Drainage and Wastewater Management Plans (DWMPs)

Investment Needs Workshop for the Arun & Western Streams River Basin Catchment

Thursday 24 March 2022

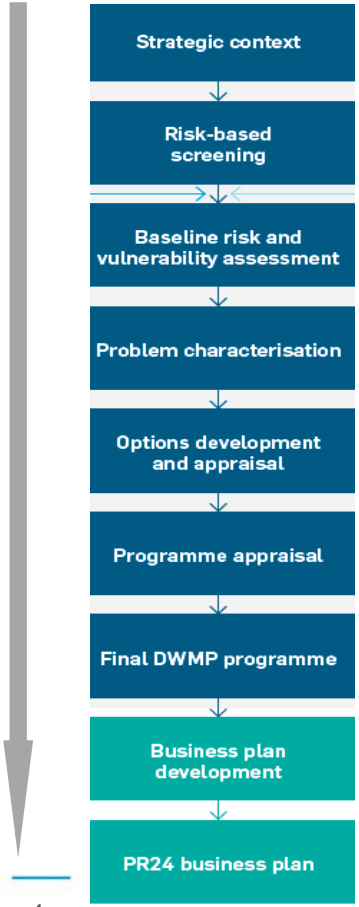
from Southern Water

Agenda

1. Welcome and Purpose
2. Presentation: Investment Planning Process
3. Review of Investment Needs
4. Programme Appraisal
5. Delivering the DWMP Investment Needs
6. Next steps

Welcome and Purpose

Our Journey So Far …



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IN PROGRESS

Working with others:

Aug 2020	Webinars: What is a DWMP?
Sept 2020	Workshops: RBCS and Planning Objectives
Dec 2020	Webinars: National BRAVA results
March 2021	Webinars: Additional BRAVA Results
May 2021	Workshops: Problem Characterisation & ODA
Aug-Oct 2021	Workshops: Identifying Unconstrained Options
Sept 2021	Initial public consultation
Dec 2021	Webinars: Water Company funding
Jan 2022	Webinar: FCERM Partnership Funding
March 2022	Workshops: Investment Needs
June 2022	Public consultation
March 2023	Publish final DWMP

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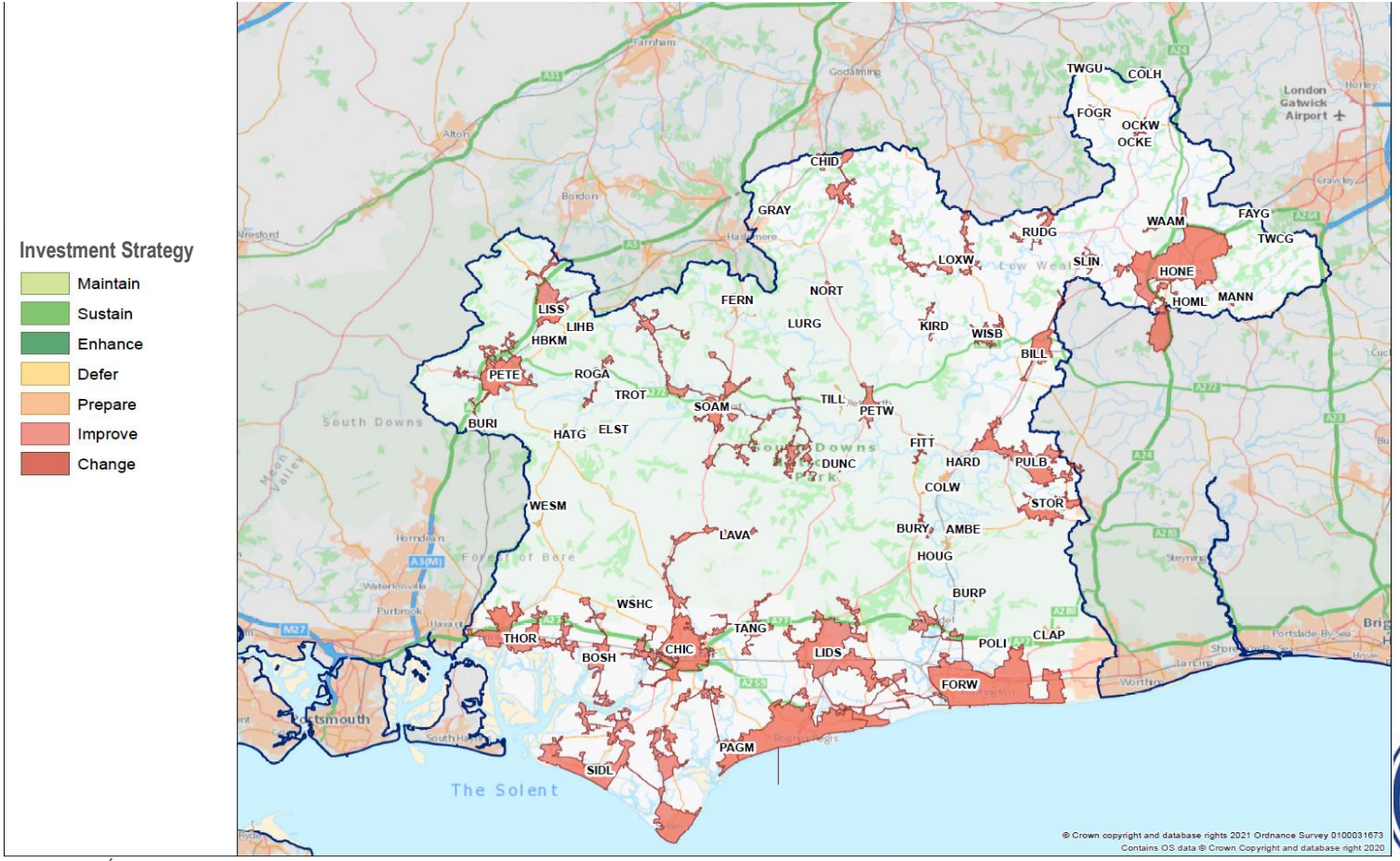
Purpose of Today's Workshop

Our aim today is to:

- Discuss and refine the investment needs identified in the draft DWMP
- Flag any missing investment needs
- Discuss prioritisation and timing for investment needs
- Review opportunities to co-create and co-deliver solutions
- Look at total investment needs across the river basin

Presentation: Investment Planning

Wastewater Catchments in Arun & Western Streams



- 60 sewer catchments
- 56 WTWs
- 502 WPS
- 4,012km sewers
- 12% area
- 93% homes connected

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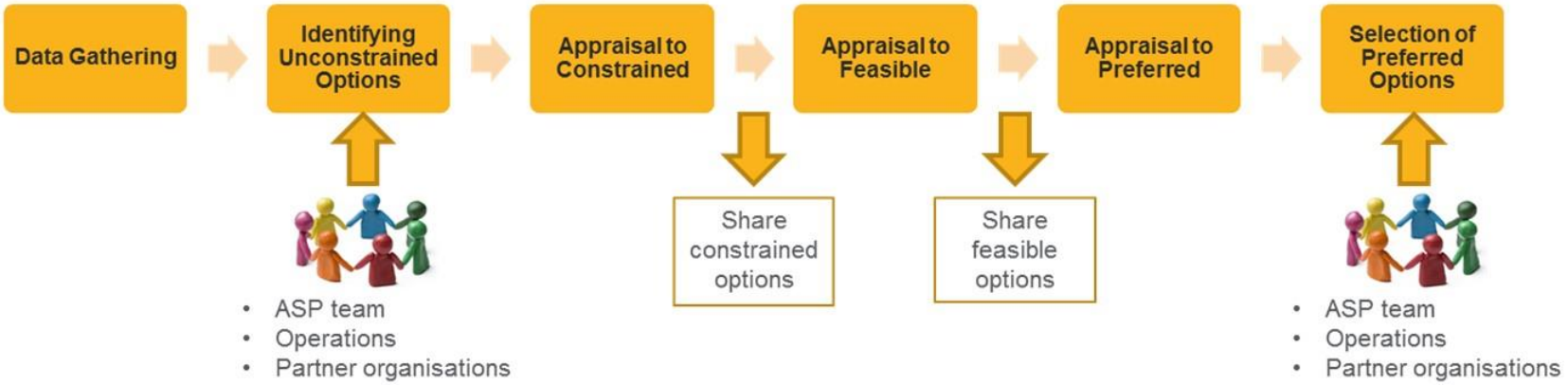
BRAVA Results: Arun and Western Streams

NF	Not Flagged *
NA	Not Applicable **
0	Not Significant
1	Moderately Significant
2	Very Significant

