Should the Victorians be blamed for the river sewage pollution scandal

or is it lack of investment and weak regulation in the 21st Century?

Peter Hammond, Windrush Against Sewage Pollution

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Background

The Victorians continue to be cited by regulators, politicians and the water industry as responsible for the sewage pollution of waterways that has attracted powerful public disapproval and mountainous media attention.

In March 2023, Sir James Bevan, just before ending 8 years as CEO of the Environment Agency, referred to fixing the "***Victorian sewerage*** *system*" in evidence to the EFRA Committee[1].

In April 2023, at the launch of the Plan for Water[2], Secretary of State at the Department for Environment, Food and Rural Affairs (Defra), Dr Therese Coffey, referred to the "***Victorian sewage network*** *creaking*" and a week later[3] wrote "*Sewage overflows stem from our principally* ***Victorian infrastructur****e*".

In May 2023, Water UK's great awakening and admission[4] of poor past performance by water companies in respect of untreated sewage spills said there was to be

> *"the biggest modernisation of* ***sewers since the Victorian era****"* Water UK

and in July 2023, in response to the latest performance assessment of the water industry by the Environment Agency said[5]

> *"The industry is strongly committed to accelerating the pace of improvement, including with a £10bn overhaul of our* ***Victorian sewage system*** *to transform our rivers and seas."* Water UK

Are these comments aimed at the sewerage infrastructure: the sewer networks, the pumping stations and the wastewater treatment works? Or, do they simply refer to the use of combined sewer overflows (CSOs), first introduced in Victorian times, whereby surface runoff and human wastewater end up in the sewerage system and excess is permitted to overflow to inland and coastal waters in specific circumstances. Such loose language does not help the public understanding of the situation.

The aim of this short report is to introduce some clarity and address specific questions such as

> *"Is the current sewer network Victorian in age?"*
>
> "*Are Victorian sewer networks more likely than other infrastructure to be associated with discharges of untreated sewage?"*
>
> *"Has there been sufficient investment in sewer network construction in the 21st Century?"*

[1] https://committees.parliament.uk/oralevidence/12822/html/

[2] https://www.wired-gov.net/wg/news.nsf/articles/The+Plan+for+Water+06042023112000?open

[3] https://conservativehome.com/2023/04/12/therese-coffey-cleaning-up-our-water-is-my-mission-but-there-are-no-short-cuts-or-easy-answers/

[4] https://www.water.org.uk/news-item/apology-transformation-programme/

[5] https://www.water.org.uk/news-item/response-to-the-environment-agencys-annual-report-on-environmental-performance-3/

Victorian sewer networks and untreated sewage spills

According to a report by Arup/Vivid Economics (Table 1)[6], less than 12% of the sewer network in England and Wales was constructed during Queen Victoria's reign - which ended in 1901. Visualising that data, Figure 1 shows the construction age of sewers in 10 regions served, since 1989, by the 9 privatised water companies in England and the not-for-profit operator in Wales: pre-1880, post 2001 (to 2016) and in 20-year bands between.

