Drainage and Wastewater Management Plan (DWMP)

Overview of the Stour River Basin Catchment

October 2022
Version 2

from Southern Water

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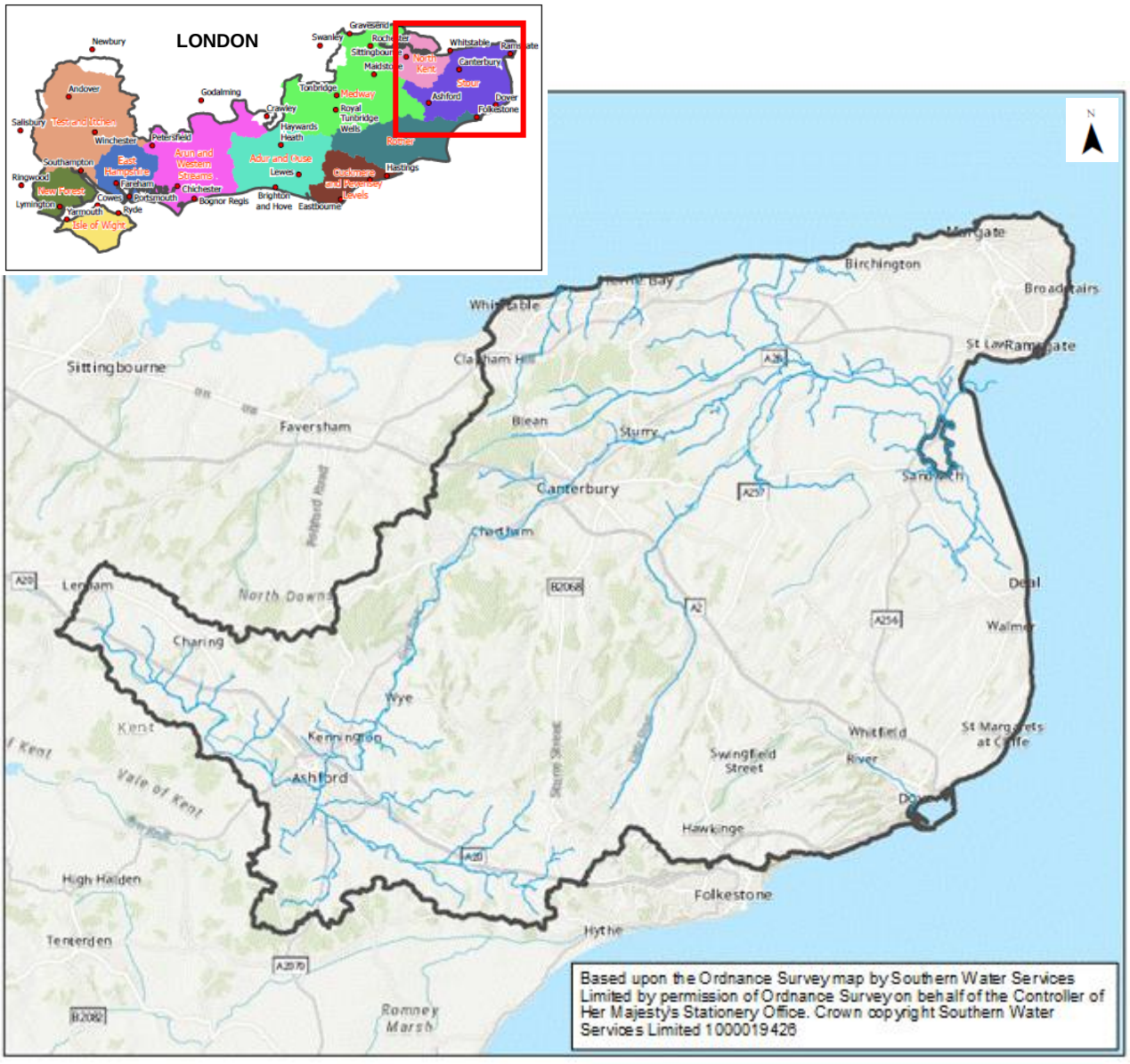
The Environment Agency has previously defined the River Basin District catchments in their River Basin Management Plans prepared in response to the European Union's Water Framework Directive. These river basin catchments are based on the natural configuration of bodies of water (rivers, estuaries, lakes etc.) within a geographical area, and relate to the natural watershed of the main rivers. We are using the same catchment boundaries for our Level 2 DWMPs. A map of the Stour river basin catchment is shown in figure 1.

Figure 1: The Stour river basin catchment in north-east Kent, England



The Stour catchment drains just over 1,110km^2 of Kent and includes the rivers Stour, Dour, North and South Streams and a number of small streams making up the Oyster Coast Brooks. The catchment incorporates rivers, lakes, estuarine and coastal waters as well as groundwater within the rock aquifers.

The Upper Great Stour (also known as the West Stour) meets the East Stour near the large urban area of Ashford. From here, it flows north-east through rural chalk downlands into the historic city of Canterbury. It is joined by the Little Stour and flows eastwards through internationally significant wetland habitat areas of Stodmarsh and Hacklinge Marshes to the Cinque Port of Sandwich before it discharges into the sea at Pegwell Bay.

The River Dour rises as a chalk stream near the village of Temple Ewell and flows southwards for approximately 6 km to the busy port of Dover. Originally, it formed a wide estuary through Dover but it now flows through a culvert into Dover Harbour. The Dour has a chalk catchment that responds slowly to rainfall, although the flows in the river are affected by groundwater levels in the chalk.

