Drainage and Wastewater Management Plan

Staplehurst
Wastewater System Plan

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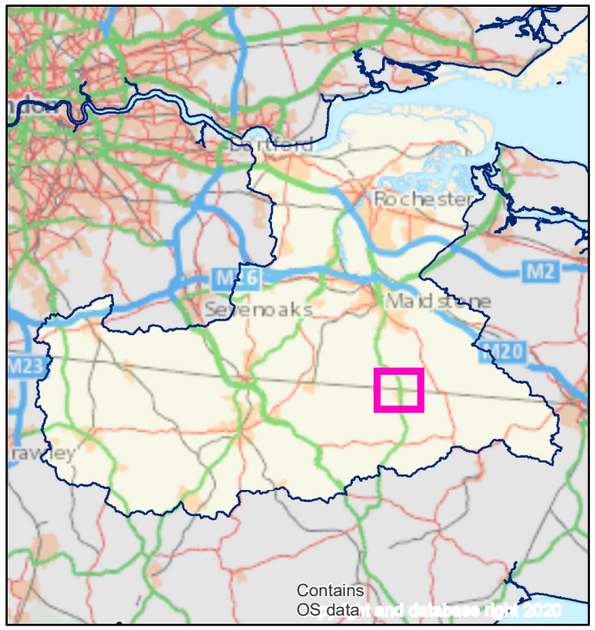
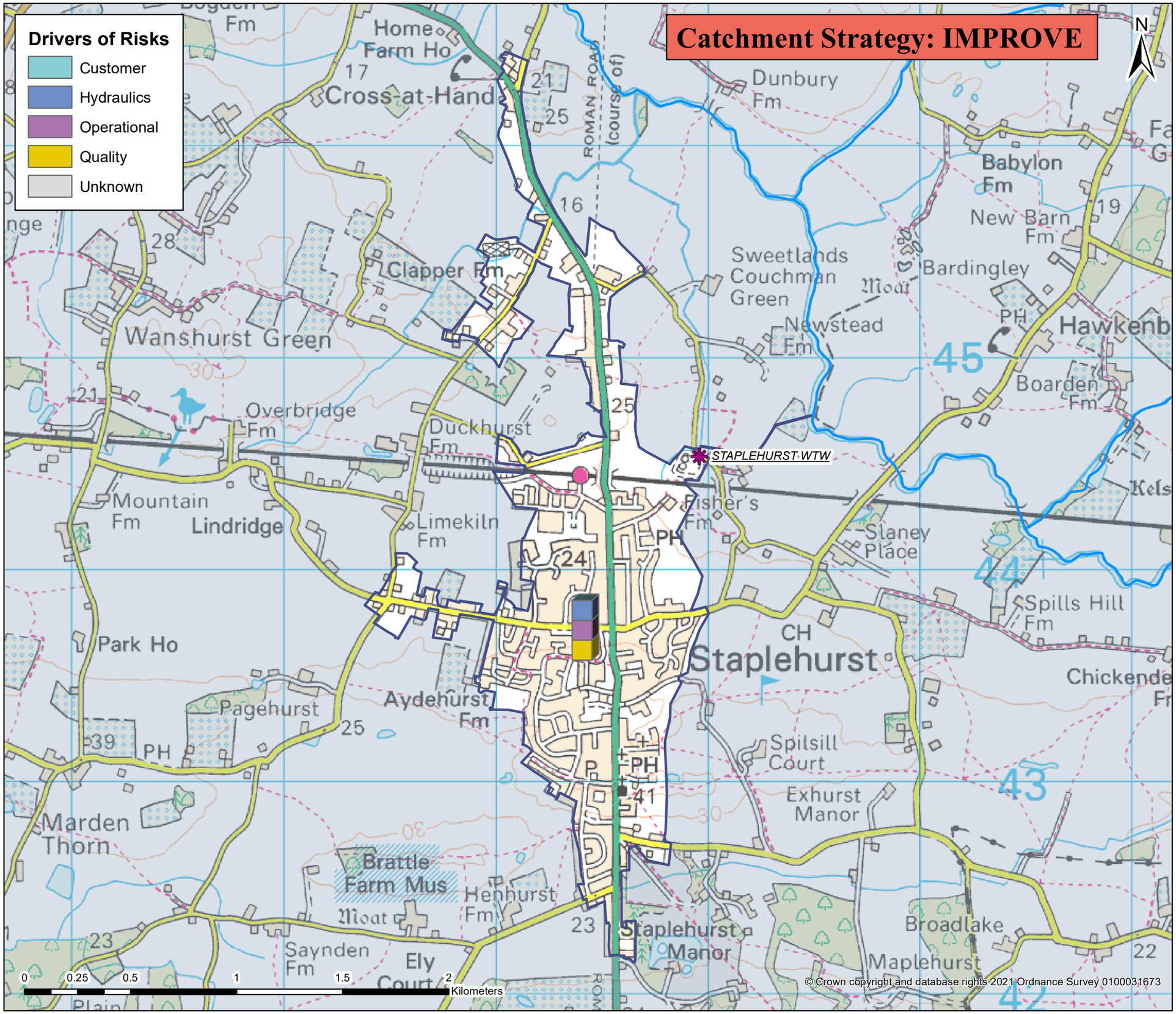
Staplehurst wastewater system: map and key facts



