



Drainage and Wastewater Management Plan

Margate and Broadstairs
Wastewater System Plan



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**Southern
Water** 

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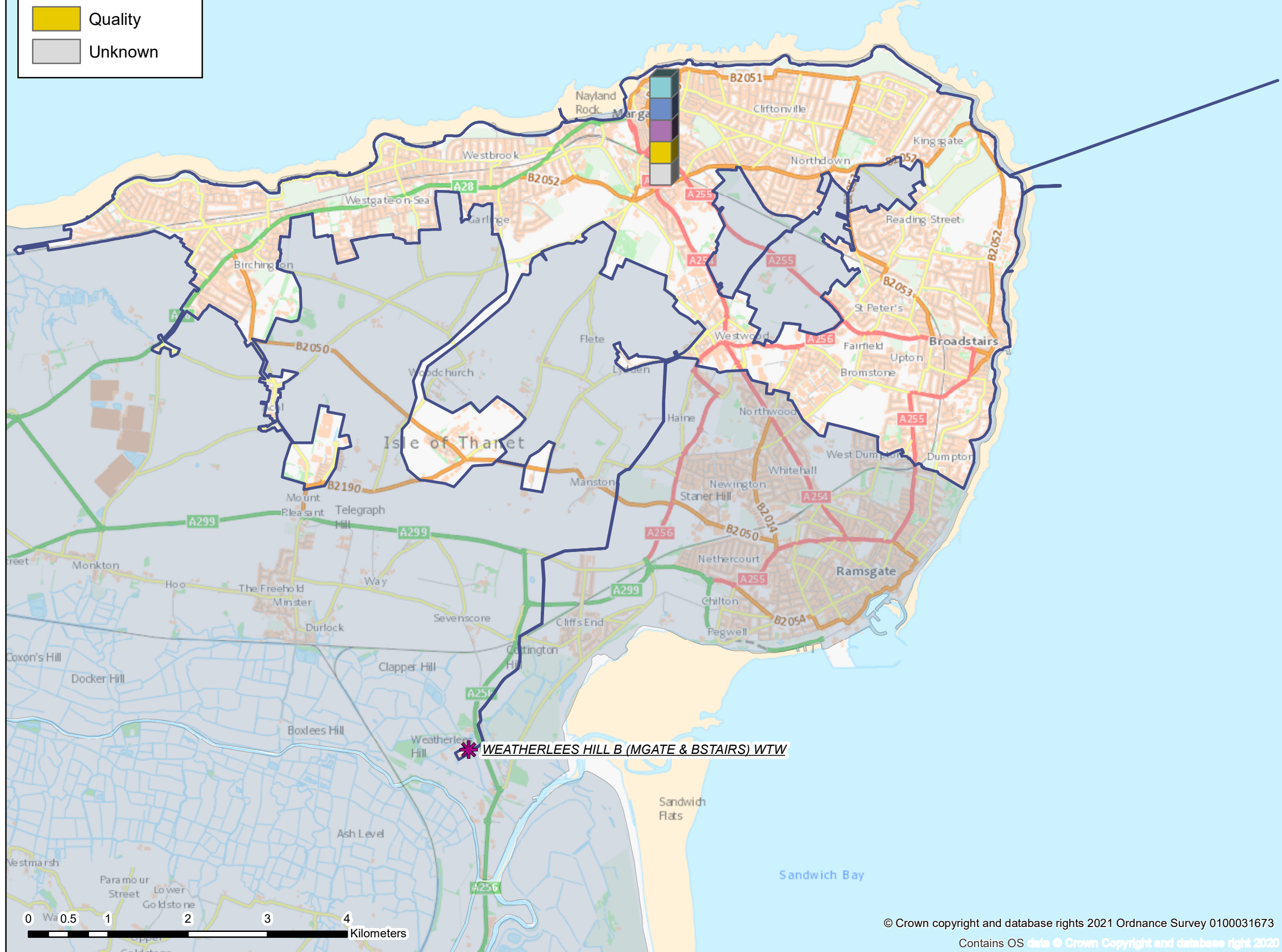
Margate And Broadstairs wastewater system: map and key facts



Drivers of Risks

- Customer
- Hydraulics
- Operational
- Quality
- Unknown

Catchment Strategy: IMPROVE



Population Equivalent (PE)	92,788
Discharge Waterbody	Minster Stream
Number of Pumping Stations	27
Number of Overflows	6
Length of Sewer (km)	606.6
Catchment Reference	WEHB

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



Problem Characterisation

Margate And Broadstairs (WEHB)

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 Margate And Broadstairs wastewater system

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

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).