Other watercourses in the catchment include the North and South Streams which flow from Eastry and Northbourne to the east of Sandwich. There are a number of watercourses associated with the marshes around the Isle of Thanet and the small streams around Whitstable and Herne Bay that make up the Oyster Coast Brooks that discharge into the North Sea. These drain a clay area and so the river flow increases quickly in response to rainfall.

There are also two 'winterbournes', the Nailbourne and Petham Bourne that flow only once every few years when groundwater levels are high. When these are flowing they respond rapidly to rainfall and flooding can be a major issue.

Around 591,000 people live in the catchment. It includes some large urban areas including the historic cathedral city of Canterbury, the ferry port of Dover, the expanding town of Ashford, the coastal resorts of Thanet, Herne Bay, Whitstable, Margate, Broadstairs and Ramsgate as well as the historic Cinque Port of Sandwich. Ashford is a major growth area that is likely to double in size in the next 20 years and Canterbury and Dover are also recognised as potential development sites.

Over the last few centuries, flood management, drainage, agriculture, mining, milling, navigation, abstraction and urbanisation have all shaped the water environment. The Lower Stour channel has been heavily modified with flood defences, sluices, gates and mills to control flow of the river. Floodplains have been drained to provide valuable agricultural land. Flood storage reservoirs were completed in the Upper Stour in the 1990s to provide flood protection for Ashford.

It is a predominantly rural catchment with some 83% of the area used for agriculture, some of which is amongst the most productive land in the country. However, agricultural practices have an impact on water quality and availability, significant in one of the driest parts of the country where water use is amongst the highest.

Groundwater provides 80% of the drinking water and it also provides an important dry weather flow in the rivers. Drinking water is treated to meet Drinking Water Standards, but the quality of the groundwater is poor owing to elevated levels of nitrate, localised impact of pesticides and point source pollution.

There are numerous important environmental sites throughout the Stour catchment that have been designated as nationally or internationally important. The landscape is varied from the rolling chalk

hills of the North Downs to the flat marshes around Thanet. There are internationally important coastal habitats at Sandwich and Pegwell Bay and near Reculver, and rare chalk downlands in the nationally protected Kent Downs. The Thanet Coast, Sandwich Bay and Dover to Kingsdown Cliffs are Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSI) for their ecological values. Extensive Forestry Commission woodlands and many historic sites and pretty villages all contribute to the character of this varied and beautiful part of England.

Drainage and Wastewater Systems

Drainage and wastewater systems are designed to convey water. There are several different drainage systems, including:

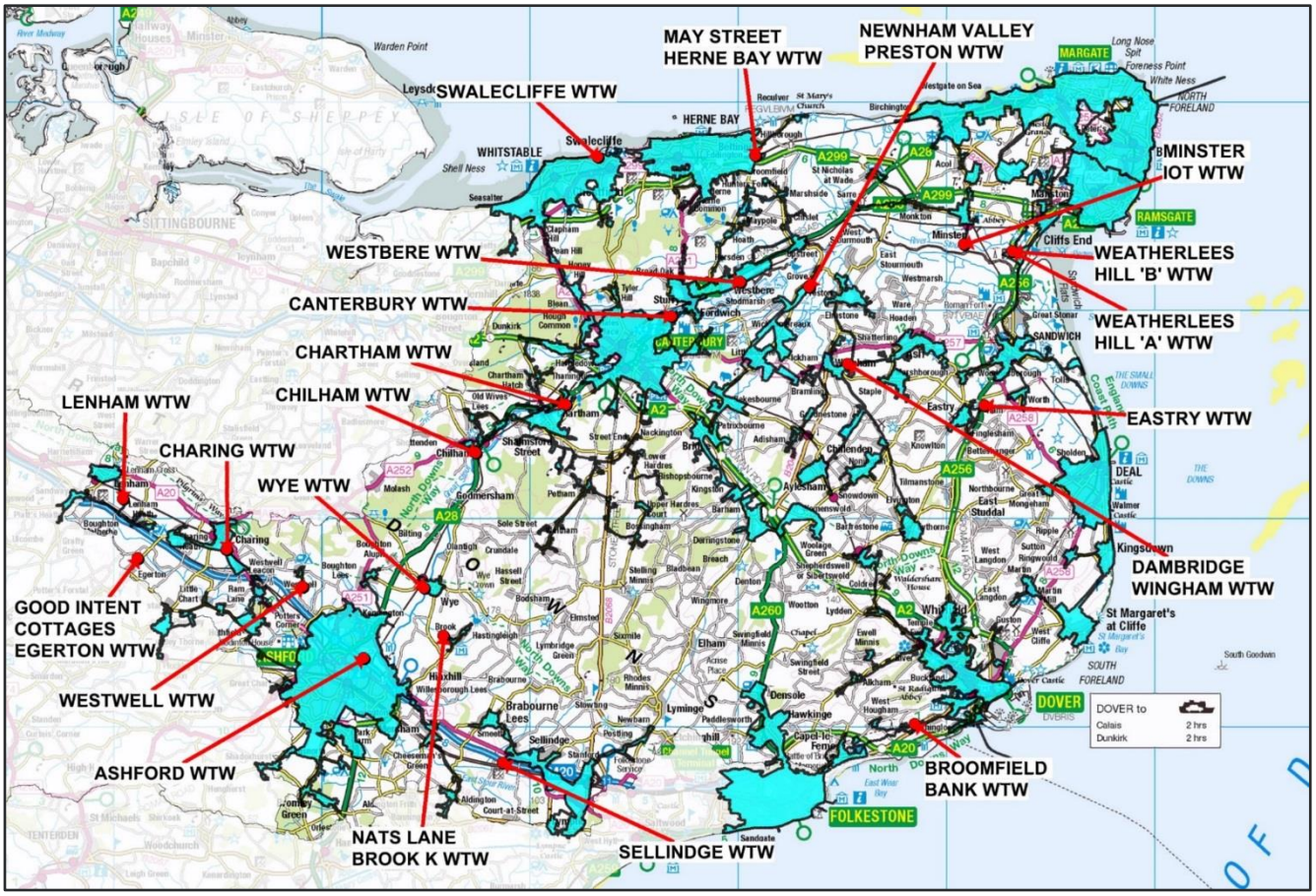
- land drains in fields to drain the land to enable it to be used for agricultural purposes
- highway drainage systems to ensure that roads and car parks remain safe and useable during rainfall
- rivers and streams to transport water running off the land to the sea
- surface water drainage systems that take water from roofs and paved areas to local rivers, and
- sewerage systems that take wastewater away from people's homes and businesses so it can be recycled and released safely back into the environment.

