

Drainage and Wastewater Management Plan (DWMP)

Overview of the Adur and Ouse River Basin Catchment

October 2022
Version 2

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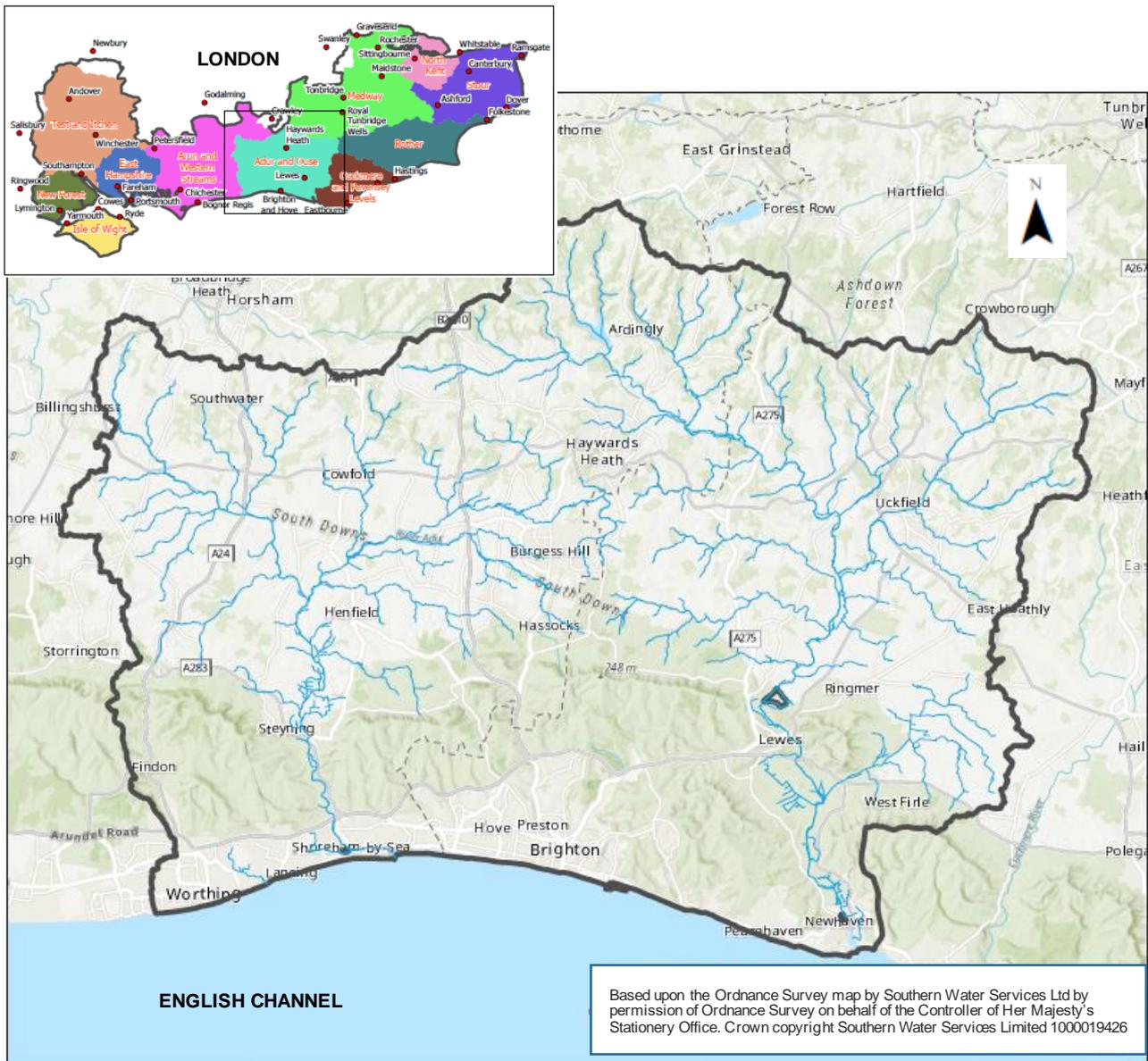


from
**Southern
Water** 

Overview of the catchments for the Rivers Adur and Ouse

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 Adur and Ouse river basin catchment is shown in figure 1.

Figure 1: The Adur and Ouse river basin catchments in Sussex, England



River Adur

The Adur catchment drains just over 500km² in West Sussex. The catchment is largely rural, although it has some large towns such as Henfield, Burgess Hill and Worthing and the smaller settlements of Cowfold, West Grinstead, Bramber and Steyning.

Upstream of Henfield, there are two distinct tributaries (sub-catchments) of the Adur. The western arm arises to the south east of Billingshurst and forms a rural catchment developed principally on impervious Weald Clay.

The eastern arm is fed by the chalk block of South Downs National Park. This sub-catchment has a mixed geology consisting of permeable headwaters but predominantly Weald Clay in the lower reaches. It is a largely rural catchment but with significant urban growth along the eastern catchment boundary (including Cuckfield, Burgess Hill and Haywards Heath).

