Drainage and Wastewater Management Plan

Queensborough Wastewater System Plan

from Southern Water®

Contents

Queenborough wastewater system: map and key facts

Population Equivalent (PE)	**38,684**
Discharge Waterbody	**The Swale**
Number of Pumping Stations	**26**
Number of Overflows	**8**
Length of Sewer (km)	**313.9**
Catchment Reference	**QUEE**

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

Catchment Strategy: IMPROVE

Drivers of Risks
- Customer
- Hydraulics
- Operational
- Quality
- Unknown

N

QUEENBOROUGH WTW

0 0.25 0.5 1 1.5 2 Kilometers

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Problem Characterisation
Queenborough (QUEE)

This document describes the causes of the risks identified by the Baseline Risk and Vulnerability Assessment (BRAVA). The BRAVA results for this wastewater systeam 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 Queenborough wastewater system

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

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 system mean that we have assigned the following investment strategy:

Improve

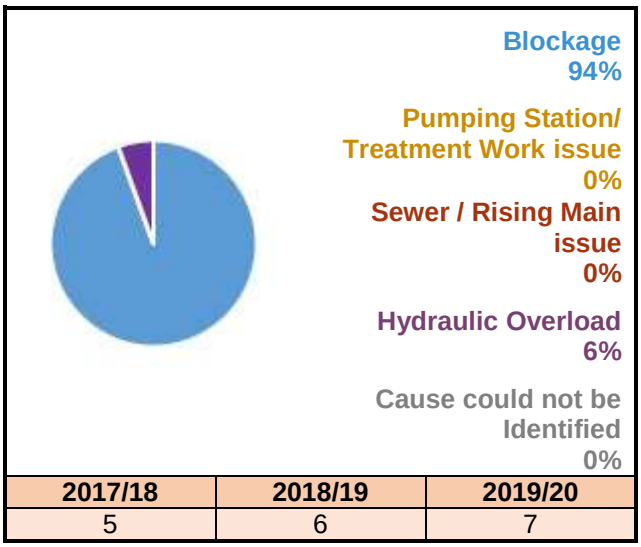
This means that we consider that the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on our customers and/or the environment. We will plan investment to reduce the current risks by actively looking to invest capital funding in the short term to address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

Planning Objective 1: Internal Sewer Flooding Risk

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

The primary driver for internal sewer flooding in this wastewater system is 'Customer'. Blockages caused 94% 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



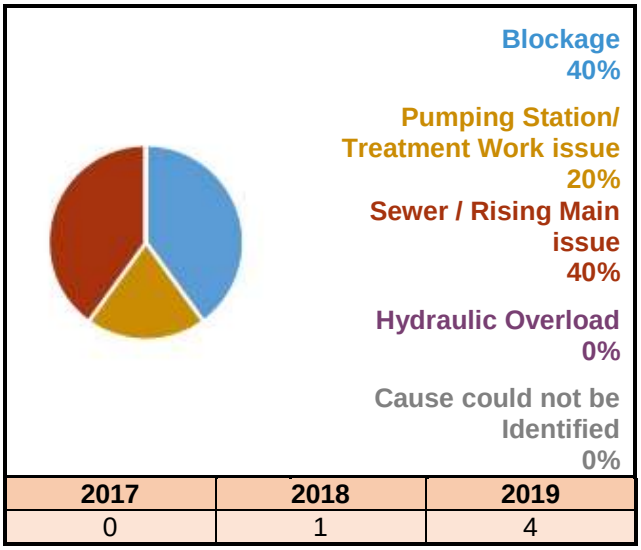
2017/18	2018/19	2019/20
5	6	7

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 'Customer'. Blockages caused 40% 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 2: Number of pollution incidents per annum and causes



2017	2018	2019
0	1	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 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	1
	2019/20	6
Rising Main Bursts	**2017/18**	1
	2018/19	7
	2019/20	1

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 very significant in 2020 and 2050. This is because our computer model of the sewer network indicate for 2020 that approximately 2700 - 2800 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 3500 - 3600 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 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	2 High	2 High	Less than 8	Between 8-10	10 or more
Bathing Waters	1 Medium	1 High	Less than 3	Between 3-10	10 or more
Freshwater	0 Medium	1 Medium	Less than 20	Between 20-40	40 or more

