Drainage and Wastewater Management Plan

Chartham
Wastewater System Plan

from Southern Water

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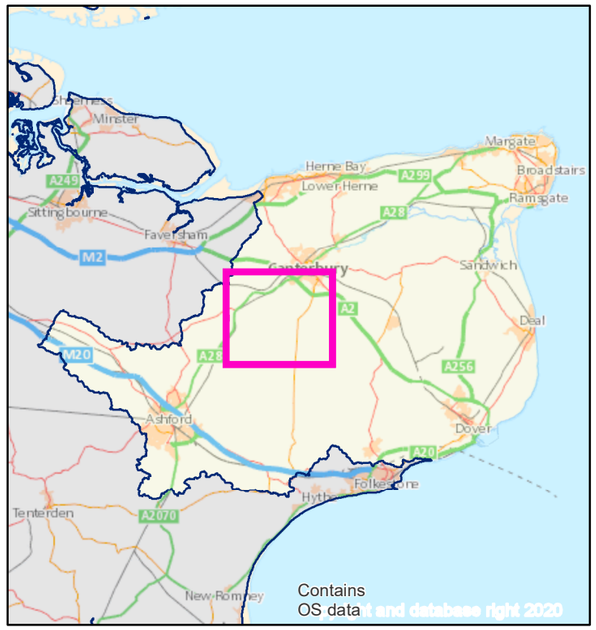
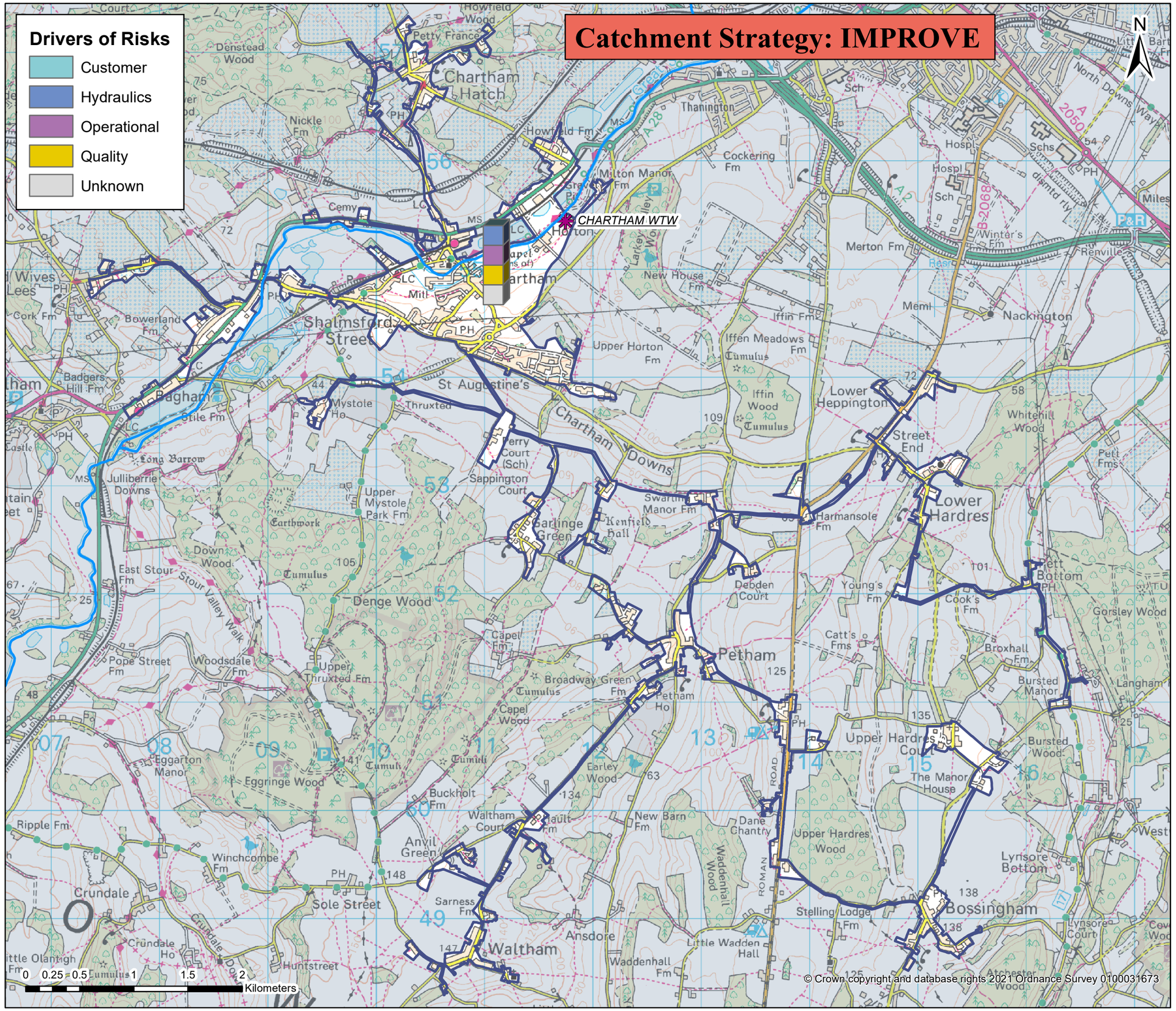
Chartham wastewater system: map and key facts



