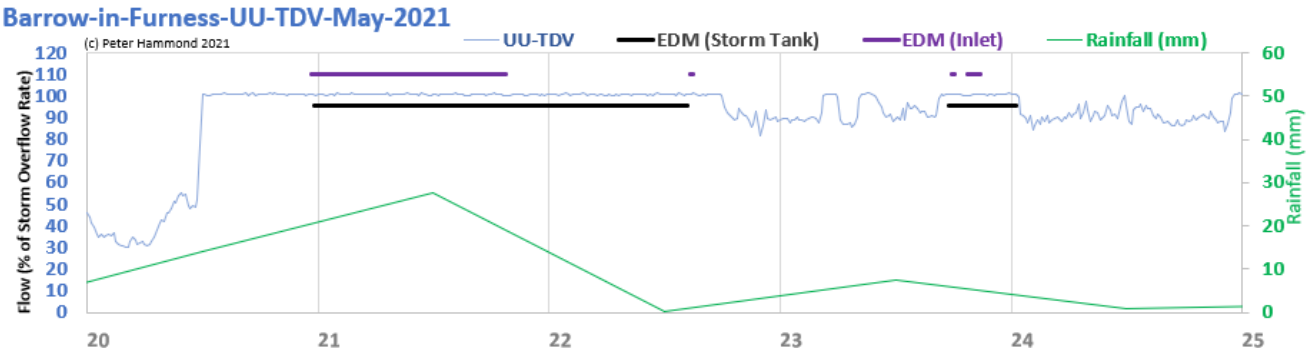


Figure 44: treatment flow, rainfall and Inlet/Storm Tank EDM intervals for selected time intervals

The overlap for simultaneous Inlet and Storm Tank EDM operation is about 22 hours when more than 65 million litres of untreated sewage was spilled in that time via the storm tanks – equivalent to 26 Olympic Pools worth. The two long storm tank spills are cleanly defined and clearly within permit.

2022

The 2022 spill hours in UU's annual submission to the EA were Storm Tank: 556 and Inlet: 188. This perfectly matches the 743 hours which is the sum of the 195 unlabelled, individual EDM detected intervals provided by the EA to WASP.

Ignoring overflow locations, the annual overview for Barrow STW for 2022 is as follows (**Fig**. 45).

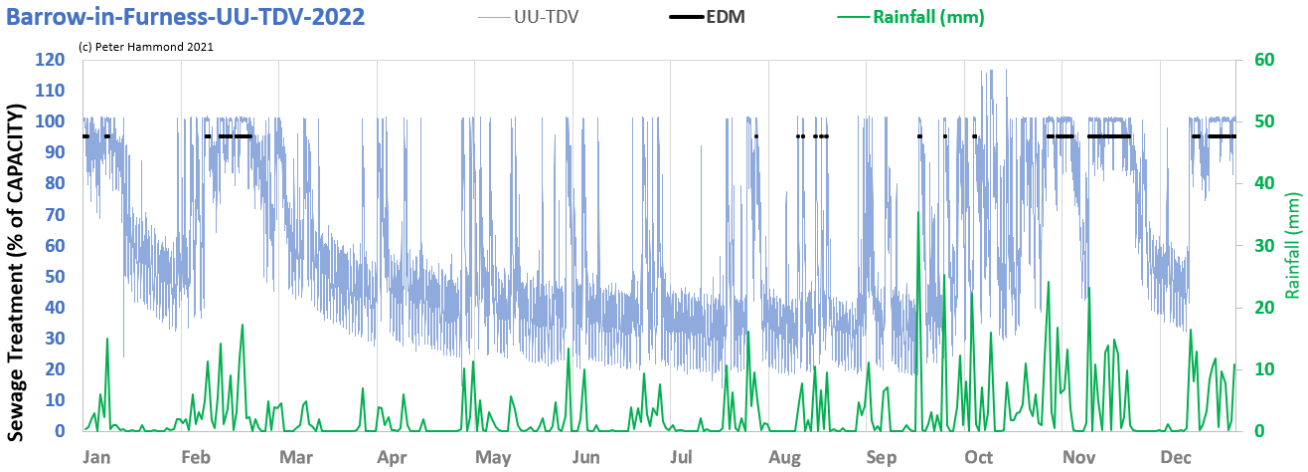


Figure 45: 2022 overview for Barrow STW: sewage treatment (UU-TDV) and unlabelled EDM data

In order to use the EDM data to check permit compliance, the 195 intervals would first have to be partitioned into disjoint sets corresponding to the Inlet and Storm Tank overflows. WASP has completed the partitioning for a few short time periods in (**Fig. 46**).

