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CPES

CPES Case study 5: Western Rother

Geographic scope report

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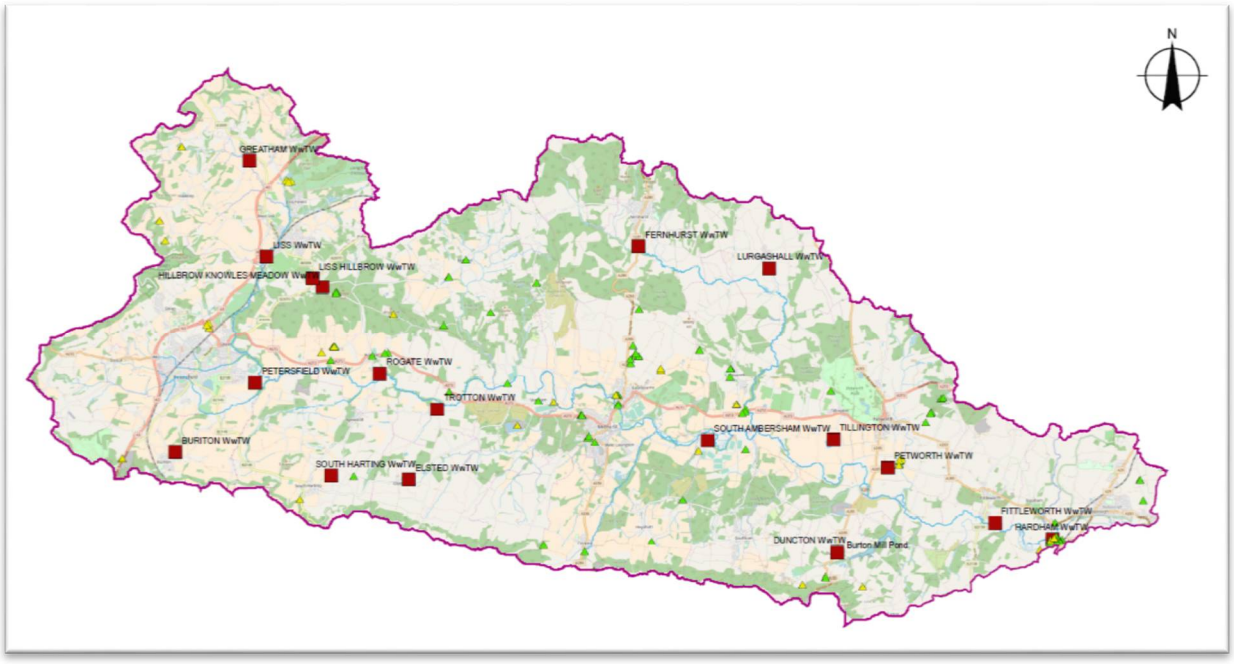
Introduction

The Western Rother operational catchment is a predominantly rural catchment of approximately 360 Km^2, extending from Petersfield in the West, to Pulburough in the East. Included within the catchment is the River Rother and its tributaries, rising in the west just north of Petersfield and flowing east through rural, agricultural land before joining the Arun at Pulborough (Stopham Bridge). Here, the two rivers become one, the tidal Arun, and flow south, cutting through the chalk above Arundel, until they enter the sea at Littlehampton. The catchment is adjacent to the operational catchment of the Upper Arun, and the operational catchment of the Lower Arun, which will be affected by water quality and quantity issues in both the Western Rother and the Upper Arun Catchment.

Catchment map

Figure 1 Western Rother catchment with location of key Southern Water assets



Tributaries to the Western Rother include the Harting Stream, Haslingbourne Stream, Stanbridge Stream, Hammer Stream, River Lod and Elsted Stream. 11 surface waterbodies have been classified under phase 2 of the Water Framework Directive, comprising of 10 rivers and 1 “lake” (Burton Mill Pond).

The river largely runs through areas characterised by the underlying geology, these are the Wealden farmland and heath mosaic, greensand terrace and low weald. The geology is chalk scarp at the southern and western edges of the catchment and a greensand ridge to the north, the majority of the catchment runs across sandstone and mudstone.

There are also 2 groundwater bodies, the “Lower Greensands” groundwater catchment which is coincident with the main river around 2km either side, and the “Chichester Chalk”, to the south of the catchment. The soils here are predominantly sandy loams.

The Western Rother is 56.3km long and has its sources in the chalk scarp to the south and west and the Greensand ridge to the north.

Arable crops are grown adjacent to the main river and there is also dairy farming (though, as with the national trend, this has declined in recent years[1]). Arable farming accounts for approximately 31% of the land use, whilst pastureland accounts for c. 37% of the total land area. Woodland is the other main

[1] For example, analysis of the Defra June Survey Returns indicates a reduction in dairy farm holdings in West Sussex of 13% between 2010 and 2016 (across the South East there was a 21% reduction) with a reduction in the herd size of 8%. (https://dairy.ahdb.org.uk/resources-library/market-information/farming-data/cow-numbers-by-county/#.WubwA8uWxYc published 12 April 2018)

land type, covering 25% of the land area[2]. There are relatively small numbers of urban centres including Petersfield, Midhurst, Easebourne, Petworth and Pulborough. Outside of these urban centres most residential centres are relatively small, typically with populations of up to 1,000 people.