Population Equivalent (PE)	**6,940**
Discharge Waterbody	**Great Stour between Wye and A2**
Number of Pumping Stations	**32**
Number of Overflows	**1**
Length of Sewer (km)	**133.6**
Catchment Reference	**CHAR**

BRAVA Results Table (CHAR)

	Planning Objective	2020	2050
1	Internal Sewer Flooding Risk	0	
2	Pollution Risk	2	
3	Sewer Collapse Risk	2	
4	Risk of Sewer Flooding in a 1 in 50 year storm	1	1
5	Storm Overflow performance	0	0
6	Risk of WTW Compliance Failure	0	0
7	Risk of flooding due to Hydraulic Overload	2	2
8	Dry Weather Flow Compliance	0	1
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
Chartham (CHAR)

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 Chartham wastewater system

Planning Objectives		2020	Driver	2050
1	Internal Sewer Flooding Risk	0	-	
2	Pollution Risk	2	Operational	
3	Sewer Collapse Risk	2	Operational	
4	Sewer Flooding in a 1 in 50-year storm	1	Hydraulic	1
5	Storm Overflow Performance	0	-	0
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	2	Operational	
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

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 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.

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 100%
Cause could not be Identified 0%

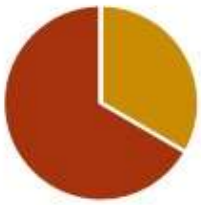
2017/18	2018/19	2019/20
0	1	0

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. Sewer collapses and bursts are the main cause of incidents, contributing to 67% of all incidents recorded in this wastewater system.

Figure 2: Number of pollution incidents per annum and causes



Blockage 0%
Pumping Station/ Treatment Work issue 33%
Sewer / Rising Main issue 67%
Hydraulic Overload 0%
Cause could not be Identified 0%

2017	2018	2019
0	0	3

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 more then 9.44 incidents per 1,000km per year (a threshold set by Ofwat) so the risk is in the 'very significant' band.

Table 2: Sewer collapses and rising main bursts

Sewer Collapse	**2017/18**	1
	2018/19	0
	2019/20	0
Rising Main Bursts	**2017/18**	0
	2018/19	1
	2019/20	3

The primary driver is 'Operational' as the cause of these collapses and bursts is due to the age and condition of the sewers.

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. A hydraulic model is not available for this wastewater system, however our wastewater system vulnerability assessment (using Ofwat's guidance on Risk of Sewer Flooding in a Storm) identified this wastewater system as grade 3/4.