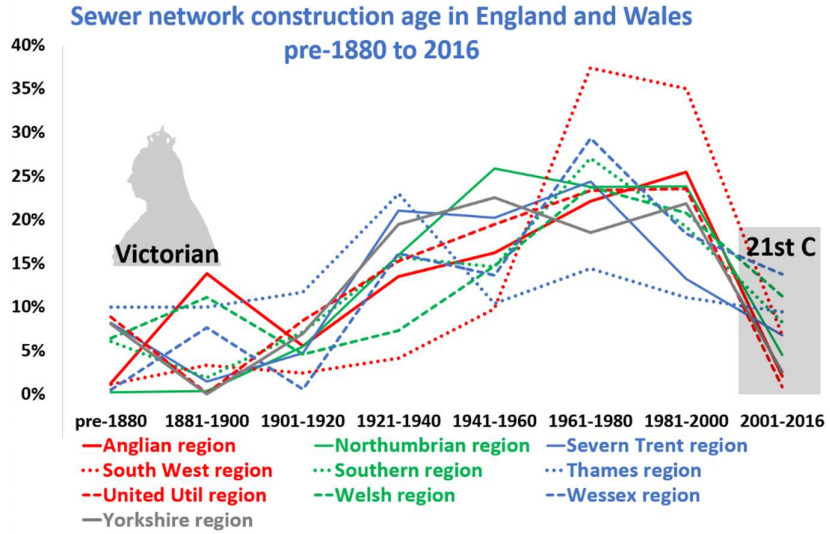

Figure 1: proportion of sewer network constructed pre-1880 to 2016 across 10 regions of England and Wales corresponding to post privatisation sewerage provision (Data: Arup/Vivid Economics, 2017)

The Thames region unsurprisingly, as it includes London, has the highest proportion of Victorian sewers at 20%. In contrast, less than 1% of the Northumbrian region's sewer network is Victorian and in the last 40 years of the 20th Century, the South West region achieved the greatest proportion of contemporary sewers while the Thames region achieved the least.

Rather than tease out the age profile of sewers in a specific region from a very busy chart, consider Figure 2 which summarises sewer construction during the same time periods as Figure 1 but for the water industry as a whole. It reflects sewer construction in England and Wales from the late 19th Century, through the 20th Century until the construction nosedive in the 21st Century.

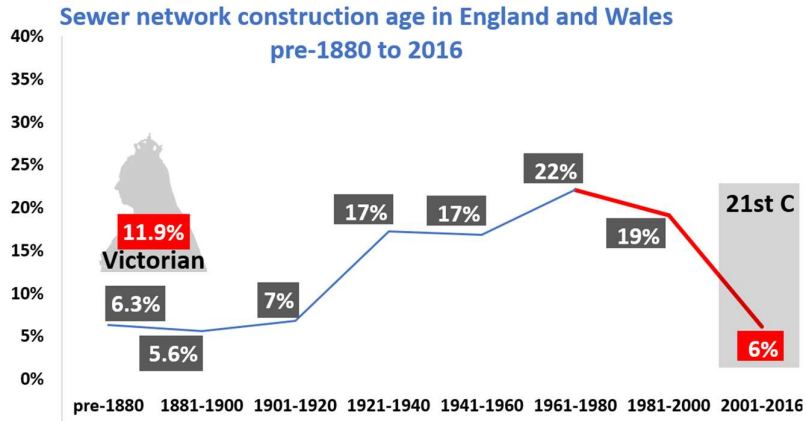

Figure 2: sewer network construction pre-1880 up to 2016 (Data: Arup/Vivid Economics, 2017)

[6] https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/looking-to-the-future/understanding-the-exogenous-drivers-of-wholesale-wastewater-costs-in-eng....pdf

According to the 2023 annual performance reports of the 10 water companies (Table 2), 37,511 kms of sewers were constructed in England and Wales in 2001-2023. The Victorian proportion may have been reduced by the new build so certainly remains less than 12%. Hence, the answer to the first question posed earlier is a resounding "*No, our sewer network is not principally Victorian*".

A thorough investigation of whether or not untreated sewage spills are more frequently associated with Victorian sewers requires knowledge of where spills occur in the sewerage system: on the sewer network, at a pumping station or at a sewage treatment works. Figure 3 shows the 2021 average number of spills per overflow for each water company grouped by overflow type