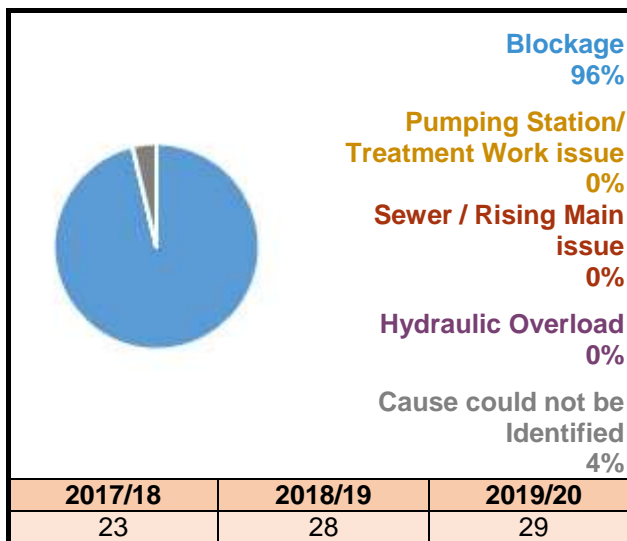


Planning Objective 1: Internal Sewer Flooding Risk

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 than 3.35 incidents per 10,000 connections per year (a threshold set by Ofwat) so the risk is in the 'very significant' band.²

The primary driver for internal sewer flooding in this wastewater system is 'Customer'. Blockages caused 96% 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

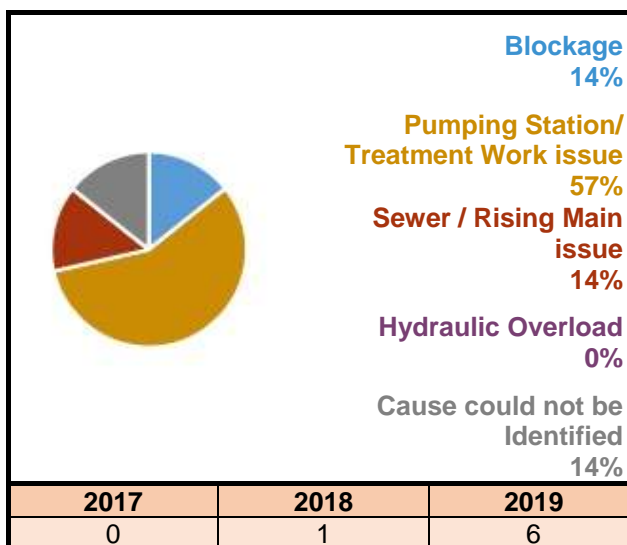


Planning Objective 2: Pollution Risk

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 between 24.51 and 49.01 incidents per 10,000km per year (a threshold set by Ofwat) so the risk is in the 'moderately 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 57% of all incidents recorded in this wastewater system.

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	1
	2019/20	1
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 moderately significant in 2020 and 2050. This is because our computer model of the sewer network indicate for 2020 that approximately 2200 - 2300 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 4000 - 4100 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 not significant in 2020, however network modelling results indicated that the risk will increase to moderately significant by 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.

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	0	Less than 8	Between 8-10	10 or more
Bathing Waters	0	1 Medium	Less than 3	Between 3-10	10 or more
Freshwater	0	0	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).

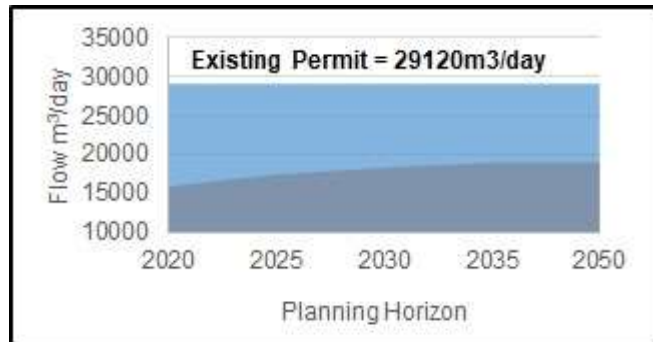
Planning Objective 7: Flooding due to Hydraulic Overload

Our initial assessment is that flooding from hydraulic overload is not significant in this wastewater catchment for both 2020 and 2050. We will use a hydraulic model of the wastewater system to determine if this catchment is at risk for Hydraulic Overload across the various storm events, and update this risk assessment accordingly for the next cycle of DWMPs.

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

Table 4 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 has been moderated from very significant to moderately significant because of the presence of Tertiary Treatment at the wastewater system Treatment Works. 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 and due to intermittent discharges from overflows.

Table 4: Waterbodies not achieving GES/GEP

Waterbody	Classification	EA-Status	Activity
Kent Isle of Thanet Chalk	General Chemical Test	Poor	Leaking utility sewers
Kent Isle of Thanet Chalk	Chemical Drinking Water Protected Area	Poor	Leaking utility sewers
Kent Isle of Thanet Chalk	Chemical Drinking Water Protected Area	Poor	Sewage discharge (intermittent)
Monkton and Minster Marshes	Macrophytes and Phytobenthos Combined	Moderate	Sewage discharge (continuous)
Monkton and Minster Marshes	Phosphate	Moderate	Sewage discharge (continuous)