Due to its relatively steep relief, well connected hillslope and river channels, geology and lithology/soil type, and intensive arable farming, the catchment suffers from diffuse pollution, and is particularly prone to erosion and sediment transport into and along the river. There are also many man-made structures along the river which prevent fish movement, impound water and alter flow. This affects sediment transport and substrate composition which alters invertebrate and vegetation assemblages.

Stakeholder analysis

There are multiple stakeholders on the rivers and lots of collaborative effort. The Arun and Rother Rivers Trust (ARRT) host the Arun & Western Streams Catchment Partnership; a group of stakeholders who come together to improve the water environment.

The Rother Valley Landcare Project, a partnership between the Sussex Downs Conservation Board, English Nature and the Environment Agency (EA), was set up to work with farmers to reduce the impact of sediment and other pollutants on the river. Natural England's Catchment Sensitive Farming initiative has focussed on the Western Rother for a number of years. The current CSF officer is funded by Southern Water as they are delivering advice on water quality issues affecting drinking water quality in the catchment. In January 2018 a group of 30+ farmers were successful in securing 3 years Facilitation Funding from Defra to create a 'farm cluster' – bringing together farmers to share best practice and work together to address key issues within the area.

The river and its sediment problems have been a focus for academic research in recent years.

Famers and landowners

Within the catchment there are around 100 active commercial farm businesses.

Southern Water

Southern Water has a number of key assets within the target catchment including:

1) One surface water abstraction at Hardham, and 5 groundwater abstractions licenced for approximately 5 million litres of water per day.
2) 18 wastewater treatment works within the catchment which are permitted to discharge to the river.

In a 'normal' year Hardham provides up to 80% of supplies to Sussex North Water Resources Zone (from the Hardham boreholes/Western Rother and River Arun abstractions) which equates to around 210,000 people and 90,000 properties. As we move into drought conditions the number of people supplied falls as abstraction from the river is reduced and alternative supplies (e.g. bulk supply from Portsmouth Water) used.

[2] Cole, B.; King, S.; Ogutu, B.; Palmer, D.; Smith, G.; Balzter, H. (2015). Corine land cover changes between 2006 and 2012 for the UK, Jersey and Guernsey. NERC Environmental Information Data Centre.

Water quality is critical for both abstraction and discharge treatment and compliance. Water quantity is critical to ensuring the provision of supplies, particularly during a drought.

Figure 2 The Western Rother downstream from Hardham Weir

Local Authorities

The key concern for Local Authorities (LA's) is through their role as a Lead Local Flood Authority (LLFA). The Catchment Flood Management Plan (CFMP) for the Arun and Western Streams was produced in 2009. It notes that the coverage of surface and groundwater flood risk was limited due to a lack of available information. The CFMPs were intended to assist spatial targeting of resources to areas where the risks are greatest. As a rural catchment with highest flood risk limited to the lower part of the Western Rother catchment (around Pulborough), flood risk may be perceived to be of less importance than elsewhere in the Arun and Western Streams catchment and the wider south east region. The Arun and Western Streams CFMP[3] indicates that the main areas of flood risk (from fluvial, surface water, groundwater flooding and tidally influenced flooding) are located in Arundel, Littlehampton and Horsham.

Environment Agency

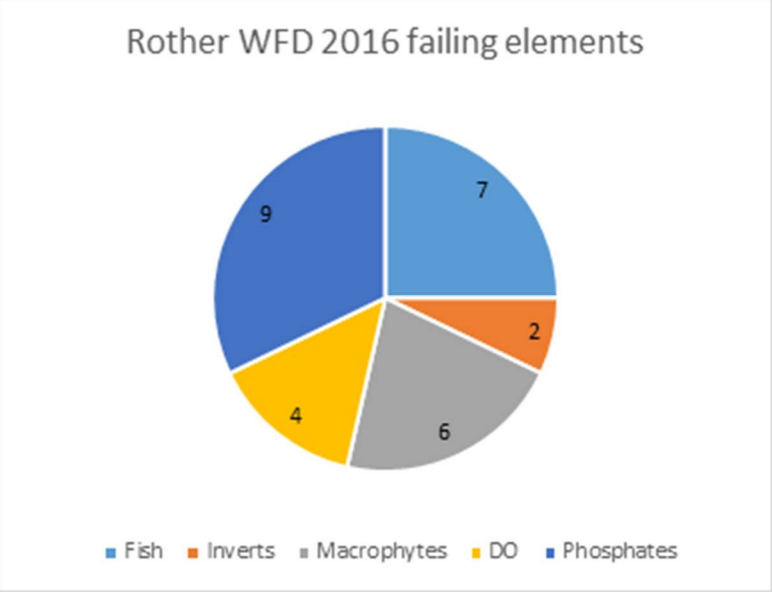
The Environment Agency (EA) Catchment Abstraction Management Strategy (CAMS) report sets out the water resources situation in the catchment. Of particular importance in this region is the interplay between the rivers Rother, Arun and Western Streams all of which make up distinct, but inter-

[3] EA, 2009 Arun and Western Streams Catchment Flood Management Plan: Summary report

dependent sub-catchments in the region. There are significant transfers of water between the sub-catchments that has modified their natural hydrological regimes.