All these systems provide essential services to protect the economy and environment, and ensure public health, safety and hygiene. The links between water use and the management of wastewater is important to protect the wider environment. This excellent independent short film, called "The Drip", shows how the water cycle links everything together.

In the Stour river basin catchment, we own and operate 21 separate sewerage systems that collect wastewater over a geographical area known as a sewer catchment. These are the areas shaded blue on the map, see figure 2 below. Each sewer catchment is drained by a complex sewerage system comprising a network of pipes, pumps and wastewater treatments works (WTWs) that combine to remove wastewater from homes and businesses and re-cycle the water so it can be safely discharged back into the environment.

Our sewer catchments generally cover the urban centres and communities. Of the 1,110km^2 of land in the river basin catchment, only 183km^2, or 16.5%, is covered by our sewer catchments. However, of the 228,000 residential properties and 11,300 businesses within the Stour catchment, 96% of the homes and 89.7% of the businesses are connected to our sewerage system. Remote rural properties are often not connected to sewerage systems and therefore rely upon a septic tank within their property to collect wastewater before it is periodically emptied by tankers and the wastewater is taken to a WTWs to be recycled.

Figure 2: Map of the Stour Catchment showing the sewer catchment areas (in blue) and locations of the WTWs



More than 5,325 km of wastewater pipes serve the Stour catchment with 392 pumping stations within the network to pump sewage to the 21 WTWs for recycling the water back into the rivers or the sea. Table 1 provides a summary of the 21 sewer catchments within the Stour river basin catchment, including the equivalent population that each sewerage system serves and the approximate length of sewers within the sewer catchment. The Population Equivalent is a measure of the quantity of sewage that the WTW needs to process and recycle, and consists of the calculated equivalent number of people who would contribute the amount of sewage from within the sewer catchment from residential and commercial properties.

Of the 21 WTWs in the catchment, seven systems serve more than 30,000 population equivalent per day.

Table 1: Sewer Catchments in the Stour River Basin Catchment

Sewer Catchment Ref	Sewer Catchment Name	Communities Served	Equivalent population served	Length of sewers (km)
BROM	BROOMFIELD BANK	Dover, Folkestone, Hawkinge, Densole, Capel le Ferne, Whitfield, Lydden, Alkham, Shepherds Well, Guston	114,216	867.6
ASHF	ASHFORD	Ashford, Pluckley, Little Chart, Hothfield, Tutt Hill, Boughton Lees, Mersham, Aldington, Bromley Green, Shadoxhurst	106,104	935.1
WEAT	WEATHERLEES HILL A	Ramsgate, Manston, Cliffs End, Sandwich, Woodnesborough, Worth, Deal, Kingsdown, St Margaret's at Cliffe, Martin	93,695	642.5
WEHB	WEATHERLEES HILL B	Margate, Broadstairs, Birchington, Westgate-on-Sea, Lydden	88,708	606.6
CANT	CANTERBURY	Canterbury, Sturry, Fordwich, Thanington, Blean, Pean Hill, Harbledown	64,462	635.3
HERN	MAY STREET HERNE BAY	Herne Bay, Beltinge, Reculver, Herne	38,503	432.6
SWAL	SWALECLIFFE	Swalecliffe, Whitstable, Chestfield, Clapham Hill, Seasalter, Yorkletts, Radfall	32,856	387.2
DAMB	DAMBRIDGE WINGHAM	Wingham, Ash, Staple, Aylesham, Chillenden, Nonington, Eythorne, Preston, Goodnestone, Adisham	16,906	185.6
NEWN	NEWNHAM VALLEY PRESTON	Stodmarsh, Wickhambreaux, Ickham, Littlebourne, Bramling, Bekesbourne, Patrixbourne, Bridge, Bishopsbourne, Kingston, Barham, Woolage Village	6,659	146.2
CHAR	CHARTHAM	Chartham, Bagham, Shalmsford Street, Chartham Hatch	6,160	133.6
WBER	WESTBERE	Westbere, Upstreet, Chislet, Hoath, Maypole, Ford, Highstead, Boyden Gate	5,979	87.7
SELL	SELLINDGE	Sellindge, Brabourne Lees, Lympne, Postling, Etching Hill, Lilyvale	4,958	92.8
MINS	MINSTER IOT	Minster, Monkton, Sarre, St Nicholas at Wade	4,247	43.2
LENH	LENHAM	Lenham, Sandway, Platt's Heath, Lenham Heath	2,919	43.2
CHAN	CHARING	Charing, Charing Heath, Charing Hill, Westwell Leacon	2,632	27.5
ETRY	EASTRY	Eastry	2,283	16.6
WYEW	WYE	Wye, Weir	1,909	22.1
CHAM	CHILHAM	Chilham, Old Wives Lees	856	11.7
BOOK	NATS LANE BROOK	Brook, Spelders Hill	267	5.8
WWLL	WESTWELL	Westwell, Dignash	194	2.2
GOOD	GOOD INTENT COTTAGES EGERTON	Good Intent Cottages, Stonebridge Green	17	0.3

Broomfield Bank WTW serves just under 110,000 people living in the Dover area. The sewerage systems includes 33 wastewater pumping stations in the network to transport the water through the sewers from homes and businesses to the treatment works. The WTW is permitted to discharge just over 42,512 m3 per day of recycled water through a long sea outfall into the English Channel.