Wastewater Catchment Reference	Wastewater Catchment Reference	Population Equivalent	Sewer Length (KM)	Planning Objective													
				Internal Sewer Flooding Risk	Pollution Risk	Sewer Collapse Risk	Risk of Sewer Flooding in a 1 in 50 year storm	Storm Overflow Performance	Risk of WTW Compliance Failure	Risk of flooding due to Hydraulic Overload	Dry Weather Flow Compliance	Good Ecological Status / Potential	Surface Water Management	Nutrient Neutrality	Groundwater Pollution	Bathing Waters	Shellfish Waters
				2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
FORW	FORD	132,208	1,131.729	1	0	1	2	2	0	0	0	1	2	NA	0	2	NA
HONE	HORSHAM NEW	66,861	617.831	0	1	0	2	1	1	1	0	1	2	2	0	NA	NA
CHIC	CHICHESTER	34,623	221.286	2	0	1	1	2	0	1	0	0	0	2	0	NA	2
SIDL	SIDLESHAM	25,167	272.693	1	1	1	2	2	0	1	1	0	0	2	0	0	NA
LIDS	LIDSEY	21,708	199.746	0	2	0	1	2	0	1	1	1	0	2	0	2	NA
THOR	THORNHAM	21,339	215.890	2	0	0	1	2	0	1	1	0	0	2	0	0	1
PETE	PETERSFIELD	17,104	214.081	1	0	2	1	0	1	2	1	0	0	1	0	NA	NA
SOAM	SOUTH AMBERSHAM	10,708	180.859	0	2	2	0	2	0	0	0	1	0	2	0	NA	NA
PAGM	PAGHAM	9,664	112.015	0	0	0	0	1	0	0	1	0	0	2	0	0	NA
PULB	PULBOROUGH	9,224	101.341	0	0	0	0	1	0	0	0	0	0	NA	0	NA	NA
BILL	BILLINGSHURST	7,999	79.575	0	0	0	2	2	0	2	1	0	0	NA	0	NA	NA
STOR	STORRINGTON	7,961	63.561	0	0	0	0	1	0	0	0	1	0	2	0	NA	NA
LISS	LISS	6,592	83.151	0	0	0	1	0	0	0	1	0	0	2	0	NA	NA
TANG	TANGMERE	5,045	44.986	0	0	2	1	0	0	1	0	0	0	1	1	2	NA
BOSH	BOSHAM	3,922	53.203	0	2	0	1	0	0	1	0	0	0	1	1	0	1
LOXW	LOXWOOD	3,761	59.619	0	0	0	1	2	1	1	1	2	0	2	0	NA	NA
CHID	CHIDDINGFOLD	2,834	40.225	0	2	0	1	2	0	0	0	2	0	2	0	NA	NA
LAVA	LAVANT	2,674	42.410	0	0	0	1	2	0	1	0	1	0	2	0	NA	NA
PETW	PETWORTH	2,634	26.982	0	0	0	0	2	0	0	0	0	0	2	0	NA	NA
RUDG	CHEPHURST COPSE RUDGWICK	2,523	24.929	0	0	0	2	0	0	0	0	1	0	2	0	NA	NA
FERN	FERNHURST	2,000	15.378	0	0	0	2	0	0	2	0	0	0	1	0	NA	NA
WAAM	WARNHAM	1,295	12.902	0	0	0	0	2	2	2	0	1	0	2	0	NA	NA
SLIN	SLINFOLD	1,217	12.903	0	0	0	0	1	0	1	0	1	0	2	0	NA	NA
WISB	WISBOROUGH GREEN	1,197	22.031	0	0	0	0	0	0	1	0	2	0	2	0	NA	NA
MANN	MANNINGS HEATH	1,078	14.456	0	0	0	1	2	0	0	0	0	0	2	0	NA	NA
HATG	SOUTH HARTING	968	12.043	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA
ROGA	ROGATE	943	13.433	0	0	0	0	0	0	1	0	1	0	1	0	NA	NA
COLW	COLDWALTHAM	880	10.345	0	0	0	0	0	0	0	0	0	0	1	0	NA	NA
CLAP	CLAPHAM	798	9.604	0	0	0	0	NA	0	0	0	0	0	1	0	NA	NA
FITT	FITTLEWORTH	743	11.574	0	0	0	0	2	1	0	0	1	0	1	0	NA	NA
KIRD	KIRDFORD	695	11.142	0	0	0	0	0	0	0	0	2	0	1	0	NA	NA
NORT	NORTHCHAPEL	603	5.402	0	0	0	0	0	1	0	0	2	0	1	0	NA	NA
AMBE	AMBERLEY	571	10.966	0	0	0	0	NA	0	0	0	0	0	1	0	NA	NA
BURI	BURITON	510	7.176	0	1	0	0	0	0	0	0	1	0	1	0	NA	NA
BURY	BURY	481	9.313	0	0	0	0	2	0	1	0	0	0	1	0		
GRAY	GRAYSWOOD	415	2.945	0	0	0	0	2	0	0	0	2	0	1	0		
TILL	TILLINGTON	404	7.065	0	0	0	0	NA	0	0	0	0	0	1	0		
FAYG	FAYGATE	371	1.311	0	0	0	0	NA	0	0	0	0	0	NA	0		

Results shown for 2020 only

Options Development and Appraisal



Arun and Western Streams River Basin :

Unconstrained Option Development meetings held on:

- Bosham 21 September 2021
- Chichester 21 September 2021
- Ford 28 September 2021
- Horsham New 13 September 2021
- Lavant 21 September 2021
- Pagham 30 September 2021
- Sidlesham 30 September 2021
- Tangmere 21 September 2021
- Thornham 21 September 2021

Options Development Process
Unconstrained Options

Source
Pathway
Receptor

Location of Risk	Description of Risk	Unconstrained Option	Option Description	Option Referer	GO Outp	L4 Area	Source of the UO
Source Demand Measures							
Control/ Reduce surface water entering the sewers				CHIC.SC01	Yes		
CHICHESTER WTW Overflow	**PO5- Sewer Overflows** Bathing Water 2020 Spilling CSO (also above in-land river spilling threshold) Spill Volume- Xm3	Surface Water Separation	Surface Water Removal (40%) will reduce the total predicted flood volume by 77%.	CHIC.SC01.1		Chichester WTW and Catchment Wide	EDM data via BRAVA PO5 Hydraulic Model Data
Pathway (Supply) Measures							
Network Improvements				CHIC.PW01	Yes		
CHIC FC01 Summersdale Road	PO4 and PO5 - Growth Projected population for CHIC catchment by 2040: 35550 Development population for CHIC catchment by 2040: 2402 Number of houses to be completed by 2040 at CHIC catchment: 1100	Upsizing	Growth solutions developed for the DAP have not been assessed for suitability. Potential erroneous data includes, but is not limited to, developments completed since DAP, change of connection location and development size. The DAP model has a confidence score of 2 and was last verified in 2014 The key risks between DAP and DWMP models are: model network used, rainfall, ground infiltration and levels files applied Option solution: Upsize pipes	CHIC.PW01.4			DAP Option Position statement: CHICGR001 Option 1 Plan 1.1
Receptor Measures							
Mitigate impacts on Water Quality				CHIC.RC03	Yes		
CHICHESTER WTW	**PO11 - Nutrient Neutrality** Chichester and Langstone Harbours, Solent and Dorest Coast, Solent Maritime	River enhancement and mitigation	Reduce consented permit levels for nutrients and solids in the final effluent from treatment works. This would have to be udertaken in agreement with the Environment Agency.	CHIC.RC03.1		CHICHESTER WTW	
Other							
Study/ investigation to gather more data				CHIC.OT01	Yes		
Chichester and Langstone Harbours, Solent and Dorest Coast, Solent Maritime	**PO11 - Nutrient Neutrality** Chichester and Langstone Harbours, Solent and Dorest Coast, Solent Maritime (Include reason for Banding)	Nutrient Budget for investigations.	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 Chichester and Langstone Harbours, Solent and Dorest Coast and Solent Maritime.	CHIC.OT01.2		Catchment Wide	Natural England supplied 'Water Dependent Habitat Sites' Table via BRAVA PO11

All options identify the BRAVA Planning Objective risk they address

(*this is an extract of the table*)

Options identified by:

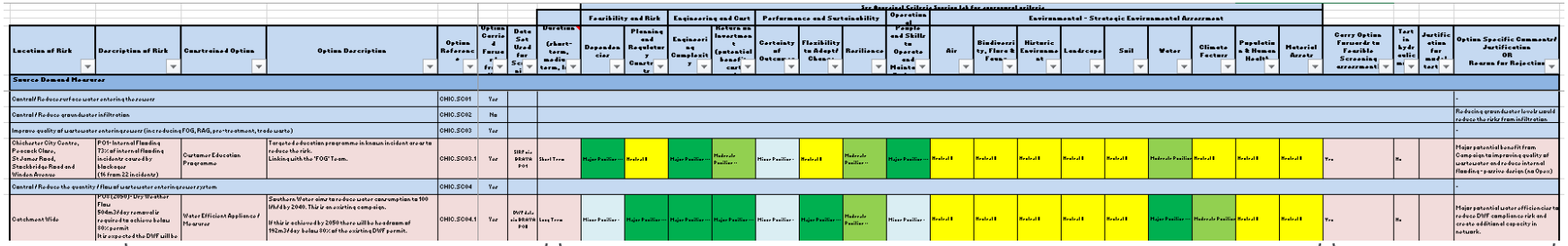
Technical Team

Previous plans and modelling (e.g. Drainage Area Plans)

Our staff and partners

Options Development Process
Benefits Screening

Multi-criteria sustainability appraisal of potential benefits – enables screening and selection of ‘best benefit’ options



Carry forward constrained options

Appraises constrained options for the five areas identified by the national DWMP framework:
1) Feasibility and Risk (2 Questions)
2) Engineering and Cost (2 Questions)
3) Performance and Sustainability (3 Questions)
4) Operational (1 Question)
5) Environmental (9 questions, aligned to WRMP & SEA)

Options with more than two Minor Negatives (--) or one Major Negative (---) are screened out.

All other options pass to Feasible Option stage for costing

DWMP Appraisal Criteria	Datasets/ Key Themes	Effect	Description
Feasibility and Risk •Dependencies	•Permission for access to land •Need to work in partnership •Dependent upon others taking action (e.g. customers) •Dependent upon other actions / projects being completed	+++	Major Positive
		++	Moderate Positive
		+	Minor Positive
		0	Neutral
		-	Minor Negative
		--	Moderate Negative
		---	Major Negative
		?	Uncertain

Extract from Criteria

Scoring of options uses a +++/ --- approach and includes guidance on interpretation for each appraisal criteria

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Options Development Process
Feasible Options to Preferred Options

DWMP Data Tables

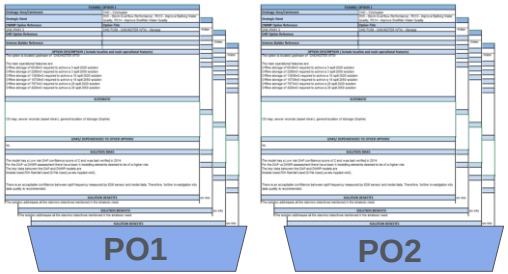
FEASIBLE OPTION 1	
Drainage Area/Catchment	CHIC - Chichester
Strategic Need	PO5 - Storm Overflow Performance, PO13 - Improve Bathing Water Quality, PO14 - Improve Shellfish Water Quality
DWMP Option Reference	Option Title
CHIC_PW01.3	CHIC FC09 - CHICHESTER WTW - Storage
DAP Option Reference	
Scheme Builder Reference	
OPTION DESCRIPTION (include location and main operational features)	
The option is located upstream of CHICHESTER WTW The main operational features are: Offline storage of 6539m3 required to achive a 3 spill 2020 solution Offline storage of 2290m3 required to achive a 3 spill 2050 solution Offline storage of 13836m3 required to achive a 10 spill 2020 solution Offline storage of 10738m3 required to achive a 10 spill 2050 solution Offline storage of 7873m3 required to achive a 20 spill 2020 solution Offline storage of 4284m3 required to achive a 20 spill 2050 solution	
SCHEMATIC	
OS map, sewer records (asset miner), general location of storage (Sophie)	
LINKS/ DEPENDENCIES TO OTHER OPTIONS	
No	
SOLUTION RISKS	
The model has a Low risk DAP confidence score of 2 and was last verified in 2014. For the DAP vs DWMP assessment there have been 4 modelling elements deemed to be of a higher risk. The key risks between the DAP and DWMP models are Models Used,FEH Rainfall Used,GI File Used,Levels Applied mAD,. There is an acceptable confidence between spill frequency measured by EDM sensor and model data. Therefore, further investigation into data quality is recommended.	
SOLUTION BENEFITS	
The solution addresses all the planning objectives mentioned in the strategic need.	

Each Wastewater System may have multiple feasible options.