In the 2016 cycle 2 assessment of Water Framework Directive compliance, 10 of the 11 surface waterbodies were assessed as Moderate and 1 as Poor Ecological Status (or Potential). All waterbodies achieved Good Chemical Status. The key elements responsible for not achieving good status were Fish, Phosphates and Marcophytes as shown in figure 3 below.

Figure 3 Western Rother 2016 Failing elements



Specific water bodies and WFD status is shown in table 1 below:

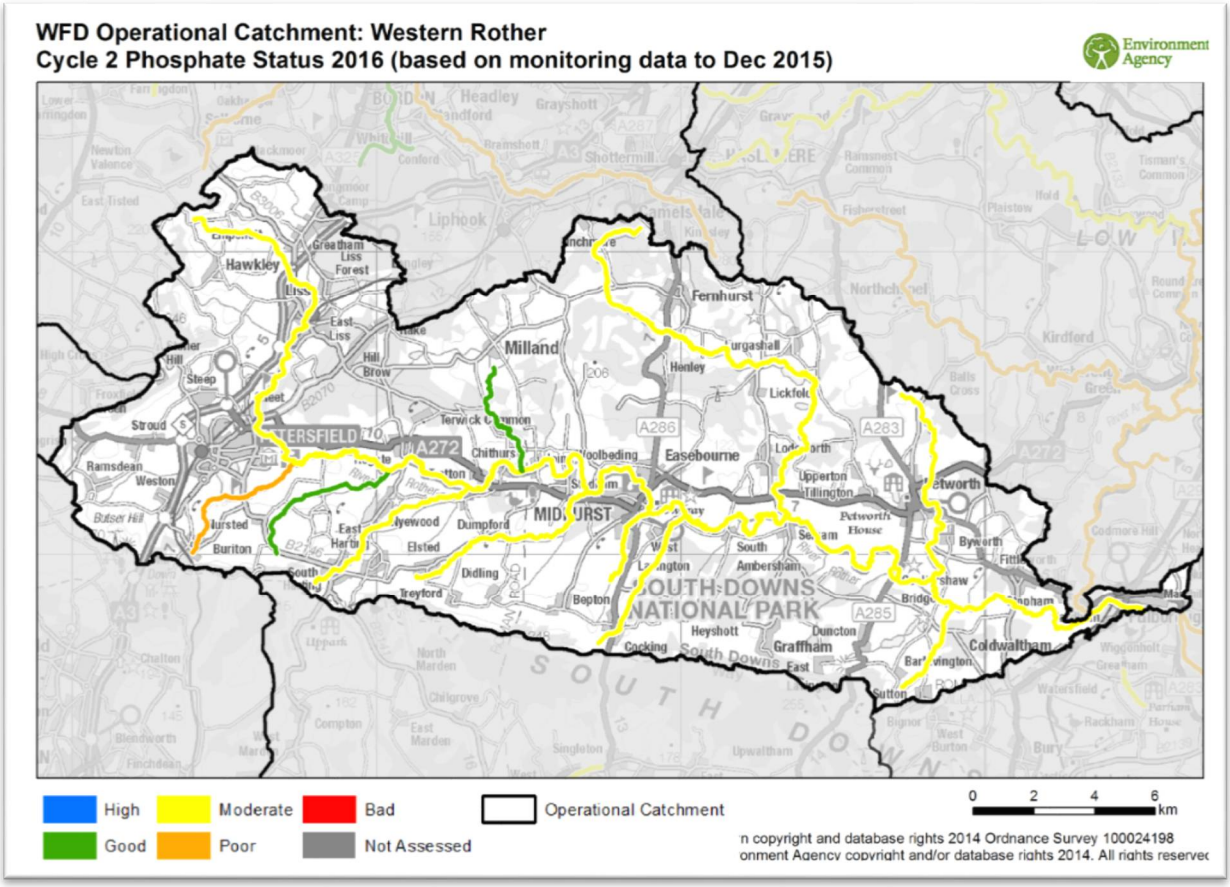
Table 1 Summary of WFD status of each waterbody in the Western Rother

Waterbody ID	Name	Fish	Inverts	Macrophytes	DO	Phosphates
GB30745108	Burton Mill Pond	n/a	n/a	Moderate	n/a	Moderate
GB107041013010	Elsted Stream	n/a	Good	Moderate	Good	Moderate
GB107041012820	Hammer Stream (W. Sussex)	Moderate	Good	Moderate	Moderate	Good
GB107041012770	Harting Stream	Moderate	High	Good	Moderate	Good
GB107041012780	Haslingbourne Stream	Good	Good	Moderate	Moderate	Moderate
GB107041012830	Lod	Moderate	Moderate	Poor	Moderate	Moderate
GB107041012760	Minsted Stream	Moderate	Good	Good	High	Moderate
GB107041012790	Stanbridge Stream	n/a	Moderate	n/a	Good	Poor
GB107041012810	Western Rother	Moderate	High	Good	Good	Moderate
GB107041012840	Western Rother (Upstream Petersfield)	Moderate	High	High	High	Moderate
GB107041012800	Western Rother (Durford)	Moderate	Good	Moderate	High	Poor

Of the EA's 51 Reasons for Not Achieving Good (RNAG) in the Western Rother surface water operational catchment, 20 were attributed to agriculture and land management with 17 attributed to the Water Industry.