Downstream of the confluence at Henfield, the river becomes tidal before flowing into the sea at Shoreham-by-Sea in West Sussex.

The history, landscape and natural beauty of the River Adur catchment make it an important recreational and tourist destination. There are numerous scheduled monuments, listed buildings and registered historic parks and gardens. It encompasses eight Sites of Special Scientific Interest (SSSIs), designated because of their ecological or geological importance. The Adur Estuary SSSI is of particular significance due to its saltmarsh habitat.

River Ouse

The River Ouse catchment is formed by an extensive network of tributaries, streams and brooks collecting water from across 650km² of East and West Sussex. Its major tributary is the River Uck. Both rise in the High Weald and South Downs National Park and flow through the countryside past the urban areas of Haywards Heath and Uckfield before joining at Barcombe Mills, where the river becomes partially tidal. The river continues through Lewes, the County Town of East Sussex, before reaching the sea at Newhaven. Smaller towns include Seahaven, Ardingly, Buxted, Isfield and Newick.

As with the Adur, the Ouse catchment is largely rural. The chalk geology of the upper reaches changes to clay and alluvial soils as the river meanders through extensive floodplains to the coast. These used to be marshlands but, historically, reaches of the river were canalised and embanked to drain the land for farming. The land is particularly subject to flash flooding, groundwater flooding and run off from the roads and that cross the area. The Environment Agency (EA) is looking for opportunities to restore to a more naturalised state which in turn will help minimise flooding.

The River Ouse has a unique landscape and its natural beauty also makes it an important recreational and tourist destination. The area is particularly environmentally rich and includes one Special Protection Area (SPA), three Special Areas of Conservation (SACs), two National Nature Reserves (NNRs) and 24 Sites of Special Scientific Interest (SSSIs). Many of these sites support important wetland habitats and species sensitive to changes in water level, flow, quality and quantity.

Together, the two catchments form the Adur and Ouse drainage catchment. This has a population of around 718,293. The majority of drinking water is sourced from groundwater abstractions taken from the South Downs chalk.

The main economies are agriculture, tourism and light industry. There are two major ports, Newhaven and Shoreham, and the only city is Brighton and Hove. The coast west of Brighton is urbanised all the way to the Ferring Gap and is subject to urban creep.

Drainage and Wastewater Systems

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

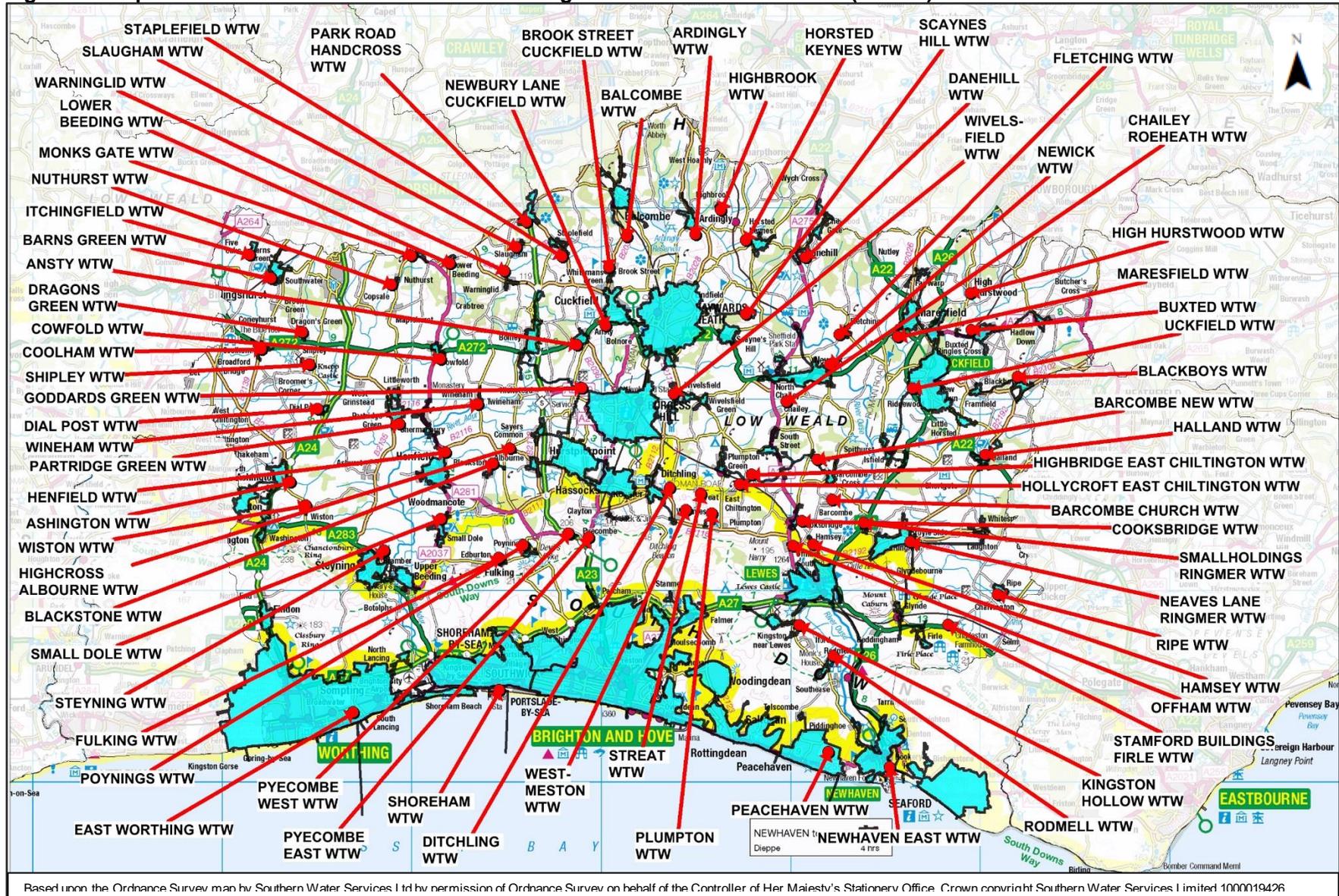
- land drains in fields to drain the land to enable it to be used for agricultural purposes
- highway drainage systems to ensure that roads and car parks remain safe and useable during rainfall
- rivers and streams to transport water running off the land to the sea
- surface water drainage systems that 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 Adur and Ouse river basin catchment we own and operate 68 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 1144 km² of land in the river basin catchment, only 153km², or 13%, is covered by our sewer catchments. However, of the 283,439 residential properties and 16,585 businesses within the Adur and Ouse catchment, 96% of the homes and 92% 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 Adur and Ouse Catchment showing the sewer catchment areas (in blue) and locations of the WTWs