Planning Objective 6: Wastewater Treatment Works Water Quality Compliance

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

Planning Objective 7: Flooding due to Hydraulic Overload

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

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

Rainfall Return Period (yr)	Number of Properties at Risk		Annualised per 10,000 connections	
	2020	2050	2020	2050
1 in 1	218	600	138	379
1 in 2	408	816	161	321
1 in 5	1107	1828	201	331
1 in 10	1631	2514	155	239
1 in 20	2230	2949	109	144
1 in 30	2523	3229	83	106
Total Annualised			**846**	**1521**

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 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 3. This is because the predicted DWF in 2050 is expected to 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

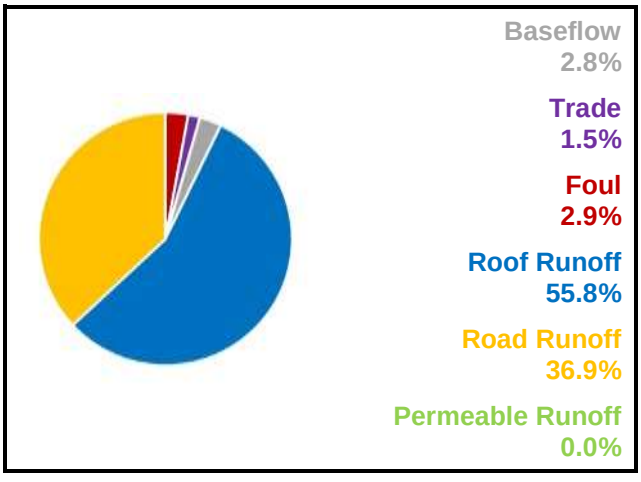
This wastewater system is not hydraulically linked to a waterbody where wastewater operations are contributing to not achieving GES/GEP, therefore the risk is not significant.

Planning Objective 10: Surface Water Management

Our initial high level assessment indicated that there is 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 92.7% of the flow in the sewers. The total contribution of foul water from homes is 2.9% with business contributing 1.5%. The baseflow is infiltration from water in the ground and makes up 2.8% of the flow in the system.

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



Planning Objective 11: Nutrient Neutrality

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 5.

Table 5: Habitat Sites hydraulically linked to wastewater system

Habitat Sites	
The Swale	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

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 these bathing waters is not significant. This is because all the designated bathing waters affected by this wastewater system have passed annual inspections..

Table 6: Bathing Water annual results

Bathing Waters	Annual Results		
	2017	2018	2019
Minster Leas	Good	Excellent	Excellent
Sheerness	Good	Excellent	Excellent

Planning Objective 14: Shellfish Waters

The discharges from this wastewater system can affect the designated shellfish waters shown in Table 7. The risk of not achieving the faecal standards for shellfish in these designated waters from this wastewater system is moderately significant. This is because the CEFAS classification for the shellfish waters is Long Term Class B.

Table 7: Shellfish Waters linked to wastewater system

Shellfish Waters
Sheppey

Generic Options Assessment for: Queenborough (QUEE)

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

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	Baseflow contribution is small, less than 3%. Reducing groundwater levels would have minimal impact in infiltration into the network. In practice, reducing groundwater levels will be detrimental to the environment, ground conditions and is prohibitively too costly to implement. For these reasons, this option has been discounted.	Reduce leakage from water supply pipes; pump away schemes to locally lower groundwater near sewer network
	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
	Reduce the **quantity** / demand		Y	-	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		Y	-	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	-	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