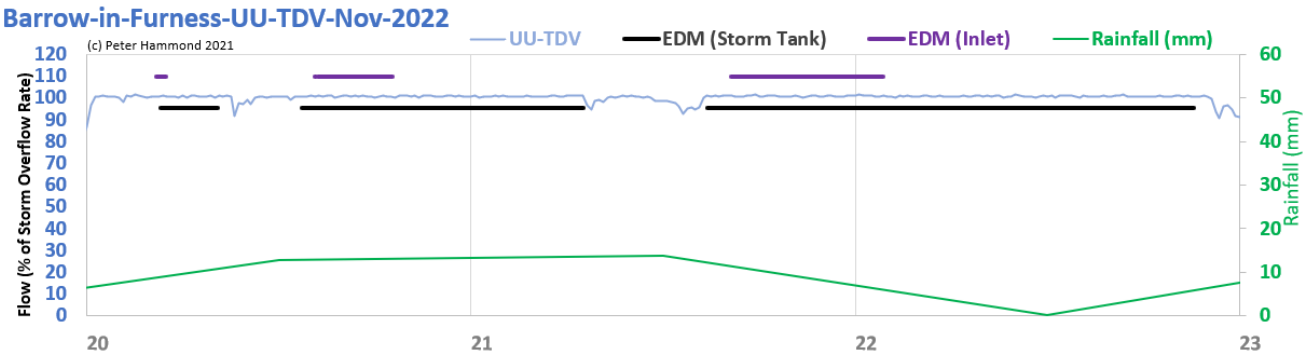


Fig**. 46:** treatment flow, rainfall and Inlet/Storm Tank EDM intervals for selected time intervals

The overlap for simultaneous Inlet and Storm Tank EDM operation in Fig. 44 is about 15 hours when almost 45 million litres of untreated sewage was spilled in that time via the storm tanks – equivalent to 18 Olympic Pools worth. The three storm tank spills are cleanly defined and clearly within permit.

2.4 Bury STW UNLABELLED INLET AND STORM TANK EDM DATA

Population served: 152,011 Storm tank overflow: 2,361 l/s Storm Tank Min: 20,153 m^3
Inlet overflow: 5,197 l/s

Bury STW discharges to the River Irwell.

2021

The 2021 spill hours in UU's annual submission to the EA were Storm Tank: 1,316 and Inlet: 66. These do not quite match the 1,418 hours which is the sum of the 1,606 unlabelled, individual EDM detected intervals provided by the EA to WASP. Ignoring overflow locations, the annual overview for Bury STW for 2021 is as follows (**Fig**. 47). Generally speaking, the treatment rate looks to be above the permit threshold but strictly speaking the compliance checking requires the separate spill data for each overflow.

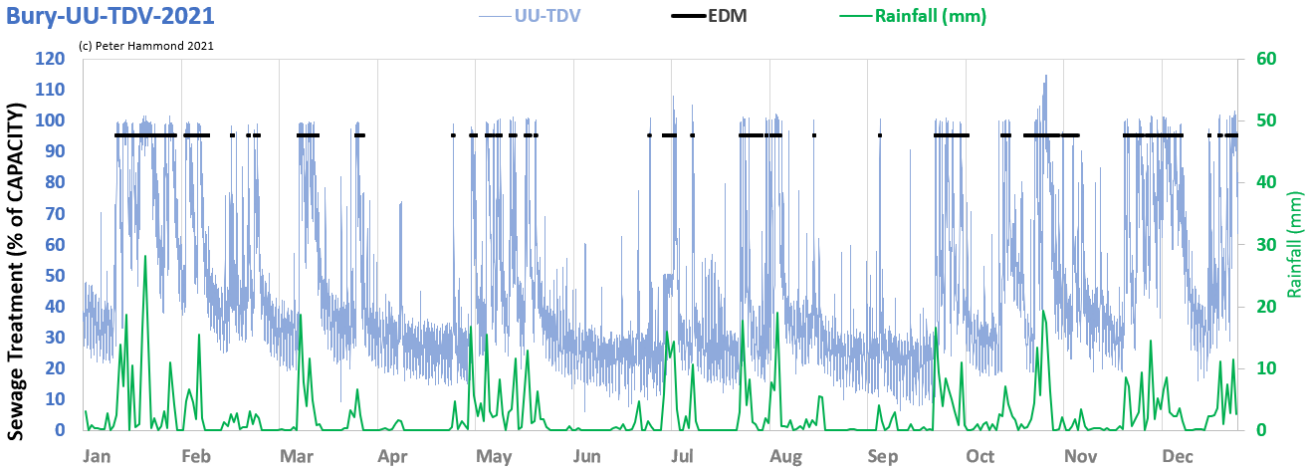


Figure 47: 2021 overview for Bury STW: sewage treatment (UU-TDV) and unlabelled EDM data

In order to use the EDM data to check permit compliance, the 1,606 intervals would first have to be partitioned into disjoint sets corresponding to the Inlet and Storm Tank overflows. WASP has completed the partitioning for a few short time periods. For example, in July, it is possible to separate out some likely Inlet and Storm Tank overflow intervals (**Fig. 48**).