No significant water management issues were identified from invasive non-native species (INNS), however, though the current spread throughout the catchment is uncertain, it is understood that INNS (e.g. Himalayan balsam, signal crayfish) may be contributing to the sediment risk within the catchment.

Figure 4 WFD classification based on Phosphorous



South Downs National Park Authority

The South Downs National Park Authority (SDNPA) is a key stakeholder within this catchment. All of the Western Rother catchment lies within the boundary of the National Park. SDNPA works with a wide variety of partners to manage the landscape of the South Downs. Its partnership management plan is based on an ecosystem services approach. The SDNPA has experience and expertise in a wide range topics and works with the defined water partnerships and has effective relationships with farmers and land owners and helps to promote the voluntary uptake of best practice, reducing the impact of land management activities on the terrestrial and water environments. SDNPA has part funded two key research projects focussing on sediment sources, pathways and receptors both along/within the river and into the river from the surrounding catchment.

Existing regulatory and economic framework

Water Company Regulation (Southern Water)

The following regulatory bodies govern water and sewerage activites by Water Companies within the UK;

Regulatory Body	Key responsibilities
Department for Environment, Food and Rural Affairs (DEFRA)	Sets the overall water and sewerage policy framework in England.
European Union	Sets European water, wastewater and environmental standards.
Ofwat	The economic regulator of the water and sewerage sectors
Environment Agency	The environmental regulator of the water and sewerage sector in England. They are the principal adviser to the government on the environment, and the leading public body protecting and improving the environment of England. They work in partnership with a range of other organisations
Drinking Water Inspectorate	The drinking water quality regulator. They check that the water companies in England and Wales supply water that is safe to drink and meets the standards set in the Water Quality Regulations.
Consumer Council for Water	They represent consumers within the water and sewerage sectors. They also investigate consumer complaints that have not been satisfactorily resolved by the water companies.
Natural England	The government's advisor on the natural environment. They provide practical advice, grounded in science, on how best to safeguard England's natural wealth for the benefit of everyone. Their purpose is to protect and improve England's natural environment and encourage people to enjoy and get involved in their surroundings.

Agricultural Regulation (Farmers and Landowners)

Regulatory Body	Key responsibilities
Department for Environment, Food and Rural Affairs (DEFRA)	Sets the overall agricultural policy framework in England.
European Union	Sets European waste and environmental standards in Europe
Environment Agency	The environmental regulator of the agricultural sector in England. They are the principal adviser to the government on the environment, and the leading public body protecting and improving the environment of England. They work in partnership with a range of other organisations
Rural Payment Agency	Responsible for provision of subsidy payments from the European common Agricultural Policy to farmers and landowners
Natural England	The government's advisor on the natural environment. They provide practical advice, grounded in science, on how best to safeguard England's natural wealth for the benefit of everyone. Their purpose is to protect and improve England's natural environment and encourage people to enjoy and get involved in their surroundings.

Cost of inaction

Southern Water currently spends approximately £300k per year treating issues associated with high suspended sediment levels in the raw water abstracted from the Western Rother. Inaction will mean these costs will be ongoing and could potentially risk if poor soil management continues, and associated with increased intense rainfall events (as predicted with climate change).
As part of the project we plan to increase our understanding of costs borne by others within the catchment (e.g. West Sussex County Council Highways in dealing with the aftermath of 'muddy floods').

We also plan to use evidence currently being collated by Sussex Wildlife Trust (on behalf of the Sussex Local Nature Partnership) to understand natural capital assets, ecosystem services and potential investment opportunities within the catchment. We also plan to explore whether EcoServe (ecosystem service mapping) undertaken for the South Downs National Park Authority can add value to our pilot.

Economic Impact of Intervention

We plan to understand the economic impact of our proposed interventions through our work with stakeholders as part of the CPES project. We will work with our partner, the University of Chichester on this.