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Version 1

Queenborough 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	Coastal areas	PO4 , PO7 and PO10 Surface water flooding	QUEE.SC01.1	SuDS	Mitigating surface water flooding in coastal areas through implementation of SuDS schemes.	Yes	Yes	Yes	Moderate Positive ++	TBC	Yes	Best Value
Control/ Reduce surface water entering the sewers	Northern and Southwest part of catchment	PO4 , PO7 and PO10 Surface water flooding	QUEE.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 ++	£1,000K	Yes	Best Value
Control / Reduce groundwater infiltration												
Improve quality of wastewater entering sewers (inc reducing FOG, RAG, pre-treatment, trade waste)	Sheerness area	PO1 - Internal Flooding & PO2 - Pollution	QUEE.SC03.1	Customer Education Programme	Target customers with a campaign to reduce FOG and unflushables discharged 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)	Sheerness area	PO1 - Internal Flooding & PO2 - Pollution	QUEE.SC03.2	Jetting programme	Increase frequency of MST (Maintenance Scheduled Tasks).	Yes	Yes	Yes	Minor Positive +	£195K	Yes	Best Value
Control / Reduce the quantity / flow of wastewater entering sewer system	Catchment wide	PO8 - Dry Weather Flow (2025)	QUEE.SC04.1	Water Efficient Appliance / Measures	Target 100 programme.	Yes	No					Environmental - Strategic Environmental Assessment
Network Improvements (eg increase capacity, storage, conveyance)	Minster	PO2 - Pollution Risk	QUEE.PW01.1	Pipe Rehabilitation Programme	Local sewer lining and renewal of rising mains.	Yes	Yes	Yes	Minor Positive +	£40K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Sheerness and Minster areas	PO8 - Dry Weather Flow	QUEE.PW01.2	Pipe Rehabilitation Programme	Sewer sealing in costal areas under tidal influence.	Yes	No					Environmental - Strategic Environmental Assessment
Network Improvements (eg increase capacity, storage, conveyance)	Sheerness	PO3 - Sewer Collapse	QUEE.PW01.3	Pipe Rehabilitation Programme	Scheme to renew 1%/year of assets by relining/improving structural grade of sewers across the catchment.	Yes	Yes	Yes	Minor Positive +	£6,630K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F01 The Broadway / The Leas / Southsea Avenue	PO4 , PO7 & PO10 - Flooding	QUEE.PW01.4	Upsizing and Online Storage	DAP Option.	Yes	Yes	Yes	Major Positive +++	TBC	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F02 Delamark Road / Broadway / High Street	PO4 , PO7 & PO10 - Flooding	QUEE.PW01.5	Upsizing and Offline Storage	DAP Option.	Yes	No					Feasibility and Risk
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F03 Delamark Road / Broadway / High Street	PO4 , PO7 & PO10 - Flooding	QUEE.PW01.6	Upsizing, new sewer and Offline Storage	DAP Option.	Yes	Yes	Yes	Major Positive +++	TBC	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F04 Barton Hill Drive	PO4 , PO7 & PO10 - Flooding	QUEE.PW01.7	Upsizing, Online Storage and Reconnection	DAP Option.	Yes	Yes	Yes	Major Positive +++	TBC	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F05 Castlemere Avenue / Dumergue Avenue	PO4 , PO7 & PO10 - Flooding	QUEE.PW01.8	Pump transfer, Reconnection, Upsize and Pump rate increase	DAP Option.	Yes	No					Feasibility and Risk
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F06 Castlemere Avenue / Dumergue Avenue	PO4 , PO7 & PO10 - Flooding	QUEE.PW01.9	Upsize, Flow transfer and Pump rate increase	DAP Option.	Yes	Yes	Yes	Major Positive +++	TBC	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F07 Oak Lane / Cliff Gardens	PO4 , PO7 & PO10 - Flooding	QUEE.PW01.10	Upsizing and Flow Transfer	DAP Option.	Yes	Yes	Yes	Major Positive +++	TBC	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	Brielle Way Westminster WPS CSO	PO5 & PO14 - High Spiller	QUEE.PW01.11	Storage	• Offline storage of 520m3 required to achieve a 3 Spill 2020 solution • Offline storage of 345m3 required to achieve a 3 Spill 2050 solution • Offline storage of 121m3 required to achieve a 10 Spill 2020 solution • Offline storage of 182m3 required to achieve a 10 Spill 2050 solution.	Yes	Yes	Yes	Major Positive +++	£845K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F08 Scrapsgate Road	PO4 and PO7 - Growth	QUEE.PW01.12	Upsizing	• 89m upsizing from 300mm to 600mm diameter located on Scrapsgate Road, keeping the original invert level and a constant gradient until manhole TQ94728301; • 50m upsizing from 450mm to 600mm diameter on Scrapsgate Road.	Yes	Yes	Yes	Minor Negative -	£2,685K	Yes	Least Cost
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F09 Marine Avenue	PO4 and PO7 - Growth	QUEE.PW01.13	Upsizing	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F10 Minster Road	PO4 and PO7 - Growth	QUEE.PW01.14	Upsizing	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F11 Parish Road	PO4 and PO7 - Growth	QUEE.PW01.15	Upsizing and Relay	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F12 Thistle Hill Way	PO4 and PO7 - Growth	QUEE.PW01.16	Upsizing and Reduce diameter	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F13 Drove Road WPS transfer to Queenborough WTW	PO4 and PO7 - Growth	QUEE.PW01.17	Transfer flow from WPS to WTW	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F14 Queenborough Road	PO4 and PO7 - Growth	QUEE.PW01.18	Relay and Upsizing	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F15 West Street	PO4 and PO7 - Growth	QUEE.PW01.19	Box culvert / Upsizing	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Network Improvements (eg increase capacity, storage, conveyance)	QUEE F16 Marine Parade, Sheernes	PO4 and PO7 - Growth	QUEE.PW01.20	Parallel Tank Sewer	DAP Option.	Yes	Yes	Yes	Major Positive +++	£2,685K	Yes	Best Value
Improve treatment (capacity and quality at existing works or develop new WTWs)	River Swale	PO11 - Secure Nutrient Neutrality	QUEE.PW02.1	New Treatment Works	An additional WTW discharging into the Thames Estuary would allow future development without impact on NN at The Swale.	Yes	No					Operational
Improve treatment (capacity and quality at existing works or develop new WTWs)	QUEE F17 Queenborough WTW	PO4, PO5 and PO7 - Growth and High Spiller PO14 - Pollution to Shellfish Waters	QUEE.PW02.2	Storm Tanks Upsize	Storm Tanks upsize to address High spills (56 in 2020) from WTW SSO (Pollution).	Yes	Yes	Yes	Major Positive +++	£3,295K	Yes	Best Value
Improve treatment (capacity and quality at existing works or develop new WTWs)	Queenborough WTW	PO8 (2050)- Dry Weather Flow	QUEE.PW02.3	Permit Review	Increase capacity at the Works / Permit Review.	Yes	Yes	Yes	Minor Positive +	£2,490K	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)												