More than 4,896km of wastewater pipes serve the Adur and Ouse catchment with 423 pumping stations within the network to pump sewage to the 68 WTWs for recycling the water back into the rivers or the sea. Table 1 provides a summary of the 68 sewer catchments within the Adur and Ouse 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 water recycling centre needs to process, 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 68 WTWs in the catchment, six systems serve more than 30,000 population equivalent per day.

Table 1: Sewerage Catchments in the Adur and Ouse River Basin

Sewer Catchment Ref	Sewer Catchment Name	Communities Served	Population Equivalent Served	Length of sewers (km)
BRIG	PEACEHAVEN BRIGHTON	Brighton, Bevenden, Brighton Marina Village, Falmer, Patcham, Portslade, Poynings, Preston, Pyecombe, Rottingdean, Saltdean, Southwick, Hove, Peacehaven, Saltdean	288,429	1,405.969
WEOA	EAST WORTHING	Lancing, Sompington, Worthing, Ferring, Findon, Goring on Sea, Tarring, Shoreham on Sea	137,559	1,167.163
NEWE	NEWHAVEN EAST	Lewes, Newhaven, Piddinghoe, South Heighton, Tarring Neville, Seaford, Bishopstone, Norton, Seaford	58,692	400.218
BURG	GODDARDS GREEN	Burgess Hill, Hassocks, Albourne, Clayton, Ditchling, Hurstpoint, Sayers Common, Bolney	54,789	363.017
PORT	SHOREHAM	Brighton, Portslade, Shoreham by Sea, Southwick, Hove, Lancing, Fishersgate	54,577	408.670
SCAY	SCAYNES HILL	Haywards Heath, Ansty, Ardingly, Balcombe, Bolney, Chelwood Gate, Cuckfield, Handcross, Horstead Keynes, Lindfield, Scaynes Hill, Wivlesfield Green	40,106	298.144
UCKF	UCKFIELD	Uckfield, Bellbrook Industrial Estate, Blackboys, Buxted, Copers Green, Duddleswell, Fairwarp, Five Ash Down, Fletching, Framfield, Hadlow Green, Hurstwood, Isfield, Little Horstead, Maresfield, Nutley, Piltdown, Ridgewood, Sheffield Park, Framfield	20,995	160.796
STEY	STEYNING	Steyping, Bramber, Upper Bedding, Ashurst	9,223	76.796
ASHI	ASHINGTON	Pulborough, Ashington, Storrington, Washington	8,405	52.519
HENF	HENFIELD	Henfield, Small Dole, Shermanbury, Oakhurst	5,015	47.145
RINL	NEAVES LANE RINGMER	Lewes, Beddingham, Firle, Glynde, Laughton, Ringmer	4,852	73.793
NEWI	NEWICK	Lewes, Newick, Sheffield Park, North Chailey	3,954	38.292
BANE	BARCOMBE NEW	Lewes, Plumpton Green, South Chailey, Barcombe	3,309	41.482
CUNL	CUCKFIELD	Haywards Heath, Cuckfield	3,067	32.310
PART	PARTRIDGE GREEN	Horsham, Partridge Green.	2,256	20.700
BUXT	BUXTED	Uckfield, Buxted, Hadlow Down	1,855	26.653