Constructed in 1996, Weatherlees Hill 'A' WTW serves more than 86,000 people in Ramsgate, Sandwich and Deal. This site also recycles sewage that is imported by road tankers from septic tanks. All the recycled water from this works is released to the tidal River Stour which flows into Pegwell Bay. The permitted discharge of recycled water is 21,435m3 per day.

Weatherlees Hill 'B' WTW serves a population of 87,500 in Margate and Broadstairs. The works was constructed in 2006 and is adjacent to Weatherlees Hill 'A' WTW. Flows from Margate undergo primary treatment comprising screening and grit removal at Foreness Point Wastewater Pumping Station (WPS) before being pumped on to Weatherlees Hill 'B' for full treatment and recycling. The recycled water receives further ultra-violet (UV) treatment to remove additional bacteria before being pumped back to Foreness Point WPS and released to the sea via a long sea outfall. The permitted discharge of recycled water is 29,120 m3 per day.

Ashford WTW serves just over 84,000 people and is it permitted to discharge 24,000 m3 per day of recycled water into the Great Stour.

Canterbury WTW is downstream of Ashford WTW and serves just under 60,000 people in the city. The flow from the works goes into the Great Stour and is permitted to release 20,176 m3 of recycled water per day.

The Ashford and Canterbury WTWs receive imports of sludge (i.e. solids that have been separated from the liquid) from other WTWs. In addition, Ashford, Broomfield Bank (Dover) and Canterbury WTWs receive higher quantities of wastewater from industrial units in those communities.

Swalecliffe WTW and May Street Herne Bay WTW serve 32,000 and 38,000 people respectively. Both works discharge recycled water into the sea off the north coast of Kent.

The Environment Agency (EA) sets limits on the quality and quantity of recycled water (known as effluent) that can be discharged from WTWs. The EA issues discharge permits to ensure the recycled water released from WTWs complies with three main legal provisions

(i) The Water Resources Act (WRA) 1991;
(ii) The Environmental Permitting (England and Wales) Regulations 2010 and
(iii) The Urban Wastewater Treatment Regulations (UWWTR) 1994.

The permits ensure that the quality of the receiving water (i.e. the river or the sea) is protected and that the discharges do not cause an unacceptable impact on the environment. The flow that may be discharged (released) in dry weather is one of the limits set by permits. Our 21 WTWs operate in accordance with their permits and recycle the wastewater to the specifications set out by the EA to ensure it is safe and clean to be released back into the rivers and streams or directly to the sea.

Under heavy storm conditions, rainfall can enter the sewerage systems and significantly increase the flow in the system. The flow of water arriving at the WTWs can exceed the recycling capacity of the works, so any excess water is temporarily stored in large storm tanks. If these tanks ever fill to capacity, then they would discharge water into the rivers or sea through storm overflows. Our aim is to prevent any discharge of water that has not been fully recycled to the required standards. Any water released from storm tanks is screened to remove items such as wet wipes and solids. This control mechanism is required to prevent the backing up of water within the sewers and putting homes at risk of flooding and these discharges are permitted by our regulator and monitored carefully.

Wastewater System Performance

We routinely monitor, analyse and report the performance of our wastewater sewerage systems to enable us and our regulators to assess the service provided to our customers and the impact of our activities on the environment.

The current performance on the sewerage systems is a good starting point for the DWMP, and enables current issues to be highlighted so the planning objectives can be identified and defined for use throughout the DWMP. These planning objectives will determine the metrics that we used in the next stage of the DWMP, which is to determine the current and future risks to people, property and the environment of changes in the river basin catchment and in the performance of our sewerage systems.

The current performance, based on the last three years of date, is summarised below.

