



# Problem Characterisation

## East Worthing (WOEA)

This document describes the causes of the risks identified by the Baseline Risk and Vulnerability Assessment (BRAVA). The BRAVA results for this wastewater system are summarised in Table 1. The results indicate that flooding, pollution and water quality are the main concerns in this wastewater system. We have completed risk assessments for 2050 where we have the data and tools available to do so. For the other planning objectives, we will explore how we can predict future risks for the next cycle of DWMPs. All the risk assessment methods need to be reviewed after the first DWMPs have been produced with a view to improve the methods and data for future planning cycles.

**Table 1: Results of the BRAVA for East Worthing wastewater system**

Planning Objectives		2020	Driver	2050
1	Internal Sewer Flooding Risk	1	Customer	
2	Pollution Risk	0	-	
3	Sewer Collapse Risk	0	-	
4	Sewer Flooding in a 1 in 50-year storm	2	Hydraulic	2
5	Storm Overflow Performance	1	Hydraulic	1
6	WTW Water Quality Compliance	0	-	0
7	Flooding due to Hydraulic Overload	2	Hydraulic	2
8	WTW Dry Weather Flow Compliance	0	-	1
9	Good Ecological Status / Good Ecological Potential	0	-	
10	Surface Water Management	2	Hydraulic	
11	Nutrient Neutrality	NA	-	NA
12	Groundwater Pollution	1	Operational	
13	Bathing Waters	2	Customer	
14	Shellfish Waters	NA	-	

### Key

BRAVA Risk Band	
NA	Not Applicable*
0	Not Significant
1	Moderately Significant
2	Very Significant

\*No issues relevant to planning objective within Wastewater System

### Investment Strategy

The risks identified in this wastewater system mean that we have assigned the following investment strategy:

**Improve**

This means that we consider that the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on our customers and/or the environment. We will plan investment to reduce the current risks by actively looking to invest capital funding in the short term to address current performance issues (and consider future risks when implementing improvements).

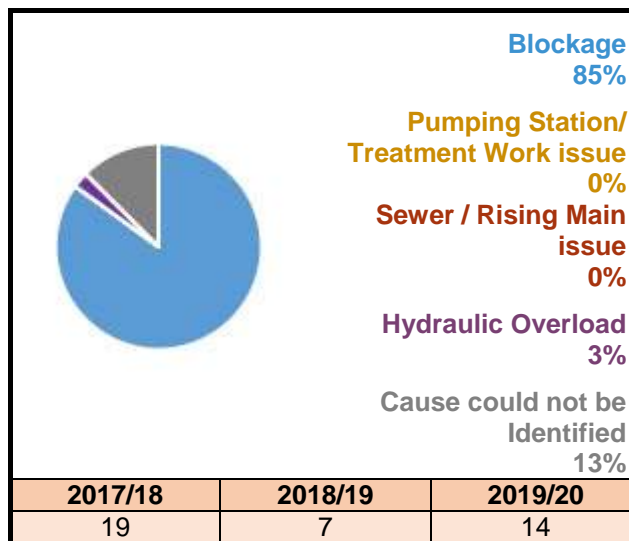


### Planning Objective 1: Internal Sewer Flooding Risk

The number of internal sewer flooding incidents reported during the three years considered by the risk assessment are shown in Figure 1. The total number of connections in this wastewater system means there have been between 1.68 and 3.35 incidents per 10,000 connections per year (a threshold set by Ofwat) so the risk is in the 'moderately significant' band.

The primary driver for internal sewer flooding in this wastewater system is 'Customer'. Blockages caused 85% of all incidents recorded in this wastewater system. Blockages are often caused by fats, oils, grease, nappies, wet wipes and sanitary products within the system. These items are non-flushable and should not be disposed of into wastewater systems.