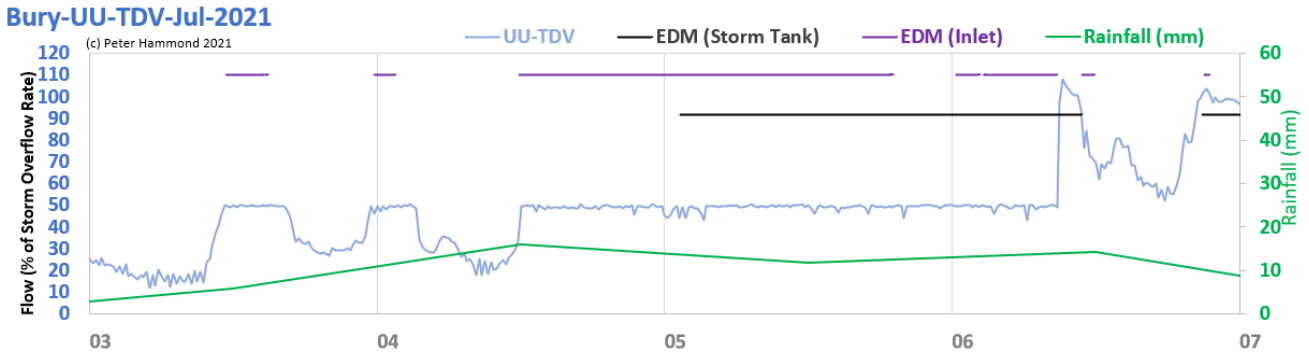


Fig**. 48:** treatment flow, rainfall and Inlet/Storm Tank EDM intervals for selected time intervals

On July 5th and 6th, the Inlet and Storm Tank overflows appear to have been simultaneously in operation for about 26 hours. As the treatment data is well below the permit threshold (at about 50%) for the Storm Tank overflow during that overlap, Bury STW illegally spilled over 350 million litres of untreated sewage – equivalent to 140 Olympic Pools worth!

SECTION 3: STWs with data not sufficiently reliable to disentangle all legal and illegal spills

This section deals with STWs where the sewage treatment flow, EDM spill and rainfall are not convincingly consistent or appear unreliable. Many of these STWs have EDM data omitting likely spills (false negative) or including spills that are unlikely (false positive). Some spill intervals appear to be extended well beyond consistent flow and/or rainfall data. Others appear overextended by linking together several convincing spills into a single spill that now includes subregions where spilling looks very unlikely given the treatment flow and rainfall data.

3.1 Longton STW **FALSE NEGATIVE SPILLS**

Population served: 13,792 Storm tank overflow: 90 l/s Storm Tank Min: 648 m^3

Longton STW discharges to the Tarra Carr Gutter just before it joins the River Douglas which soon flows into the River Ribble close to the mouth of the Ribble Estuary, a Special Protection Area EC Directive and SSSI. It is internationally important for wintering waterbirds.

2021

Annual spill hours Storm Tank: 564 0 Illegal spilling days: ? up to 20 false NEGATIVES

Spill frequency reason: Not asset maintenance - Hydraulic capacity

The 2021 overview for Longton STW is shown in **Fig**. 49.

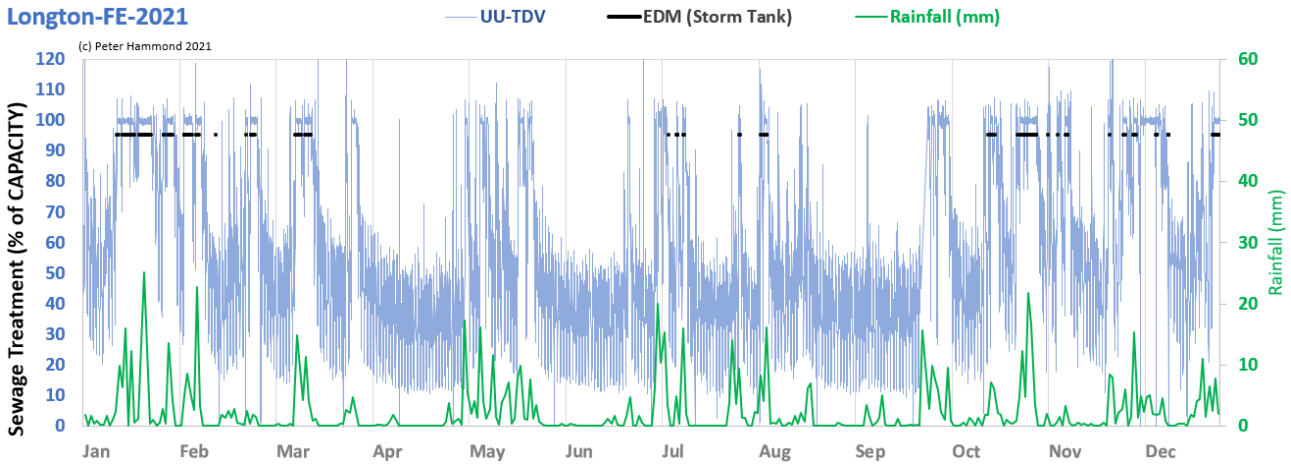


Figure 49: 2022 overview for Longton STW: sewage treatment (UU-TDV) & EDM detection at storm tanks

The EDM detected spill intervals are crisp and accurately separated throughout the year. But given the amount of spilling detected during wet periods in Jan-Feb, Oct-Nov and Nov-Dec, it seems odd that there were no spills detected in the wet periods in May and Sept-Oct. **Fig.** 50 shows the clean definition and separation of EDM spill intervals in January 2021.