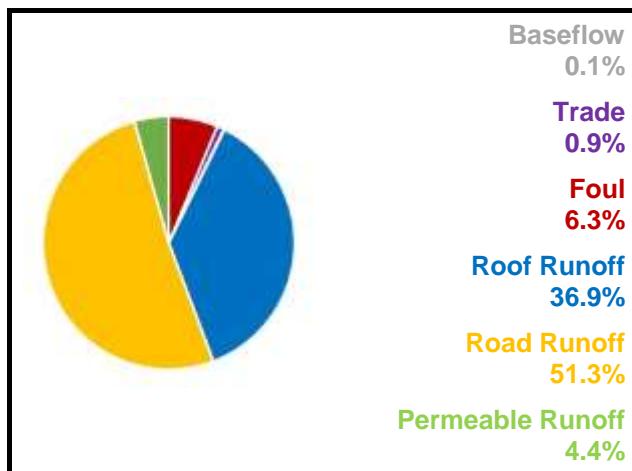
The primary driver is 'Operational'.

Planning Objective 10: Surface Water Management

Our initial high level assessment indicated that there is moderately 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 92.6% of the flow in the sewers. The total contribution of foul water from homes is 6.3% with business contributing 0.9%. The baseflow is infiltration from water in the ground and makes up 0.1% 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

The risk to internationally designated habitat sites from this wastewater system is moderately significant in 2020 but rises to very significant in 2050. This is because Natural England have advised a condition assessment is planned by them after 2025 for the habitat site (hydraulically linked to our wastewater catchment) shown in Table 5.

Table 5: Habitat Sites hydraulically linked to wastewater system

Habitat Sites	
Thanet Coast & Sandwich Bay	Condition Assessment after 2025

Our growth forecast suggest that more than 2,000 new homes could occur in this wastewater system by 2050 which means the risk to habitat sites increases to very significant by 2050.

Planning Objective 12: Groundwater Pollution

The risk of Groundwater Pollution is very 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 6, along with the current classification from the Environment Agency.

The risks from this wastewater system on Broadstairs (Viking Bay), Walpole Bay (Margate), Botany Bay (Broadstairs), Joss Bay (Broadstairs), Margate The Bay bathing waters has led to an assessment of moderately significant.

The primary driver is 'Customer' due to suspected foul to surface water misconnections as well as suspected agriculture affecting the bathing waters in this wastewater system.

Table 6: Bathing Water annual results

Bathing Waters	Annual Results		
	2017	2018	2019
Broadstairs (Viking Bay)	Good	Good	Sufficient
Walpole Bay (Margate)	Excellent	Good	Excellent
Botany Bay (Broadstairs)	Excellent	Good	Good
Joss Bay (Broadstairs)	Excellent	Good	Good
Margate The Bay	Good	Excellent	Excellent
Margate Fulsam Rock	Good	Excellent	Excellent
West Bay, Westgate	Excellent	Excellent	Good
St Mildred's Bay, Westgate	Excellent	Excellent	Excellent
Westbrook Bay, Margate	Excellent	Excellent	Excellent
Broadstairs, Stone Bay	Excellent	Excellent	Excellent

Planning Objective 14: Shellfish Waters

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

Generic Options Assessment for: Margate And Broadstairs (WEHB)



Planning Objectives		2020	Driver	2050	Type of Measures	Generic Option Categories	Icon	Take Forward?	Reasons	Examples of Generic Options
PO1	Internal Flooding	2	Customer	-	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	1	Operational	-		Reduce groundwater levels		N	None of the significant risks in this catchment are caused by high groundwater levels. Hence reducing groundwater levels will not impact any of the risks in this catchment.	Reduce leakage from water supply pipes; pump away schemes to locally lower groundwater near sewer network
PO3	Sewer Collapse	0	-	-		Improve quality of wastewater		Y	-	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	0	-	1	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	0	-	0		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	0	-	0		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	0	-	0	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	1	Operational	-		Improve Land and Soils		N/A	Not included in first round of DWMPs	Sludge soil enhancement
PO10	Improve Surface Water Management	1	Hydraulic	-		Mitigate impacts on receiving waters		Y	-	River enhancement, aeration
PO11	Secure Nutrient Neutrality	1	Unknown	2		Reduce impact on properties		Y	-	Property flood resilience; non-return valves; flood guards / doors; air brick covers
PO12	Reduce Groundwater Pollution	2	Operational	-	Other	Study / Investigation		Y	-	Additional data required; hydraulic model development; WQ monitoring and modelling
PO13	Improve Bathing Water Quality	1	Customer	-						
PO14	Improve Shellfish Water Quality	NA	-	-						