Appendix 1 : Summary of stakeholders and interest level

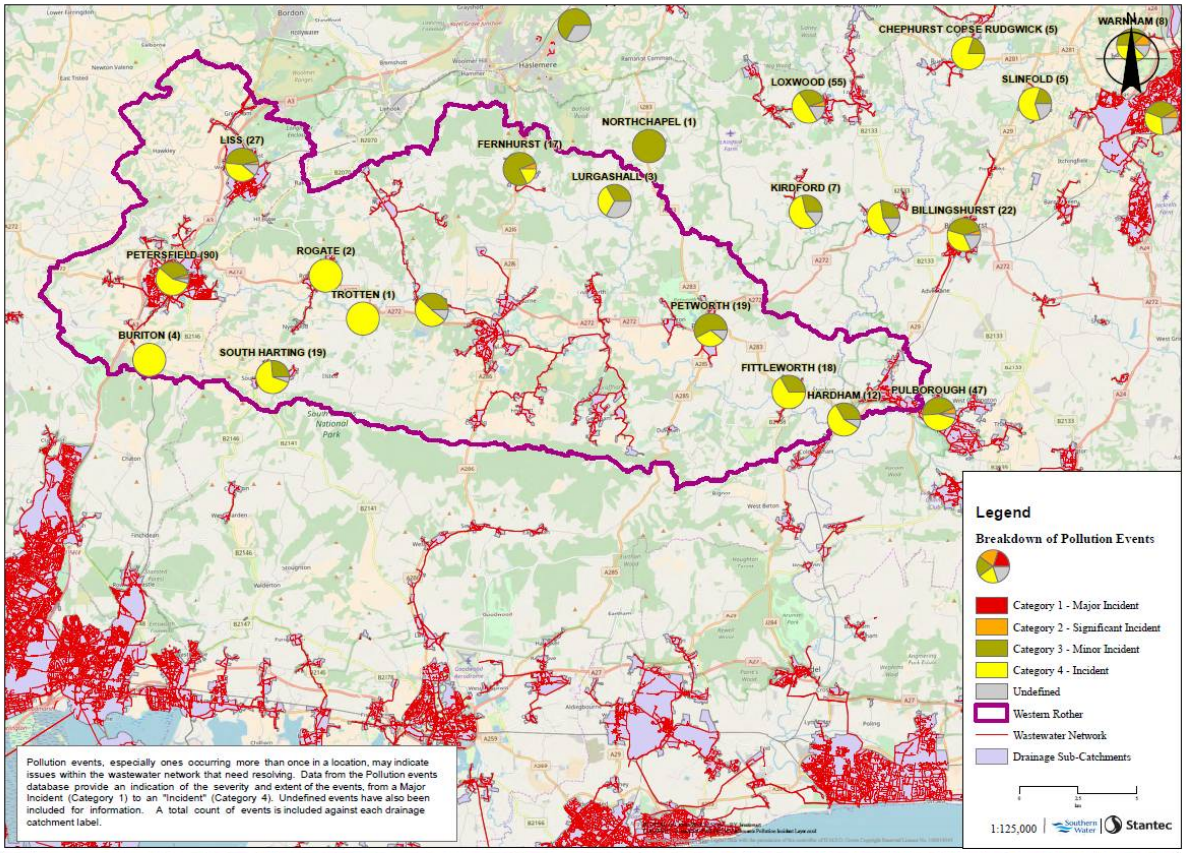
Engagement Approach	Stakeholders	Communication objectives	Communication methods	Responsibility	Timing and frequency of communications
Manage - regular contact	Agronomists	Enable them to be informed intermediaries between farmers/ SWS	Workshops, 1:1, published material, website, phone calls, emails, newsletter, farm walks/demos	SW/ SDNPA, UoC, EA	Milestones, monthly
	ARRT	Enable them to be informed intermediaries between farmers/ SWS	As above	SW – Strategic Environment Panel & Sussex stakeholder Panel comms	As needed/milestones
	Environment Agency	Ensure objectives meet expectations- share of data	As above	SW – Senior management meetings with regulators and key stakeholder meetings	
	DWI	Ensure objectives meet expectations	As above		
	Land Agents	Buy in and support	As above		
	NFU	Enable them to be informed intermediaries between farmers/ SWS	As above		
	Natural England/CSF	Ensure objectives meet expectations	As above		
	Ofwat	Ensure objectives meet expectations	As above		
	Other farmers (in SWS catchment areas)	Buy in and participation in the scheme	As above		
	Rother Valley Farmers' Group	Buy in and participation in the scheme	As above		
	South Downs National Park Authority	Ensure objectives meet expectations- share of data	As above		
	Environment Agency	Ensure objectives meet expectations- share of data	As above		
	Sussex/Hants-IoW Wildlife Trusts	Ensure objectives meet expectations	As above		