WIVE	WIVELSFIELD	Wivlesfield Green, Haywards Heath, Burgess Hill, Wivlesfield	1,669	18.279
BALC	BALCOMBE	Balcombe, Haywards Heath	1,560	24.172
DITC	DITCHLING	Ditchling, Westmeston, Hassocks	1,468	17.528
MARE	MARESFIELD	Fairwarp, Uckfield, Maresfield, Horney Common	1,438	23.172
ARDI	ARDINGLY	Ardingly, Haywards Heath	1,346	8.793
COWF	COWFOLD	Cowfold, Horsham	1,253	8.890
DANE	DANEHILL	Danehill, Chelwood Gate, Haywards Heath	1,199	17.727
HOKE	HORSTED KEYNES	Horstead Keynes, Haywards Heath	1,143	7.790
NUTL	NUTLEY	Nutley, Uckfield	1,084	11.589
BLBO	BLACKBOYS	Blackboys, Framfield, Uckfield	1,061	17.179
BARN	BARNS GREEN	Barns Green, Itchingfield, Horsham	1,003	18.512
KING	KINGSTON HOLLOW	Swanborough, Kingston, Lewes	970	15.561
SMAL	SMALL DOLE	Small Dole, Woodmancote, Henfield	764	7.066
RODM	RODMELL	Rodmell, Lewes	444	3.192
HALL	HALLAND	Halland, Blackboys, Framfield, Halland, Uckfield, Lewes	369	6.033
COOK	COOKSBRIDGE	Cooksbridge, Lewes	358	4.298
LOBE	LOWER BEEDING	Plummers Plain, Lower Bedding, Horsham	292	2.719
POYN	POYNINGS	Poynings, Brighton	260	3.319
ANST	ANSTY	Ansty, Haywards Heath	236	5.832
WAID	WARNINGLID	Warninglid, Haywards Heath	230	2.249
FLET	FLETCHING	Fletching, Uckfield	224	1.728
STFI	STAPLEFIELD	Staplefield, Haywards Heath	214	4.568
BERW	BERWICK	Arlington, Berwick, Selmeston, Polegate	201	10.629
DIAL	DIAL POST	Dial Post, Horsham	193	3.326
MONK	MONKS GATE	Monks Gate, Horsham	177	3.373
FULK	FULKING	Fulking, Henfield	159	2.648
COOL	COOLHAM	Coolham, Horsham	153	5.534
RIPE	RIPE	Chalvington, Ripe, Lewes, Hailsham	152	5.004
HIHU	HIGH HURSTWOOD	High Hurstwood, Uckfield	119	0.683
BLST	BLACKSTONE	Blackstone, Henfield, Albourne, Hassocks	116	2.703
CUBS	BROOK STREET CUCKFIELD	Cuckfield, Haywards Heath	108	2.928
SHIP	SHIPLEY	Shipley, Horsham	107	0.952
PYEE	PYECOMBE EAST	Pyecombe, Brighton	95	1.159
SLAU	SLAUGHAM	Slaugham, Haywards Heath	90	1.259
WINE	WINEHAM	Wineham, Henfield	88	2.085
DRAG	DRAGONS GREEN	Shipley, Horsham	86	2.001
PLUM	PLUMPTON	Plumpton, Lewes	74	0.000

ECHC	HOLLYCROFT EAST CHILTINGTON	East Chilington, Lewes	71	0.060
OFFH	OFFHAM	Hamsey, Offham, Lewes	65	1.043
ITCH	ITCHINGFIELD	Itchingfield, Horsham	60	0.000
PYEW	PYECOMBE WEST	Pyecombe, Brighton	59	0.511
RISH	SMALLHOLDING S RINGMER	Ringmer, Lewes	56	0
ALHC	HIGHCROSS ALBOURNE	Albourne, Sayers Common, Hassocks	54	0.776
HIBR	HIGHBROOK	Ardingly, Haywards Heath	53	0.864
WIST	WISTON	Wiston, Steyning	52	1.678
WEMM	WESTMESTON	Westmeston, Hassocks	44	0.000
NUTH	NUTHURST	Nuthurst, Horsham	37	0.433
HAMS	HAMSEY	Hamsey, Lewes	37	0.909
STRE	STREAT	Streat, Hassocks	28	0.784
CHRO	CHAILEY	North Chailey, Lewes	27	0.107
FIRL	STAMFORD BUILDINGS FIRLE	Firle, Lewes	25	0.192
BACH	BARCOMBE CHURCH	Barcombe, Lewes	21	0.408
ECHB	HIGHBRIDGE EAST CHILTINGTON	East Chilington, Lewes	18	0

Peacehaven WTW serves Brighton and Hove City, Saltdean and Peacehaven with a population equivalent of 288,429. The sewage network is mostly combined gravity sewers with 15 Pumping Stations and a large rising main sewer which is over 2km long. This site is also a sludge treatment centre (STC) and received imported sewage sludge from Newhaven WTW for processing. The recycled water is discharged out to sea through a long sea outfall into the English Channel.