Some Options may:
- address multiple BRAVA risks
- need to be combined to fully mitigate a BRAVA risk

“Preferred Options” are best value options

“Baskets of Measures” are created for the preferred option where more than one feasible option is required to reduce the risk for a planning objective to band 0



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Outputs from Options Development Stage

- Table of Investment Needs for the Wastewater Catchment
- Each Investment Need assessed in terms of risk band reduction

Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners

Definitions:

- Location: Specific known location of the risk e.g. hotspot, high spilling CSO
- Issues: Description of the issue the option is tackling e.g. flooding
- Indicative Cost: Our initial estimate of the investment needed to deliver the option
- Indicative Timescale: Based upon when the risk occurs (now or in the future)
- Potential Partners: Opportunities to work with others

Investment Needs – Chichester (CHIC)

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Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Chichester WTW	Flooding & Drainage- Overflows	Attenuate excess flows in sewer network upsizing sewers to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£8,054k	Medium	West Sussex County Council Chichester District Council
Salthill	Flooding & Drainage	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£884k	Short	
Sherlock Avenue			£479k	Short	
Catchment Wide		Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£150k	Short	
Summersdale Road Pammers Filed Avenue Broyle Road College Lane Spitalfield Lane Baxendale Road Orchard Street Saint Pancras	Growth- Flooding & Drainage	Attenuate excess flows in sewer network upsizing sewers to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£10,212k	Medium - Long	
Town Centre	Internal Flooding - Blockages	Enhanced maintenance: Customer Education	£116k	Short	WSCC Chichester DC
		Enhanced maintenance: Proactive Jetting	£183k	Short	
A285 / A286	Sewer Collapses	Sewer CCTV surveys, integrity checks and re-lining/enforcement	£292k	Short	
Chichester and Langstone Harbours Solent and Dorset Coast Solent Maritime	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites.	£76k	Short	Natural England
Chichester WTW	Growth- DWF at WTWs	Completion of wastewater transfer to Tangmere, June'22. Position Statement- future developments flow to remain the same as current site.	-	Medium - Long	

Investment Needs – Horsham New (HONE)

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Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Five Oaks Road Broadbridge Heath Langhurstwood Road Horsham	Pollution Risk - Operational	Enhanced maintenance: Wastewater Pumping Stations	£466k	Short	
Horsham New WTW	Flooding & Drainage- Overflows	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	
Billingshurst Road	Flooding & Drainage	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£1,781k	Short - Medium	West Sussex County Council Horsham District Council
Hurst Road			£1,493k	Short - Medium	
Southwater			£2,819k	Medium	
Worthing Road			£918k	Short	
Catchment Wide		Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£125k	Short	
Land North of Horsham West of Southwater Land Off Mill Straight Parsonage Road Forest Road Land South of Athelstan Way Holbrook Club North Heath Lane Horsham New WTW	Growth - Flooding & Drainage	Attenuate excess flows in sewer network using, upsizing sewer, storage tanks, increasing pump capacity and creating new sewers to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£49,650k	Medium - Long	
Horsham New WTW	WTW - Increase Capacity	Deliver associated works to increase capacity of the works.	~£15,000k	Medium	
Arun Source / Boldings Brook / Arun Horsham	Good Ecological Status	Study: Understand the risks and sources that Phosphate, Invertebrates, Macrophytes and Phytobenthos are having on the linked waterbodies.	£76k	Short	Environment Agency
Arun Valley	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites. (Potential to recycle effluent)	£76k	Short	Natural England
Warnham Network	Drainage	Pumping wastewater to Horsham from Warnham network is a viable option	AMP 7	Short	
Catchment Wide	Internal Flooding - Blockages	Enhanced maintenance: Customer Education (Note a risk, implementing this solution would still provide benefit)	£TBC	Short	Horsham District Council
Barns Green	Water Supply	Study: Identify solution to protect the deep borehole water supply (growing transient population)	£TBC	Short	

Other Issues from the DWMP Feedback / Input Log

- A detailed strategic assessment and master plan that integrates:
  - A potential comprehensive redesign of all the systems taking economic and social solutions into account
  - An increase in, and creation of, more wetlands, habitats and biodiversity
  - water resource issues and recycling
  - flooding solutions, surface water management, green solutions, rainwater harvesting
  - reduces the need to pump and treat wastewater over long distances
  - identifies the best location to discharge wastewater to.
- Identifying ownership of privately sewers and establishing responsibility for maintenance and repairs.

Questions

Review of Investment Needs

Risks in the Arun and Western Streams Catchment

BRAVA Results indicated the main risks in this river basin catchment are for the following Planning Objectives (PO):

- Storm Overflows (PO5)
- Nutrients (PO11)

PO5 – Storm Overflows

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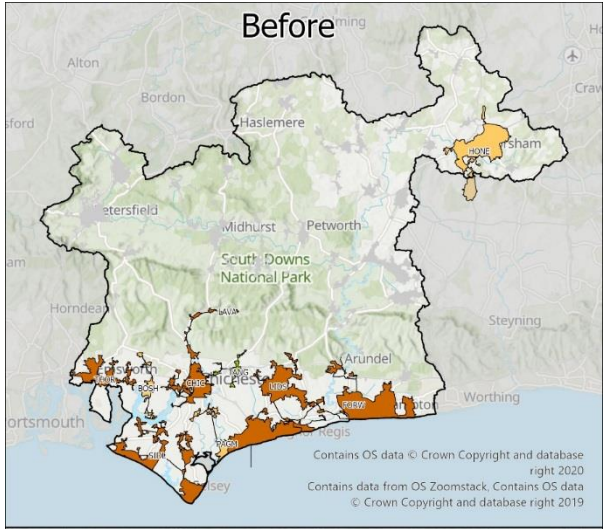
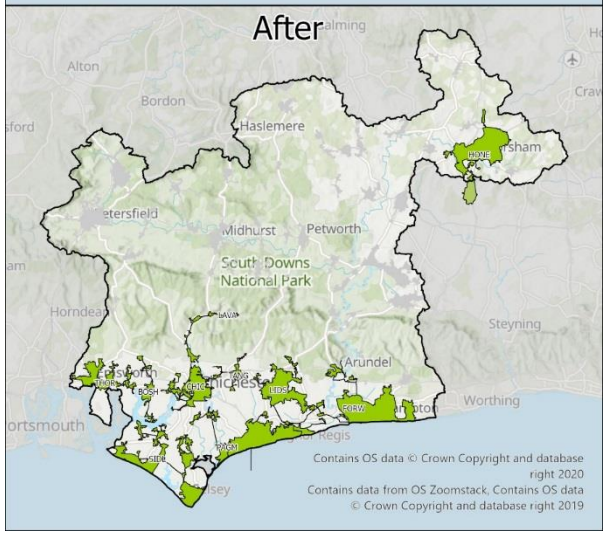
Arun and Western Streams	PO5	BRAVA (2050)	
Option Type	Est Cost(£)	Before	After
Bosham			
BOSH.OT01.5 – Storage (Bosham WTW)	£1000 K	1	0
Chichester			
CHIC.PW01.7 - Storage (CHICHESTER WTW)	£8054 K	2	0
Ford			
FORW.PW01.19 - Storage (West Park Bognor Regis WPS)	£1000 K	2	0
FORW.PW01.20 - Storage (Bognor Main WPS)	£1000 K		
FORW.OT01.6 – Storage (Aldwick Avenue CSO)	£1000 K		
FORW.OT01.7 – Storage (Foreshore WPS)	£1000 K		
FORW.OT01.8 – Storage (Esplanade Bognor CSO)	£1000 K		
FORW.OT01.9 – Storage(Sea Road Littlehampton WPS)	£1000 K		
FORW.OT01.10 – Storage (Broadmark Lane Rustington CEO)	£1000 K		
Horsham New			
HONE.OT01.4 – Storage (Horsham New WTW)	£1000 K	1	0
Lavant			
LAVA.OT01.5 – Storage (Singleton Relief WPS)	£1000 K	2	0
LAVA.OT01.6 – Storage (Lavant WTW)	£1000 K		
Lidsey			
LIDS.OT01.6 – Storage (Lidsey WTW)	£1000 K	2	0
LIDS.OT01.7 – Storage (Marshall Close Barnham CSO)	£1000 K		
Pagham			
PAGM.OT01.3 – Storage (Summer Lane Pagham WTW)	£1000 K	1	0
Sidlesham			
SIDL.SC01.2 – Storage (Sidlesham WTW)	£1000 K	2	0
Tangmere		0	0
Thornham			
THOR.PW01.4 –Storage (Thornham WTW)	£1000 K	2	0
THOR.OT01.4 - Storage (KINGS ROAD EMSWORTH NO.2 CSO)	£1000 K		
THOR.OT01.5 – Storage (School Lane Nutbourne CEO)	£1000 K		





PO11 – Nutrient Neutrality

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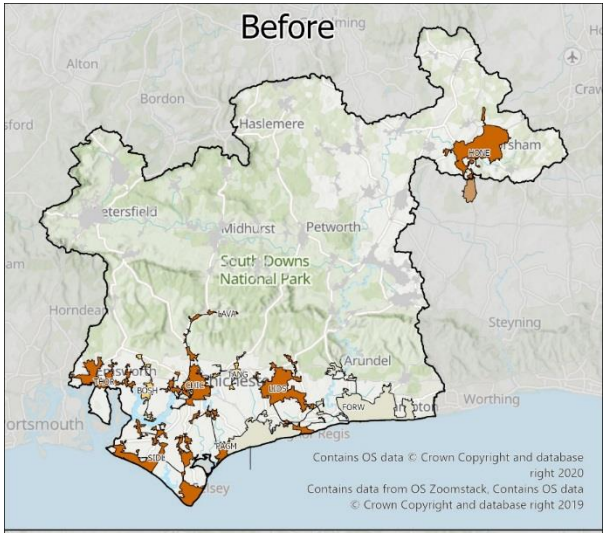
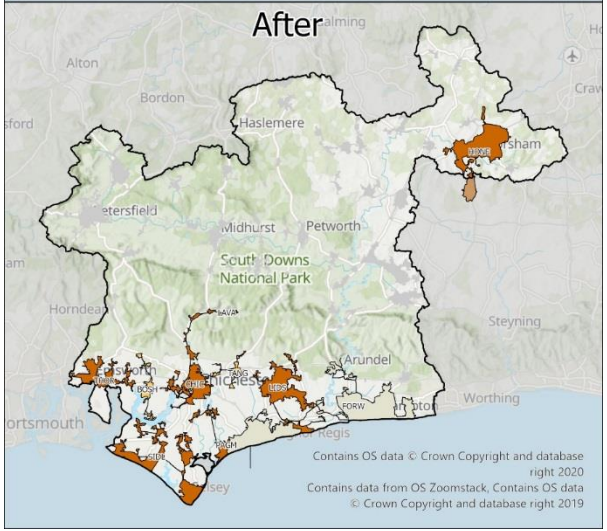
Arun and Western Streams	PO11	BRAVA (2050)	
Option Type	Est Cost(£)	Before	After
Bosham			
BOSH.OT01.2 - Nutrient Budget	£76 K	1	1
Chichester			
CHIC.OT01.4 - Nutrient Budget	~£76 K	2	2
Ford		NA	NA
Horsham New			
HONE.OT01.2 - Nutrient Budget	£76 K	2	2
Lavant			
LAVA.OT01.3 - Nutrient Budget	£76 K	2	2
Lidsey			
LIDS.OT01.4 - Nutrient Budget	£76 K	2	2
Pagham			
PAGM.OT01.2 - Nutrient Budget	£76 K	2	2
Sidlesham			
SIDL.OT01.4 - Nutrient Budget	£76 K	2	2
Tangmere			
TANG.OT01.3 - Nutrient Budget	£76 K	1	1
Thornham			
THOR.OT01.2 - Nutrient Budget	£76 K	2	2