Population Equivalent (PE)	**5,866**
Discharge Waterbody	**Beult**
Number of Pumping Stations	**11**
Number of Overflows	**2**
Length of Sewer (km)	**56.6**
Catchment Reference	**STAP**

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



Problem Characterisation
Staplehurst (STAP)

This document describes the causes of the risks identified by the Baseline Risk and Vulnerability Assessment (BRAVA). The BRAVA results for this catchment are summarised in Table 1. The results indicate that flooding, pollution and water quality are the main concerns in this wastewater catchment. 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 Staplehurst wastewater system

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

Catchment Investment Strategy

The risks identified in this wastewater catchment 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 more then 3.35 incidents per 10,000 connections per year (a threshold set by Ofwat) so the risk is in the 'very significant' band.

This planning objective requires further investigation to better understand the causes of risks and the drivers. The main cause of internal flooding, contributing to 67 % of incidents, is Unknown. Further information is needed to understand the cause of this risk.

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

Blockage 0%
Pumping Station/ Treatment Work issue 0%
Sewer / Rising Main issue 0%
Hydraulic Overload 0%
Cause could not be Identified 67%

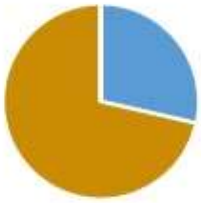
2017/18	2018/19	2019/20
0	0	3

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 more than 49.01 incidents per 10,000km per year (a threshold set by Ofwat) so the risk is in the 'very significant' band.

The primary driver for pollution is 'Operational' due to asset operational issues. Asset operational issues at our pumping stations and treatments works are the main cause of incidents, contributing to 71% of all incidents recorded in this wastewater system.

Figure 2: Number of pollution incidents per annum and causes



Blockage 29%
Pumping Station/ Treatment Work issue 71%
Sewer / Rising Main issue 0%
Hydraulic Overload 0%
Cause could not be Identified 0%

2017	2018	2019
1	2	4

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

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 500 - 600 properties within this wastewater system are in areas that could flood by water escaping from sewers. The model prediction for 2050 does not identify a notable increase.

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 not significant in 2020 and 2050.

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 asset risks have been identified in our Asset Risk Management (ARM) record. 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

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 3.

Table 3: Annualised number of properties at risk per 10,000 connections.

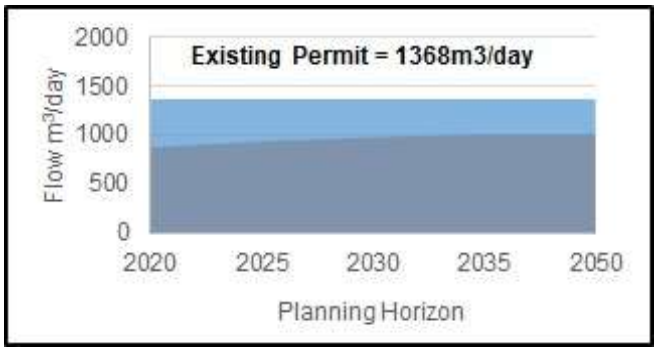
Rainfall Return Period (yr)	Number of Properties at Risk		Annualised per 10,000 connections	
	2020	2050	2020	2050
1 in 1	91	141	58	89
1 in 2	124	170	49	67
1 in 5	190	297	34	54
1 in 10	244	399	23	38
1 in 20	371	472	18	23
1 in 30	402	508	13	17
Total Annualised			**195**	**287**

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 (DWF) Compliance is not significant for both 2020 and 2050. This is because the average annual DWF for 2017, 2018 and 2019 has been below 80% of the current permit. The predicted DWF in 2050 is also expected to remain below 80% of the current permit, shown in Figure 3.