East Worthing WTW serves just under 137,559 people living in the East Worthing area. The sewerage systems includes 26 wastewater pumping stations in the network to transport the water through the sewers from homes and businesses to the treatment works. The works is permitted to discharge just over 38,725 m³ per day of recycled water into the English Channel. We are currently investing in this treatment works to improve the HV power supply to improve the site's resilience to power outages.

Newhaven WTW serves just under 58,962 people living within Newhaven area. Newhaven WTW comprises two sites - Newhaven East WTW and Newhaven Main WTW. There are three sub-catchments within the area served by gravity sewers. Lewes is served by combined gravity sewers and a pumping station from Ham Lane to Newhaven. Seaford has gravity sewers with a pumping station from Cliff End to Newhaven. Newhaven East provides preliminary treatment and storm storage and Newhaven Main provides primary and secondary treatment and sludge dewatering. Screened and de-gritted sewage with flows up to 549 l/s is received at the high level distribution chamber of Newhaven Main WTW. The permit conditions for the DWF is up to 14,027m³ a day.

Goddards Green WTW serves 54,798 people living within the Goddards Green area. The sewerage systems includes 18 wastewater pumping stations in the network to transport the water through the sewers from homes and businesses to the treatment works. The works is permitted to discharge just over 9,917 m³ per day of recycled water.

Shoreham WTW serves Shoreham-by-Sea and Portslade-by-Sea with a population of some 54,577 people. Within the catchment there are 16 Pumping Stations with 3 located within Ropetackle Street, Beech Green and Harbour Way in Shoreham and are followed by a Rising Main which is longer than 100m. The permitted discharge within the WTW is up to 10,714m³ per day.

Scaynes Hill WTW serves population of 20,995 people within Haywards Heath area. The sewerage systems includes 14 wastewater pumping stations followed by short rising mains in the network to transport the water through the sewers from homes and businesses to the treatment works. The works is permitted to discharge just over 10725 m³ per day of recycled water.

Uckfield WTW serves population of 40,106 people within Uckfield area. The sewerage systems includes 15 wastewater pumping stations in the network to transport the water through the sewers from homes and businesses to the treatment works. The works is permitted to discharge just over 5000 m³ per day of recycled water.

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 68 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. These discharges are permitted by our regulator and monitored carefully. This control mechanism is required to prevent the backing up of water within the sewers and putting homes at risk of flooding.

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 data, is summarised below.