Sewer Blockages

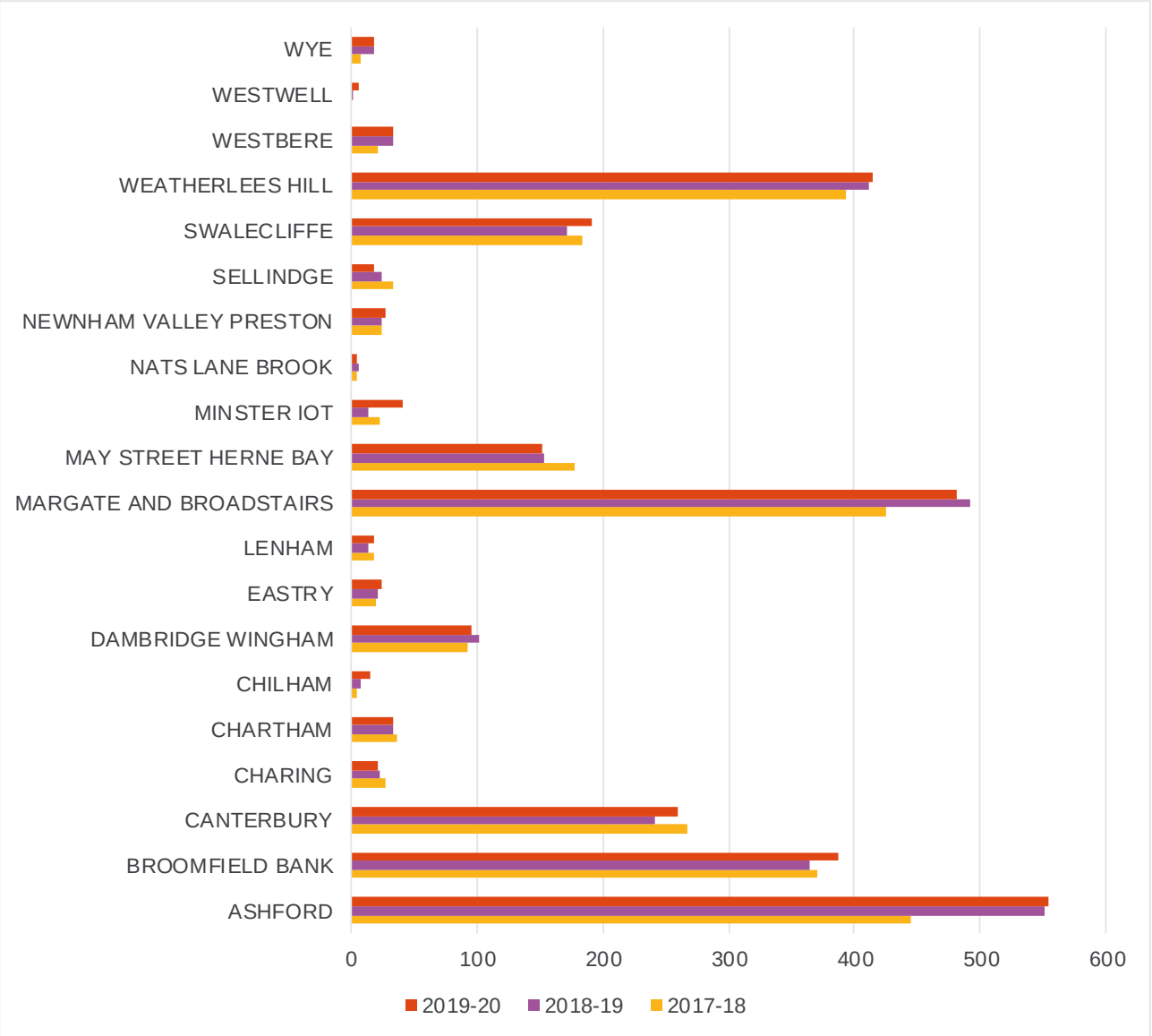
Every year there are thousands of avoidable blockages in our sewers caused by the flushing of wet wipes, cotton buds and other inappropriate items down the toilet, or by pouring fat, oil and grease down the sink. These items cause blockages within the sewer systems, and these blockages can result in flooding to customers' properties or impact upon watercourses or coastal waters.

Figure 3 shows the number of blockages recorded in the Stour river basin catchment by sewer catchment over the last three years. We have noticed an increasing trend in the number of blockages over the last three years, which we are tackling through our pollution and flooding reduction programmes.

Ashford had the highest number of blockages, closely followed by Margate and Broadstairs and Weatherlees Hill.

We use high-powered water jets to clear blockages and ensure our sewers are running freely. In 2015, we launched our 'Keep it Clear' campaign which involves teams visiting 'blockage hotspot' areas to educate customers on how to safely dispose of items rather than putting them down their sinks or toilets. We visit almost 20,000 customers a year across the region to promote correct disposal of 'unflushable' items. One of the hotspot areas is Margate, so in 2019, we targeted Margate for a customer education campaign to reduce "unflushable" items entering the sewer network. This helped to reduce the number of blockages in this area.

Figure 3: Number of blockages in each of the sewer catchments in the Stour river basin catchment