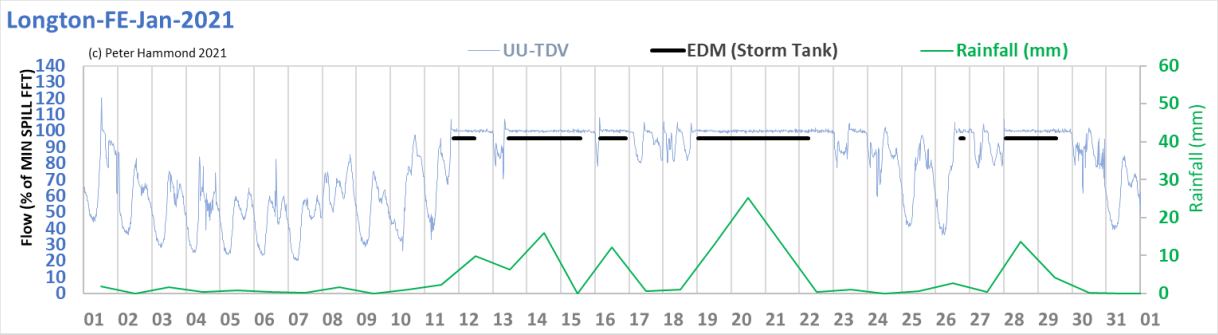


Figure 50: January 2022 with well separated EDM intervals consistent with treatment and rainfall data

The treatment flow data in early October (**Fig**. 51) could just reflect diversion of flow to the storm tanks but when compared to the January data, it is not unreasonable to expect to see spills occurring in the midst of similar rainfall and treatment flow combination in October (**Fig**. 51) and other months.

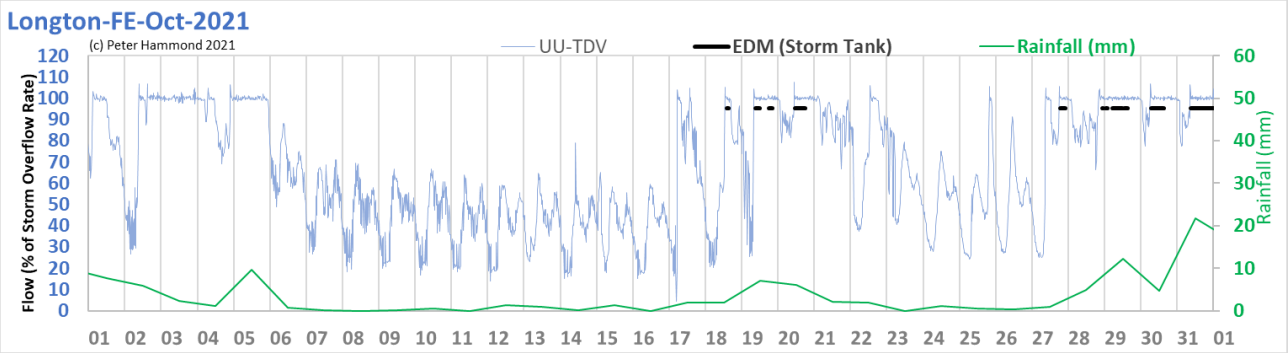


Figure 51: October 2022 with similar treatment flow and rainfall combinations with no EDM spill detection early in the months compared to spills detected mid- and end-of-month

WASP suggests that the EDM may have failed to detect spills during several wet periods in the year.

3.2 Burnley STW EXTENDED EDM INTERVALS

Population served: 106,021 Storm tank overflow: 1,020 l/s Storm Tank Min: 9,536 m^3

Burnley STW discharges treated effluent to the River Calder and from its storm tanks to Pendle Water.

2022

Annual spill hours Storm Tank: 1,246 75 Illegal spilling days if EDM data are assumed reliable
Spill frequency reason: Performance - Other maintenance / capital works (e.g. jetting)

Despite being installed in 2019, the EDM on the storm tanks at Burnley STW was continuing to produce unreliable data at the beginning of 2022. However, there is an obvious improvement half-way through the year.

If the EDM data are assumed to be reliable throughout the year, then the number of days with illegal early spills between January and June would be 30 and for the rest of the year just 6.
The 2022 overview for Burnley STW is given in **Fig**. 52.