PO9 – Good Ecological Status

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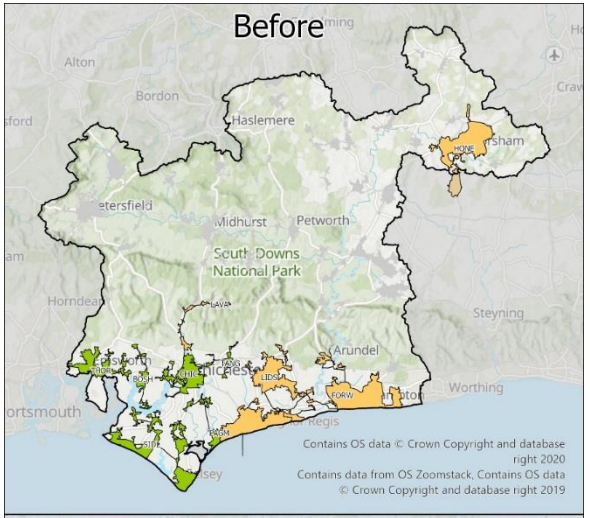
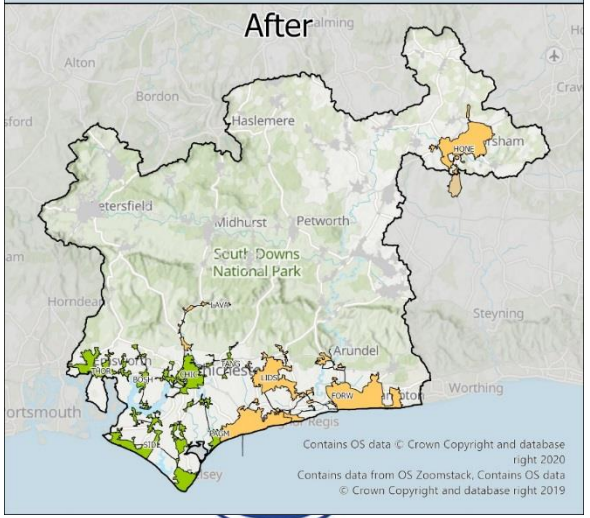
Arun and Western Streams	PO9	BRAVA	
Option Type	Est Cost(£)	Before	After
Bosham		0	0
Chichester		0	0
Ford			
FORW.OT01.4 – Study (UPM) Ammonia (Phys-Chem)	£76 K	1	1
Horsham New			
HONE.OT01.1 – Study (UPM) Phosphate Invertebrates Macrophytes and Phytobenthos Combined	£76 K	1	1
Lavant			
LAVA.OT01.2 – Study (UPM) Phosphate	~£76 K	1	1
Lidsey			
LIDS.OT01.3 – Study (UPM) Phosphate	~£76 K	1	1
Pagham		0	0
Sidlesham		0	0
Tangmere		0	0
Thornham		0	0





PO8 – DWF Compliance

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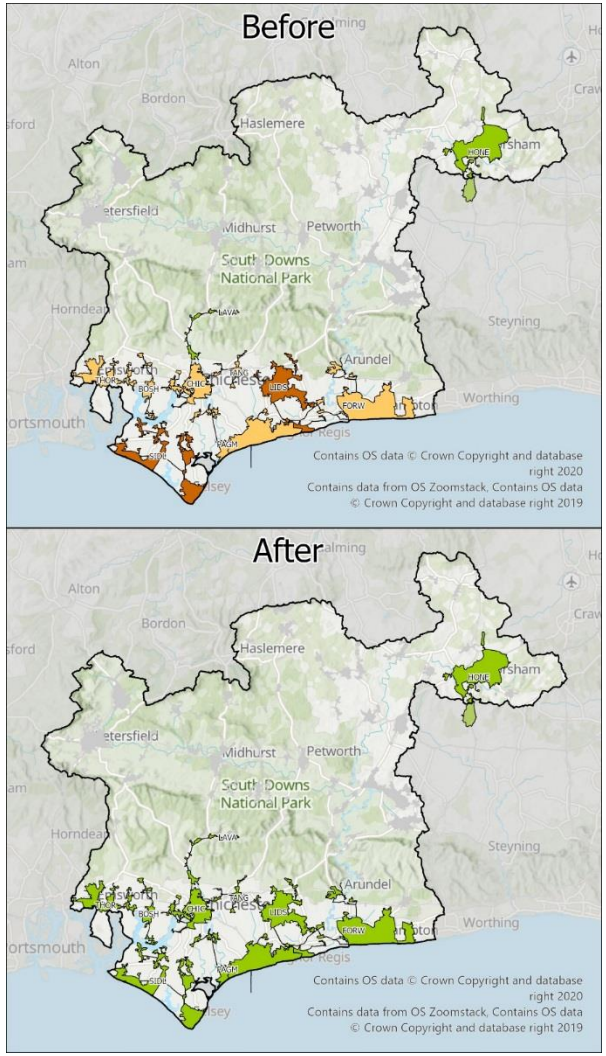
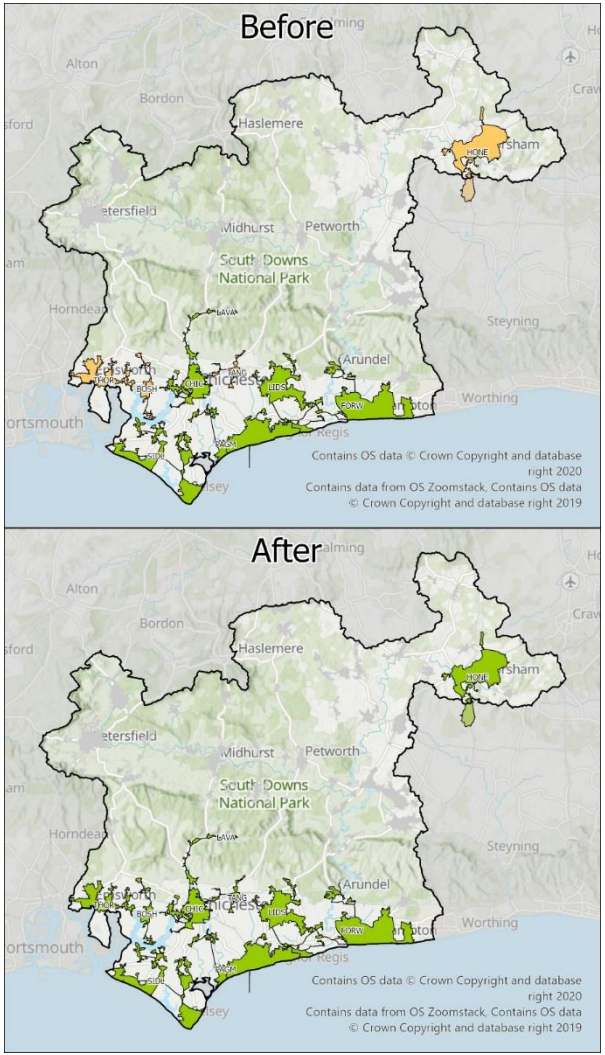
Arun and Western Streams	PO8	BRAVA (2050)	
Option Type	Est Cost(£)	Before	After
Bosham			
BOSH.PW02.2 - Increase DWF Capacity	£1,137 K	1	0
Chichester			
		1	0
Ford			
FORW.PW02.1 - Increase DWF Capacity	£2,163 K	1	0
Horsham New		0	0
Lavant		0	0
Lidsey			
LIDS.PW02.1 - Increase DWF Capacity	£2,138 K	2	0
Pagham			
PAGM.PW02.1 - Increase DWF Capacity	£2,637 K	1	0
Sidlesham			
SIDL.PW02.2 - Increase DWF Capacity	£2,534 K	2	0
Tangmere		0	0
Thornham			
THOR.PW02.2 - Increase DWF Capacity	£2,205 K	1	0



PO6 – WTW Compliance Failure

DRAFT

Arun and Western Streams	PO6	BRAVA (2050)	
Option Type	Est Cost(£)	Before	After
Bosham			
BOSH.PW02.1 - Increase Capacity	£5,664 K	1	0
Chichester		0	0
Ford		0	0
Horsham New			
HONE.PW02.1 – Increase Capacity	~ £15,000 K	1	0
Lavant		0	0
Lidsey		0	0
Pagham		0	0
Sidlesham		0	0
Tangmere			
TANG.PW02.1 - Increase Capacity	£625 K	1	0
Thornham			
THOR.PW02.1 - Increase Capacity	£TBC K	1	0



PO7 – Hydraulic Overload

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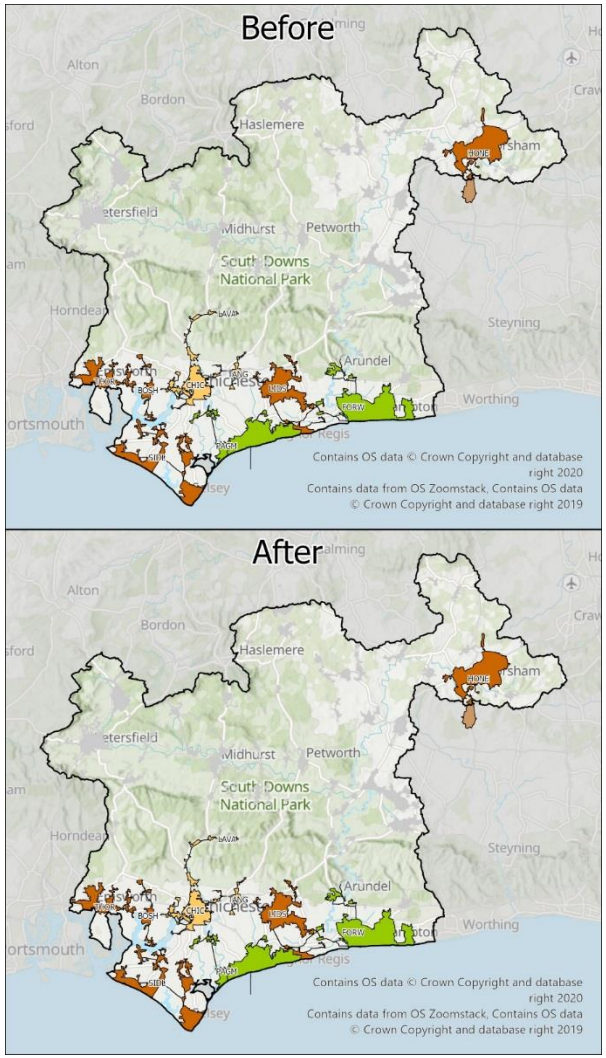
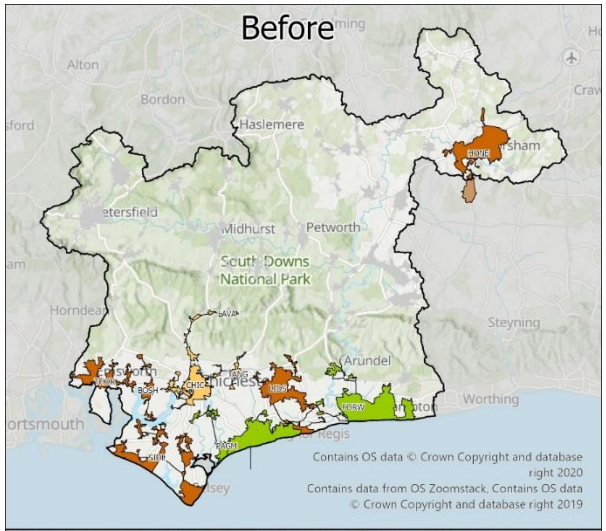
Arun and Western Streams	PO7	BRAVA (2050)	
Option Type	Est Cost(£)	Before	After
Horsham New			
HONE.PW01.6 - New ring sewer (Growth)	£49,650 K	2	2
HONE.PW01.7 - New sewer and rising main (Growth)			
HONE.PW01.8 - New sewer (Growth)			
HONE.PW01.9 - On-line storage (Growth)			
HONE.PW01.10 - On-line storage (Growth)			
HONE.PW01.11 - New sewer and Upsizing (Growth)			
HONE.PW01.12 - On-line storage (Growth)			
HONE.PW01.13 - Pump capacity and storage (Growth)			
HONE.PW01.14 - Storage	£1,781 K		
HONE.PW01.15 - Storage	£1,493 K		
HONE.PW01.16 - Storage	£2,819 K		
HONE.PW01.17 - Storage	£918 K		
HONE.OT01.3 - Improve Hydraulic Model	£125 K		