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 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

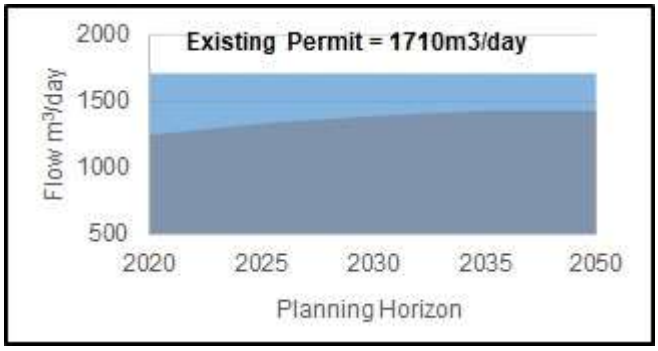
This is an assessment of the risk of flooding from sewers during a 1 in 30 year storm, and more frequent rainfall, to understand where flooding could occur. The risk of sewer flooding due to hydraulic overload is very significant in 2020 and 2050. A network model was not available for this assessment, however the network in the wastewater system exceeds its design capacity for 2020 and 2050.

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

Table 3 shows the waterbodies connected to this wastewater catchment 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 there are potential issues with leaking sewers allowing the sewerage to escape into the ground due to the condition of our sewer network in this wastewater system.

Table 3: Waterbodies not achieving GES/GEP

Waterbody	Classification	EA-Status	Activity
Great Stour between Wye and A2	Macrophytes and Phytobenthos Combined	Moderate	Sewage discharge (continuous)
Great Stour between Wye and A2	Phosphate	Moderate	Sewage discharge (continuous)
East Kent Chalk - Stour	Chemical Drinking Water Protected Area	Poor	Leaking utility sewers

The primary driver is 'Operational'.

Planning Objective 10: Surface Water Management

A network model was not available for this assessment, therefore the risk has been moderated to not significnat for this planning objective.

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 (hydraulically linked to our wastewater catchment) shown in Table 4.

Table 4: Habitat Sites hydraulically linked to wastewater system

Habitat Sites	
Stodmarsh	Phosphate and Nitrate permit review required

Planning Objective 12: Groundwater Pollution

The risk of Groundwater Pollution is not significant. Although our wastewater network crosses over Source Protection Zones (SPZ) used for water supply, there is no evidence to suggest our network is leaking into these SPZs.

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: Chartham (CHAR)

Planning Objectives		2020	Driver	2050
PO1	Internal Flooding	0	-	-
PO2	Pollution Risk	2	Operational	-
PO3	Sewer Collapse	2	Operational	-
PO4	Risk of Sewer Flooding in 1 in 50 yr	1	Hydraulic	1
PO5	Storm Overflow Performance	0	-	0
PO6	Risk of WTW Compliance Failure	0	-	0
PO7	Annualised Flood Risk/Hydraulic Overload	2	Hydraulic	2
PO8	DWF Compliance	0	-	1
PO9	Achieve Good Ecological Status	2	Operational	-
PO10	Improve Surface Water Management	0	-	-
PO11	Secure Nutrient Neutrality	2	Unknown	2
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	Although there is no hydraulic model for this catchment, there may be benefit in reducing the amount of surface runoff entering network in order to address flooding due to hydraulic overload (PO7).	Natural Flood Management; rural land management and catchment management; SuDS including blue and green infrastructure; storm management
	Reduce groundwater levels		N	Catchment is not modelled and there is no supporting evidence that infiltration is an issue.	Reduce leakage from water supply pipes; pump away schemes to locally lower groundwater near sewer network
	Improve **quality** of wastewater		N	There is no supporting evidence that the quality of wastewater at source will reduce the very significant risks in catchment	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		Y	Interception and recycling of rainwater and greywater at source will improve network capacity during storms. This will have a positive impact on reducing flooding due to hydraulic overload (PO7). Reducing water consumption using regional campaign (Target100) may also help improve capacity.	Water efficient appliances; water efficient measures; blackwater and/or greywater re-use; treatment at source
Pathway (Supply) Measures (to reduce likelihood)	Network Improvements		Y	Improving the hydraulic and storage capacity in the network will reduce the risk of flooding due to hydraulic overload (PO7). Improving the structural condition of gravity sewers and rising mains through rehabilitation / replacement will reduce indicents of bursts / collapse (PO3).	Asset optimisation; additional network capacity; storage; separate flows; structural repairs; re-line sewer pipe and manholes; smart networks.
	Improve Treatment Quality		Y	Improving treatment quality or capacity may address contribution of WTW spills to the failure to achieve Nutrient Neutrality (PO11) and Good Ecological Status (PO9). This is subject to further investigation; WTW may require new permits.	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		Y	Transfer of flows from subcatchment to a different catchment could provide hydraulic relief in network during storm events (PO7).	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		Y	WTW discharges affect the Great Stour, but treating the waterbody into the Medway Estuary, so it may be very difficult to enhance the habitat at receptor level (PO9 & PO11), i.e. it will be very challenging to achieve.	River enhancement, aeration
	Reduce impact on properties		Y	This could be done to provide flood mitigation at property level in the medium term until a flood mitigation scheme is in place (PO7).	Property flood resilience; non-return valves; flood guards / doors; air brick covers
Other	Study / Investigation		N	No further studies required at this stage	Additional data required; hydraulic model development; WQ monitoring and modelling

