Appendix 5.1.F – Alternative approaches to delivery of the WINEP

Wessex Water

September 2018

Wessex Water
YTL GROUP

Business plan section		Supporting document	
	Board vision and executive summary		
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2	Addressing affordability and vulnerability		
3	Delivering outcomes for customers		
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This appendix comprises the document we submitted to the EA and Ofwat on 19 June 2018.

In addition for completeness we have added as annexes at the back of the document:

- The reply from EA/Ofwat dated 12 July 2018
- Our response dated 30 July 2018.

Executive summary

Wessex Water have a successful track record of innovating in the delivery of environmental improvements, and management of day to day environmental services. We have, for over a decade, been a consistent advocate of the opportunities that arise from investing in water at a system level, not just an asset level. Our approach to catchment management and more recently the introduction of EnTrade has led to more efficient delivery of our water service and environmental obligations, saving customers over £80m as a result over the past ten years.

We recognise that the value arising from asset or catchment based approaches are not just financial. Asset solutions benefit from certainty of delivery but have a financial and carbon impact, whereas alternative land management and behavioural management solutions address diffuse issues as well as offering a whole host of natural capital benefits, such as the potential for carbon lock up, soil improvements, water retention and improved bio-diversity; but the benefits, obvious as they are, are difficult to quantify.

We strongly support the direction of travel set in the government's 25 year Environment Plan. We are keen to align our investment strategy with the plan in a way that accelerates delivery of environmental benefits and optimises the cost of delivery for society as a whole, by enabling better collaboration with partners, including customers, on environmental matters. We see the next decade as pivotal to enabling the 25 year plan, with the need for greater evidence on environmental response to Natural Capital or behavioural solutions.

The use of markets exposes opportunities and costs. It also addresses the government's objective of improving the allocation of public monies and/or private capital to environmental improvement, thus enabling the opportunity to accelerate environmental gain at no extra financial cost to society, in particular by supporting greater focus on the value of resource efficiency, and a blend of asset and alternative solutions.

In support of this direction of travel, and the joint letter from Defra, the Environment Agency and Ofwat dated 23 May 2018, we are pleased to submit an alternative delivery strategy for the Water Industry National Environment Programme (WINEP) that embraces innovation but does not subject the customer or the environment to additional risk.

Our alternative plan will be supported by a programme of work in partnership with the Environment Agency and Natural England to establish the efficacy of Natural Capital and demand side solutions, how to ascribe value to them, and how to enable smart regulation to adapt to the opportunities that arise.

For the Water Framework Directive (WFD) phosphorus removal programme we are proposing a combination of asset and catchment solutions phased over the period 2020 to 2027, as described below. In consultation with the EA we have already agreed a phased programme for the Wastewater flow programme and do not consider that there are any further opportunities for phasing this programme.

WFD Phosphorus removal

We recommend an innovative approach for the Water Framework Directive (WFD) phosphorus removal programme, focussing on the Parrett and Dorset Stour catchments, comprising a combination of:

- construction of new phosphorus removal plants for cost effective permit limits of not less than 1 mg/l
- optimisation of existing and proposed phosphorus removal plants using catchment wide permitting
- catchment interventions, including working with farmers and using market tools such as EnTrade to reduce P
- updated river water quality modelling to ensure all investments are based on the best available scientific evidence.

This approach will deliver at least the same tonnage of phosphorus removed per year in 2027 as the baseline included in WINEP3 issued in March 2018.

The cost over the five years of the next price control period will be £52m less than WINEP3.

Furthermore in addition to phosphorus reduction, the catchment interventions will achieve wider benefits, such as reduced soil erosion, reductions in other pollutants, biodiversity, and will assist in beginning to deliver the government's 25-year Environment Plan. Therefore the net benefit for the alternative will be greater than the baseline.

It will be necessary to monitor progress throughout the delivery of the programme and build in the results of the improved river water quality modelling. There is a risk that the specific phosphorus removal targets for each water body are not achieved. Our programme caters for this by still allowing sufficient time to install additional asset solutions in the period 2025 to 2027, if necessary following a progress review in 2023.

Our business plan includes four performance commitments specifically related to river water quality that will be used to hold us to account for delivery of the programme.

Customer research has shown very strong support for environmental improvements in our region. Customers have also indicated a preference for approaches that are sustainable and holistic. Thus we consider that this alternative and innovative approach is the best value option for customers and for the environment.