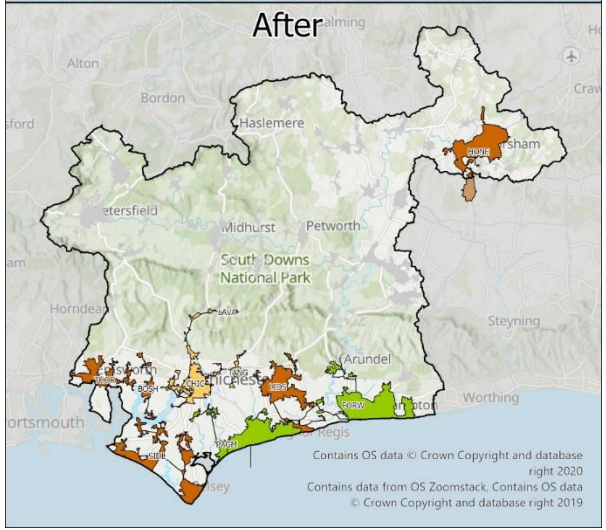


PO7 – Hydraulic Overload

DRAFT

Arun and Western Streams	PO7	BRAVA (2050)	
Option Type	Est Cost(£)	Before	After
Bosham			
BOSH.PW01.6 - Drain all flows from the proposed developments to a new pumping station via a new gravity network. (Growth)	£1,649 K	2	2
BOSH.OT01.4 - Improve Hydraulic Model	£175 K		
Chichester			
CHIC.PW01.16 - Storage	£884 K	1	1
CHIC.OT01.5 – Improve Hydraulic Model	£150 K		
Ford			
FORW.OT01.5 – Improve Hydraulic Model	£225 K	0	0
Lavant			
LAVA.OT01.4 - Improve Hydraulic Model	£300 K	1	1
Lidsey			
LIDS.PW01.4 - Storage	£1,041 K	2	2
LIDS.PW01.5 - Storage	£1,694 K		
LIDS.PW01.6 - Storage	£520 K		
LIDS.OT01.5 - Improve Hydraulic Model	£200 K		
Pagham			
PAGM.OT01.4 – Improve Hydraulic Model	£225 K	0	0
Sidlesham			
SIDL.PW01.6 - Storage	£25,910 K	2	2
SIDL.OT01.5 - Improve Hydraulic Model	£200 K		
Tangmere			
TANG.OT01.5 - Improve Hydraulic Model	£125 K	1	1
Thornham			
THOR.PW01.14 - Storage	£3,404 K	2	2
THOR.PW01.15 - Storage	£1,011 K		
THOR.PW01.16 - Storage	£1,954 K		
THOR.OT01.3 - Improve Hydraulic Model	£200 K		

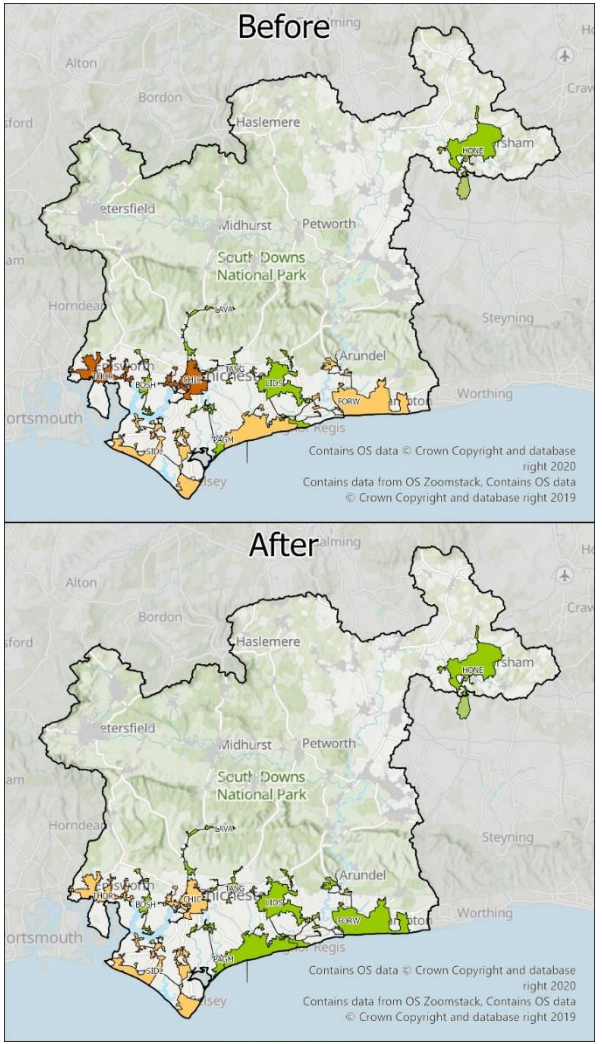




PO1 – Internal Flooding

DRAFT

Arun and Western Streams	PO1	Internal Flood Incidents (Nr in 3yrs)			BRAVA	
Option Type	Est Cost(£)	Solution Reduction	Total	Reduction Req'd for Band 0	Before	After
Bosham					0	0
Chichester						
CHIC.SC03.1 - Customer Education Programme	£116 K	4	22	14	2	1
CHIC.PW01.6 - Jetting Programme	£183 K	4				
Ford						
FORW.SC03.1 - Customer Education Programme	£116 K	6	43	13	1	0
FORW.PW01.4 - Jetting Programme	£263 K	6				
FORW.PW01.31 - Storage	~£4,294 K	5				
Horsham New					0	0
Lavant					0	0
Lidsey					0	0
Pagham					0	0
Sidlesham						
SIDL.SC03.1 – Customer Education Programme	£116K	~1	7	2	1	1
SIDL.PW01.4 – Jetting Programme	£23K	~1				
Tangmere					0	0
Thornham						
THOR.SC03.1 - Customer Education Programme	£116 K	~2	10	6	2	1
THOR.PW01.1 - Pipe Rehabilitation Programme	£253 K	~2				
THOR.PW01.3 - Jetting Programme	£69 K	~2				



PO2 – Pollution Risk

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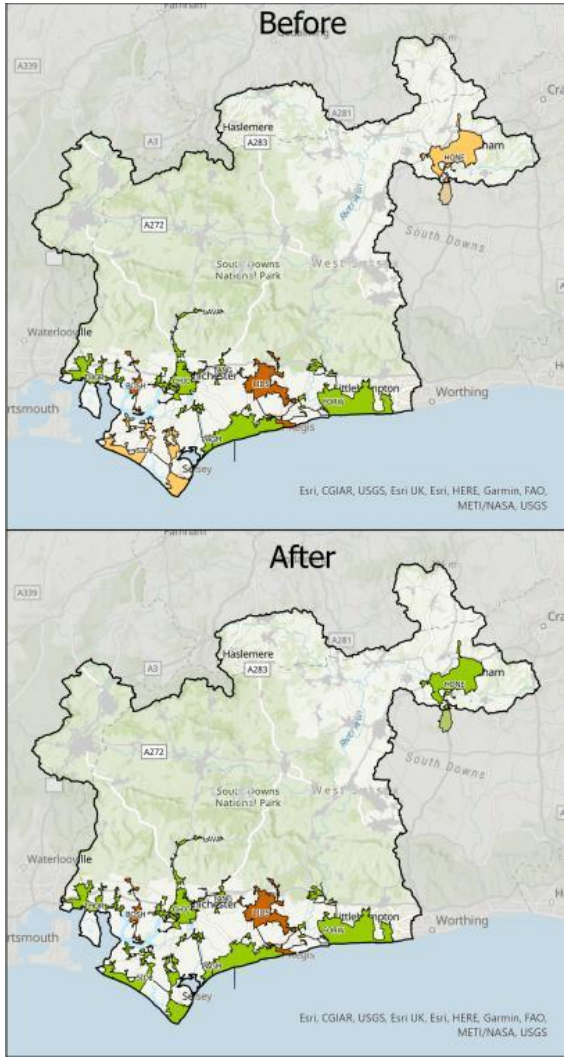
Arun and Western Streams	PO2	Pollution Incidents (Nr in 3yrs)			BRAVA	
Option Type	Est Cost(£)	Solution Reduction	Total	Reduction Req'd for Band 0	Before	After
Bosham						
BOSH.SC03.1 - Customer Education Programme	£116 K	~1	6	6	2	2
BOSH.PW01.1 - Maintenance Programme WPS	£233 K	3				
BOSH.PW01.5 - Jetting Programme	£23 K	~1				
Chichester					0	0
Ford					0	0
Horsham New						
HONE.PW01.1 - Maintenance Programme WPS	£466 K	2	6	2	1	0
Lavant					0	0
Lidsey						
LIDS.SC03.1 - Customer Education Programme	£116 K	~1	3	2	2	2
LIDS.PW01.3 - Jetting Programme	£11 K	~1				
Pagham					0	0
Sidlesham						
SIDL.SC03.2 - Customer Education Programme	£116 K	1	4	2	1	0
SIDL.PW01.5 - Jetting Programme	£34 K	1				
SIDL.PW02.1 - Maintenance Programme WTW	£6970 K	1				
Tangmere					0	0
Thornham					0	0