Queenborough 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
Study/ investigation to gather more data	Seafront	PO8 - Dry Weather Flow Saline intrusion	QUEE.OT01.1	Investigation to reduce saline intrusion	Surveys to review asset condition and identify disjoints, manhole ingression and locations of saline intrusion along seafront.	Yes	Yes	Yes	Minor Positive +	£100K	Yes	Best Value
Study/ investigation to gather more data	South Street Queenborough WPS	PO5 and PO14 - Shellfish Waters	QUEE.OT01.2	Study / modelling investigation	The model has a Low risk DAP confidence score of 1 and was last verified in 2013/2014 by Atkins.	Yes	Yes	Yes	Minor Positive +	£1,000K	Yes	Best Value
Study/ investigation to gather more data	QUEE F18 Wards Hill WPS	PO4, PO5 & PO7 - Growth	QUEE.OT01.3	Study / modelling investigation	DAP Option.	Yes	Yes	Yes	Major Positive +++	£1,000K	Yes	Best Value
Study/ investigation to gather more data	Catchment wide	PO1 - Internal Flooding (hydraulic causes) PO4 - 1 in 50 year Flood Risk PO10 - Surface Water Management	QUEE.OT01.4	Hydraulic Study	Hydraulic surveys and verification to improve model confidence and accuracy of network simulations.	Yes	Yes	Yes	Minor Positive +	£150K	Yes	Best Value
Study/ investigation to gather more data	The Swale	PO11 - Nutrient Neutrality	QUEE.OT01.5	Nutrient Budget	Catchment is Hydraulically linked to The Swale Banding 2020 - 2; No Phosphate or Nitrate permit Banding 2050 - 2; Due to baseline assessment Study / Investigation required to understand the impact of wastewater discharges and achieve or prevent deterioration from Natrural England's revised Common Standards Monitoring Guidance (rCSMG) targets Total Phosphorus (TP) and Total Nitrogen (TN) on the The Swale.	Yes	Yes	Yes	Minor Positive +	£75K	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

