



Drainage and Wastewater Management Plan

Loxwood
Wastewater System Plan



from
**Southern
Water** 

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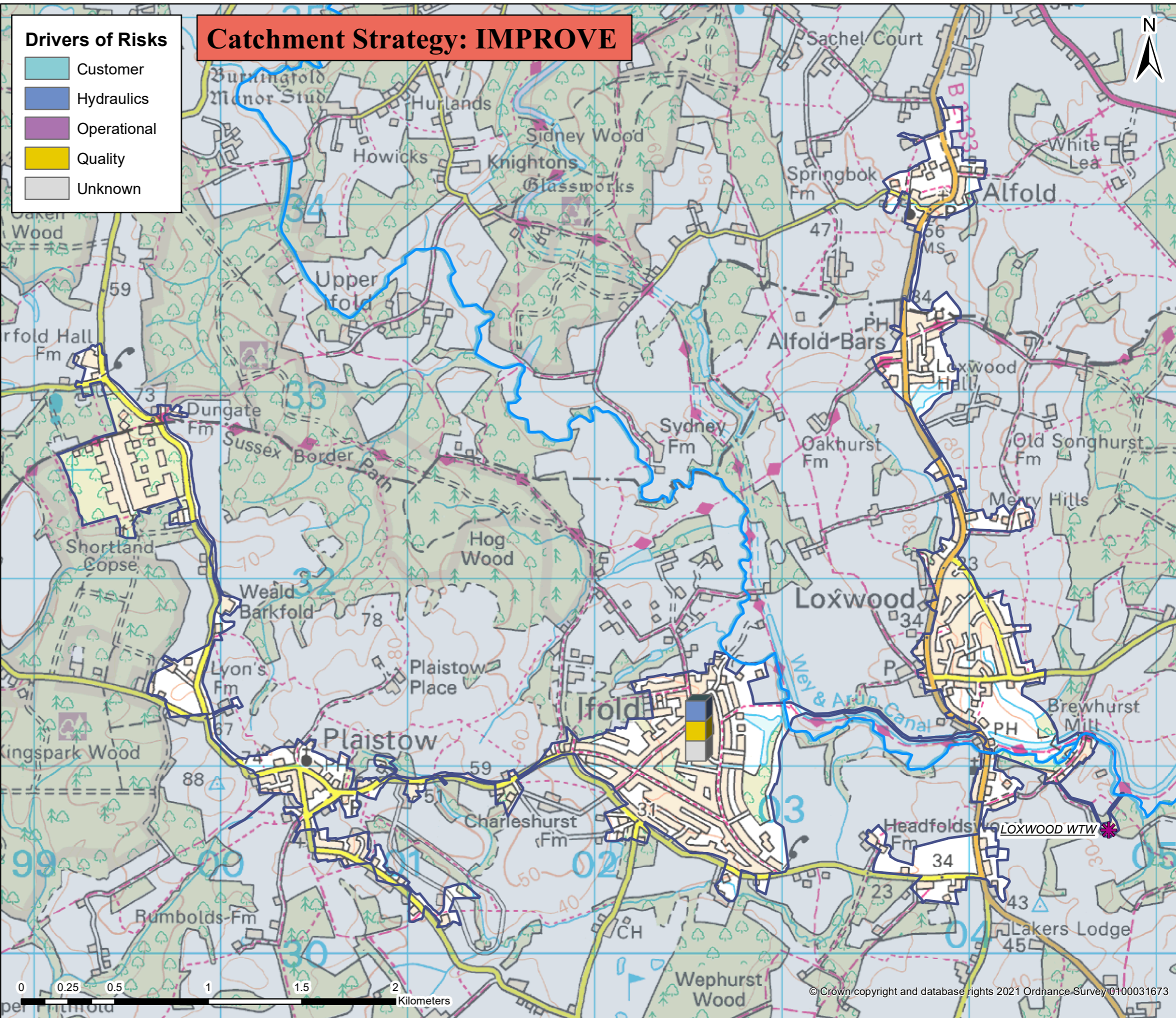
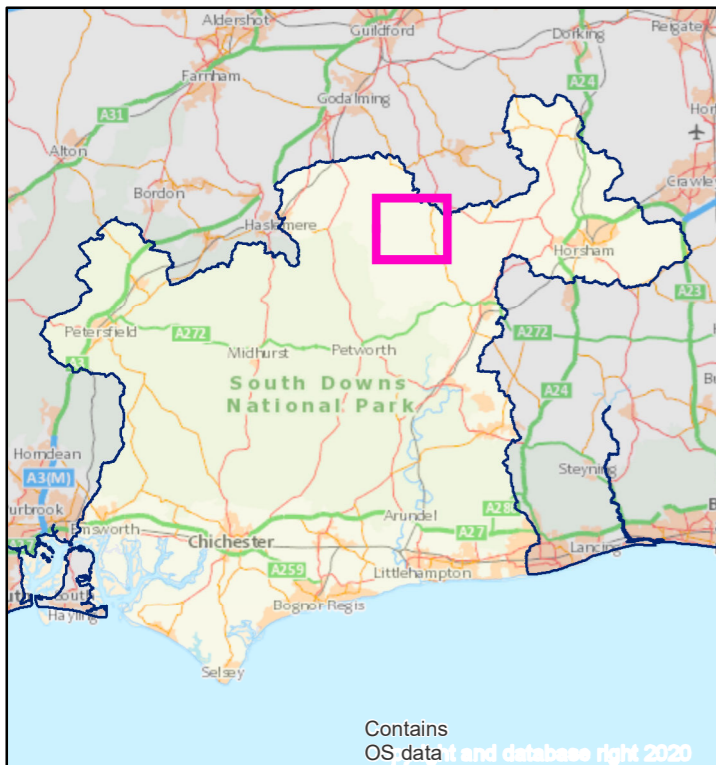
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Loxwood wastewater system: map and key facts