PO3 – Sewer Collapse

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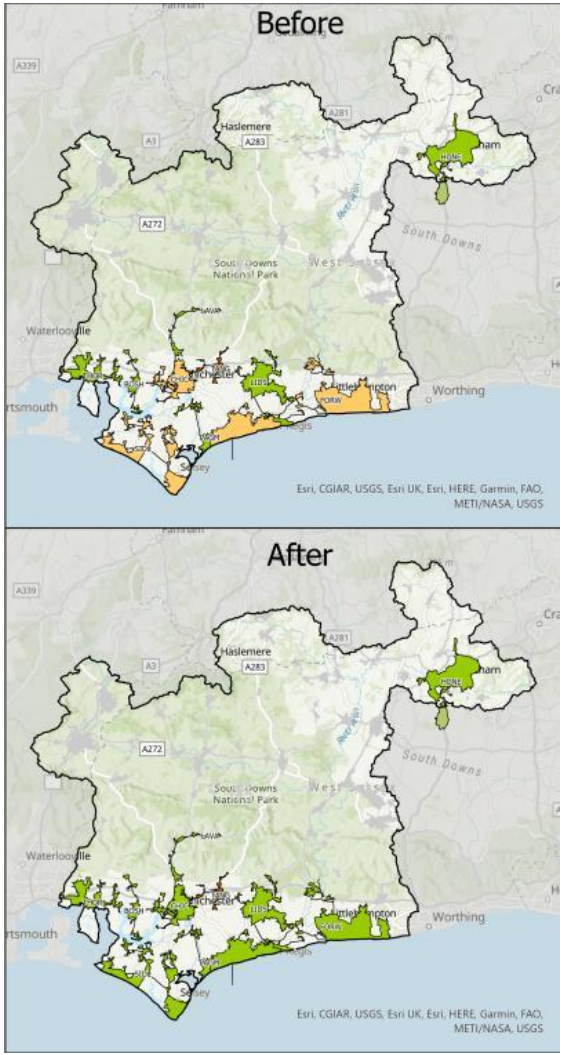
Arun and Western Streams	PO3	Collapses and Bursts (Nr)			BRAVA	
Option Type	Est Cost(£)	Solution Reduction	Total	Reduction Req'd for Band 0	Before	After
Bosham					0	0
Chichester						
CHIC.PW01.4 - Pipe Rehabilitation Programme	£292 K	2	4	1	1	0
Ford						
FORW.PW01.2 - Pipe Rehabilitation Programme	£1,650 K	12	23	4	1	0
Horsham New					0	0
Lavant					0	0
Lidsey					0	0
Pagham					0	0
Sidlesham						
SIDL.PW01.2 - Pipe Rehabilitation Programme	£535 K	3	6	2	1	0
Tangmere						
TANG.PW01.1 - Pipe Rehabilitation Programme	£816 K	4	8	8	2	2
Thornham					0	0



PO12 – Groundwater Pollution Risk

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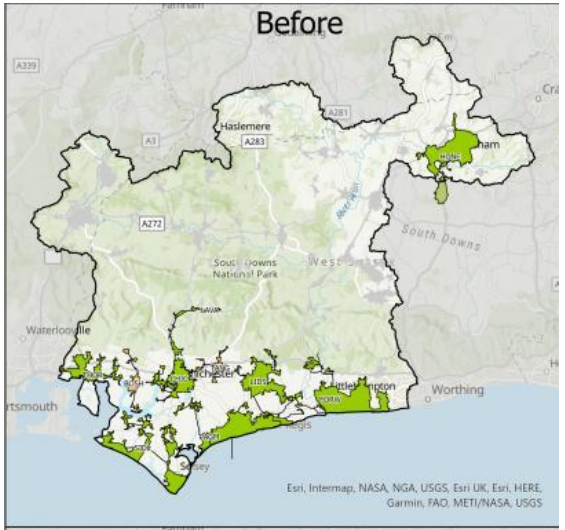
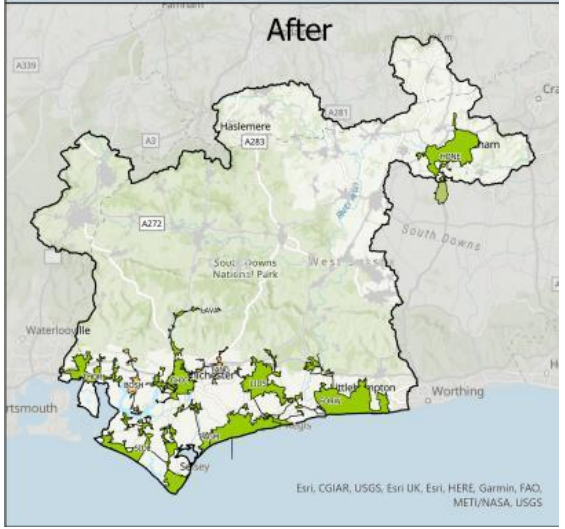
Arun and Western Streams	PO12	BRAVA	
Option Type	Est Cost(£)	Before	After
Bosham			
BOSH.PW01.4 - Pipe Rehabilitation Programme	£272 K	1	0
Chichester		0	0
Ford		0	0
Horsham New		0	0
Lavant		0	0
Lidsey		0	0
Pagham		0	0
Sidlesham		0	0
Tangmere			
TANG.PW01.3 - Pipe Rehabilitation Programme	£455 K	1	0
Thornham		0	0





PO13 – Bathing Water

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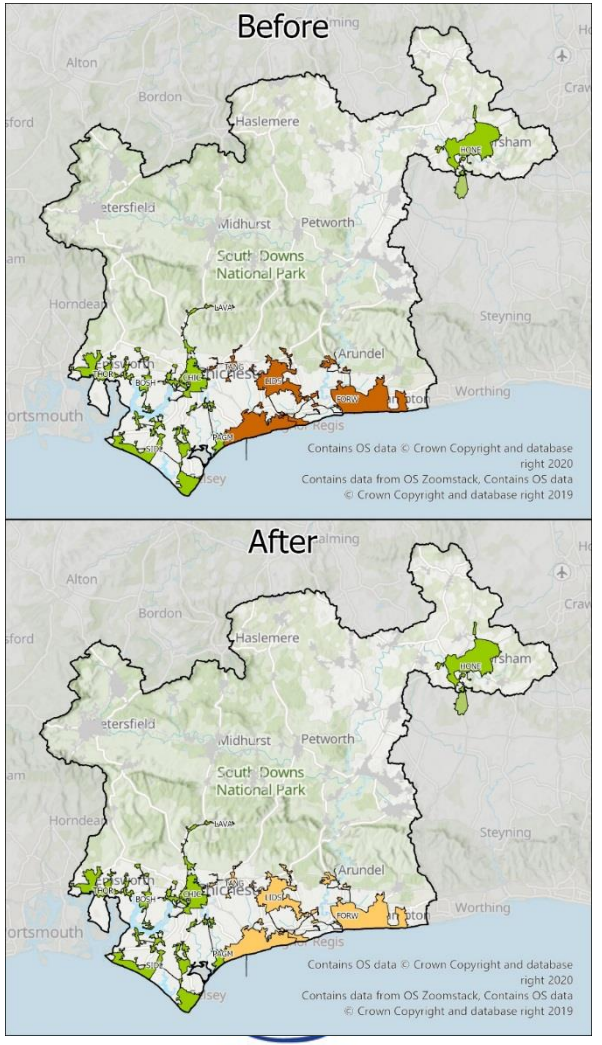
Arun and Western Streams	PO13	BRAVA	
Option Type	Est Cost(£)	Before	After
Bosham		0	0
Chichester		NA	NA
Ford			
FORW.PW01.20 - Storage (Bognor Main WPS)	£1000 K	2	1
FORW.OT01.6 – Storage (Aldwick Avenue Bognor CSO)	£1000 K		
FORW.OT01.9 – Storage (Esplanade Bognor CSO)	£1000 K		
FORW.OT01.10 – Storage (Sea Road Littlehamption WPS)	£1000 K		
FORW.OT01.17 – Storage (Broadmark Lane Rustington CEO)	£1000 K		
Horsham New		NA	NA
Lavant		0	0
Lidsey	~	2	1
Pagham		0	0
Sidlesham		0	0
Tangmere	~	2	1
Thornham		0	0



PO14 – Shellfish Water

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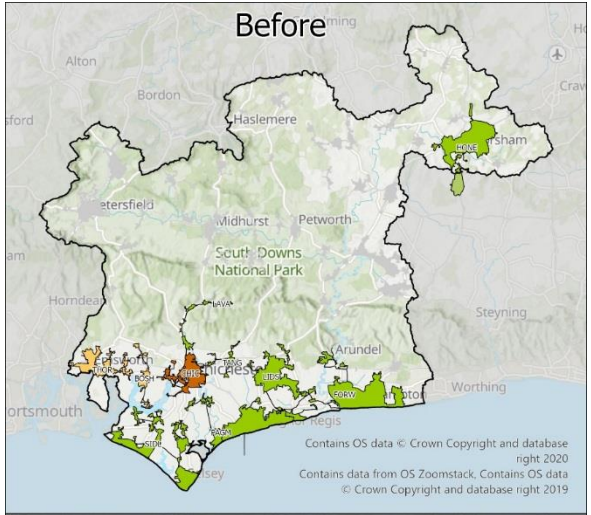
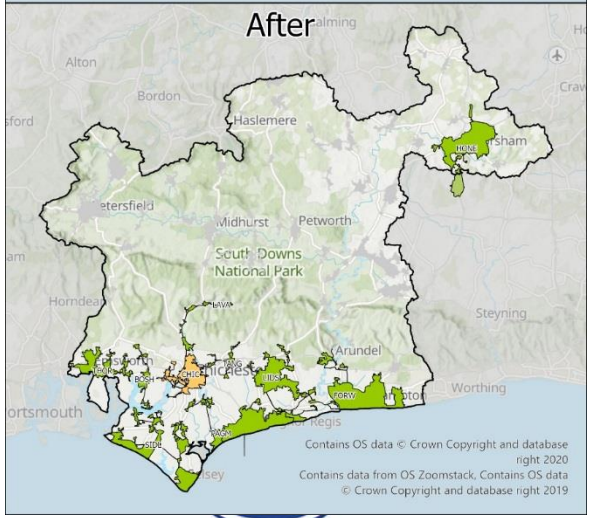
Arun and Western Streams	PO14	BRAVA	
Option Type	Est Cost(£)	Before	After
Bosham		1	0
Chichester			
CHIC.PW01.7 – Storage (Chichester WTW)	£8,053 K	2	1
Ford		NA	NA
Horsham New		NA	NA
Lavant		NA	NA
Lidsey		NA	NA
Pagham		NA	NA
Sidlesham		NA	NA
Tangmere		NA	NA
Thornham			
THOR.PW01.4 - Storage (Thornham WTW)	£1,000 K	1	0