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



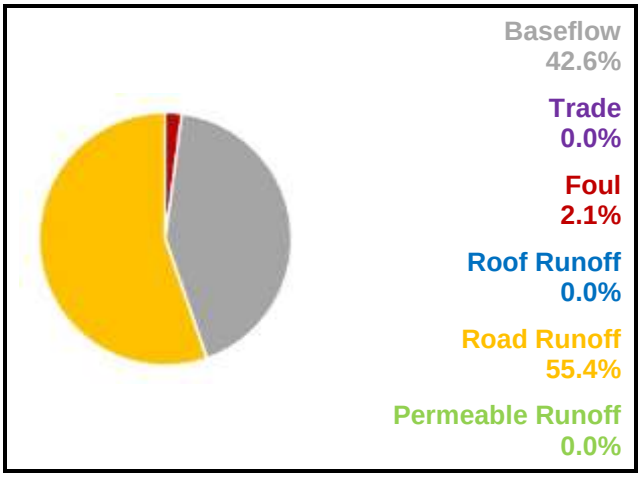
Planning Objective 9: Good Ecological Status / Good Ecological Potential

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

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 55.4% of the flow in the sewers. The total contribution of foul water from homes is 2.1% with business contributing 0.0%. The baseflow is infiltration from water in the ground and makes up 42.6% 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 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.

Southern Water
August 2021
Version 1

Generic Options Assessment for: Staplehurst (STAP)

Planning Objectives		2020	Driver	2050
PO1	Internal Flooding	2	Unknown	-
PO2	Pollution Risk	2	Operational	-
PO3	Sewer Collapse	0	-	-
PO4	Risk of Sewer Flooding in 1 in 50 yr	2	Hydraulic	2
PO5	Storm Overflow Performance	0	-	0
PO6	Risk of WTW Compliance Failure	1	Operational	1
PO7	Annualised Flood Risk/Hydraulic Overload	2	Hydraulic	2
PO8	DWF Compliance	0	-	0
PO9	Achieve Good Ecological Status	0	-	-
PO10	Improve Surface Water Management	0	-	-
PO11	Secure Nutrient Neutrality	NA	-	NA
PO12	Reduce Groundwater Pollution	0	-	-
PO13	Improve Bathing Water Quality	NA	-	-
PO14	Improve Shellfish Water Quality	NA	-	-

Type of Measures	Generic Option Categories	Icon	Take Forward?	Reasons	Examples of Generic Options
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
	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
	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
	Reduce the **quantity** / demand		N	None of the significant risks are caused by too much foul wastewater entering our systems from homes and businesses.	Water efficient appliances; water efficient measures; blackwater and/or greywater re-use; treatment at source
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.
	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
	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
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
	Improve Land and Soils		N/A	Not included in first round of DWMPs	Sludge soil enhancement
	Mitigate impacts on receiving waters		N	The receiving waters are not advserly impacted by our wastewater operations. Hence, offsetting any adverse impacts on receiving waters will not reduce any of the significant risks in this catchment.	River enhancement, aeration
	Reduce impact on properties		Y	-	Property flood resilience; non-return valves; flood guards / doors; air brick covers
Other	Study / Investigation		Y	-	Additional data required; hydraulic model development; WQ monitoring and modelling