Population Equivalent (PE)	3,761
Discharge Waterbody	River Lox
Number of Pumping Stations	9
Number of Overflows	2
Length of Sewer (km)	59.6
Catchment Reference	LOXW

BRAVA Results Table (LOXW)		
Planning Objective	2020	2050
1 Internal Sewer Flooding Risk	0	
2 Pollution Risk	0	
3 Sewer Collapse Risk	0	
4 Risk of Sewer Flooding in a 1 in 50 year storm	1	1
5 Storm Overflow performance	2	2
6 Risk of WTW Compliance Failure	1	1
7 Risk of flooding due to Hydraulic Overload	1	2
8 Dry Weather Flow Compliance	1	2
9 Good Ecological Status / Potential	2	
10 Surface Water Management	0	
11 Nutrient Neutrality	2	2
12 Groundwater Pollution	0	
13 Bathing Waters	NA	
14 Shellfish Waters	NA	



Problem Characterisation

Loxwood (LOXW)

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 Loxwood wastewater system

Planning Objectives		2020	Driver	2050
1	Internal Sewer Flooding Risk	0	-	
2	Pollution Risk	0	-	
3	Sewer Collapse Risk	0	-	
4	Sewer Flooding in a 1 in 50-year storm	1	Hydraulic	1
5	Storm Overflow Performance	2	Hydraulic	2
6	WTW Water Quality Compliance	1	Quality	1
7	Flooding due to Hydraulic Overload	1	Hydraulic	2
8	WTW Dry Weather Flow Compliance	1	Quality	2
9	Good Ecological Status / Good Ecological Potential	2	Quality	
10	Surface Water Management	0	-	
11	Nutrient Neutrality	2	Unknown	2
12	Groundwater Pollution	0	-	
13	Bathing Waters	NA	-	
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 less than 1.68 incidents per 10,000 connections per year (a threshold set by Ofwat) so the risk is in the 'not significant' band.

Planning Objective 2: Pollution Risk

There has been less than one pollution incident reported on average during the three year period considered by the risk assessment, so the risk is in the 'not significant' band. The exception is if there were two incidents in the most recent year.

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.

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

The risk of flooding in a 1 in 50 year storm is moderately significant in 2020 and 2050. This is because our computer model of the sewer network indicate for 2020 that approximately 40 - 50 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 70 - 70 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.

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

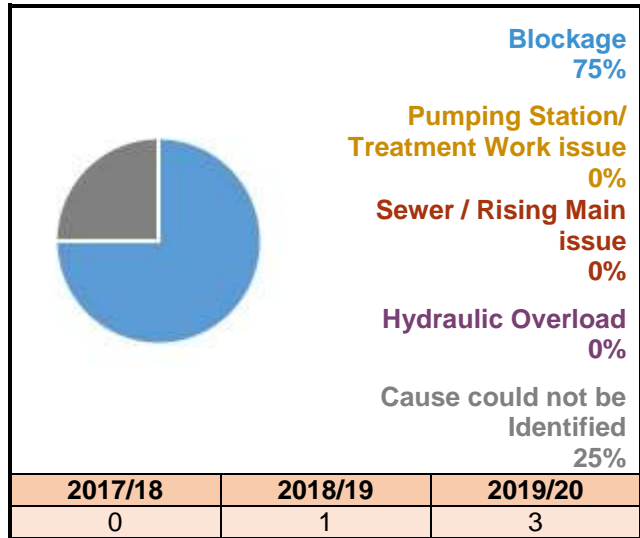


Table 2: Sewer collapses and rising main bursts

Sewer Collapse	2017/18	0
	2018/19	0
	2019/20	0
Rising Main Bursts	2017/18	2
	2018/19	0
	2019/20	1