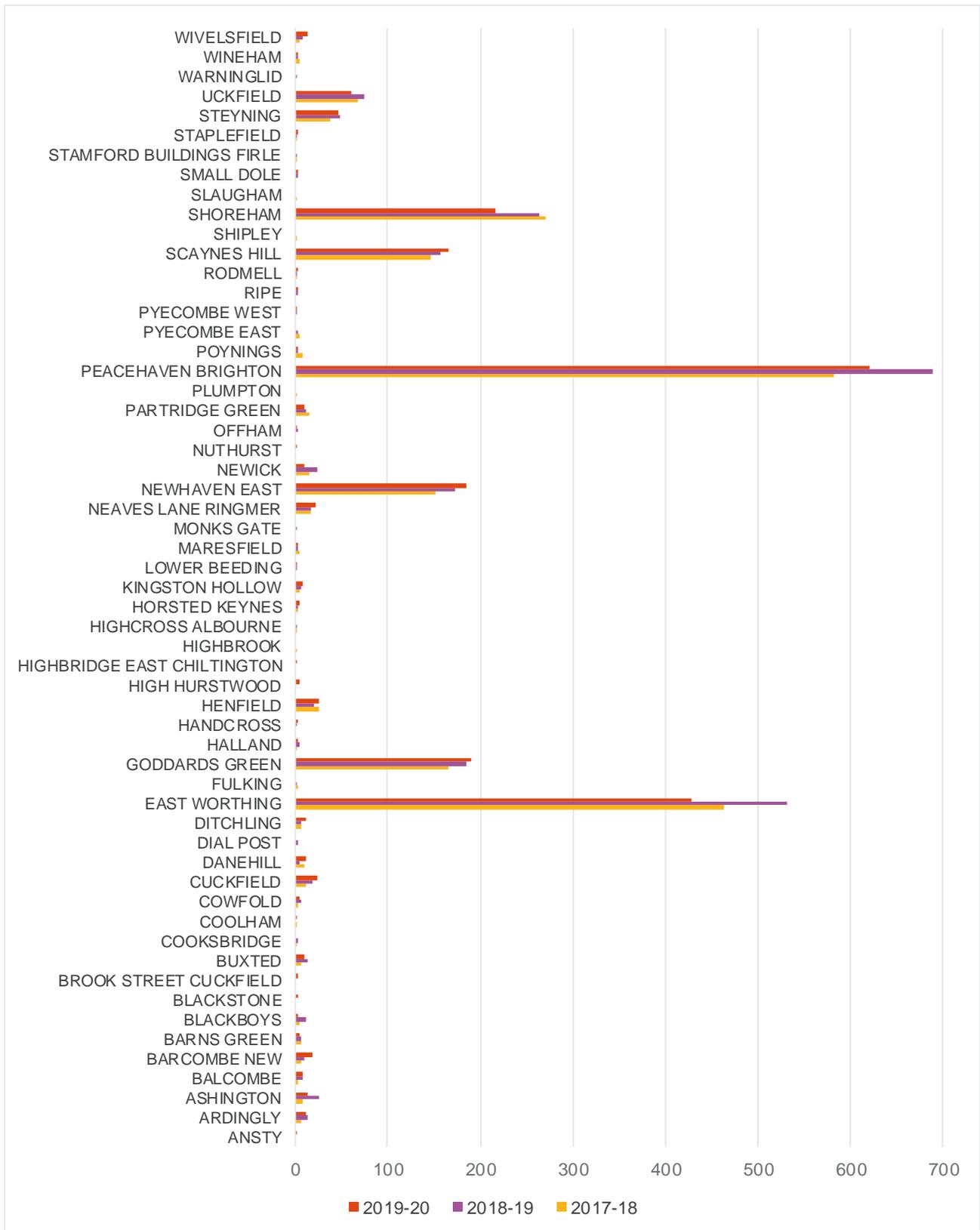
Sewer Blockages

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 Adur and Ouse river basin catchment. Brighton, followed by Ditchling and Shoreham, had the highest number of blockages. 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.

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.

Figure 3: Number of blockages in each of the sewer catchments in the Adur and Ouse river basin catchment