Margate And Broadstairs 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	Flooding Cluster WEHB FC01 - Fort Paragon	PO4 and PO7,PO10 Flooding	WEHB.SC01.1	Surface Water Separation and SuDS for Storage	DAP Option.	No						
Control/ Reduce surface water entering the sewers	Flooding Cluster WEHB FC02 - Northdown Road / Holly Lane	PO4 and PO7,PO10 Flooding	WEHB.SC01.2	Surface Water Separation and SuDS for Storage	DAP Option.	No						
Control/ Reduce surface water entering the sewers	Flooding Cluster WEHB FC03 - All Saints Ave. / Arlington Square	PO4 and PO7,PO10 Flooding	WEHB.SC01.3	Surface Water Separation and SuDS for Storage	DAP Option.	No						
Control/ Reduce surface water entering the sewers	Flooding Cluster WEHB FC04 - All A254 Ramsgate Road,	PO4 and PO7,PO10 Flooding	WEHB.SC01.4	Surface Water Separation and SuDS for Storage	DAP Option.	No						
Control / Reduce groundwater infiltration												
Improve quality of wastewater entering sewers (inc reducing FOG, RAG, pre-treatment, trade waste)	Internal Flooding Cluster WEHB IFC03 - Old Town / Margate Beach	PO1- Internal Flooding	WEHB.SC03.1	Customer Education Programme	Target domestic and business customers in the cluster with a campaign to stop discharges of FOG and unflushables into the sewer network.	Yes	Yes	Yes	Minor Positive +	£115K	Yes	Best Value
Improve quality of wastewater entering sewers (inc reducing FOG, RAG, pre-treatment, trade waste)	Harbour Street Broadstairs	PO2- Pollution Risk	WEHB.SC03.2	Customer Education Programme	Target domestic and business customers in Harbour Street Broadstairs with a campaign to stop discharges of FOG and unflushables into the sewer network.	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)	Internal Flooding Cluster WEHB IFC03 - Old Town / Margate Beach	PO1- Internal Flooding PO2- Pollution Risk	WEHB.PW01.1	Smart Network and Improved Sewer Jetting	Install Smart Network with sewer level monitoring and surcharge level warning system to Improve Sewer Jetting reaction time and reduce flooding due to blockages.	Yes	Yes	Yes	Minor Positive +	£880K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Margate WPS	PO2- Pollution Risk	WEHB.PW01.2	Maintenance Programme WPS	An improved maintenance programme relinmate the risk of pollution incidents by increasing resilience to operational failures.	Yes	Yes	Yes	Minor Positive +	£235K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Bromstone and Manston area, Broadstairs - Groundwater capture zone	PO9 - Good Ecological Status	WEHB.PW01.3	Sewer Rehabilitation	Targeted CCTV / electroscan surveys and Sewer Rehabilitation within Groundwater Capture Zone / SPZ to reduce leakage from sewers Link to Southern Water's Sewer Maintenance Programme.	No						Risk and uncertainty - future resilience
Network Improvements (eg increase capacity, storage, conveyance)	Flooding Cluster WEHB FC01 - Fort Paragon	PO4 and PO7 PO10 Flooding	WEHB.PW01.4	Storage Tank	DAP Option.	Yes	Yes	Yes	Major Positive +++	£500K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Flooding Cluster WEHB FC02 - Northdown Road / Holly Lane	PO4 and PO7 PO10 Flooding	WEHB.PW01.5	Storage Tank	DAP Option.	Yes	Yes	Yes	Major Positive +++	£1,380K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Flooding Cluster WEHB FC03 - All Saints Ave. / Arlington Square	PO4 and PO7, PO10 Flooding	WEHB.PW01.6	Storage Tank	DAP Option.	Yes	Yes	Yes	Major Positive +++	£1,935K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Flooding Cluster WEHB FC04 - All A254 Ramsgate Road,	PO4 and PO7, PO10 Flooding	WEHB.PW01.7	Storage Tank	DAP Option.	Yes	Yes	Yes	Major Positive +++	£620K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	MARGATE WPS	PO5 - Storm Overflow Performance PO13 - Bathing Waters	WEHB.PW01.8	Storage Tank	Conventional storage tank.	No						Technically feasible
Network Improvements (eg increase capacity, storage, conveyance)	Lord of the Manor, Bromstone Road and areas within groundwater capture zone and SPZ	PO12- Ground Water Pollution	WEHB.PW01.9	Pipe Rehabilitation Programme	Targeted CCTV / electroscan surveys and proactive sewer rehabilitation to reduce risk of sewer collapse within groundwater SPZ and drinking water capture zones.	Yes	Yes	Yes	Minor Positive +	£13,755K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB Broadstairs FC01 Former British Gas Site (Broadstairs Area)	PO4 and PO7 - Growth	WEHB.PW01.10	New sewer and flow diversion	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB Broadstairs FC02 Castle Keep Hotel (Broadstairs Area)	PO4 and PO7 - Growth	WEHB.PW01.11	Upsize	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB Broadstairs FC03 Kinsdown Dev Site (Broadstairs Area)	PO4 and PO7 - Growth	WEHB.PW01.12	Upsize	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB Broadstairs FC04 Land west of Northdown Hill (Broadstairs Area)	PO4 and PO7 - Growth	WEHB.PW01.13	Upsize	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB Broadstairs FC05 Alexandra Road Dev site (Broadstairs Area)	PO4 and PO7 - Growth	WEHB.PW01.14	Upsize	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB FC02 Land at Nash Road and Ramsgate Road (Margate Area)	PO4 and PO7 - Growth	WEHB.PW01.15	Upsize, offline storage and flow control device	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB FC03 Manston Road Site (Margate Area)	PO4 and PO7 - Growth	WEHB.PW01.16	Upsize, online storage and flow control device	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB FC04 The Lido development site (Margate Area)	PO4 and PO7 - Growth	WEHB.PW01.17	Upsize, online storage and flow control device	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB FC05 Westgate (Margate Area)	PO4 and PO7 - Growth	WEHB.PW01.18	Upsize and online storage	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	WEHB FC06 Manston Airport (Margate Area)	PO4 and PO7 - Growth	WEHB.PW01.19	New sewer	DAP Option.	Yes	Yes	Yes	Major Positive +++	£490K	Yes	Best Value
Improve treatment (capacity and quality at existing works or develop new WTWs)	Weatherlees Hill B (Margate & Broadstairs) WTW	PO2 - Pollution Risk	WEHB.PW02.1	Maintenance Programme WTW	An efficient maintenance programme for the treatment works to eliminate the risk of a pollution incident due to an operational failure.	Yes	Yes	Yes	Minor Positive +	£6,970K	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	Flooding Cluster WEHB FC01 - Fort Paragon North of Cliff Terrace, Margate	PO4 & PO10 - Sewer Flooding	WEHB.OT01.1	Improve Hydraulic Model	DAP Option.	Yes	No					Environmental - Strategic Environmental Assessment
Study/ investigation to gather more data	Flooding Cluster WEHB FC02 - Northdown Road, Margate	PO4 & PO10 - Sewer Flooding	WEHB.OT01.2	Improve Hydraulic Model	DAP Option.	Yes	No					Environmental - Strategic Environmental Assessment