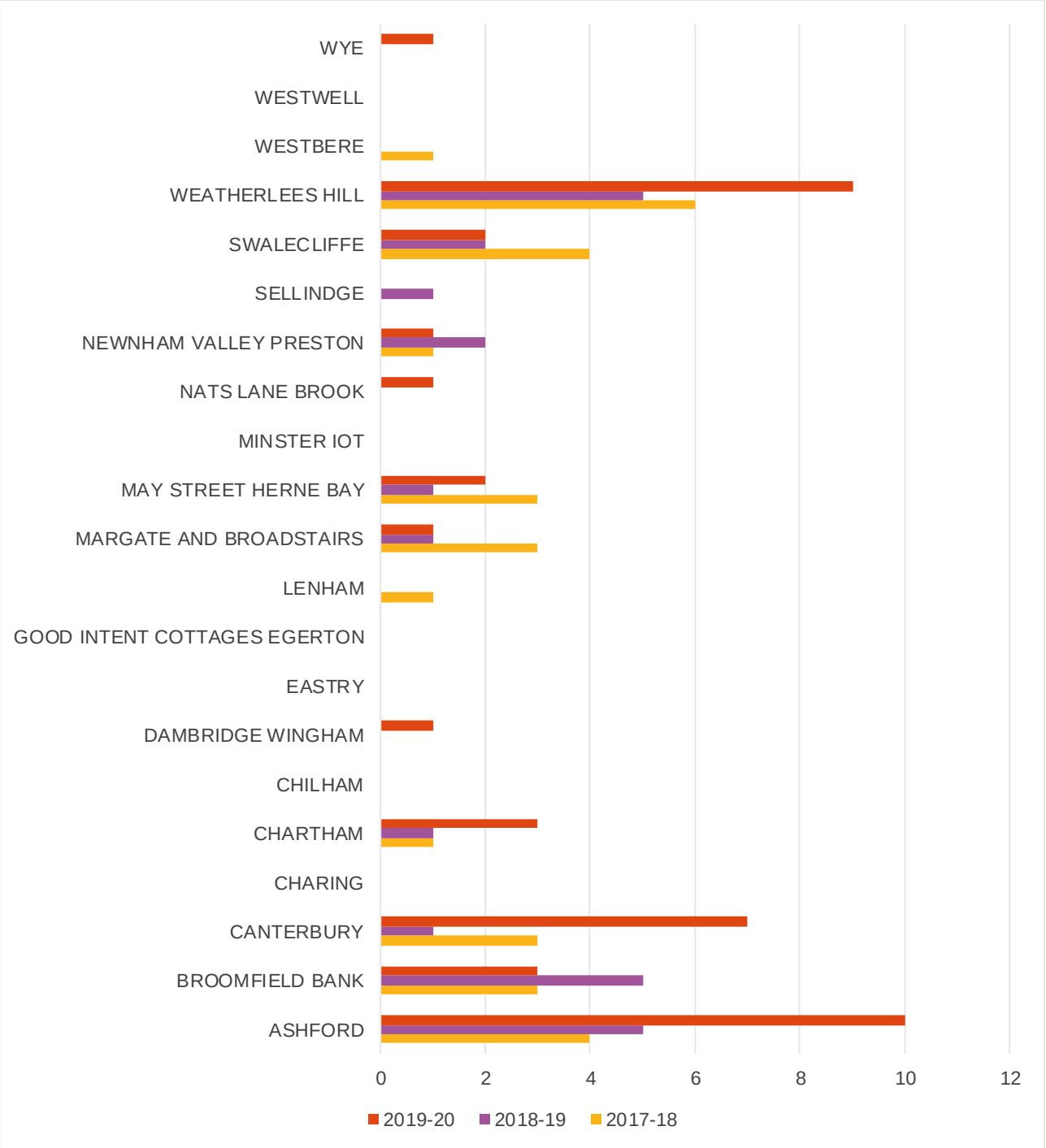


Sewer collapses and rising main bursts

Figure 4 shows the number of sewer collapses and rising main bursts recorded by our Sewer Incident Reporting for public sewers in the Stour river basin catchment over the last three years. Rising mains contain wastewater that is pumped under pressure from our wastewater pumping stations towards the treatment works.

The majority of these collapses and bursts were in Ashford, Canterbury, Ramsgate and Deal (Weatherlees Hill). A collapse or burst can result in a discharge to the environment or flooding. We have an ongoing programme to inspect (by CCTV), replace or refurbish ageing sewers at high risk of collapse or where bursts are likely.

Figure 4: Number of incidents of sewer collapses and rising main bursts in the Stour River Basin by sewer catchment



Flooding Incidents

The most common cause of flooding is from blockages of debris such as wet wipes. However, flooding can also occur in wet weather when the sewerage system becomes overloaded due to rainwater entering the sewer system.

Within the Stour river basin catchment, several of our sewer catchment have both separate and combined sewer systems to carry wastewater. Combined systems convey both sewage from homes and businesses as well as rain and storm water collected from roofs and hard paved areas. During heavy rainfall, the capacity of combined sewers can be exceeded and lead to localised flooding as a result of the water backing up the system to the closest available escape route: manhole, toilet, sink, basement etc. In some combined sewer systems where flooding of properties could occur in heavy rainfall, there are built in overspill weirs, called storm overflows, which release excess water into rivers to prevent flooding of homes or businesses. Storm overflows (also known as Combined Sewer Overflows) are permitted by the Environment Agency to operate in certain conditions. The majority of storm overflows have equipment installed to record the number of times that water passes through the storm overflow. We monitor these carefully and report this information to the Environment Agency. There are 90 combined sewer overflows in the Stour catchment.

Sewer flooding can also occur as a result of rising groundwater seeping into the underground sewer systems and creating additional flow within the sewer network of pipes. This is called infiltration. High local levels of infiltration have previously been observed in the villages along the Nailbourne valley to the south-east of Canterbury. The infiltration has filled the sewer pipes and restricted our customers' use of toilets and washing facilities. When this has occurred, we have removed excess groundwater from the sewers by pumping out the water using road tankers. Between 2013 and 2017, we invested £1.65 million in surveying and repairing the local sewer network in the Nailbourne valley. Since the repair works have been carried out, there has been a noticeable difference in the way the sewerage network behaves during periods of high groundwater levels. Analysis of long-term data shows that infiltration to the sewage network has decreased since the repair work has been carried out. Further information is in the Nailbourne Infiltration Reduction Plan which is available on our website here.

Figures 5 and 6 show the number of internal and external flooding incidents respectively over the last 3 years in the Stour catchment. For the purpose of the DWMP, sewer flooding is defined as incidents caused by an escape of water and sewage from a public sewer due to a blockage, sewer collapse, rising main burst, equipment failure or from too much water entering the system (known as hydraulic overload). Importantly, the definition of sewer flooding excludes extreme storms with a probability of occurring of less than once in 20 years (i.e. less likely than a 5% chance in any given year). Internal flooding occurs inside a building or cellar, whilst external flooding occurs within a curtilage (garden) or on a highway or public space.

Of the 219,852 homes connected to the 21 sewer systems within the Stour river basin, 53 properties experienced some form of internal flooding (including sewage backing up into a bath or shower tray) during the financial year 2019-20. This figure is down from 90 properties that experienced flooding in 2017-18. The data shows there have been an increase in the number of floods from the sewer network in the Weatherlees Hill, Sellindge and Chartham catchments which we are targeting in our flooding reduction programme.