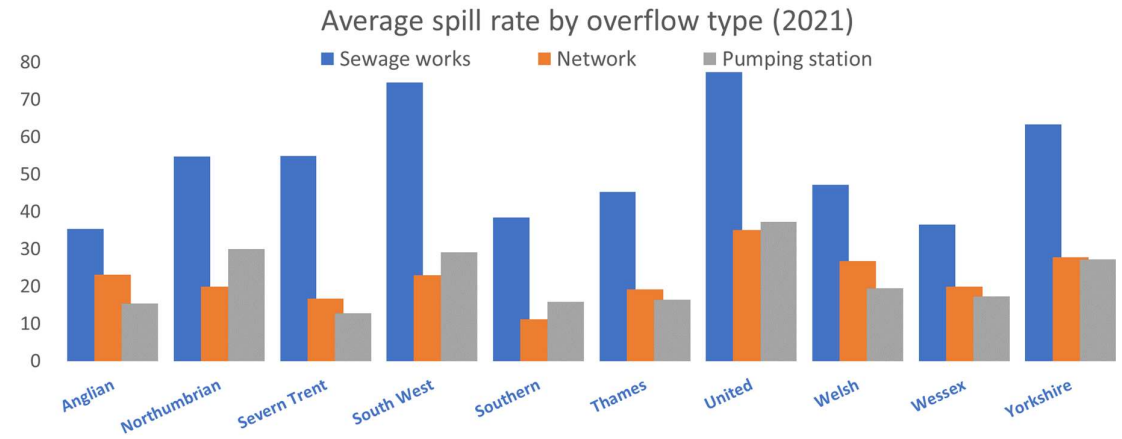

Figure 3: annual spill rate in 2021 for overflows at sewage works, on the sewage network or at pumping stations
(Date: Environment Agency in England; Welsh figure only for overflows in England)

Clearly, in 2021, overflows at sewage treatment works discharged untreated sewage much more frequently than those on the network or at sewage pumping stations. For overflows on sewage networks, there appears to be no obvious correlation between average spill rate and the proportion of Victorian sewers, as is suggested by Figure 4.

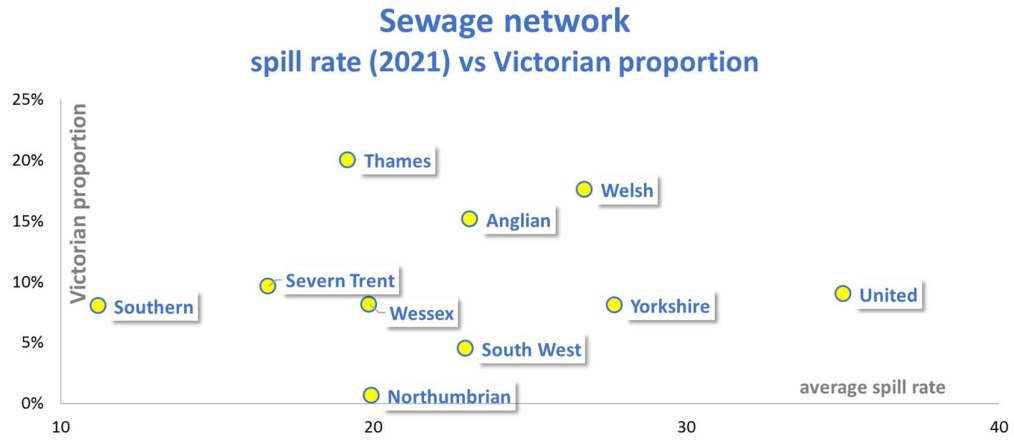

Figure 4: % of Victorian sewers in network vs average number of spills per overflow in 2021
(Data: 2021 Environment Agency; water company annual performance reports)

It appears, therefore, that the answer to the second question above is

"*No, Victorian sewer networks are not more likely to be involved in spills of untreated sewage*".

Investigation of the same question for sewage treatment works and sewage pumping stations would require water companies to publish much more detailed information about their construction age and subsequent maintenance.

What has been achieved in terms of sewer construction by water companies in the 21st Century?

Arup/Vivid Economics reported the proportion of 21st century sewers in the network across England and Wales to be 6% in 2017. Between then and 2023, that has risen to 6.5% (Table 2/Figure 4). At 1.9%, United Utilities, the sponsor of the Arup/Vivid Economics study, has the lowest proportion of 21st Century sewers and, at 19%, Wessex Water has the highest. The only sewerage company rated by the Environment Agency as 4* and industry leading, Severn Trent Water, has 8% 21st Century sewers.