Margate And Broadstairs Wastewater System - Outline Options Appraisal

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Study/ investigation to gather more data	Flooding Cluster WEHB FC03 - All Saints Avenue, Margate	PO4 & PO10 - Sewer Flooding	WEHB.OT01.3	Improve Hydraulic Model	DAP Option.	Yes	No					Environmental - Strategic Environmental Assessment
Study/ investigation to gather more data	Bromstone and Manston, Broadstairs	PO9 - Good Ecological Status PO12 - Groundwater Pollution	WEHB.OT01.4	Sewer Condition Investigations	Targeted CCTV / electroscan surveys to determine the structural condition of the sewer network within Groundwater Capture Zone / SPZ Link to Southern Water's Sewer Maintenance Programme for Rehabilitation / Repair of Sewers in poor condition.	Yes	No					Operational
Study/ investigation to gather more data	Margate WPS	PO5 - Storm Overflow Performance PO13 - Bathing Waters	WEHB.OT01.5	Improve Hydraulic Model	The model has a Medium risk DAP confidence score of 3 and was last verified in 2014.	Yes	Yes	Yes	Major Positive +++	£375K	Yes	Best Value
Study/ investigation to gather more data	Kent Isle of Thanet Chalk	PO9 - Good Ecological Status PO12 - Groundwater Pollution	WEHB.OT01.6	AMP7 WINEP: Lord of the Manor Catchment Scheme	Catchment scheme actions and measures within SGZ's recommended by investigations to date to prevent WQ deterioration and help reduce/avoid the need for additional treatment (WFD 'must do'); subject to cost effectiveness, sustainability and measurement of effectiveness.	Yes	No					Operational
Study/ investigation to gather more data	Kent Isle of Thanet Chalk	PO9 - Good Ecological Status PO12 - Groundwater Pollution	WEHB.OT01.7	AMP7 WINEP: Minster B Catchment Scheme	Catchment scheme actions and measures within SGZ's recommended by investigations to date to prevent WQ deterioration and help reduce/avoid the need for additional treatment (WFD 'must do'); subject to cost effectiveness, sustainability and measurement of effectiveness.	Yes	No					Operational
Study/ investigation to gather more data	Kent Isle of Thanet Chalk	PO9 - Good Ecological Status PO12 - Groundwater Pollution	WEHB.OT01.8	AMP7 WINEP: Sparrow Castle Catchment Scheme	Catchment scheme actions and measures within SGZ's recommended by investigations to date to prevent WQ deterioration and help reduce/avoid the need for additional treatment (WFD 'must do'); subject to cost effectiveness, sustainability and measurement of effectiveness.	Yes	No					Operational
Study/ investigation to gather more data	Kent Isle of Thanet Chalk	PO9 - Good Ecological Status PO12 - Groundwater Pollution	WEHB.OT01.9	AMP7 WINEP: Thanet Groundwater Scheme WINEP Driver "WFDGW_ND_GWQ"	Implement Phase 3 of sewer rehabilitation and storage replacement for Thanet Groundwater Water Protection zone implementation plan.	Yes	Yes	Yes	Minor Positive +	£TBC - With Partners	Yes	Best Value
Study/ investigation to gather more data	Catchment wide	PO11 - Nutrient Neutrality Continuous (WTW treated effluent) and / or intermittent (storm overflow) wastewater discharges affecting Nutrient Neutrality on Thanet Coast and Sandwich Bay	WEHB.OT01.10	Nutrient Budget	Study / Investigation required to understand the impact of wastewater discharges and achieve or prevent deterioration from Natural England's revised Common Standards Monitoring Guidance (rCSMG) targets Total Phosphorus (TP) and Total Nitrogen (TN) on the Thanet Coast and Sandwich Bay.	Yes	No					Operational
Study/ investigation to gather more data	Catchment wide	PO13- Bathing Waters Bathing Waters in Margate and Broadstairs	WEHB.OT01.11	Studies and Investigations to Improve Bathing Waters	Investigations continuing under the Bathing Water Programme to be completed to identify misconnections (foul to surface) along with sewer rehabilitation.	Yes	No					Operational
Study/ investigation to gather more data	Catchment wide	PO9- GE Status / Potential Leaking sewers and intermittent sewage discharges to Kent Isle of Thanet Chalk Continuous discharges for Monkton & Minster Marshes	WEHB.OT01.12	Study and Investigations to Achieve Good Ecological Status	Catchment was banded 1 in because of; - Leaking sewers and intermittent sewage discharges to Kent Isle of Thanet Chalk - Continuous discharges for Monkton & Minster Marshes Study and Investigations to understand the impact of wastewater discharges on Kent Isle of Thanet Chalk and Monkton & Minster Marshes and identify measures required to achieve good ecological status.	Yes	No					Operational
Study/ investigation to gather more data	Catchment Wide	PO1- Internal Flooding (hydraulic causes) PO4- 1 in 50 year Flood Risk PO5- Storm Overflow PO10- Surface Water Management	WEHB.OT01.13	Improve Hydraulic Model	Hydraulic surveys and reverification to improve model confidence and accuracy of simulations.	Yes	No					Environmental - Strategic Environmental Assessment