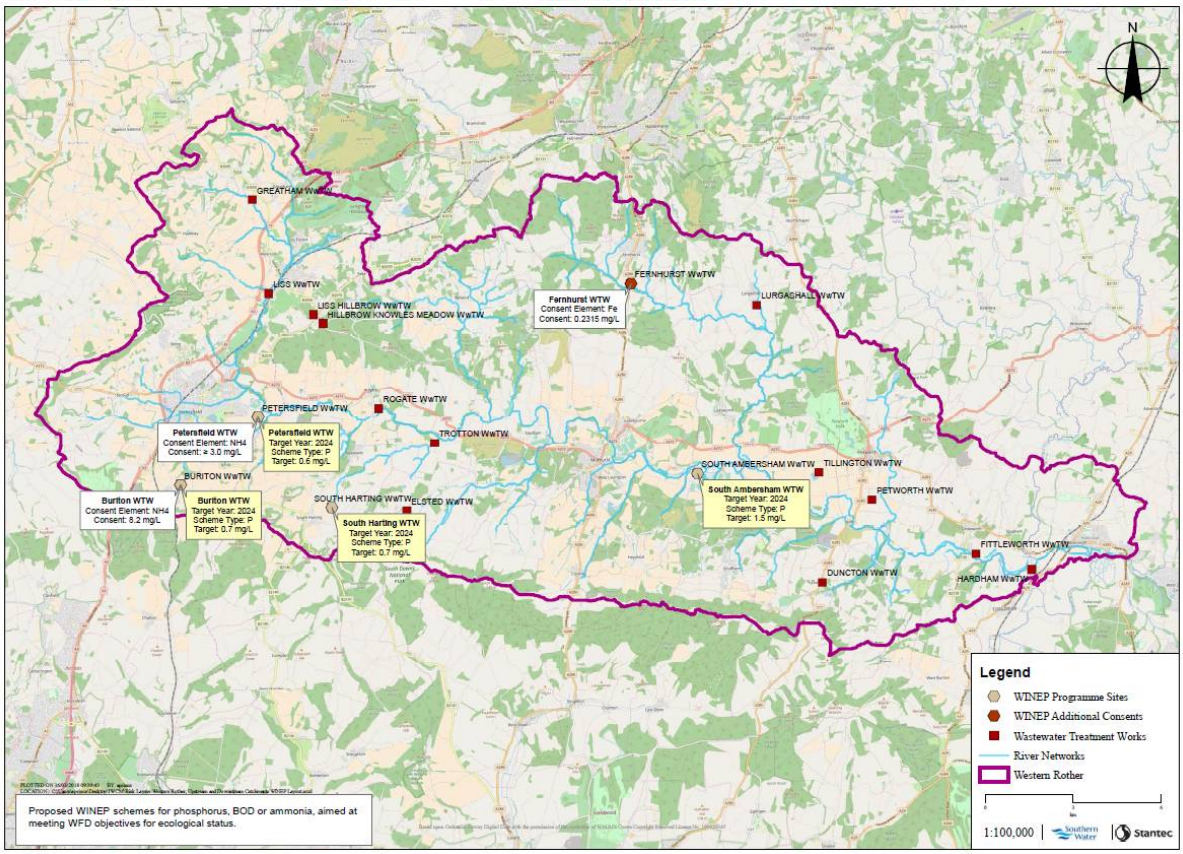
Engagement Approach	Stakeholders	Communication objectives	Communication methods	Responsibility	Timing and frequency of communications
Manage - when needed	CLA	Ensure objectives meet expectations	Workshops, 1:1, published material, website, newsletter		
	Defra	Ensure objectives meet expectations	As above		
	Rural Payments Agency	Enable them to be informed intermediaries between farmers/ SWS	As above		
	West Sussex co-operative	Enable them to be informed intermediaries between farmers/ SWS	As above		
	West Sussex County Council	Buy in and support	As above		
	WWF	Ensure objectives meet expectations	As above		
	General public		As above		
	Hampshire County Council		As above		
	Southern Water		As above		
	CCG		As above		
	RSPB		As above		
	Southern IFCA		As above		
	Sussex IFCA		As above		

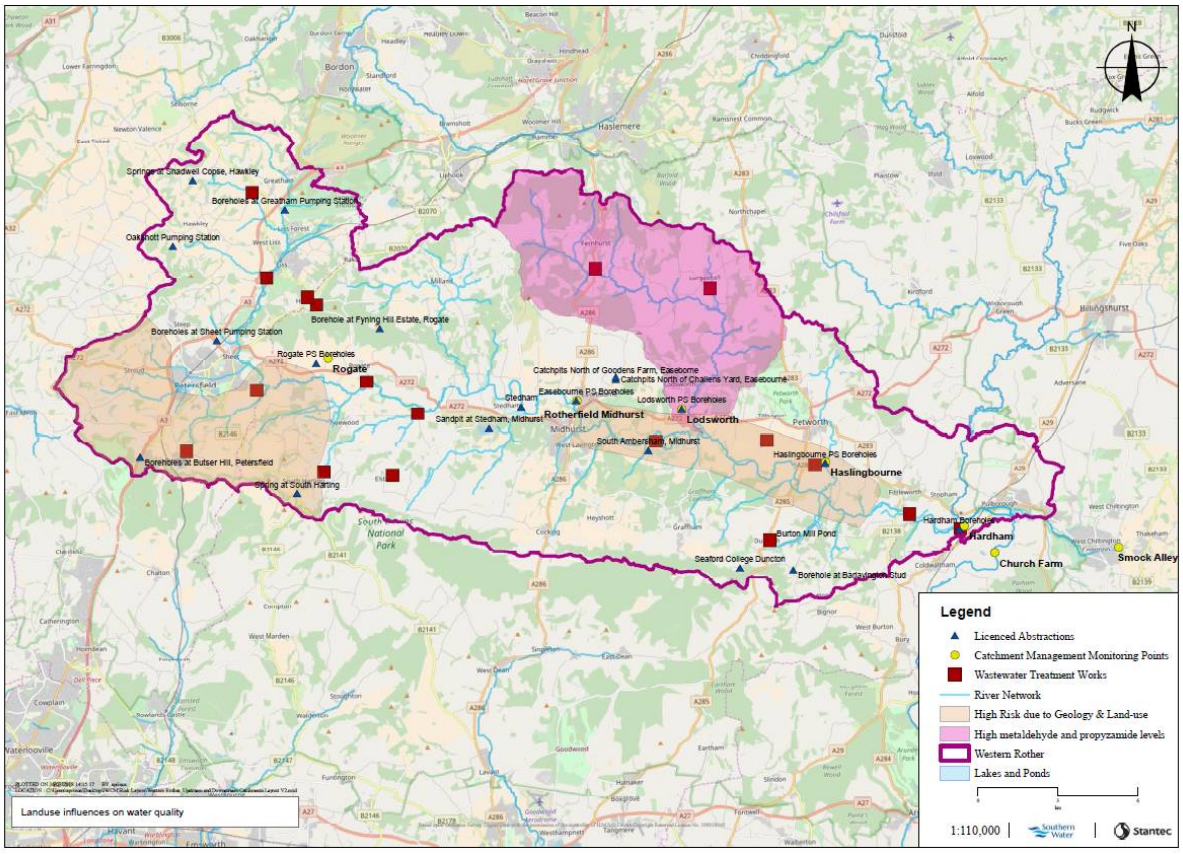
Engagement Approach	Stakeholders	Communication objectives	Communication methods	Responsibility	Timing and frequency of communications
Contact	CPRE	Inform projects aims and objectives and invitation to support/participate(?)	As above	SW/ SDNPA, UoC, EA	Start up and milestones
	Horsham District Council		As above		
	National Flood Forum		As above		
	Sussex Chamber of Commerce		As above		