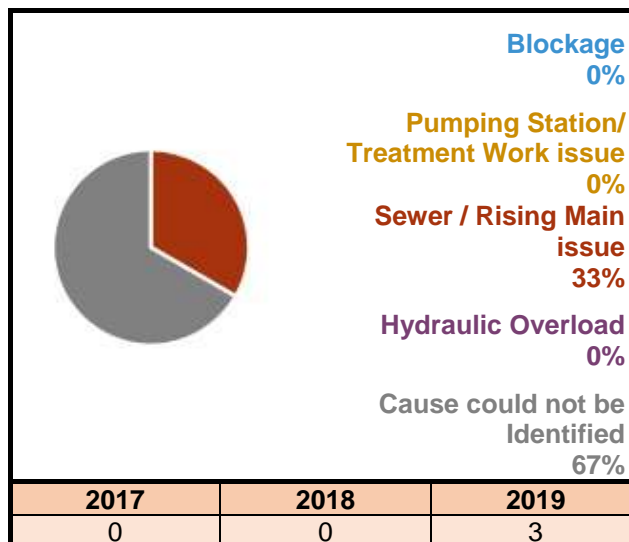
Figure 1: Number of internal flooding incidents per annum and causes



### Planning Objective 2: Pollution Risk

The number of pollution incidents reported during the three years considered by the risk assessment are shown in Figure 2. The length of sewer in this wastewater system means there have been less than 24.51 incidents per 10,000km per year (a threshold set by Ofwat) so the risk is in the 'not significant' band.

Figure 2: Number of pollution incidents per annum and causes



### Planning Objective 3: Sewer Collapse Risk

The number of sewer collapses reported during the three years considered by the risk assessment are shown in Table 2. The length of sewer in this wastewater system means there have been less than 5.72 incidents per 1,000km per year (a threshold set by Ofwat) so the risk is in the 'not significant' band.

Table 2: Sewer collapses and rising main bursts

Sewer Collapse	2017/18	2
	2018/19	2
	2019/20	3
Rising Main Bursts	2017/18	0
	2018/19	0
	2019/20	4

### Planning Objective 4: Sewer Flooding in a 1 in 50 Year Storm

The risk of flooding in a 1 in 50 year storm is very significant in 2020 and 2050. This is because our computer model of the sewer network indicate for 2020 that approximately 6400 - 6500 properties within this wastewater system are in areas that could flood by water escaping from sewers. This model prediction increases the number of properties in areas at risk from flooding to approximately 13100 - 13200 by 2050.

Our wastewater networks are generally designed with capacity for up to a 1 in 30 year storm, hence flooding is expected to occur during more severe storms such as a 1 in 50 year event. Flooding will occur due to insufficient capacity of the drainage system either on the surface before it enters the drainage system, and/or from manholes, in people's homes or at a low point elsewhere in the system.

### Planning Objective 5: Storm Overflow Performance

The storm overflow performance risk has been assessed as moderately significant in 2020 and 2050. Table 3 shows the overflows that discharge above the low threshold set for storm overflow discharges to Shellfish Water, Bathing Water and inland rivers.

The numbers for the 2050 assessment may be lower than the 2020 assessment. This is because the 2050 figures are predicted from modelling, whereas the 2020 figures are based on actual recorded data and include spills due to blockages or operational issues which cannot be forecast into the future.

The primary driver for the Storm Overflow Performance is 'Hydraulic.'

**Table 3: Overflows exceeding discharge frequency threshold per annum**

	Number of overflows		Threshold for number of discharges per annum		
	2020	2050	Low	Medium	High
<b>Shellfish Waters</b>	0 Medium	0 Medium	Less than 8	Between 8-10	10 or more
<b>Bathing Waters</b>	2 Medium	1 Medium	Less than 3	Between 3-10	10 or more
<b>Freshwater</b>	1 Medium	1 Medium	Less than 20	Between 20-40	40 or more

### Planning Objective 6: Wastewater Treatment Works Water Quality Compliance

The risk of non-compliance with our wastewater quality permit has been assessed as not significant for both 2020 and 2050. This is because the wastewater treatment works has no record of compliance failure during the last three years (2018-2020).

### Planning Objective 7: Flooding due to Hydraulic Overload

This is an assessment of the risk of flooding from sewers during a 1 in 30 year storm, and more frequent rainfall, to understand where flooding could occur. The risk of sewer flooding due to hydraulic overload is very significant in 2020 and 2050. The annualised number of properties in areas at risk of flooding is shown in Table 4.