Drainage and Wastewater Management Plan (DWMP)

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](#).

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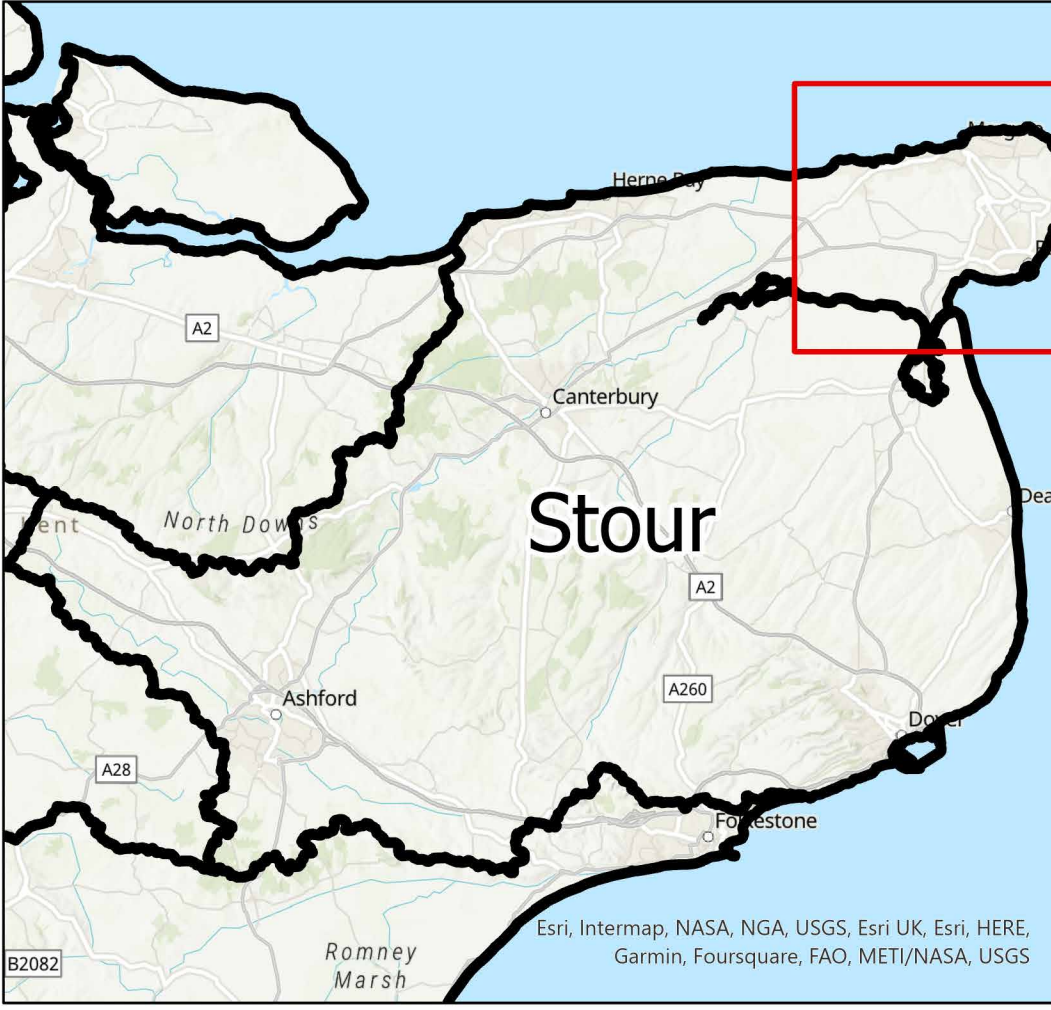
Reference	River Basin (L2)	Wastewater System (L3)	Location	Option	Indicative Cost	Indicative Timescales	Potential Partners	Applicable Planning Objectives
Stour								
Margate And Broadstairs								
WEHB.SC03.1	Stour	Margate And Broadstairs	Old Town and Margate Beach	Customer Education Programme: Targeted campaign to reduce the amount of FOG (fats, oils and grease) and unflushables discharged into the sewer network	£115K	AMP8 onwards	Thanet District Council	PO1
WEHB.SC03.2	Stour	Margate And Broadstairs	Harbour Street Broadstairs	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	Thanet District Council	PO2
WEHB.PW01.1	Stour	Margate And Broadstairs	Old Town and Margate Beach	Enhanced Sewer Maintenance: Increase targeted sewer jetting to reduce the number of blockages in the network	£880K	AMP8 onwards	-	PO1 PO2
WEHB.PW01.2	Stour	Margate And Broadstairs	Margate WPS	Improve the operational resilience of wastewater pumping station (WPS) to reduce pollution incidents	£235K	AMP8 onwards	-	PO2
WEHB.PW01.4	Stour	Margate And Broadstairs	Fort Paragon - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£500K	AMP9	Kent CC, Catchment Partnership, Kent Wildlife Trust	PO4 PO7 PO10
WEHB.PW01.5	Stour	Margate And Broadstairs	Northdown Road, Holly Lane - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£1,380K	AMP9	Kent CC, Catchment Partnership, Kent Wildlife Trust	PO4 PO7 PO10
WEHB.PW01.6	Stour	Margate And Broadstairs	All Saints Avenue, Arlington Square - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£1,935K	AMP9	Kent CC, Catchment Partnership, Kent Wildlife Trust	PO4 PO7 PO10
WEHB.PW01.7	Stour	Margate And Broadstairs	A254 Ramsgate Road - Broadstairs	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£620K	AMP9	Kent CC, Catchment Partnership, Kent Wildlife Trust	PO4 PO7 PO10
WEHB.PW01.9	Stour	Margate And Broadstairs	Groundwater Capture Zone & Source Protection Zones including hotspots Lord of the Manor and Bromstone Road	Sewer Rehabilitation: Targeted CCTV or electroscan surveys to check the integrity of sewers and reline or renew them to reduce the risk of groundwater pollution	£13,755K	AMP9 to AMP10	Environment Agency	PO12
WEHB.PW01.10	Stour	Margate And Broadstairs	Former British Gas Site - Broadstairs	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.11	Stour	Margate And Broadstairs	Castle Keep Hotel - Broadstairs	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.12	Stour	Margate And Broadstairs	Kinsdown Dev Site - Broadstairs	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.13	Stour	Margate And Broadstairs	Land west of Northdown Hill - Broadstairs	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.14	Stour	Margate And Broadstairs	Alexandra Road Dev site - Broadstairs	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7