August 2021
Version 1

Chartham 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												
Control / Reduce groundwater infiltration												
Improve quality of wastewater entering sewers (inc reducing FOG, RAG, pre-treatment, trade waste)												
Control / Reduce the quantity / flow of wastewater entering sewer system	CHARTHAM WTW	PO8 (2050)- Dry Weather Flow	CHAR.SC04.1	Water Efficient Appliance / Measures.	South East Water aims to reduce water consumption to under 100 l/h/d by 2040 as part of an existing campaign.	No						Deliver the required outcome
Network Improvements (eg increase capacity, storage, conveyance)	Chartham Green WPS	PO2- Pollution Risk	CHAR.PW01.1	Maintenance Programme WPS.	An efficient maintenance programme for pumping stations to elimate the risk of a pollution incident due to an operational failure.	Yes	Yes	Yes	Minor Positive +	£TBC - With Partners	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Horton Crossing WPS & Shalmsford Street Chartham WPS	PO2- Pollution Risk	CHAR.PW01.2	Pipe Rehabilitation Programme.	Proactive maintenance and rehabilitation of rising main system.	Yes	Yes	Yes	Minor Positive +	£TBC - With Partners	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Shalmsford Street Chartham WPS and Bossingham area	PO3- Sewer Collapse	CHAR.PW01.3	Pipe Rehabilitation Programme.	Targeted CCTV / electroscan surveys (3km) and proactive sewer rehabilitation.	Yes	Yes	Yes	Minor Positive +	£3,145K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Catchment Wide	PO8 (2050)- Dry Weather Flow	CHAR.PW01.4	Pipe Rehabilitation Programme.	Relining/improving structural grades of sewers across the catchment.	No						Cost Effective and Risk and uncertainty - future resilience
Network Improvements (eg increase capacity, storage, conveyance)	Catchment Wide	PO9 - Good Ecological Status	CHAR.PW01.5	Pipe Rehabilitation Programme.	To reduce risk of leaking sewers affecting Good Ecological Status.	Yes	Yes	Yes	Minor Positive +	£TBC - With Partners	Yes	Best Value
Improve treatment (capacity and quality at existing works or develop new WTWs)	CHARTHAM WTW	PO8 (2050)- Dry Weather Flow	CHAR.PW02.1	DWF Permit Increase.	Propose New DWF Permit of 1900 m3 / day at the WTW.	No						Do customer support it and Risk and uncertainty - future resilience
Improve treatment (capacity and quality at existing works or develop new WTWs)	CHARTHAM WTW	PO9- GE Status / Potential Sewage discharge (continuous)	CHAR.PW02.2	Tertiary Treatment.	Propose tertiary treatment to reduce amount of Phosphate in final effluent.	No						Cost Effective and Risk and uncertainty - future resilience
Wastewater Transfer	CHARTHAM WTW	PO8 (2050)- Dry Weather Flow	CHAR.PW03.1	Construct New WPS & Rising Main.	Within 15km radius of CHAR is WYEW (Wye) which in 2050 will have approximately 196m3day of headroom (until it is above 80% of its DWF permit).	No						Cost Effective, Environmental risk mitigatable and Do customer support it
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)	Flooding Cluster CHAR FC01 - Canterbury Road	PO4 & PO7 - Sewer Flooding	CHAR.RC04.1	Property Flood Mitigation / Resistance.	Short-term property level protection.	No						Technically feasibleCost EffectiveDeliver the required outcomeEnvironmental risk mitigatableDo customer support itRisk and uncertainty - future resilience
Study/ investigation to gather more data	CHARTHAM WTW	PO8 (2050)- Dry Weather Flow	CHAR.OT01.1	Infiltration Reduction Plan.	Relining/improving structural grades of sewers across the catchment.	No						Cost Effective and Risk and uncertainty - future resilience
Study/ investigation to gather more data	Great Stour between Wye and A2 East Kent Chalk - Stour	PO9- GE Status / Potential Sewage discharge (continuous)	CHAR.OT01.2	Study and Investigations to Achieve Good Ecological Status.	Catchment was banded 2 in because; Great Stour between Wye and A2-Macrophytes and Phytobenthos Combined .	Yes	Yes	Yes	Minor Positive +	£TBC - With Partners	No	Best Value
Study/ investigation to gather more data	Stodmarsh	PO11 - Nutrient Neutrality	CHAR.OT01.3	Study and Investigations to identify Measures to Secure Nutrient Neutrality.	Catchment is Hydraulically linked to; Stodmarsh.	Yes	Yes	Yes	Minor Positive +	£TBC - With Partners	Yes	Best Value
Study/ investigation to gather more data	Catchment Wide	PO4 & PO7 - Sewer Flooding	CHAR.OT01.4	Model Build.	CAS, Flow surveys and Model build for entire catchment comprising 134km of sewers, 1 overflow and 32 WPSs.	Yes	Yes	Yes	Minor Positive +	£325K	Yes	Best Value
Study/ investigation to gather more data	Flooding Cluster CHAR FC01 - Canterbury Road	PO4 and PO7 Flooding	CHAR.OT01.5	Study and modelling investigation.	DAP Option.	No						