WATER for LIFE
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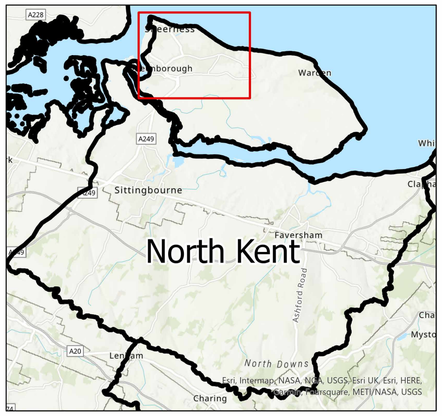
Reference	River Basin (L2)	Wastewater System (L3)	Location	Option	Indicative Cost	Indicative Timescales	Potential Partners	Applicable Planning Objectives
North Kent								
Queenborough								
QUEE.SC01.2	North Kent	Queenborough	Northern and Southwest part of system	Flood Alleviation: Separate or attenuate 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)	£1,000K	AMP9	Kent County Council	PO4 PO7 PO10
QUEE.SC03.1	North Kent	Queenborough	Sheerness area	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	-	PO1 PO2
QUEE.SC03.2	North Kent	Queenborough	Sheerness area	Enhanced Sewer Maintenance: Increase targeted sewer jetting to reduce the number of blockages in the network	£195K	AMP8 onwards	-	PO1 PO2
QUEE.PW01.1	North Kent	Queenborough	Minster	Sewer Rehabilitation: Targeted CCTV or electroscan surveys and sewer rehabilitation to reduce the risk of sewer bursts and collapses	£40K	AMP8 onwards	Kent County Council	PO2
QUEE.PW01.3	North Kent	Queenborough	Sheerness	Sewer Rehabilitation: Targeted CCTV or electroscan surveys and sewer rehabilitation to reduce the risk of sewer bursts and collapses	£6,630K	AMP8 onwards	Kent County Council	PO3
QUEE.PW01.12	North Kent	Queenborough	Scrapsgate Road	Growth scheme from our Drainage Area Plan (DAP): upsize local sewers on Scrapsgate Road	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.13	North Kent	Queenborough	Marine Avenue	Growth scheme from our Drainage Area Plan (DAP): Upsize sections of local sewers and construct a box culvert in the field west of Marine Avenue	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.14	North Kent	Queenborough	Minster Road	Growth scheme from our Drainage Area Plan (DAP): Upsize sections of local sewers on Minster Road	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.15	North Kent	Queenborough	Parish Road	Growth scheme from our Drainage Area Plan (DAP): Upsize sewer on Parish Road and relay sewers on Dreadnought Avenue	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.16	North Kent	Queenborough	Thistle Hill Way	Growth scheme from our Drainage Area Plan (DAP): Upsize sections of local sewers on Thistle Hill Way and Minster Road and relay smaller sewer on Thistle Hill Way	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.17	North Kent	Queenborough	Drove Road WPS transfer to WTW	Growth scheme from our Drainage Area Plan (DAP): Transfer all pumped flow from Drove Road WPS directly to the inlet works at Queenborough WTW	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.18	North Kent	Queenborough	Queenborough Road	Growth scheme from our Drainage Area Plan (DAP): Upsize sections of sewer on Queenborough Road	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.19	North Kent	Queenborough	West Street	Growth scheme from our Drainage Area Plan (DAP): Upsize sections of sewer in West Street and Brielle Way and construct box culvert in West Street	£2,685K	AMP9	-	PO4 PO7
QUEE.PW01.20	North Kent	Queenborough	Marine Parade, Sheernes	Growth scheme from our Drainage Area Plan (DAP): Construct birfucation manhole and tank sewer for excess storm flows from network.	£2,685K	AMP9	-	PO4 PO7