Contents

1. Introduction

1.1 Background

This submission is in response to the joint letter from Defra, the Environment Agency and Ofwat dated 23 May 2018 (copy included in Appendix A), inviting proposals for alternative or innovative approaches for delivery of the Water Industry National Environment Programme (WINEP).

In our previous submission on phasing in January 2018 we pointed out that a longer timeframe for delivery of the WINEP would enable wider environmental benefits to be considered in the selection of solutions. Therefore we are pleased to submit proposals for alternative approaches that deliver wider benefits for customers, communities and the environment.

The letter suggests two investment areas that could be considered for delivery beyond 2025:

- Water Framework Directive enhancements (where we are seeking to ensure innovation, partnerships, multiple benefits and catchment approaches)
- Wastewater flow programme (where we can demonstrate that there are clear and well-defined prioritisation criteria based on environmental risk). Since our January phasing proposals we have worked with the Environment Agency to phase this programme. Following another review it does not appear that there are any further opportunities for phasing this programme.

Further guidance from the EA (dated 6 June) was received on 14 June 2018 (copy included in Appendix A).

Therefore this submission includes:

- a summary of current WINEP, version 3 that was issued in March 2018
- alternative proposals for Water Framework Directive enhancements
- an outline of our Wastewater flow programme, which has already been subject to prioritisation
- our PR19 outcomes and performance commitments in relation to the environment, as they will be used to monitor delivery of the programme
- a summary of our proposals.

Consistent with the business plan, all financial values are at 2017/18 price base.

1.2 Track record

Our environmental performance is comparatively very high. Using the headline Environmental Performance Assessment (EPA) measure published by the Environment Agency we have been rated as industry leading for five of the seven years the measure has existed – more than any other company.

Of the individual indicators within EPA we have achieved exemplary performance including:

- better permit compliance than the rest of the sector
- significantly lower pollution incident rates than the sector
- 100% delivery of schemes in the National Environment Programme by the due dates.

On the back of our excellent performance we have been at the forefront of developing innovative ways of achieving environmental improvements. We have pioneered catchment wide permitting in the Bristol Avon to deliver reductions in phosphorus and the EnTrade online reverse auction for reducing nitrates – see the case studies below.

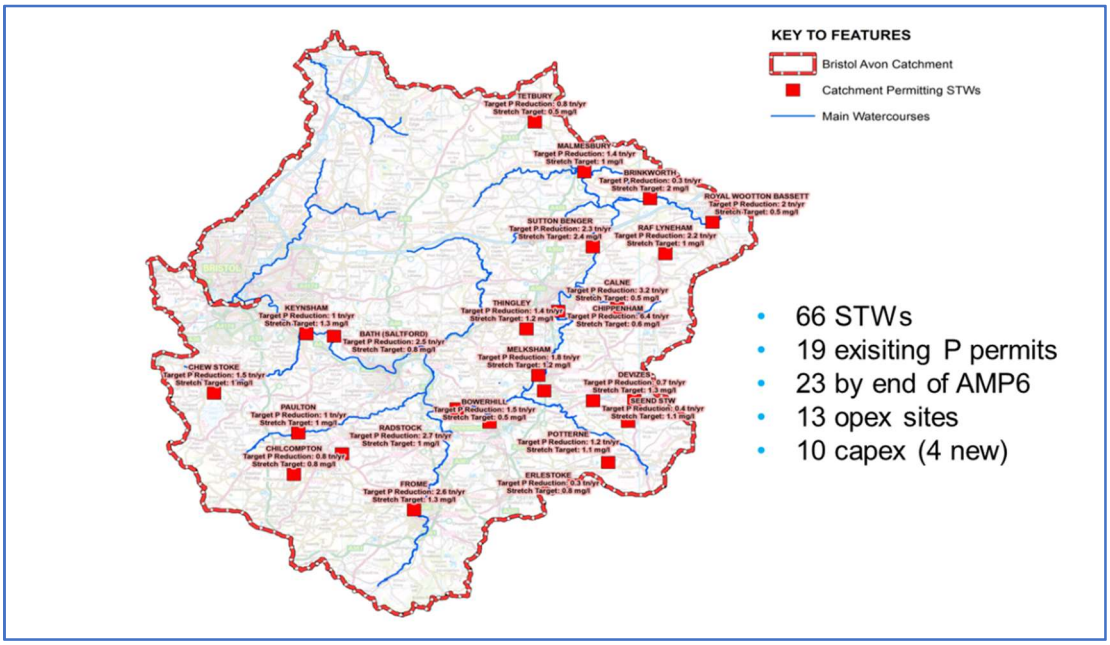
Environmental standards continue to tighten, and to meet Water Framework Directive (WFD) requirements for the ecological condition of rivers, we need to reduce the quantity of nutrients reaching rivers. We also need to take account of population growth, particularly in areas with sensitive rivers or inland waters.