Reference	River Basin (L2)	Wastewater System (L3)	Location	Option	Indicative Cost	Indicative Timescales	Potential Partners	Applicable Planning Objectives
WEHB.PW01.15	Stour	Margate And Broadstairs	Land at Nash Road and Ramsgate Road - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.16	Stour	Margate And Broadstairs	Manston Road Site - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.17	Stour	Margate And Broadstairs	The Lido development site - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.18	Stour	Margate And Broadstairs	Westgate - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW01.19	Stour	Margate And Broadstairs	Manston Airport - Margate	Flood Alleviation: Separate or attenuate excess rainwater in sewer network using Sustainable Drainage Systems (SuDS) to reduce risk of flooding (Costs based on storage solution but surface water separation is our preferred approach)	£490K	AMP9	-	PO4 PO7
WEHB.PW02.1	Stour	Margate And Broadstairs	Weatherlees Hill B WTW	Improve the operational resilience of wastewater treatment works (WTW) to reduce pollution incidents	£6,970K	AMP8 onwards	-	PO2
WEHB.OT02.1	Stour	Margate And Broadstairs	Viking Bay Broadstairs, Walpole Bay Margate, Botany Bay Broadstairs, Joss Bay Broadstairs, Margate The Bay, Margate Fulsam Rock, West	Study and Investigation: Investigations continuing under the Bathing Water Programme to be completed to identify misconnections (foul to surface) aAMP11/AMP12 with sewer rehabilitation.	£TBC	AMP8	Environment Agency	PO13
WEHB.OT02.2	Stour	Margate And Broadstairs	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
WEHB.OT02.3	Stour	Margate And Broadstairs	System Wide	Improve the Hydraulic Model: Surveys and reverification of model to improve confidence and accuracy	£375K	AMP8	-	PO1 PO4 PO5 PO10
WEHB.WINEP01.1	Stour	Margate And Broadstairs	BROADSTAIRS CEO	Reduce the number of storm discharges from BROADSTAIRS CEO by a combination of SuDS and storage options	£31,280K	AMP9	-	PO4 PO5 PO9 PO13
WEHB.WINEP01.2	Stour	Margate And Broadstairs	ST MILDREDS BAY CSO	Reduce the number of storm discharges from ST MILDREDS BAY CSO by a combination of SuDS and storage options	£9,025K	AMP11	-	PO4 PO5 PO9
WEHB.WINEP01.3	Stour	Margate And Broadstairs	MARINE TERRACE MARGATE CSO	New or improved screen to reduce aesthetics impacts from storm discharges at MARINE TERRACE MARGATE CSO	£130K	AMP11	-	PO5 PO9
WEHB.WINEP.PO2.1	Stour	Margate And Broadstairs	Margate And Broadstairs WTW	Action to reduce total phosphorus and/or total nitrogen levels from discharges which drain to internationally designated sites where there is a risk from nutrients	£62,860K	AMP10	-	PO9 PO11