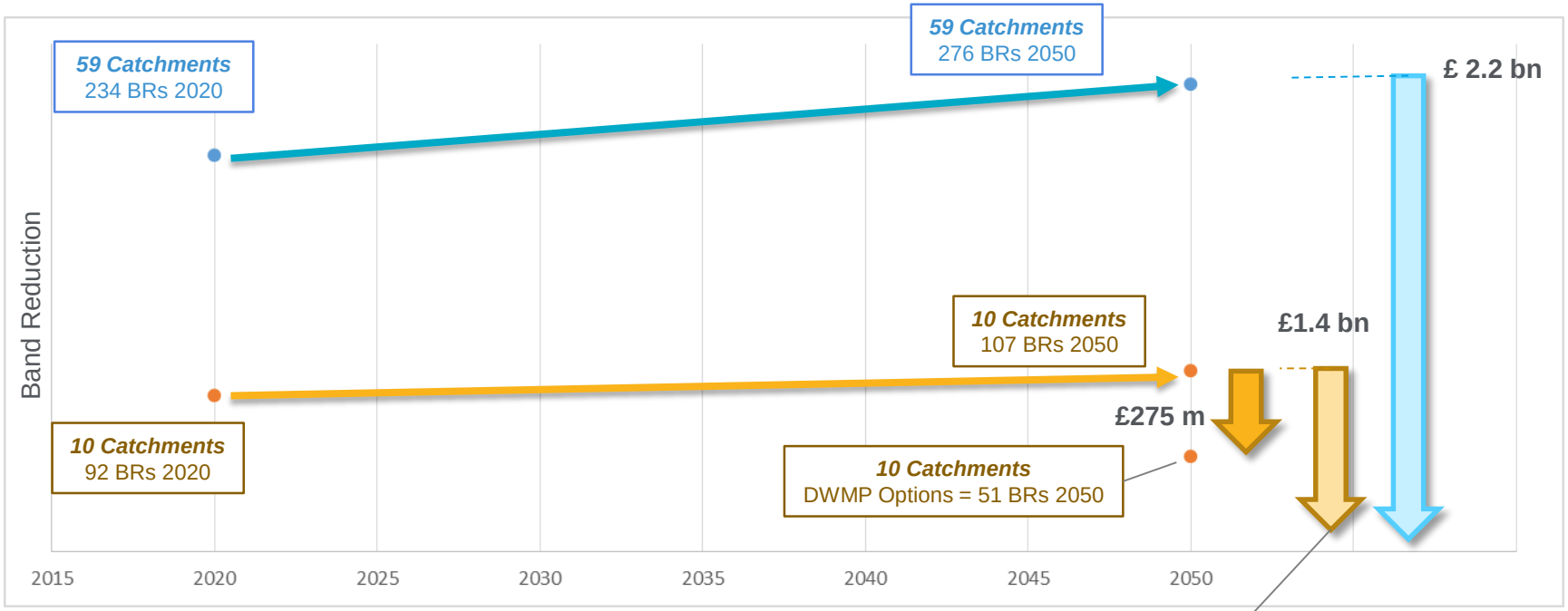


Programme Appraisal

Programme Appraisal

- Purpose: to develop an optimised ‘best value’ plan of measures to achieve the planning objectives
- Process: Collated all the investment needs from the 61 wastewater catchments, with information on costs and risk band reductions (across all 14 planning objectives)
- Extrapolated investment needs to other wastewater catchments in the river basin based on average cost per band reduction for each planning objective
- Optimise and prioritise investment needs for the final DWMP consultation

Arun & Western Streams: DWMP Cost & Risk Band Reduction



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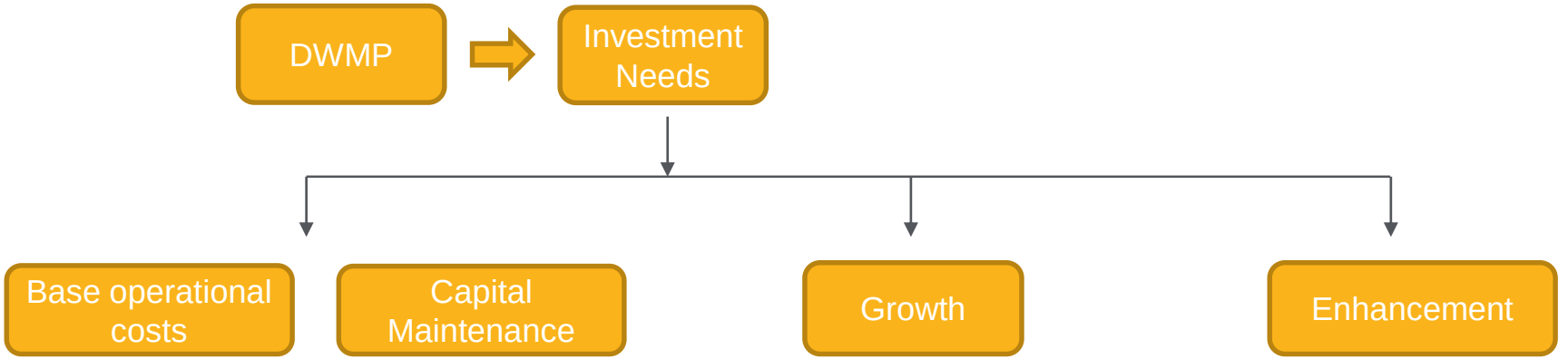
10 catchments = 323,000 population
59 catchments = 412,000 population

WATER for LIFE from Southern Water

Questions

Delivering the DWMP Investment Needs

Funding the DWMP Investment Needs in PR24



Maintain existing wastewater system to meet expected performance levels

Developer contributions and shareholder investment (included in base for Price Review 2019)

Improve system for better performance, growth & climate change

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Examples of Enhancement Spend

- New environmental requirements
- New or emerging water quality risks or tightening of regulations
- Other new statutory or regulatory requirements
- Customer supported improvements – special cost cases
- Level of service improvement beyond upper quartile performance – special cost cases supported by customers

How to Fund Enhancements?

WINEP — If investment needs meet specific drivers set by the EA

Or

Special Cases — To meet customer needs

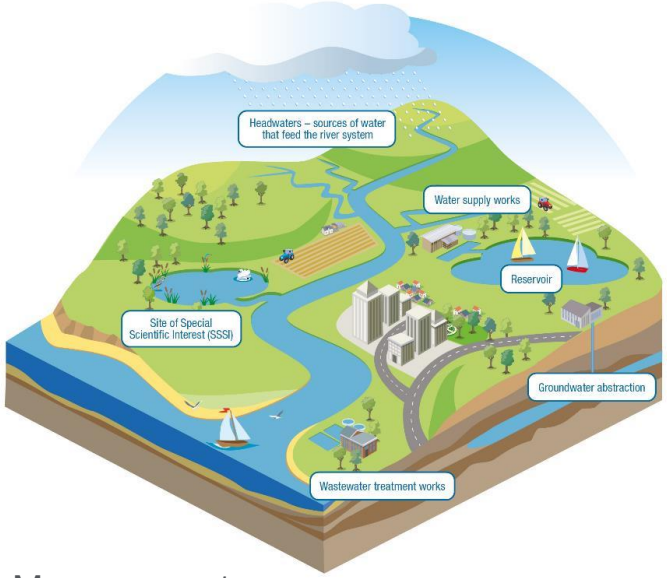
Special cases have a high evidence threshold, and must have:

- ✓ A clear need
- ✓ Clear efficient cost of delivery
- ✓ Customer support – Including a clear willingness to pay extra for it
- ✓ Clear cost benefit + proven environmental & social value
- ✓ Customer protection from non-delivery or significant underspend

Catchment and nature-based solutions

Key findings from our DWMP:

- Significant percentage of rainfall in sewers
- Need to tackle sewer flooding and storm overflows at source – surface water separation / attenuation
- Potentially huge benefits to people & the environment



Pathfinder projects in AMP7 – pioneering solutions in AMP7 to support our business cases for next Business Plan (PR24)

Catchment portfolios have been developed in our Water Resources Management Plan (WRMP), which include solutions such as:

- River restoration
- Nutrient and sediment reduction
- Working with farmers to improve land management practices
- Sustainable drainage systems (SuDS)

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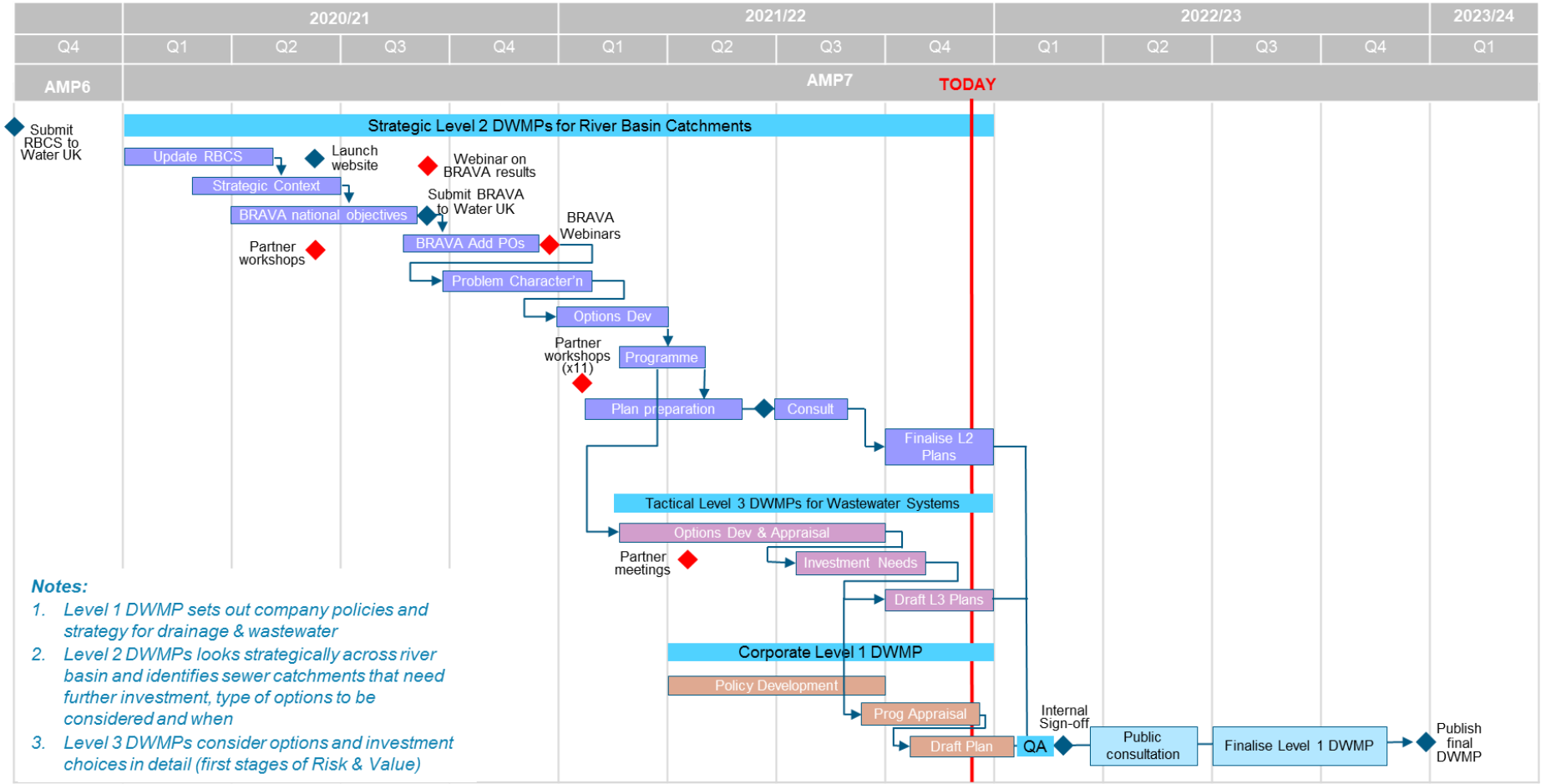
Next Steps