Based on our track record in delivery and innovation, we are well placed to meet these challenges.

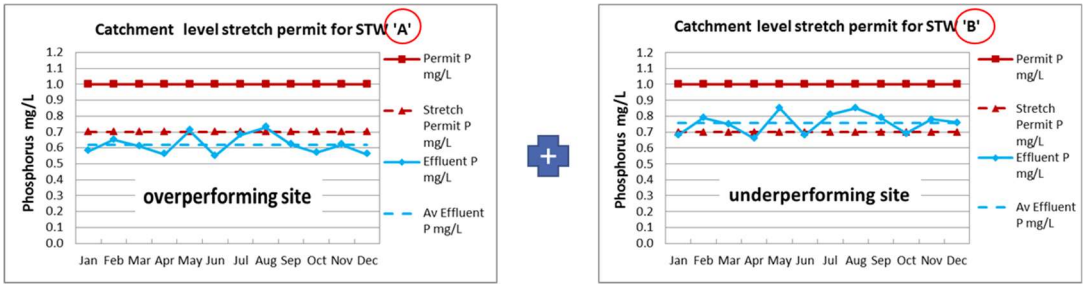
Case Study : Bristol Avon Catchment Permitting Trial

The Bristol Avon Catchment Permitting trial was the first trial of its kind in the UK. We promoted this trial in order to deliver the greatest phosphorus reduction in the catchment for the least cost, while improving the environment.

This innovative type of permitting enabled us to take different approach to risk, with more focussed and appropriate capital investment. In some cases STW performance could be significantly improved through operational changes only, albeit at a higher risk than the conventional capital solution approach.



The catchment permit links contributing polluting sources (STWs) together to facilitate a focus on achieving the environmental outcome for the catchment as a whole. It involved the introduction of "stretch targets" at 24 STWs together with normal regulatory permits as a "back-stop". The details were agreed with the EA in a new Operating Technique agreement, linked to the permits for all the STWs in the catchment. The opportunity to take a greater risk on STW performance at some sites, and to sweat assets to over-perform at others, meant that significant capital investment could be avoided.



At the end of the first year the trial had worked well, removing an additional 37.4 tonnes of phosphorus from the catchment, compared to the target of 25.2 tonnes. Compared to a conventional solution we have estimated the capital and operating cost savings of £25m and £0.3m per year respectively.

Case Study : EnTrade

EnTrade allows buyers of environmental offsets to create an online auction for particular measures. The platform quickly estimates the resulting savings for measures that sellers (typically farmers and landowners) choose to bid for. This then allows the seller to enter their own cost and see the resulting unit cost on which their bid will be judged. Sellers can adjust their bid at any point throughout the auction, and once closed the buyer of the offsets can calculate the most cost-effective combination of bids to meet their given target.

We trialled the EnTrade concept as an extension of the leading role we have played in catchment management over the past 10 years, but moving the previously bilateral relationships with individual farmers to a more systemic approach.

In 2015 we successfully negotiated with the Environment Agency and Natural England to offset 40 tonnes of nitrogen from entering Poole Harbour by working with farmers in the catchment rather than build an asset at Dorchester sewage works.

We then used the EnTrade process to invite farmers to bid for funding to grow cover crops over winter to reduce the nitrogen leaching into the water course. We ran the first auction in June 2016 for 20 tonnes and received 147 bids from19 farmers to make nitrogen savings of 47.5 tonnes through cover crops. The auction saved us 30% on our nitrogen costs compared to previous methods of interacting with farmers.

Two further auctions were run in February 2017 comprising:

- A second cover crop auction which received bids for a further 40 tonnes of nitrogen savings against a target of 15 tonnes, at a lower price than the previous auction.
- An auction for arable reversion which received bids for 8 tonnes of savings over 3 years across 66 hectares.