Figure 5: Internal Sewer Flooding within properties by sewer catchment (number of incidents)

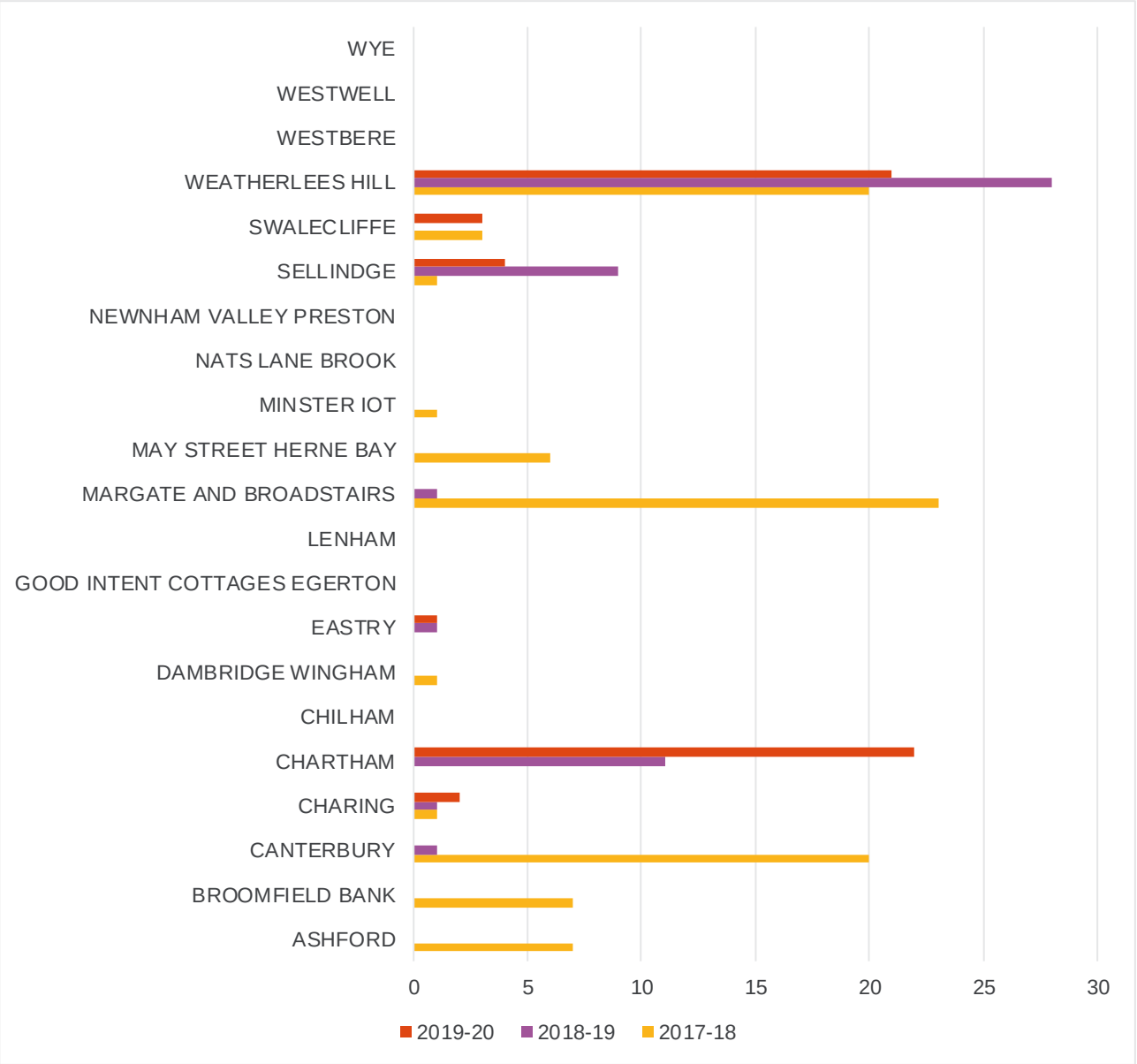
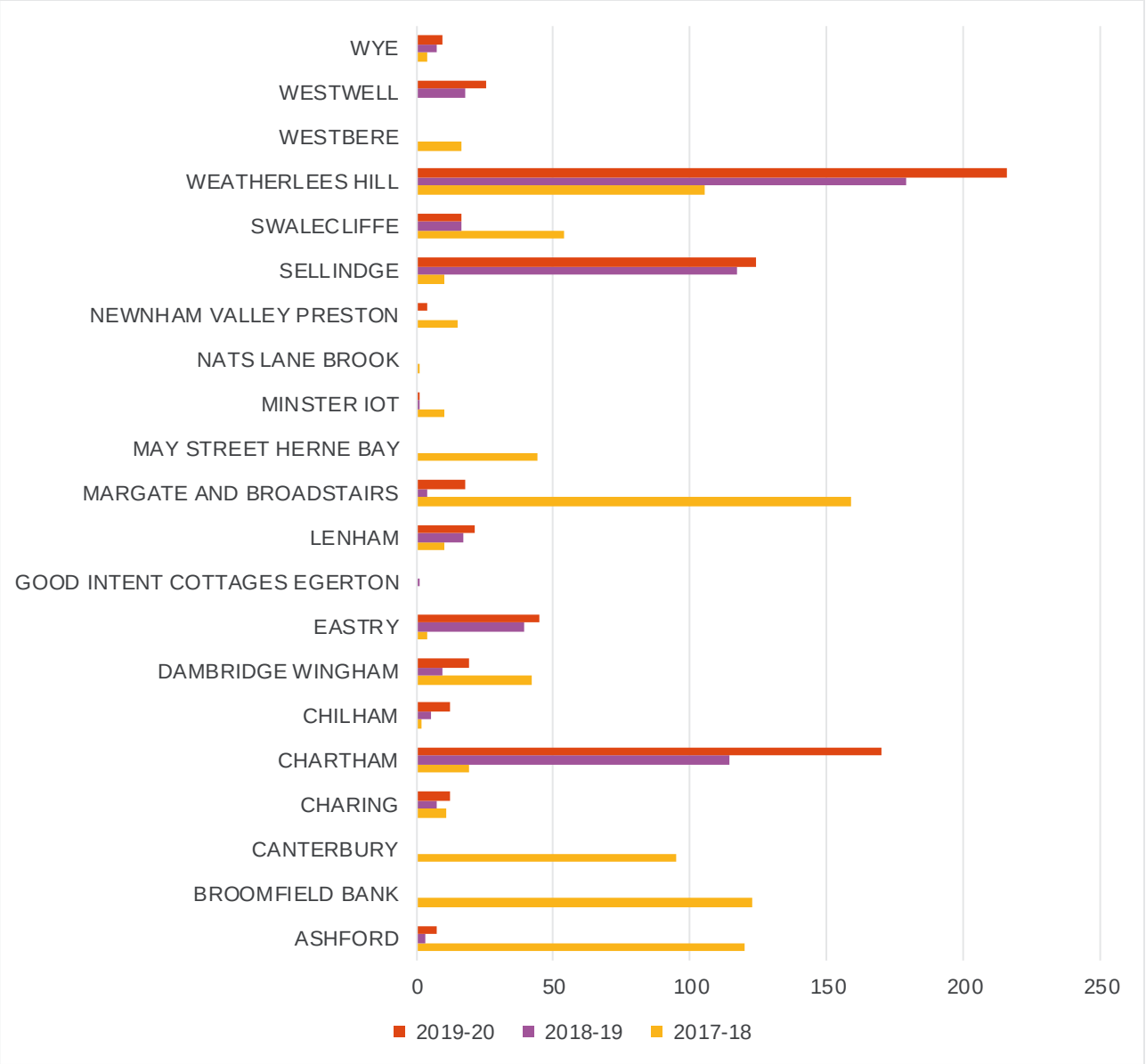