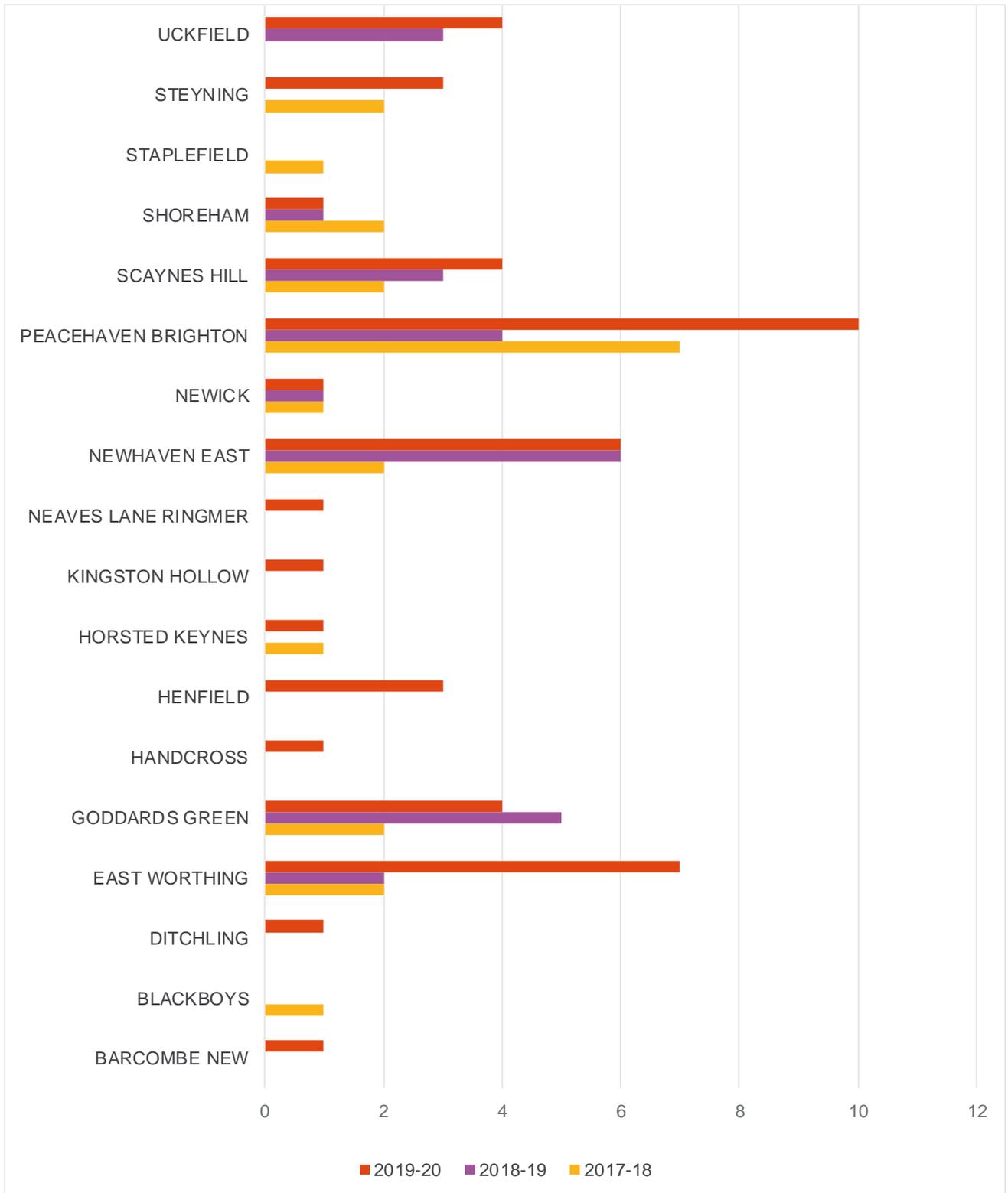


Sewer collapses and rising main bursts

Figure 4 shows the number of sewer collapses and rising main bursts recorded by our Sewer Incident Reporting for public sewers in the Adur and Ouse 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 Brighton, East Worthing, Newhaven and Goddards Green. 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 Adur and Ouse 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 Adur and Ouse 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 156 combined sewer overflows in the Adur and Ouse catchment.

Figures 5 and 6 show the number of internal and external flooding incidents respectively over the last 3 years in the Adur and Ouse 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 283,439 homes connected to the 68 sewer systems within the Adur and Ouse river basin, 114 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 has increased from 50 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 Brook Street Cuckfield, Nuthurst and Ripe catchments which we are targeting in our flooding reduction programme.