2. WINEP3

2.1 Current WINEP3

We have collaborated very intensively with the Environment Agency and Natural England to ensure that the WINEP delivers the best possible outcomes for the environment and for our customers. Our overall aims have been to ensure that there is scientific evidence of the need for an environmental improvement, to always consider alternative ways of achieving similar objectives such as catchment solutions rather than asset based solutions, and to challenge the timescales for delivery.

Through this process, innovative approaches have enabled us to avoid more than £50m of investment needs, whilst still delivering the overall environmental outcome that regulators require and customers support. Examples of improvements achieved include:

- Bristol Avon and Little Avon catchments – catchment wide permitting and maximisation of synergies, avoiding disproportionately expensive improvements at small sewage works, saving £3m
- catchment offsetting removing the need for immediate improvements at three works which discharge to groundwater, avoiding £15m of investment
- prioritising investigation of flow issues to ensure a sound science approach is adopted before major investment is scheduled.

We also worked hard with the Environment Agency to develop a phased programme that we considered met the overall environmental needs and balanced the need for an affordable and deliverable plan. Our proposed programme would have resulted in the uncertain phosphorus removal work being extended through to the end of the RBMP3 in 2027 and the flow driver works phased across ten years to 2030. This phased programme would still have delivered the majority of the environmental improvements (measured in terms of tonnes of phosphorus removed) by March 2025. However following review by the Secretary of State, Defra have advised that all the environmental improvements should be delivered as soon as possible.

Version 3 of WINEP was issued in March 2018. It includes over 1,000 rows, covering numerous different legislative drivers.

There are three main parts to the WINEP: water quality; fisheries, biodiversity and geomorphology; and water resources. The total cost of the programme is estimated to be £537m, dominated by the water quality part, which exceeds £500m even allowing for the avoided costs mentioned above.

A breakdown by driver is given in Figure 2-1 and Table 2-1 below.