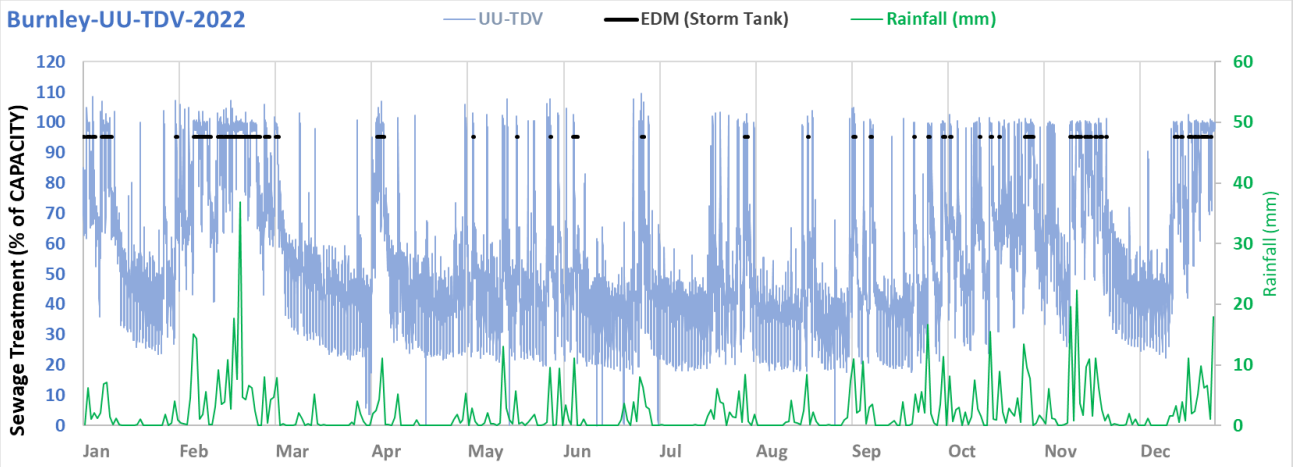


Figure 52: 2022 overview for Burnley STW: sewage treatment (UU-TDV) & EDM detection at storm tanks

To illustrate the difference in EDM reliability consider **Fig.** 53 which shows February with many extended intervals and October with much tighter defined EDM intervals with hardly any overlap into regions where a spill is unlikely.