Our DWMP Delivery Programme



Notes:

1. *Level 1 DWMP sets out company policies and strategy for drainage & wastewater*
2. *Level 2 DWMPs looks strategically across river basin and identifies sewer catchments that need further investment, type of options to be considered and when*
3. *Level 3 DWMPs consider options and investment choices in detail (first stages of Risk & Value)*

Questions

Summary

Summary of Workshop

Our aim today was to:

- Discuss and refine the investment needs identified in the draft DWMP
- Flag any missing investment needs
- Discuss prioritisation and timing for investment needs
- Review opportunities to co-create and co-deliver solutions
- Look at total investment needs across the river basin

Poll

Thank you for participating today

Website: www.southernwater.co.uk/dwmp

Contact us: DWMP@southernwater.co.uk

from Southern Water

Investment Needs for other wastewater catchments

Investment Needs – Ford (FORW)

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Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Limmer Lane	Flooding & Drainage	Attenuate excess flows in sewer network using, upsizing sewer, storage tanks and creating new sewers to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£1,384k	Short	West Sussex County Council Arun District Council
The Causeway			£2,050k	Short - Medium	
Greenwood Close			£2,800k	Short - Medium	
West Drive		NB-South Terrace solution would aid with reducing the risk identified for the Internal Flooding planning objective.	£949k	Short	
Millfield Close,			£1,550k	Short - Medium	
South Terrace			£4,294k	Medium	
Catchment Wide		Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£232k	Short	
Chichester Road	Growth - Flooding & Drainage	Attenuate excess flows in sewer network using, upsizing sewer, storage tanks and creating new sewers to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£32,888k	Medium - Long	
Shirpney Road					
New Town WPS					
Pembroke Way					
Rose Green Road					
Nyetimber Lane					
West Park WPS					
Van Gogh Place					
Bangor					
Bew, Yapton and North Middleton WPS					
Gloucester Road Bognor CSO and WTW					
Foreshore WPS	Flooding & Drainage - Overflows	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	
Esplanade Bognor CSO			£1,000k	Short	
Sea Road Littlehampton WPS			£1,000k	Short	
West Park Bognor Regis WPS	Flooding & Drainage - Overflows (Shellfish)		£1,000k	Short	
Bognor Main WPS			£1,000k	Short	
Aldwick Avenue Bognor CSO			£1,000k	Short	
Broadmark Lane Rustington CEO			£1,000k	Short	
	Sewer Collapses	Sewer CCTV surveys, integrity checks and re-lining/enforcement	£1,651k	Short - Medium	
Aldingbourne Rife	Good Ecological Status	Study: Understand the risks and sources that Ammonia is having on the linked waterbodies.	£76k	Short	Environment Agency
	Internal Flooding -	Enhanced maintenance: Customer Education	£116k	Short	WSCC , ADC

Investment Needs – Sidlesham (SIDL)

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Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Manor Lane	Flooding & Drainage	Attenuate excess flows in sewer network using, upsizing sewer, storage tanks and creating new sewers to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£25,910k	Medium - Long	West Sussex County Council Chichester District Council
Catchment Wide		Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£200k	Short	
Sidlesham WTW	Flooding & Drainage-Overflows	Attenuate excess flows in sewer network using storage tanks to reduce risk of spill events. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	
	Pollution Risk-Blockages	Enhanced maintenance: Customer Education	£116k	Short	WSCC Chichester District Council
		Enhanced maintenance: Proactive Jetting	£34k	Short	
Sidlesham WTW	Pollution Risk - Operational	Enhanced maintenance: Treatment Works	£6,970k	Medium	
Sidlesham WTW	Growth-DWF at WTWs	Review permit for the WTW with the EA, and deliver associated works to increase capacity of the works.	£2,534k	Medium - Long	
Pagham Harbour	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites.	£76k	Short	Natural England
	Sewer Collapses	Sewer CCTV surveys, integrity checks and re-lining/enforcement.	£535k	Short	
Catchment Wide	Flooding & Drainage, Water Resources, Infiltration	Study: Use of rainwater harvesting to be considered within routine planning objectives	£TBC	Short	
Catchment Wide	Total Catchment Scheme	Study: Consider the system as the first 'Total Catchment Scheme', tackling climate change, sea level rise, flooding, water resources, water quality, and biodiversity and habitat loss, and funding schemes.	£TBC	Short	WSCC, CDC, EA, NE, SWS
Pinks Lane WPS	Infiltration	Study: Joint position statement addressing localised flooding caused at the WPS by infiltration (incorporating an investigation into private sewer infiltration contribution)	£TBC	Short	WSCC Chichester District Council

Investment Needs – Thornham (THOR)

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Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Woodlands Avenue	Flooding & Drainage	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option)	£3,404k	Medium	West Sussex County Council Chichester District Council
Main Road, Nutbourne			£1,011k	Short	
Brook Gardens			£1,954k	Short - Medium	
Catchment Wide		Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£200k	Short	
Kings Road Emsworth No.2 CSO	Flooding & Drainage - Overflows (Bathing & Shellfish)	Attenuate excess flows in sewer network using storage tanks to reduce risk of spill events. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	
School Lane Nutbourne CEO			£1,000k	Short	
Thornham WTW			£1,000k	Short	
Watersedge Gardens, Victoria Road, Main Road, Harbour Way	Internal Flooding - Blockages	Enhanced maintenance: Customer Education	£116k	Short	WSCC Chichester District Council
		Enhanced maintenance: Proactive Jetting	£69k	Short	
	Internal Flooding - Collapses / Bursts	Sewer CCTV surveys, integrity checks and re-lining/enforcement	£253k	Short	
Thornham WTW	DWF at WTWs Increase Capacity (Growth)	Review permit for the WTW with the EA, and deliver associated works to increase capacity of the works.	£34,900k	Medium - Long	Environment Agency
Chichester and Langstone Harbours Solent and Dorset Coast Solent Maritime	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites.	£76k	Short	Natural England

Investment Needs – Lidsey (LIDS)

DRAFT

Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
	Pollution Risk-Blockages	Enhanced maintenance: Customer Education	£116k	Short	WSCC Arun District Council
		Enhanced maintenance: Proactive Jetting	£11k	Short	
West Barnham	Flooding & Drainage	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Cost based on storage but surface water separation is the preferred option, although SuDS and soakaways unlikely due to high water table.)	£1,041k	Short	West Sussex County Council Arun District Council
The Elmer Hard			£1,694k	Short - Medium	
The Elmer Hard			£520k	Short	
Catchment Wide		Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration (potential for impermeable area surveys)	£200k	Short	
Lidsey WTW	Flooding & Drainage - Overflows	Attenuate excess flows in sewer network using storage tanks to reduce risk of spill events. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	
Marshall Close Barnham CSO			£1,000k	Short	
Lidsey WTW	Growth-DWF at WTWs	Review permit for the WTW with the EA, and deliver associated works to increase capacity of the works.	£2,138k	Medium - Long	Environment Agency
Solent and Dorset Coast	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites. (Study will aid with achieving Good Ecological Status due to the Phosphate Determinate for Lidsey Rife)	£76k	Short	Natural England
Catchment Wide - Yapton and Angmering	Flooding & Drainage	Study: Additional work to identify impacts and solutions for groundwater flooding / Infiltration. (Work to resolve infiltration has happened, but its effectiveness requires checking)	£TBC	Short	WSCC Arun District Council

Investment Needs – Lavant (LAVA)

DRAFT

Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Chichester and Langstone Harbours, Solent and Dorset Coast, Solent Maritime	Nutrients & Good Ecological Status	Develop a nutrient budget to understand the risks and sources impacting Habitat sites. Study will aid with achieving Good Ecological Status due to the Phosphate Determinate for Lavant.	£76k	Short	Natural England
Singleton Relief WPS	Flooding & Drainage - Overflows	Attenuate excess flows in sewer network using storage tanks to reduce risk of spill events. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	WSCC Chichester District Council
Lavant WTW			£1,000k	Short	
Catchment Wide	Flooding & Drainage	Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£300k	Short	

Investment Needs – Tangmere (TANG)

DRAFT

Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
	Sewer Collapses	Integrity checks of Rising Mains and enforcement.	£816k	Short	
Arundel Capture Zone	Groundwater Pollution	Sewer CCTV surveys, integrity checks and re-lining/enforcement	£455k	Short - Medium	
Tangmere WTW	Growth- Increase Capacity	Deliever associated works to increase capacity of the works.	£625k	Medium - Long	
Solent and Dorset Coast	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites.	£76k	Short	Natural England
Catchment Wide	Flooding & Drainage	Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£125k	Short	

Investment Needs – Bosham (BOSH)

DRAFT

Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Bosham WTW	Flooding & Drainage Overflows	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	West Sussex County Council
BOSH FC01 Bosham catchment	Growth- Flooding & Drainage	Drain all flows from the proposed developments to a new pumping station via a new gravity network to reduce risk of flooding.	£1,649k	Short - Medium	Chichester District Council
Catchment Wide	Flooding & Drainage	Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£175k	Short	
	Pollution Risk- Blockages	Enhanced maintenance: Customer Education	£116k	Short	WSCC Chichester District Council
		Enhanced maintenance: Proactive Jetting	£23k	Short	
Taylors Lane Bosham WPS	Pollution Risk - Operational	Enhanced maintenance: Wastewater Pumping Stations	£233k	Short	
	Groundwater Pollution	Sewer CCTV surveys, integrity checks and re-lining/enforcement	£272k	Short	
Bosham WTW	Growth- DWF at WTWs, Increase Capacity	Review permit for the WTW with the EA, and deliver associated works to increase capacity of the works.	£6,801k	Medium - Long	
Chichester and Langstone Harbours Solent and Dorset Coast Solent Maritime	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites.	£76k	Short	

Investment Needs – Pagham (PAGM)

DRAFT

Location	Issues	Option	Indicative Cost	Indicative Timescale	Potential Partners
Summer land Pagham WTW	Flooding & Drainage - Overflows	Attenuate excess flows in sewer network using storage tanks to reduce risk of flooding. (Nominal Cost based on storage but surface water separation is the preferred option)	£1,000k	Short	West Sussex County Council Arun District Council
Catchment Wide	Flooding & Drainage	Study: Model improvements, including flow surveys for storm and dry weather flow, and model calibration.	£225k	Short	
Summer land Pagham WTW	DWF at WTWs	Review permit for the WTW with the EA, and deliver associated works to increase capacity of the works.	£2,637k	Short - Medium	
Pagham Harbour Solent and Dorset Coast	Nutrients	Develop a nutrient budget to understand the risks and sources impacting Habitat sites.	£76k	Short	Natural England
Catchment Wide	Flooding & Drainage, Water Resources, Infiltration	Study: Use of rainwater harvesting to be considered within routine planning objectives	£TBC	Short	
Summer land Pagham WTW	DWF at WTWs	Study: Explore the option of transferring wastewater for treatment elsewhere due to predicted growth in the system and the environmental constraints on expansion of the works discharging into designated waters.	£TBC	Short	