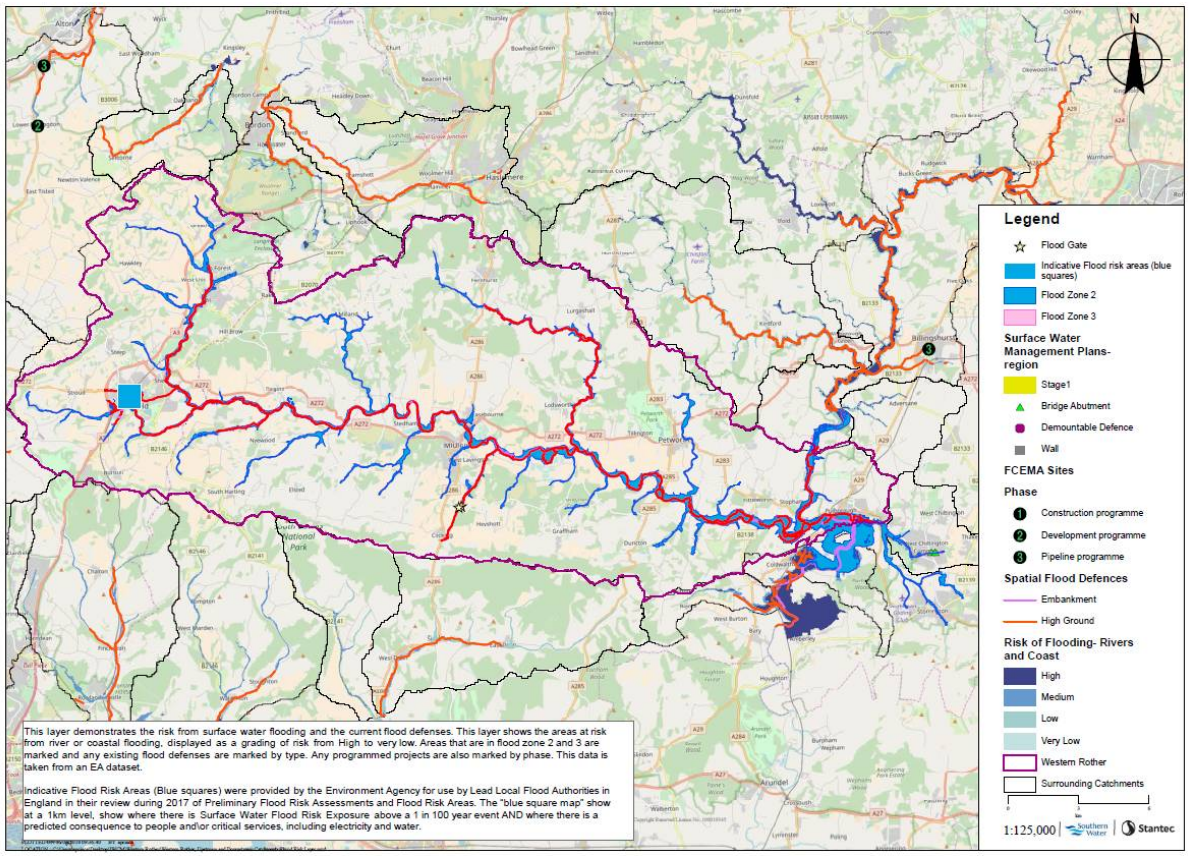
Engagement Approach	Stakeholders	Communication objectives	Communication methods	Responsibility	Timing and frequency of communications
Anticipate	Local Councillors	Inform projects aims and objectives and invitation to support/ participate(?)	Newsletter	SW/ SDNPA, UoC, EA	Start up and milestones
	Local MPs		As above		
	MEPs		As above		
	Parish Councillors		As above		
	Water UK/ other water Companies		As above		
	West Sussex Growers		As above		