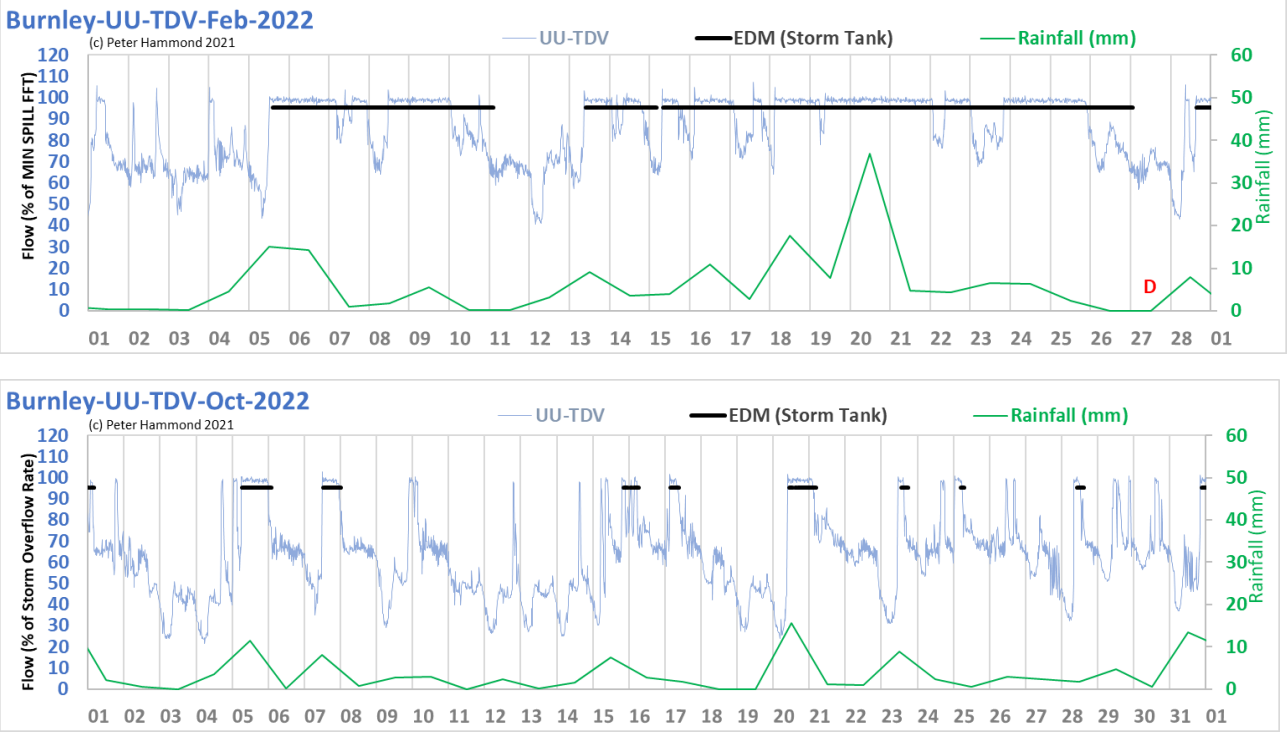


Figure 53: February contains multiple likely spills coalesced into two extended spills covering regions where spilling was unlikely judging by rainfall and treatment data; in contrast, October contains well separated EDM intervals with no extension and no overlap with unlikely spill regions.

An obvious consequence is that the declared total spill hours for 2022 for Burnley STW is much less than is supported by the rainfall and treatment data. The solution here would be to have a reliable flow meter on the storm tank overflow recording flow not frequency and duration. This is precisely how final effluent and flow to treatment metering has been made for decades.

3.3 Kidsgrove STW FALSE POSITIVES

Population served: 25,097 Storm tank overflow: 227 l/s Storm Tank Min: 1,870 m^3

Kidsgrove STW discharges to the Kidsgrove Stream.

2022

Annual spill hour: 279 EDM: 96.83%

Spill frequency reason:

The annual overview for 2022 for Kidsgrove STW is shown in **Fig**. 54.

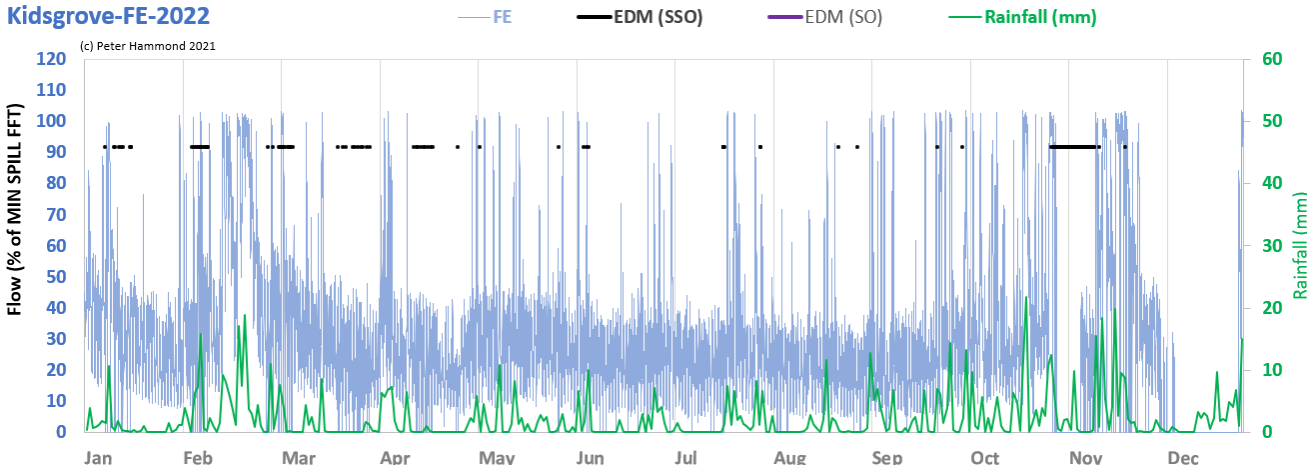


Figure 54: 2022 overview for Kidsgrove STW

The false positives can be seen on the overview chart. On closer inspection, they appear to many short spills, likely due to (unreported) EDM malfunction (**Fig**. 55) during availability of 96.83%.