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.

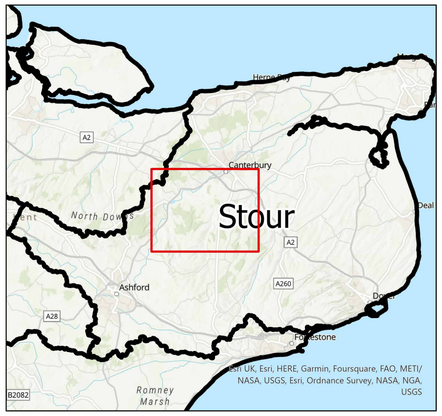
7. The options listed are prioritised by the method stated in the Programme Appraisal Technical Summary.

Date : May 2023
Version : 1.0

Reference	River Basin (L2)	Wastewater System (L3)	Location	Option	Indicative Cost	Indicative Timescales	Potential Partners	Applicable Planning Objectives
Stour								
Chartham								
CHAR.PW01.1	Stour	Chartham	Chartham Green WPS	Improve the operational resilience of wastewater pumping station (WPS) to reduce pollution incidents	£235K	AMP8 onwards	-	PO2
CHAR.PW01.2	Stour	Chartham	Horton Crossing WPS & Shalmsford Street Chartham WPS Rising Mains	Improve the operational resilience of wastewater pumping station (WPS) to reduce pollution incidents	£845K	AMP8 onwards	-	PO2
CHAR.PW01.3	Stour	Chartham	Shalmsford Street Chartham WPS and Bossingham sewer network	Sewer Rehabilitation: Targeted CCTV or electroscan surveys and sewer rehabilitation to reduce the risk of sewer bursts and collapses	£3,145K	AMP8 onwards	-	PO3
CHAR.PW01.5	Stour	Chartham	System Wide	Sewer Rehabilitation: Targeted CCTV or electroscan surveys and sewer rehabilitation to reduce the risk of sewer bursts and collapses	£9,180K	AMP8 onwards	-	PO9
CHAR.OT01.2	Stour	Chartham	System Wide	Study and Investigation to understand the impact of wastewater discharges on the local environment and identify measures required to achieve good ecological status in the receiving waterbody	£695K	AMP8	Environment Agency	PO9
CHAR.OT01.4	Stour	Chartham	System Wide	Improve the Hydraulic Model: Surveys and reverification of model to improve confidence and accuracy	£325K	AMP8	-	PO4 PO7

Drainage and Wastewater Management Plan: Location of Potential Options CHARTHAM Wastewater system in Stour 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