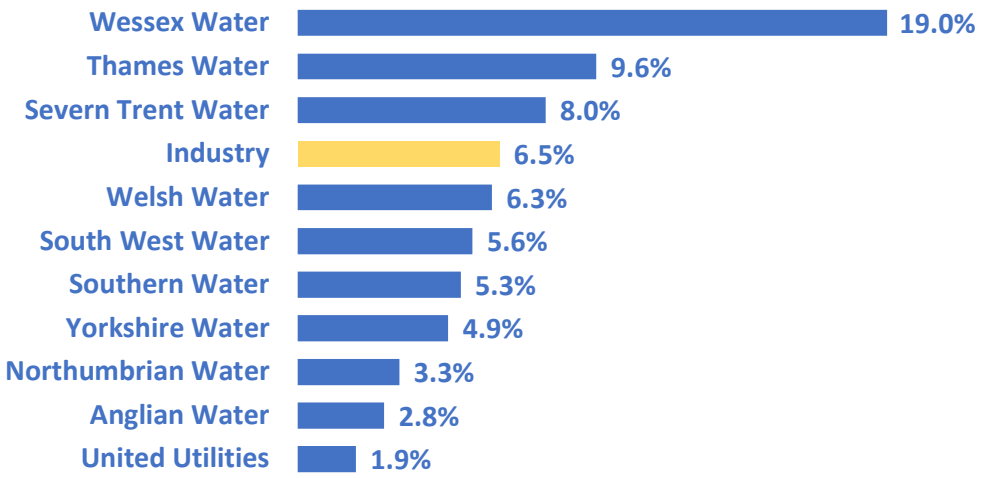

Figure 4: Proportion of sewer network constructed since 2001
(Data: 2023 Annual performance reports of water companies)

The answer to the third question posed earlier is

"No, there has not been sufficient investment in sewer network construction in the 21st Century?"

What have water companies said recently about sewer networks and the sewage pollution of inland and coastal waters in England and Wales?

With at most 8% of its sewer network Victorian and 5.3% 21st Century, Lawrence Gosden, CEO of Southern Water, said in May 2023[7] that his company will be

"investing significant money to build bigger infrastructure and redesign a legacy Victorian sewer system" Southern Water

In June 2023, Gill Rider, chair of Pennon Group which owns SouthWest Water and whose sewer network is at most 4.5% Victorian and 6.3% 21st Century, said[8]

"There is more we need to do, more rapidly, to modernise our Victorian sewage system".
SouthWest Water

Concluding remarks

Regulators, government and the water industry continue to cite Victorian infrastructure as a primary reason for untreated sewage spills. In response to Financial Times coverage of an earlier version of

[7] https://www.southernwater.co.uk/the-news-room/the-media-centre/2023/may/southern-water-response-to-water-uk-industry-plan-announcement
[8] https://www.telegraph.co.uk/business/2023/06/19/south-west-water-boss-gives-up-bonus-amid-sewage-leak/

this report by Gill Plimmer[9], Water UK claimed that 100,000 kms (17%) of the 576,239 kms of existing sewer network are combined with storm overflows. So, 12% of the existing sewers are Victorian in age according to the Arup report and 17% are Victorian in age or design as claimed by WaterUK. Both suggest it is unreasonable for Victorian sewers to be solely blamed for the toxic mix of untreated human waste and road surface runoff polluting our inland and coastal waters.

Without further data, it is not possible to decide if the "vintage" of sewage works and pumping stations is associated with higher levels of spilling. More likely, it is the lack of maintenance and investment that was expressed, in a broad review of infrastructure maintenance for the UK government, just before the Arup/Vivid Economics study appeared, as

"the longevity of assets is being pushed ('sweating the assets') due to a lack of funding for replacement infrastructure" [10]

The disparity of investment before and since water industry privatisation must surely bear the brunt of blame for leaving us with sewers where only 6.5% were constructed in the 21st Century. In future, comments on the causes of untreated sewage discharges must

a) specify which components of the sewerage system are being fingered with blame; and
b) compare pre-privatisation (before 1989) to the period post privatisation to the water industry's *mea culpa* of May 2023[11].