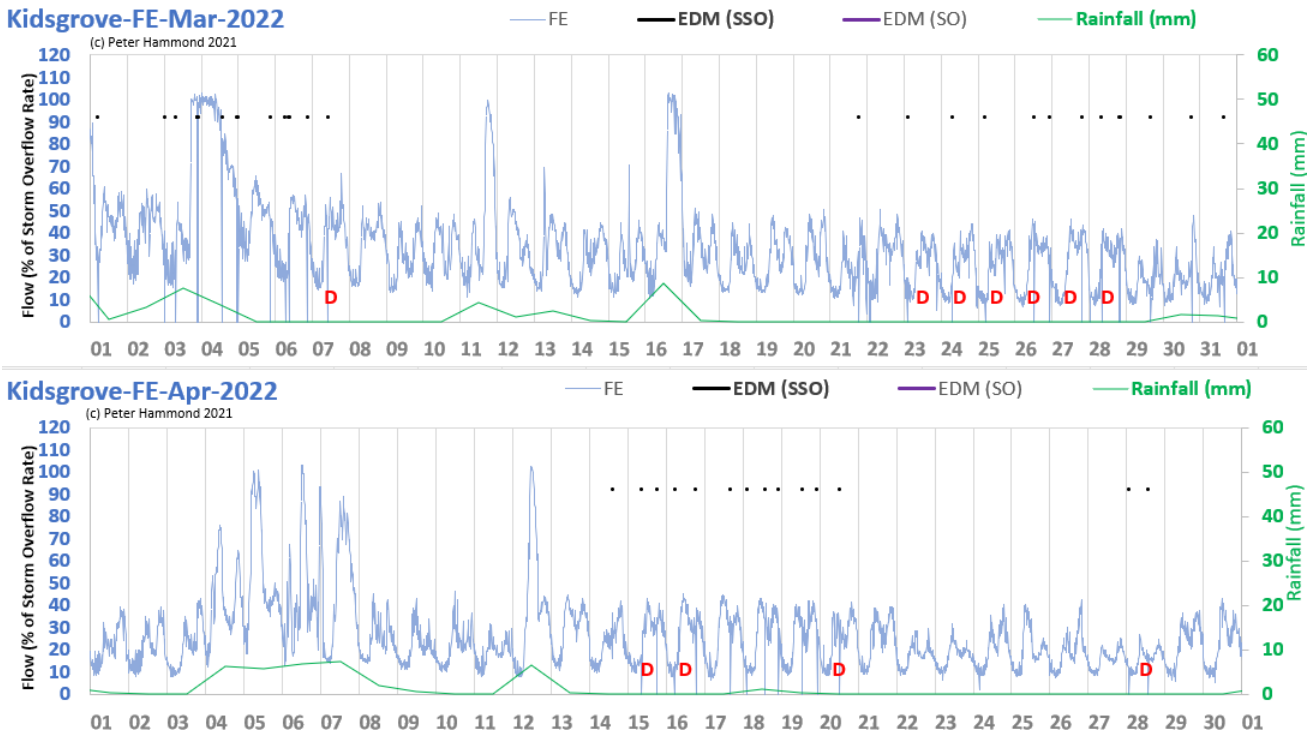


Figure 55: examples of very short false positive spills mistakenly reorded by EDM malfunction

3.4 Crewe STW EXTENDED INTERVALS

Population served: 90,000 Storm tank overflow: 812.5 l/s Storm Tank Min: m^3

Crewe STW discharges to the River Weaver.

2022

Annual spill hour: 993 EDM: 100%

Spill frequency reason: Not asset maintenance - Hydraulic capacity

The annual overview for 2022 for Crewe STW is shown in **Fig**. 56.

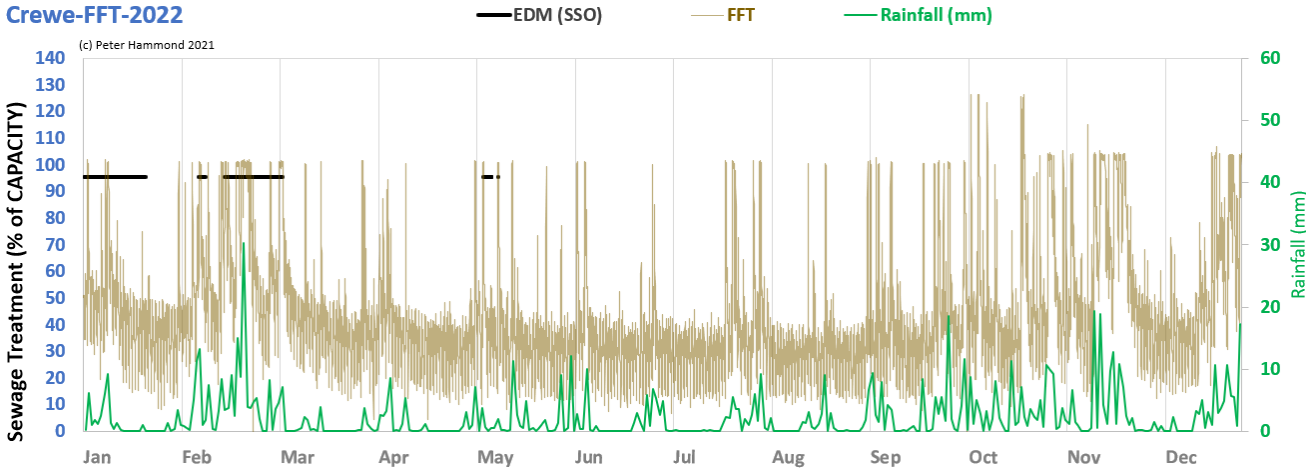


Figure 56: 2022 overview for Crewe STW

The extended EDM intervals are clearly seen in the overview chart and even more obviously on closer inspection (**Fig.** 57).