Reference	River Basin (L2)	Wastewater System (L3)	Location	Option	Indicative Cost	Indicative Timescales	Potential Partners	Applicable Planning Objectives
QUEE.PW02.3	North Kent	Queenborough	Queenborough WTW	Increase capacity to allow for planned new development	£2,590K	AMP9	Environment Agency	PO8
QUEE.OT01.1	North Kent	Queenborough	Seafront	Surveys to assess the condition of sewers and identify locations where there is groundwater ingress and saline water intrusion into displaced pipe joints, fractures and manholes.	£100K	AMP8	Kent County Council	PO8
QUEE.OT01.4	North Kent	Queenborough	System Wide	Improve the Hydraulic Model: Surveys and reverification of model to improve confidence and accuracy	£150K	AMP8	-	PO1 PO4 PO10
QUEE.WINEP01.1	North Kent	Queenborough	QUEENBOROUGH SSO	Reduce the number of storm discharges from QUEENBOROUGH SSO by a combination of SuDS and storage options	£18,300K	AMP10	-	PO4 PO5 PO7
QUEE.WINEP01.2	North Kent	Queenborough	BRIELLE WAY WESTMINSTER CEO	Reduce the number of storm discharges from BRIELLE WAY WESTMINSTER CEO by creating below-ground storage	£1,045K	AMP12	-	PO5
QUEE.WINEP01.3	North Kent	Queenborough	SOUTH STREET QUEENBOROUGH CEO	Reduce the number of storm discharges from SOUTH STREET QUEENBOROUGH CEO by a combination of SuDS and storage options	£2,870K	AMP11	-	PO4 PO5 PO7
QUEE.WINEP01.4	North Kent	Queenborough	DROVE ROAD SHEERNESS CEO	New or improved screen to reduce aesthetics impacts from storm discharges at DROVE ROAD SHEERNESS CEO	£130K	AMP12	-	PO5
QUEE.WINEP01.5	North Kent	Queenborough	WESTCLIFFE DRIVE MINSTER IOS CEO	New or improved screen to reduce aesthetics impacts from storm discharges at WESTCLIFFE DRIVE MINSTER IOS CEO	£130K	AMP9	-	PO5 PO13
QUEE.WINEP01.6	North Kent	Queenborough	WARDS HILL ROAD MINSTER IOS CEO	Reduce the number of storm discharges from WARDS HILL ROAD MINSTER IOS CEO by creating below-ground storage	£1,515K	AMP8	-	PO5 PO13 PO14
QUEE.WINEP01.7	North Kent	Queenborough	QUEENBOROUGH ROAD QUEENBOROUGH CEO	New or improved screen to reduce aesthetics impacts from storm discharges at QUEENBOROUGH ROAD QUEENBOROUGH CEO	£130K	AMP12	-	PO5
QUEE.WINEP01.8	North Kent	Queenborough	NOREEN AVENUE SHEERNESS CSO	Reduce the number of storm discharges from NOREEN AVENUE SHEERNESS CSO by a combination of SuDS and storage options	£2,155K	AMP12	-	PO4 PO5 PO7

Drainage and Wastewater Management Plan: Location of Potential Options QUEENBOROUGH Wastewater system in North Kent River Basin Catchment

from Southern Water

(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

QUEE.PW01.3
QUEE.SC03.1
QUEE.SC03.2
QUEE.SC03.1
QUEE.SC03.2
QUEE.SC03.1
QUEE.SC03.2
QUEE.SC03.1
QUEE.SC03.2
QUEE.PW01.1
QUEE.WINEP01.2
QUEE.PW01.3
QUEE.SC03.2
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QUEE.WINEP01.6
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QUEE.SC03.1
QUEE.PW01.3
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QUEE.WINEP.PO2.1
QUEE.PW02.3
QUEE.SC03.1
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QUEE.SC03.1
QUEE.SC03.2

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