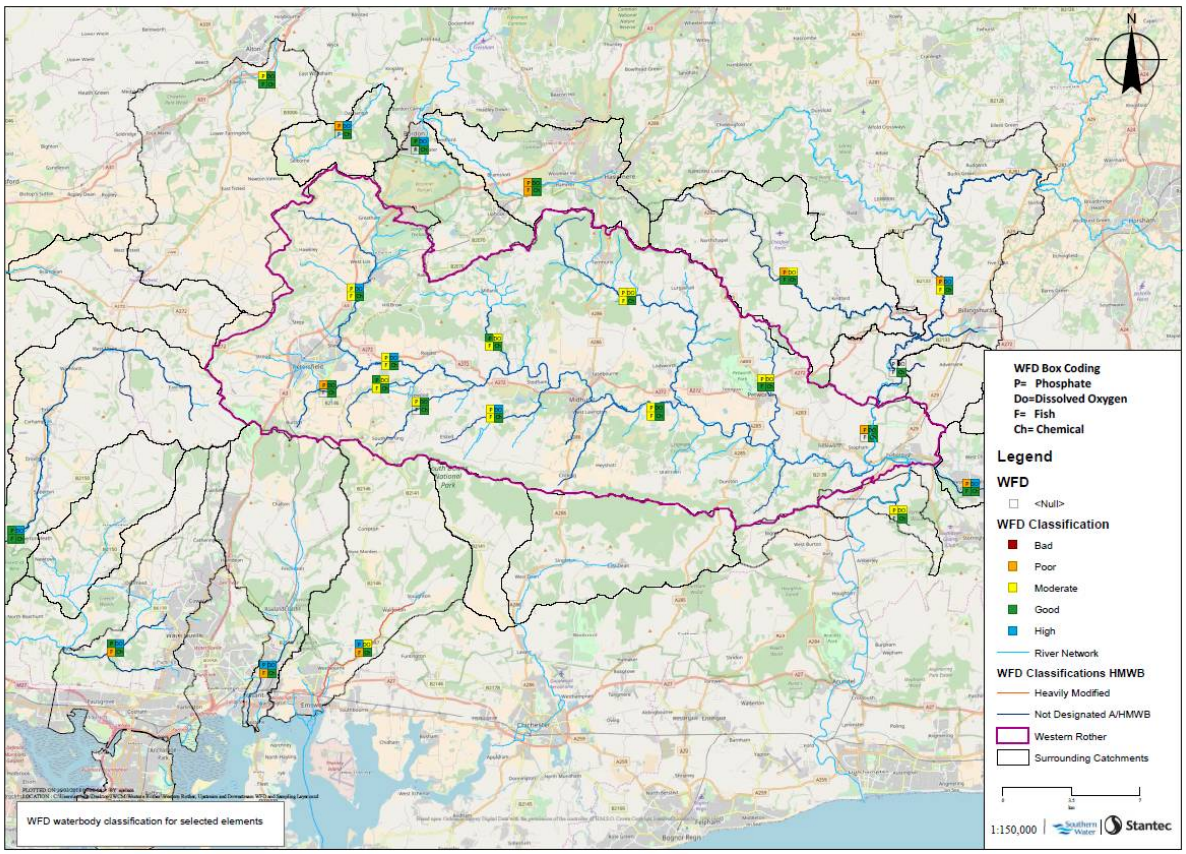
Appendix 2 : Detailed catchment maps






Springs at Shadwell Copse, Hawkley
Boreholes at Greatham Pumping Station
Oakhanott Pumping Station
Borehole at Fyning Hill Estate, Rogate
Boreholes at Sheet Pumping Station
Rogate PS Boreholes
Rogate
Catchpits North of Goodens Farm, Easebourne
Catchpits North of Challens Yard, Easebourne
Easebourne PS Boreholes
Lodsworth PS Boreholes
Stedham
Sandpit at Stedham, Midhurst
Rotherfield Midhurst
Lodsworth
South Ambersham, Midhurst
Haslingbourne PS Boreholes
Haslingbourne
Boreholes at Butser Hill, Petersfield
Spring at South Harting
Hardham Boreholes
Hardham
Burton Mill Pond
Seaford College Duncton
Borehole at Badgington Stud
Church Farm
Smock Alley
Landuse influences on water quality
Legend
Licenced Abstractions
Catchment Management Monitoring Points
Wastewater Treatment Works
River Network
High Risk due to Geology & Land-use
High metaldehyde and propyzamide levels
Western Rother
Lakes and Ponds
1:110,000
Southern Water
Stantec


This layer demonstrates the risk from surface water flooding and the current flood defenses. This layer shows the areas at risk from river or coastal flooding, displayed as a grading of risk from High to very low. Areas that are in flood zone 2 and 3 are marked and any existing flood defenses are marked by type. Any programmed projects are also marked by phase. This data is taken from an EA dataset.
Indicative Flood Risk Areas (Blue squares) were provided by the Environment Agency for use by Lead Local Flood Authorities in England in their review during 2017 of Preliminary Flood Risk Assessments and Flood Risk Areas. The "blue square map" show at a 1km level, show where there is Surface Water Flood Risk Exposure above a 1 in 100 year event AND where there is a predicted consequence to people and/or critical services, including electricity and water.
Legend
Flood Gate
Indicative Flood risk areas (blue squares)
Flood Zone 2
Flood Zone 3
Surface Water Management Plans- region
Stage1
Bridge Abutment
Demountable Defence
Wall
FCEMA Sites
Phase
Construction programme
Development programme
Pipeline programme
Spatial Flood Defences
Embankment
High Ground
Risk of Flooding- Rivers and Coast
High
Medium
Low
Very Low
Western Rother
Surrounding Catchments
1:125,000
Southern Water
Stantec


N
WFD Box Coding
P= Phosphate
Do=Dissolved Oxygen
F= Fish
Ch= Chemical
Legend
WFD
<Null>
WFD Classification
Bad
Poor
Moderate
Good
High
River Network
WFD Classifications HMWB
Heavily Modified
Not Designated A/HMWB
Western Rother
Surrounding Catchments
1:150,000
Southern Water
Stantec
WFD waterbody classification for selected elements