[9] https://www.ft.com/content/e298ca8d-ab02-4e1a-bae1-452004905cc6
[10] https://assets.publishing.service.gov.uk/media/57a08975ed915d622c00021b/EoD_Topic_Guide_Infrastructure_Maintenance_June2015.pdf
[11] https://www.water.org.uk/news-item/apology-transformation-programme/

	Region	Victorian	pre-1880	1881-1900	1901-1920	1921-1940	1941-1960	1961-1980	1981-2000	post 2001
ANH	Anglian	15.11%	1.26%	13.85%	5.54%	13.51%	16.20%	22.13%	25.44%	2.07%
NES	Northumbrian	0.62%	0.24%	0.38%	5.50%	15.94%	25.84%	23.76%	23.83%	4.51%
NWT	United Util	8.97%	8.86%	0.11%	8.44%	15.29%	19.51%	23.37%	23.57%	0.85%
SRN	Southern	7.99%	6.07%	1.92%	7.14%	15.73%	14.63%	27.07%	19.17%	8.26%
SVT	Severn Trent	9.63%	8.19%	1.44%	4.71%	21.07%	20.26%	24.34%	13.20%	6.79%
SWT	South West	4.49%	1.13%	3.36%	2.48%	4.12%	9.81%	37.40%	35.03%	6.67%
TMS	Thames	20.01%	10.01%	10.00%	11.67%	23.01%	10.43%	14.38%	11.08%	9.42%
WSH	Welsh	17.58%	6.45%	11.13%	4.61%	7.30%	14.73%	23.78%	20.76%	11.24%
WSX	Wessex	8.12%	0.49%	7.63%	0.58%	16.16%	13.65%	29.33%	18.37%	13.79%
YKY	Yorkshire	8.06%	8.04%	0.02%	6.99%	19.48%	22.52%	18.52%	21.87%	2.56%
	Industry	11.94%	6.33%	5.61%	6.77%	17.23%	16.84%	22.08%	19.07%	6.08%

Table 1 Construction age of sewer network across 10 regions of England and Wales
(Data: Arup/Vivid Economics report)

	Water company	Sewer construction post 2001 (km)	Sewer network @July'23 (km)	post 2001
ANH	Anglian[12]	2,156	77,284	2.8%
NES	Northumbrian[13]	992	30,237	3.3%
NWT	United Util[14]	1,491	79,039	1.9%
SRN	Southern[15]	2,102	39,973	5.3%
SVT	Severn Trent[16]	7,398	92,576	8.0%
SWT	South West[17]	1,299	23,028	5.6%
TMS	Thames[18]	10,530	109,355	9.6%
WSH	Welsh[19]	2,326	37,125	6.3%
WSX	Wessex[20]	6,667	35,089	19.0%
YKY	Yorkshire[21]	2,550	52,533	4.9%
	Industry	37,511	576,239	6.5%

Table 2 Sewers constructed across 10 regions of England and Wales between 2001 and 2023
(Data: 2023 Annual performance reports of water companies)

[12] https://www.anglianwater.co.uk/siteassets/household/about-us/anglian-water-annual-performance-report-2023.pdf
[13] https://www.nwg.co.uk/about-us/nwl/how-we-are-performing/annual-performance-report/
[14] https://www.unitedutilities.com/globalassets/documents/pdf/united-utilities-annual-performance-report-2022-23
[15] https://www.southernwater.co.uk/our-performance/reports/annual-reporting
[16] https://www.stwater.co.uk/regulatory-library/regulatory-library-documents/
[17] https://www.southwestwater.co.uk/siteassets/about-us/annual-report/2022-23-annual-performance-report-tables-excluding-tables-3a-3i---swb.xlsx
[18] https://www.thameswater.co.uk/media-library/home/about-us/investors/our-results/2023-reports/annual-performance-report-2022-23.pdf
[19] https://corporate.dwrcymru.com/-/media/Project/Files/Page-Documents/Corporate/Library/Annual-Performance-Reports/2022-2023/APR-Tables-parts-1-to-11-excluding-part-3.ashx
[20] https://corporate.wessexwater.co.uk/media/ieqel4hp/annual-performance-report-tables-2022-23.xlsx
[21] https://www.yorkshirewater.com/media/bpboezcj/annual-performance-report-2022-2023.pdf