Figure 2-1: Breakdown of WINEP3

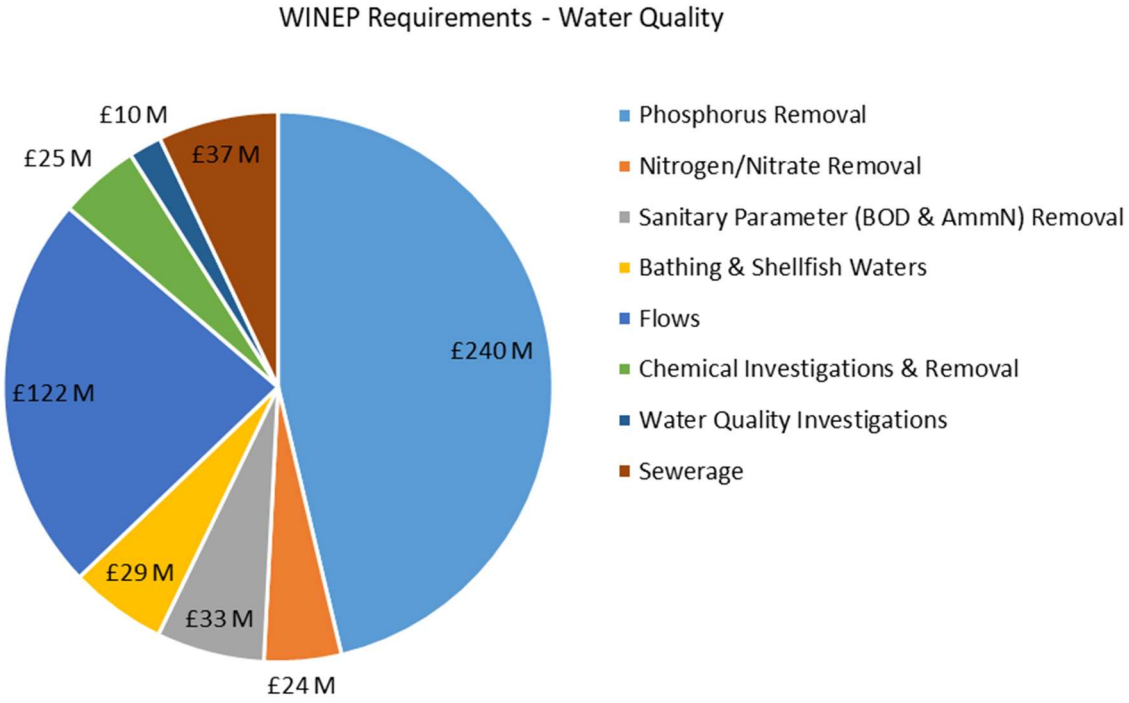


Table 2-1: WINEP3 summary

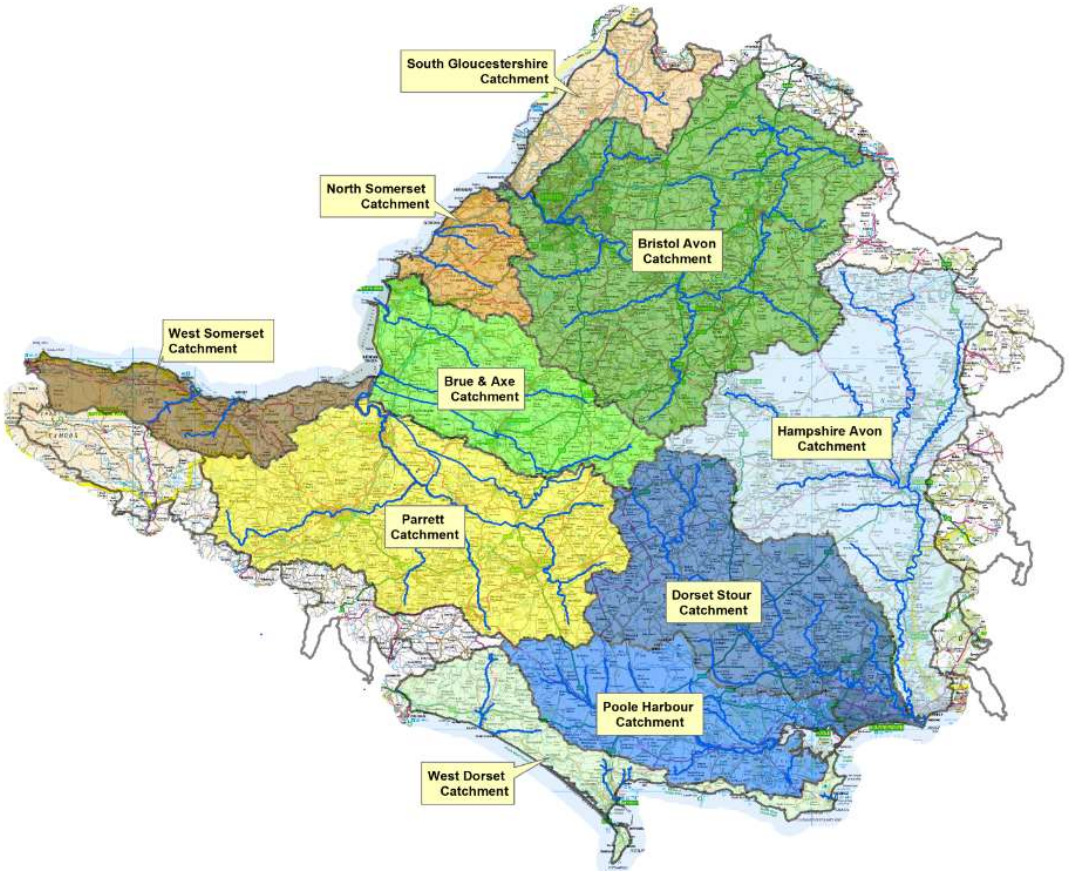
Driver	Number of schemes (WINEP lines)	Totex cost £m		
		High Certainty (green)	Medium Certainty (amber)	Total
Water Quality				
Phosphorus removal • UWWTD, Habitats Directive, SSSI, WFD	76	107	134	241
Nitrogen removal • UWWTD, Habitats Directive, DrWPA, WFD	10	22	-	22
Bathing and shellfish waters • Bathing Water Directive, Shellfish Water Directive	13	28	2	30
Sanitary parameters (BOD and Ammonia) • WFD	10	21	12	33
Flows • UWWTD	488	116	6	122
Chemical investigations and removal • WFD	34	25	-	25
Water quality investigations / catchment management • DrWPA	22	11	-	11
Sewerage • UWWTD, IUDM etc	365	37	-	37
Fisheries, biodiversity and geomorphology • Biodiversity, biosecurity, eels	45	10	-	10
Water resources	18	7	-	7
Total	**1081**	**383**	**154**	**537**

Key: WFD = Water Framework Directive; UWWTD = Urban Wastewater Treatment Directive; DrWPA = Drinking Water Protected Areas; SSSI = Sites of Special Scientific Interest

We have 401 sewage treatment works that discharge to groundwater, rivers and the sea in our area. WINEP3 includes over £470m for schemes at sewage treatment works. There are very substantial programmes related to phosphorus removal and flow drivers, of which £154m is indicative (amber) to be confirmed by 2021.