Figure 6: External Flooding within the curtilage of a property (not inside) by sewer catchment in the Stour river basin (number of incidents)



Within the Stour catchment, we estimate that there are approximately 42 properties currently at risk of internal sewer flooding in any given year due to overloading of the sewers by rainwater in a storm.

Pollution Incidents

Reducing the number of pollution incidents is a priority for us, our customers and our stakeholders. We have set the target to reduce the number of pollution incidents across the whole of our operating region to 79 incidents by 2024-25, and our aim by 2040 is to have zero pollution incidents. To achieve this we have created an extensive pollution incident reduction plan with the Environment Agency to significantly reduce pollution over the next five years in line with industry targets.

Pollution incidents connected with our wastewater assets (e.g. blocked sewers, pump failures) are reported to the Environment Agency.

The impact an incident has on the environment is categorised into one of four categories using the Common Incident Classification System (CICS). More information on the classification system can be found on the Ofwat website here. There are four categories for pollution incidents: 1 (major), 2 (significant), 3 (minor) or 4 (no pollution). Only category 1, 2 and 3 pollutions are reportable.

We continue to investigate the root causes of pollution incidents. Our improvements in monitoring of assets and data collection are informing our Pollution Reduction Programme and resulting in more pollutions being prevented. We have also strengthened our incident response team and arrangements to improve our response and reporting of a potential pollution incident.

In addition, our new Environment+ programme looks at all aspects of environmental compliance and performance. Our focus on wastewater treatment works compliance will bring about improved river quality, reduced pollution incidents and flooding, and enhance bathing water quality.

Substantial parts of the sewer systems which serve Ramsgate, Broadstairs and Margate were laid in hand-dug underground tunnels by miners over a century ago. There has been a risk of water escaping from the sewers, seeping through the unlined chalk tunnels and potentially impacting groundwater. We are close to completion of a £34.5 million rehabilitation project of the Thanet sewers. This was the second phase of a three phase scheme to overhaul the area's sewer network, protecting customers' home and the environment for the future.

We publish pollution data in our Annual Report and on our website. However, we are not yet at the stage where we can publish that data in greater detail or make further detail publically available. To do so would also require the agreement of the Environment Agency as they provide some of the information. We are currently being investigated by the Environment Agency in relation to pollution events, and the management of some of our wastewater treatment works, so what we can say about these at this time is limited.

Wastewater Treatment Works Compliance with Permits

The Environment Agency sets limits on the quality and quantity of recycled water from WTWs entering rivers or the sea so the water does not cause an unacceptable impact on the environment. The flow that may be discharged in dry weather (known as Dry Weather Flow) is one of these limits. Dry weather flow (DWF) is the average daily flow to a wastewater treatment works during a period without rain. Exceedances of the DWF can be caused by a number of factors, but it can be due to the additional flow from new development in the sewer catchment. To enable further development, we work with planning authorities to understand where future development is planned and include growth schemes in our investment programme so we can increase the capacity of WTWs and continue to comply with our permits in the future.

We must comply with permits issued by the EA. Where we do not meet the permit requirement, we call this a compliance failure.

We are investing in improved operational resilience to maintain wastewater treatment compliance at a high standard by achieving 99.0% as a minimum, but continuing to aim for 100% compliance.

In the Stour catchment, there have been no water quality compliance failures over the last three years.

Southern Water
October 2022

Version 2