Planning Objective 5: Storm Overflow Performance

The storm overflow performance risk has been assessed as very significant for both 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 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
Shellfish Waters	0 Medium	0 Medium	Less than 8	Between 8-10	10 or more
Bathing Waters	0 Medium	0 Medium	Less than 3	Between 3-10	10 or more
Freshwater	1 High	1 High	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 moderately significant for both 2020 and 2050. This is because the compliance status of the wastewater treatment works in 2019 and 2020 was Sub Critical. Future forecast growth for 2050 was assessed to not have an adverse affect for the risk score.

Planning Objective 7: Flooding due to Hydraulic Overload

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

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 moderately significant in 2020. The risk The annualised number of properties in areas at risk of flooding is shown in Table 4.

Rainfall Return Period (yr)	Number of Properties at Risk		Annualised per 10,000 connections	
	2020	2050	2020	2050
1 in 1	8	15	5	9
1 in 2	10	19	4	7
1 in 5	19	32	3	6
1 in 10	25	41	2	4
1 in 20	35	48	2	2
1 in 30	39	62	1	2
Total Annualised			18	31

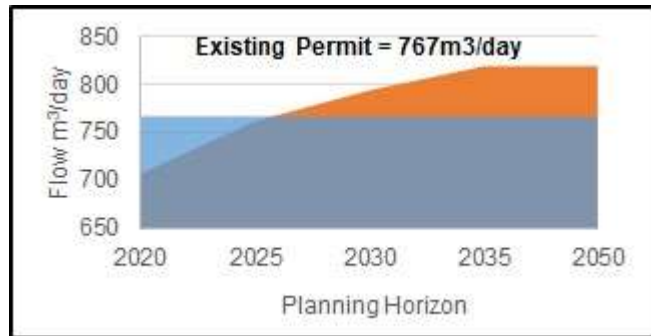
This indicates that the existing capacity of the wastewater network can be exceeded during 1 in 30 year storms (or more frequent events), and that the risk will increase due to future growth, creep and/or climate change by 2050.

Planning Objective 8: Wastewater Treatment Works Dry Weather Flow Compliance

The risk of Wastewater Treatment Works Dry Weather Flow Compliance is moderately significant for 2020 but is predicted to increase to very significant in 2050. This is because the average annual dry weather flow for 2017, 2018 and 2019 has been between 80% and 100% of the current permit, shown in Figure 2. This is because the predicted DWF in 2050 might exceed the current permit.

The primary driver is 'Quality' due to the permit and capacity at the treatment work.

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



Planning Objective 9: Good Ecological Status / Good Ecological Potential

Table 5 shows the waterbodies connected to this wastewater system are not achieving Good Ecological Status or Potential (GES/GEP). The Environment Agency has attributed the 'reasons for not achieving good status' to water company operations. Our risk assessment has been assessed based on the worst assigned status (Poor) and is very significant. This is because we are might not be complying with our permit from the Environment Agency, or the permits need to be tightened to reduce the risk.

Table 5: Waterbodies not achieving GES/GEP

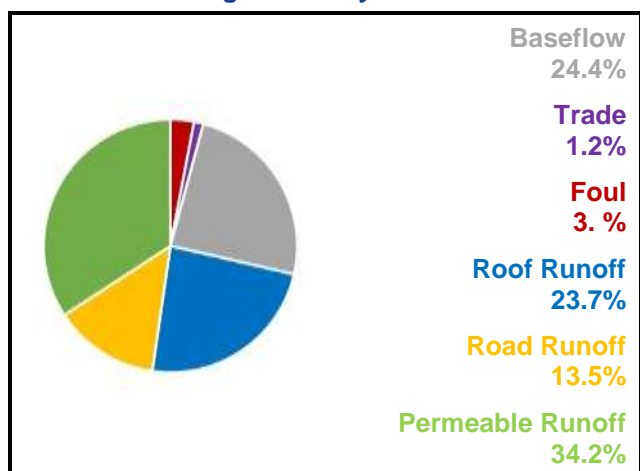
Waterbody	Classification	EA-Status	Activity
Kird	Phosphate	Poor	Sewage discharge (continuous)
Loxwood Stream	Macrophytes and Phytobenthos Combined	Moderate	Sewage discharge (continuous)
Loxwood Stream	Dissolved oxygen	Poor	Sewage discharge (continuous)

The primary driver is 'Quality'.