August 2021
Version 1

Staplehurst Wastewater System - Outline Options Appraisal

Generic Option	Location of Risk	Planning Objective and Description of Risk	Option Reference	Description	Further Description	Unconstrained Option?	Constrained Option?	Feasible Option?	Net Benefits	Estimated Cost	Preferred Option	Best value / Least cost or Reasons for Rejection
Control/ Reduce surface water entering the sewers	South areas	PO4 and PO7 Surface water flooding	STAP.SC01.1	SuDS	Mitigating surface water flooding through implementation of SuDS schemes.	Yes	Yes	Yes	Moderate Positive ++	£TBC - With Partners	Yes	Best Value
Control/ Reduce surface water entering the sewers	Northern / South-west areas	PO4 and PO7 Surface water flooding	STAP.SC01.2	Surface water separation	Opportunities to disconnect surface water runoff from the combined system and direct it to watercourses throughout this area of the catchment.	Yes	Yes	Yes	Moderate Positive ++	£TBC - With Partners	Yes	Best Value
Control / Reduce groundwater infiltration												
Improve quality of wastewater entering sewers (inc reducing FOG, RAG, pre-treatment, trade waste)	Marden Road	PO1- Internal Flooding	STAP.SC03.1	Customer Education Programme	Customer education programme to reduce the risk.	Yes	Yes	Yes	Minor Positive +	£115K	Yes	Best Value
Improve quality of wastewater entering sewers (inc reducing FOG, RAG, pre-treatment, trade waste)	TBC	PO2- Pollution Risk	STAP.SC03.2	Customer Education Programme	Customer education programme to reduce the risk.	Yes	Yes	Yes	Minor Positive +	£115K	Yes	Best Value
Control / Reduce the quantity / flow of wastewater entering sewer system												
Network Improvements (eg increase capacity, storage, conveyance)	Staplehurst WTW, Bathurst Road Staplehurst WPS	PO2- Pollution Risk	STAP.PW01.1	Maintenance Programme WPS	Enhanced maintenance programme for pumping stations to elimate the risk of pollution incidents due to operational failures Linking with the 'Pollution Reduction Programme'.	Yes	Yes	Yes	Minor Positive +	£235K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Marden Road	PO1- Internal Flooding	STAP.PW01.2	Jetting Programme	Increase frequency of MST (Maintenance Scheduled Tasks).	Yes	Yes	Yes	Minor Positive +	£10K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Catchment wide	PO2- Pollution Risk	STAP.PW01.3	Jetting Programme	Increase frequency of MST (Maintenance Scheduled Tasks).	Yes	Yes	Yes	Minor Positive +	£23K	Yes	Best Value
Improve treatment (capacity and quality at existing works or develop new WTWs)	Staplehurst WTW	PO2- Pollution Risk	STAP.PW02.1	Maintenance Programme WTW	An efficient maintenance programme for the treatment works to elimate the risk of a pollution incident due to an operational failure.	Yes	Yes	Yes	Minor Positive +	£1,000K	Yes	Best Value
Improve treatment (capacity and quality at existing works or develop new WTWs)	Staplehurst WTW	PO6 (2050)- WTW compliance	STAP.PW02.2	Increase Capacity	Catchment was banded 1 in 2020 ; ARM Risk = 8485 of which 82.	Yes	Yes	Yes	Minor Positive +	£955K	Yes	Best Value
Wastewater Transfer												
Mitigate impacts on Air Quality (e.g. Carbon neutrality, noise, odour)												Not included in the first round of DWMPs
Improve Land and Soils												Not included in the first round of DWMPs
Mitigate impacts on Water Quality												
Reduce consequences Properties (e.g. Property Flood Resilience)												
Study/ investigation to gather more data	Marden Road	PO1- Internal Flooding	STAP.OT01.1	Investigation into causes	Further investigation to identify the cause of the internal flooding incidents, and possible hydraulic solution to Marden Road flooding.	Yes	Yes	Yes	Minor Positive +	£232K	Yes	Best Value
Study/ investigation to gather more data	Catchment Wide / Overflow Locations	PO4- 1 in 50 year PO7- Hydraulic Overload	STAP.OT01.2	Improve Hydraulic Model	Existing model considered to be unreliable.	Yes	Yes	Yes	Minor Positive +	£275K	Yes	Best Value
Study/ investigation to gather more data	Areas in the South	PO2 - Pollution Risk PO4 - 1 in 50 year PO7 - Hydraulic Overload	STAP.OT01.3	Investigation into causes	Study: Investigate Infiltration and Exfiltration to identify the causes and highest risk areas.	Yes	Yes	Yes	Minor Positive +	£275K	Yes	Best Value

DWMP Investment Needs

1. The options listed in the DWMP Investment Needs below are the preferred options in our DWMP. They will need further refinement as we implement the DWMP to confirm the exact location and scope of action needed, and the cost.

2. The costs are indicative costs for planning purposes only. The basis for the cost estimates, including assumptions and uncertainties, are explained in our DWMP Investment Plans.

3. The table of Investment Need provides an indicative cost so we know what level of funding is needed to reduce the risks. It is not a commitment to fund or deliver any option.

4. The Indicative Timescale is when the investment is needed. Some options may take several investment periods to achieve the desired outcomes.

5. Potential Partners have been identified in the table of Investment Needs. This is to indicate where there may be opportunities for us to work with these partners when developing and delivering these options. It is not a commitment by any of the partners to work with us.

6. These options will inform our future business plans as part of the Ofwat periodic review process to secure the finance to implement these options.