Our proposals are orientated around the ten main catchments in our region (shown in Figure 2-2 below), with the aim of ensuring holistic and effective improvements throughout the catchment.

Figure 2-2: Wessex Water river catchments



Our plan is to achieve the improvements in the most cost beneficial way through a mixture of asset solutions and innovative catchment based methods, particularly for nutrient removal. In the current period we have adopted catchment permitting for the Bristol Avon, which has proved to be a very flexible and economical way of delivering reduction in the load in the river. We plan to extend this approach to other catchments where the WINEP allows, such as the South Gloucestershire Streams (Little Avon).

The programme will remove an additional 307 tonnes per year of phosphorus, on top of the 440 tonnes per year we will have removed up to 2020.

2.2 Investment areas for review

Based on the suggestions in the joint letter, the main investment areas for consideration in this submission relate to the Water Framework Directive (WFD). The table below is a subset of the overall WINEP3 related to WFD improvements for nutrient (phosphorus and nitrogen) removal.

Table 2-2: WFD improvement drivers in WINEP3

Driver	Number of schemes (WINEP lines)	Cost £m		
		High Certainty (green)	Medium Certainty (amber)	Total
Water Quality				
Phosphorus removal				
• WFD No deterioration	2	8.8	-	8.8
• WFD Good ecological status (by Dec 2021)	18	66.1	-	66.1
• WFD Good ecological status (by Dec 2024)	34	-	103.2	103.2
Sub total	54	74.9	103.2	178.1
Nitrogen removal				
• WFD groundwater discharge investigations, catchment management and trials	6	2.7	-	2.7
Total		**77.6**	**103.2**	**180.8**

Furthermore, the split of the WFD phosphorus programme by catchment shows that the majority of the programme is in the following catchments:

- Dorset Stour £65m
- Parrett (including upper Tone) £50m

(n.b. the above WFD costs are over and above those costs required to achieve potential UWWTD requirements)

3. Water Framework Directive enhancements

Our alternative innovative approach for phosphorus (P) removal is a combination of long-term catchment interventions alongside cost-effective and optimised asset solutions.

In this section we describe our proposed approach for phosphorus removal including:

- the overall concept
- updating river water quality models
- proposed alternative asset solutions
- catchment trials
- wider benefits
- revised costs
- proposed timeline and risk management
- potential changes to the WINEP.

We have also reviewed the potential for changes to programmes for nitrogen removal.

3.1 WFD Phosphorus removal

3.1.1 Overall concept

The long-term concept is to integrate several approaches as illustrated below:

- Update river water quality models so investment is based on sound science
- Construction of asset solutions for a cost-effective permit limit of 1 mg/l P
- Optimise existing P removal assets (and new assets once constructed) to deliver stretch targets for P under a catchment wide permit
- Catchment interventions, including working with farmers and using EnTrade to reduce P

Targeted to deliver at least the same tonnage of phosphorus removal per year for the catchment as WINEP3
+
Additional environmental benefits from 2022

The analyses we carried out on our Bristol Avon Catchment permitting trial showed that the average concentration of phosphorus discharged in effluent from our STWs, which currently have no requirement to remove phosphorus, is in the range 5-6 mg/l. It follows therefore that the proposed introduction of a 1.0 mg/l phosphorus permit limit would remove at least 80% of the phosphorus being discharged by such STWs., as shown in Figure 3-1.

Figure 3-1: Typical final effluent phosphorus limits achievable through different process steps