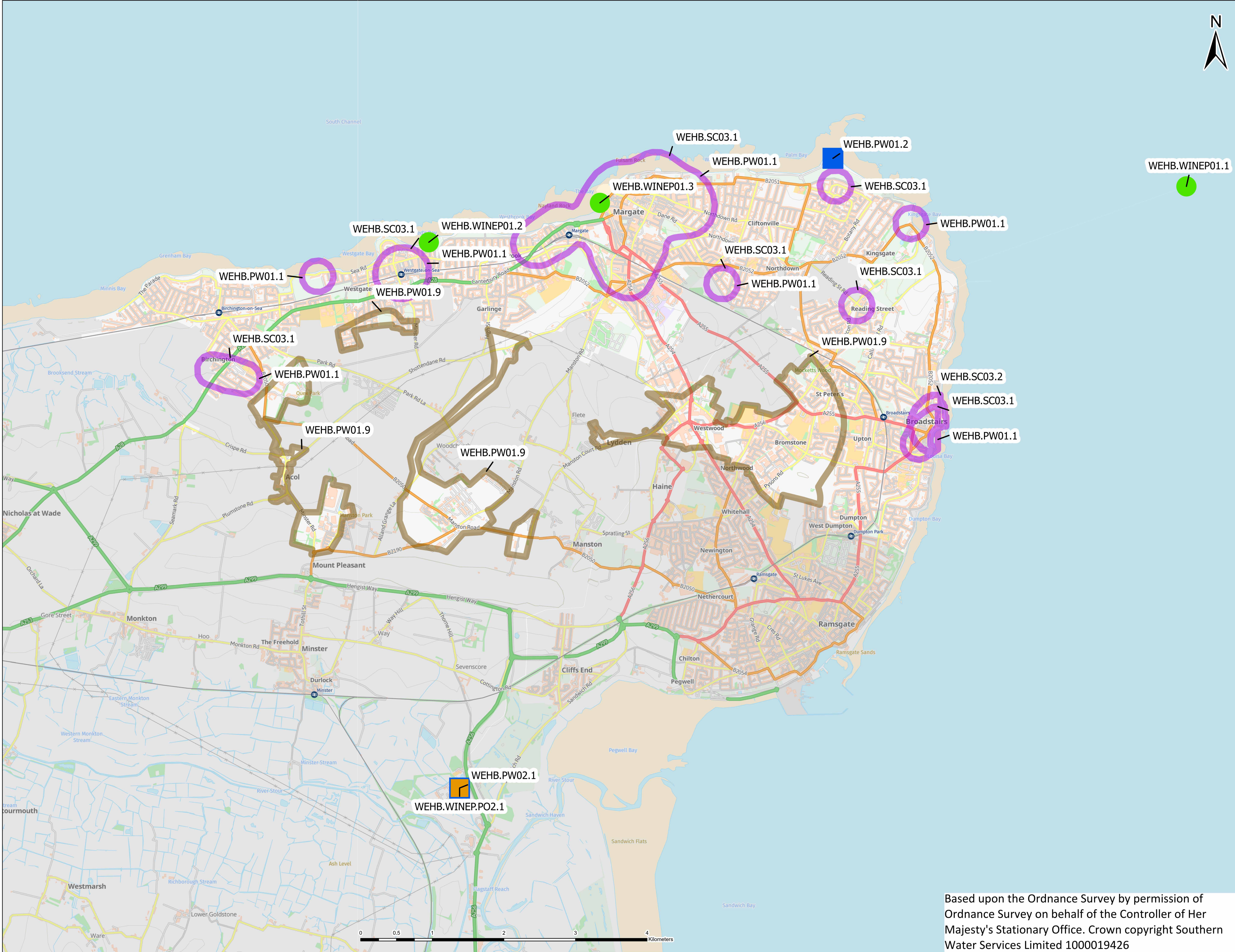
Drainage and Wastewater Management Plan: Location of Potential Options MARGATE AND BROADSTAIRS Wastewater system in Stour River Basin Catchment



(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.



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



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