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

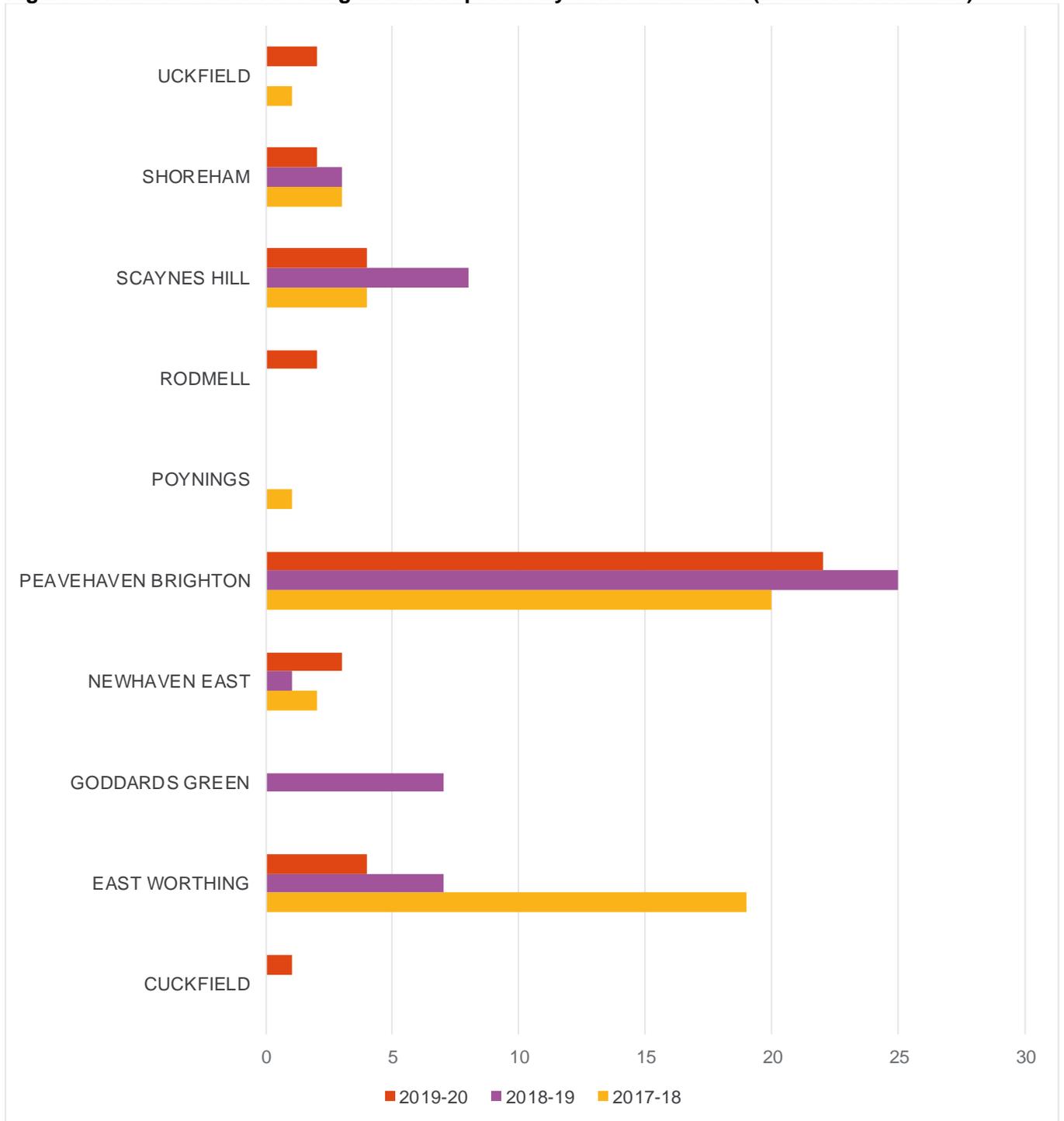
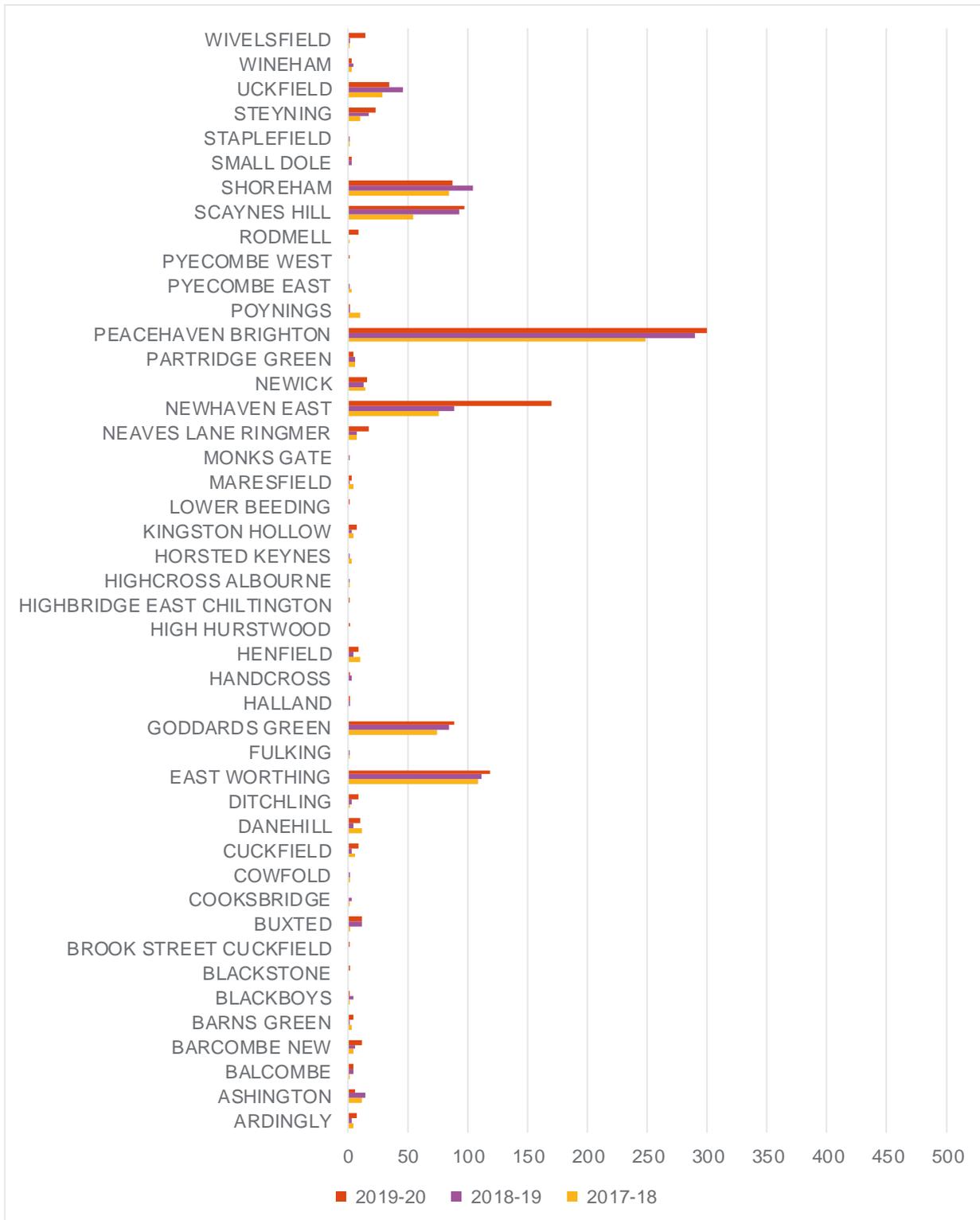


Figure 6: External Flooding within the curtilage of a property (not inside) by sewer catchment in the Adur and Ouse river basin (number of incidents)



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.

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 Adur and Ouse catchment, there have been one water quality compliance failure over the last three years.

Southern Water
October 2022

Version 2