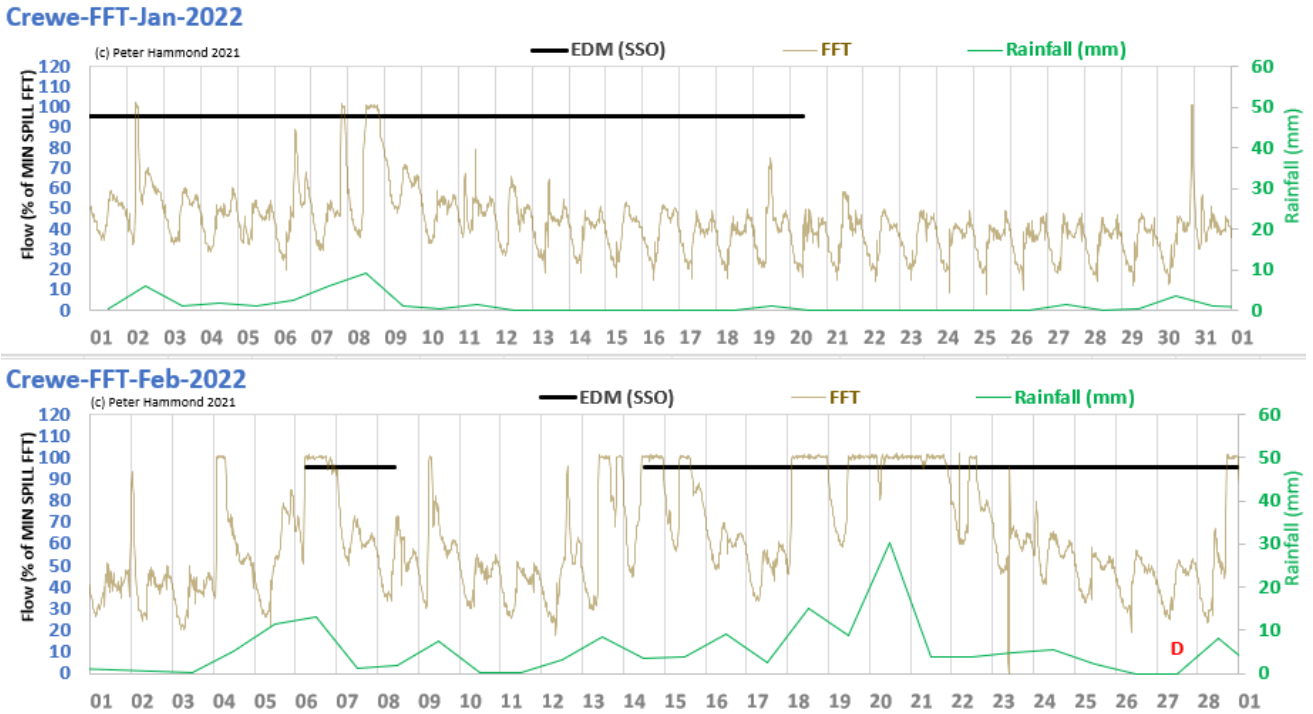


Figure 57: examples of hugely extended EDM intervals including long regions where spills are unlikely

The EDM data are extremely unreliable for this Crewe STW.

PREVIOUS WASP REPORTS

2021 Mar	**Detection of untreated sewage discharges to watercourses using machine learning** WASP publishes first AI research on automated detection of sewage spills	
Nov	**Wasp Review Of Unpermitted Spills From Sewage Treatment Works – Part 1 Thames Water** WASP reveals 700+ illegal spills by Thames Water	
2022 Jan	**Wasp Review Of Unpermitted Spills From Sewage Treatment Works – Part 2** WASP reveals 2,400 illegal spills by 7 water companies: Southern, South West, Thames, United Utilities, Welsh, Wessex & Yorkshire.	
Sept	Wasp Review of Unpermitted Spills From Sewage Treatment Works – Part 3 EDM Submissions WASP reveals dodgy sewage spill monitoring data submitted to EA by Water Companies.	
2023 Feb	The failure of Operator Self-Monitoring WASP shows how self-testing of sewage treatment quality has failed and how the system can be manipulated by Water Companies.	
May	Effective regulation of untreated sewage discharges needs volumetric and catchment-based monitoring WASP estimates volumes of sewage spills and shows how pollution exposure progresses down a river catchment from the headwaters.	
Aug	Sewage spills and infrastructure: don't blame the Victorians WASP dispels the myth about Victorian sewerage networks. Only 12 % of all sewers in England are Victorian in age.	
Oct	Illegal sewage discharges to 11 Welsh rivers 2018 to 2023 WASP shows 2,274 days with illegal sewage discharges to 11 Welsh rivers from 2018 to 2023 and reveals that one, Cardigan STW, has been in breach of its permit for a decade without criminal prosecution.	
2024 Jun	**Event duration monitors are not fit for purpose** WASP demonstrates that even when sewage spill monitors are working they often generate inaccurate data. In 2026, such data is planned to be a metric for the EA's annual review of water companies – "a system built on sand".	