**Table 4: Annualised number of properties at risk per 10,000 connections.**

Rainfall Return Period (yr)	Number of Properties at Risk		Annualised per 10,000 connections	
	2020	2050	2020	2050
1 in 1	282	899	178	568
1 in 2	459	1285	181	506
1 in 5	1365	4026	247	730
1 in 10	2589	6462	246	615
1 in 20	3989	9085	195	443
1 in 30	5158	10677	169	350
<b>Total Annualised</b>			<b>1216</b>	<b>3212</b>

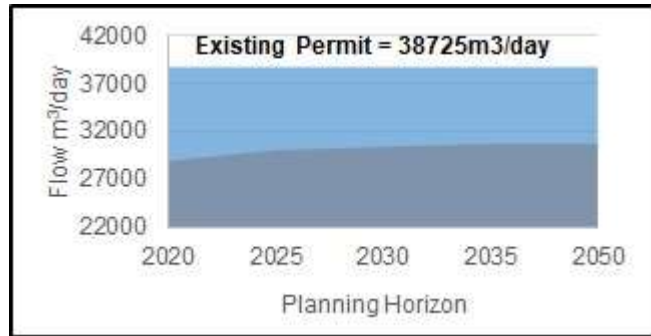


This indicates that the existing capacity of the wastewater network can already be exceeded during 1 in 30 year storms (or more frequent events).

**Planning Objective 8: Wastewater Treatment Works Dry Weather Flow Compliance**

The risk of Wastewater Treatment Works Dry Weather Flow Compliance is not significant for 2020 but is predicted to increase to moderately significant in 2050, shown in Figure 3. This is because the predicted DWF in 2050 is expected to be between 80% and 100% of the current permit.

**Figure 3: Recorded and predicted dry weather flow with existing permit**



**Planning Objective 9: Good Ecological Status / Good Ecological Potential**

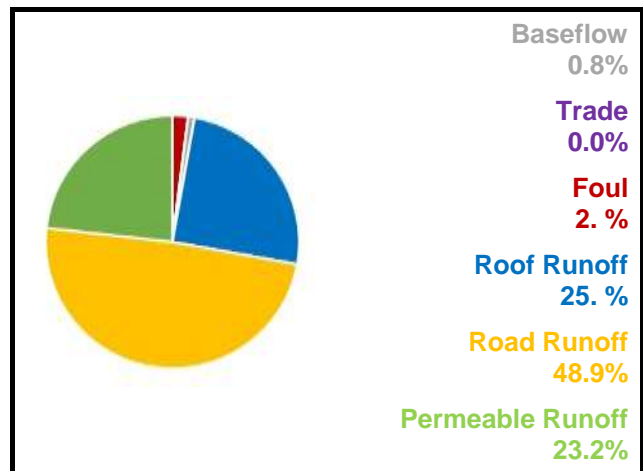
This wastewater system is not hydraulically linked to a waterbody where wastewater operations are contributing to not achieving GES/GEP, therefore the risk is not significant.

**Planning Objective 10: Surface Water Management**

Our initial high level assessment indicated that there is very significant interaction between surface water flooding and flooding from sewers in this wastewater system. The cause of this localised flooding is the capacity of the drainage network in these areas to convey both wastewater and surface water run-off.

Figure 4 illustrates the sources of water flowing in the wastewater system during a 1 in 20 year storm. It shows that surface water runoff from roofs, road and permeable surfaces constitutes more than 97.1% of the flow in the sewers. The total contribution of foul water from homes is 2.0%. The baseflow is infiltration from water in the ground and makes up 0.8% of the flow in the system.

**Figure 4: Sources of water flowing in sewers during a 1 in 20 year storm**



**Planning Objective 11: Nutrient Neutrality**

This wastewater system is not hydraulically linked to Habitat Sites noted as under threat by Natural England.

### Planning Objective 12: Groundwater Pollution

The risk of Groundwater Pollution is moderately significant. The wastewater system network of sewers extends across geographical areas that are designated as a Source Protection Zone (SPZ) for water supply. Sewer survey data indicates that parts of the sewer network are in poor condition and are likely to leak sewage.

The primary driver is 'Operational' due to condition of our assets.

### Planning Objective 13: Bathing Waters

The designated bathing waters that could be affected by discharges from this wastewater system are shown in Table 5, along with the current classification from the Environment Agency.

Table 5: Bathing Water annual results

Bathing Waters	Annual Results		
	2017	2018	2019
Worthing	Poor	Good	Excellent
Lancing (Beach Green)	Sufficient	Excellent	Excellent

The risks from this wastewater system on Worthing, Lancing (Beach Green) bathing waters has led to an assessment of is very significant.

The primary driver is 'Customer' due to evidence of agriculture affecting the bathing waters in this wastewater system.

### Planning Objective 14: Shellfish Waters

The discharges from this wastewater system do not impact on any designated shellfish waters.

## Southern Water

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Version 1