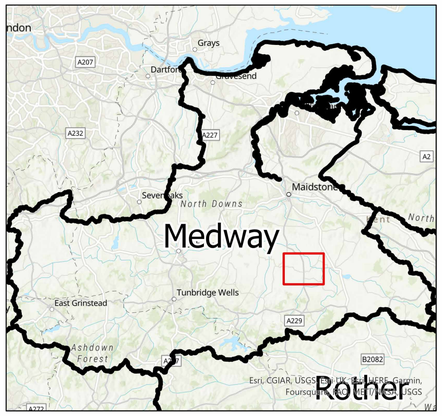
7. The options listed are prioritised by the method stated in the Programme Appraisal Technical Summary.

Date : May 2023
Version : 1.0

Reference	River Basin (L2)	Wastewater System (L3)	Location	Option	Indicative Cost	Indicative Timescales	Potential Partners	Applicable Planning Objectives
Medway								
Staplehurst								
STAP.SC03.1	Medway	Staplehurst	Marden Road	Customer Education Programme: Targeted campaign to reduce the amount of FOG (fats, oils and grease) and unflushables discharged into the sewer network	£115K	AMP8 onwards	Maidstone Borough Council	PO1
STAP.SC03.2	Medway	Staplehurst	System Wide	Customer Education Programme: Targeted campaign to reduce the amount of FOG (fats, oils and grease) and unflushables discharged into the sewer network	£115K	AMP8 onwards	Maidstone Borough Council	PO2
STAP.PW01.1	Medway	Staplehurst	Staplehurst WTW, Bathurst Road Staplehurst WPS	Improve the operational resilience of wastewater pumping station (WPS) and wastewater treatment works (WTW) to reduce pollution incidents	£235K	AMP8 onwards	-	PO2
STAP.PW01.2	Medway	Staplehurst	Marden Road	Enhanced Sewer Maintenance: Increase targeted sewer jetting to reduce the number of blockages in the network	£10K	AMP8 onwards	-	PO1
STAP.PW01.3	Medway	Staplehurst	System Wide	Enhanced Sewer Maintenance: Increase targeted sewer jetting to reduce the number of blockages in the network	£25K	AMP8 onwards	-	PO2
STAP.PW02.1	Medway	Staplehurst	Staplehurst WTW	Improve the operational resilience of wastewater pumping station (WPS) to reduce pollution incidents	£1,000K	AMP8 onwards	-	PO2
STAP.PW02.2	Medway	Staplehurst	Staplehurst WTW	Increase treatment capacity to allow for planned new development	£745K	AMP9	Environment Agency	PO6
STAP.OT01.1	Medway	Staplehurst	Marden Road	Study and Investigation: Investigation to identify the root cause of internal flooding and measures to reduce the number of incidents	£230K	AMP8	-	PO1
STAP.OT01.2	Medway	Staplehurst	System Wide / Overflow Locations	Improve the Hydraulic Model: Surveys and reverification of model to improve confidence and accuracy	£275K	AMP9	-	PO4 PO7
STAP.OT01.3	Medway	Staplehurst	Areas in the South	Study and Investigation: Investigate infiltration and exfiltration to identify the causes and highest risk areas	£275K	AMP9	-	PO2 PO4 PO7
STAP.WINEP01.1	Medway	Staplehurst	Pattenden Lane Staplehurst CEO	Reduce the number of storm discharges from Pattenden Lane Staplehurst CEO by a combination of SuDS and storage options	£2,080K	AMP11	-	PO4 PO5 PO7
STAP.WINEP01.2	Medway	Staplehurst	STAPLEHURST SSO	Reduce the number of storm discharges from STAPLEHURST SSO by a combination of SuDS and storage options	£990K	AMP12	-	PO4 PO5 PO7
STAP.WINEP.PO.1	Medway	Staplehurst	Staplehurst WTW	Provision of chemical dosing and tertiary treatment to achieve 0.25mg/l Total P, and 2.41mg/l Ammonia permit. (WINEP OAR 08SO104110)	£11,909K	AMP8	-	PO9

Drainage and Wastewater Management Plan: Location of Potential Options STAPLEHURST Wastewater system in Medway River Basin Catchment

(i) This map should be read in conjunction with the list of Investment Needs for this wastewater system
(ii) The areas shown on this map are the potential locations for the options. The location of the risk may be elsewhere in the system.
(iii) Labels for each location are the option references in the list of Investment Needs
(iv) Drainage Area Plan (DAP) options on flooding and growth are not shown.



- Customer Education
- Pipe Rehabilitation
- Asset Resilience
- Wastewater Treatment
- WINEP Nutient Neutrality
- WINEP Storm Overflows