Planning Objective 10: Surface Water Management

Figure 3 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 71.4% of the flow in the sewers. The total contribution of foul water from homes is 3. % with business contributing 1.2%. The baseflow is infiltration from water in the ground and makes up 24.4% of the flow in the system.

Figure 3: Sources of water flowing in sewers during a 1 in 20 year storm



Planning Objective 11: Nutrient Neutrality

The risk to internationally designated habitat sites from this wastewater system is very significant in 2020 and 2050. This is because Natural England have advised that there is a risk to condition for the habitat sites that are hydraulically linked to our wastewater system, listed in Table 6.

Table 6: Habitat Sites hydraulically linked to wastewater system

Habitat Sites	
Arun Valley	Phosphate and Nitrate permit review required Overflow Spills

Planning Objective 12: Groundwater Pollution

The risk of Groundwater Pollution is not significant. This is because the wastewater network in this wastewater system does not overlap with any groundwater Source Protection Zones (SPZ) used for water supply.

Planning Objective 13: Bathing Waters

This wastewater system does not discharge into a designated bathing water.

Planning Objective 14: Shellfish Waters

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

Generic Options Assessment for: Loxwood (LOXW)



Planning Objectives		2020	Driver	2050	Type of Measures	Generic Option Categories	Icon	Take Forward?	Reasons	Examples of Generic Options
PO1	Internal Flooding	0	-	-	Source (Demand) Measures (to reduce likelihood)	Control / Reduce surface water run-off		Y	-	Natural Flood Management; rural land management and catchment management; SuDS including blue and green infrastructure; storm management
PO2	Pollution Risk	0	-	-		Reduce groundwater levels		N	Reducing groundwater levels would reduce the risks from infiltration into the network. However, in practice, reducing groundwater levels will be detrimental to the environment, ground conditions and is prohibitively too costly to implement. For these reasons, this generic option has been discounted.	Reduce leakage from water supply pipes; pump away schemes to locally lower groundwater near sewer network
PO3	Sewer Collapse	0	-	-		Improve quality of wastewater		N	None of the significant risks are caused by the quality of wastewater entering the wastewater system.	Domestic and business customer education; incentives and behaviour change (reduce Fats, Oils & Grease, wet wipes etc.); monitoring trade waste at source; on-site black water and/or greywater pre-treatment
PO4	Risk of Sewer Flooding in 1 in 50 yr	1	Hydraulic	1		Reduce the quantity / demand		Y	-	Water efficient appliances; water efficient measures; blackwater and/or greywater re-use; treatment at source
PO5	Storm Overflow Performance	2	Hydraulic	2	Pathway (Supply) Measures (to reduce likelihood)	Network Improvements		Y	-	Asset optimisation; additional network capacity; storage; separate flows; structural repairs; re-line sewer pipe and manholes; smart networks.
PO6	Risk of WTW Compliance Failure	1	Quality	1		Improve Treatment Quality		Y	-	Increase treatment capacity; rationalisation of treatment works (centralisation / de-centralisation); install tertiary plant; UV plant or disinfection facilities; innovation; improve Technical Achievable Limits; new WTWs
PO7	Annualised Flood Risk/Hydraulic Overload	1	Hydraulic	2		Wastewater Transfer to treatment elsewhere		N	The causes of risk are not due to where our systems discharge to the environment or our ability to increase the capacity to connect more homes. Transferring wastewater for treatment elsewhere will not reduce any of the significant risks in this catchment.	Transfer flow to other network or treatment sites; transport sewage by tanker to other sites
PO8	DWF Compliance	1	Quality	2	Receptor Measures (to reduce consequences)	Mitigate impacts on Air Quality		N/A	Not included in first round of DWMPs	Carbon offsetting; noise suppression /filtering; odour control and treatments
PO9	Achieve Good Ecological Status	2	Quality	-		Improve Land and Soils		N/A	Not included in first round of DWMPs	Sludge soil enhancement
PO10	Improve Surface Water Management	0	-	-		Mitigate impacts on receiving waters		Y	-	River enhancement, aeration
PO11	Secure Nutrient Neutrality	2	Unknown	2		Reduce impact on properties		Y	-	Property flood resilience; non-return valves; flood guards / doors; air brick covers
PO12	Reduce Groundwater Pollution	0	-	-	Other	Study / Investigation		Y	-	Additional data required; hydraulic model development; WQ monitoring and modelling
PO13	Improve Bathing Water Quality	NA	-	-						
PO14	Improve Shellfish Water Quality	NA	-	-						