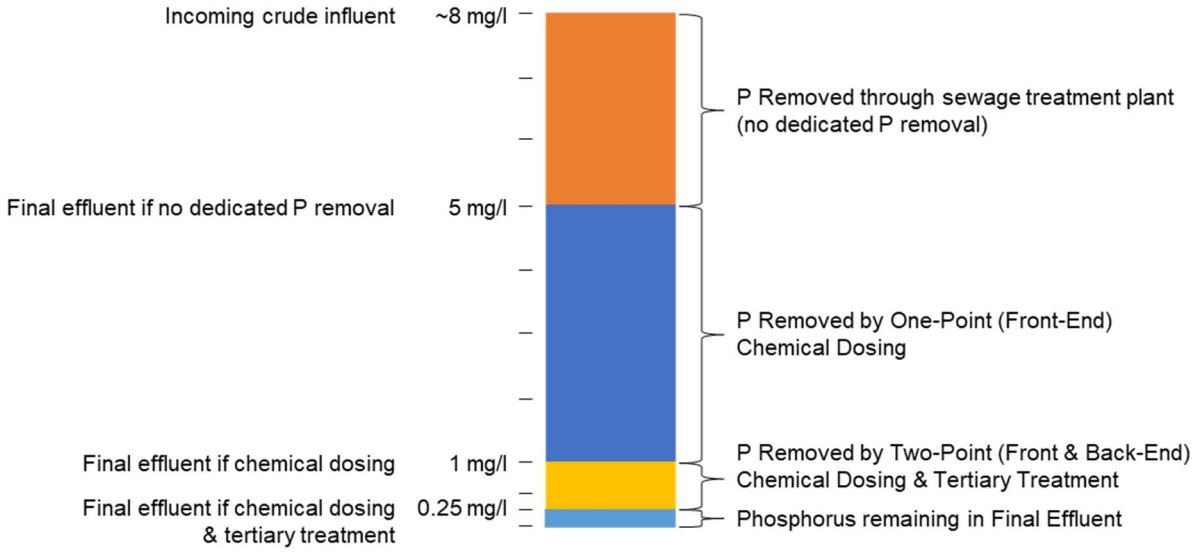
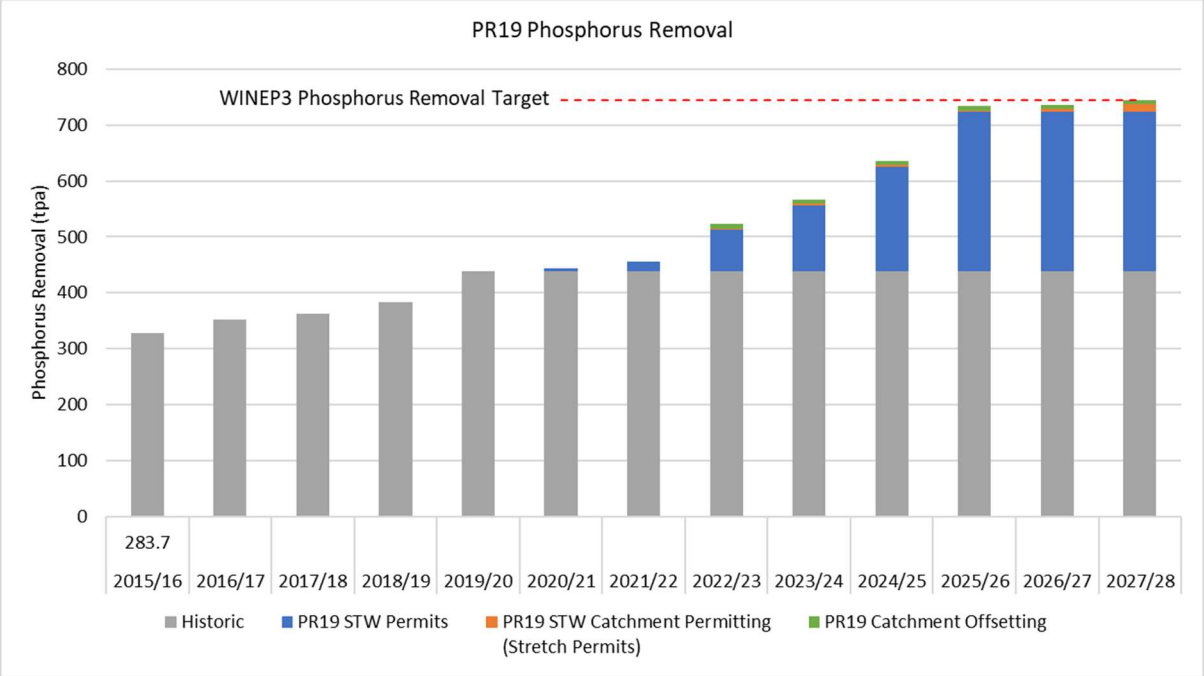


Figure 3-2 below presents the projected profile of P removal for our proposed approach. Based on our proposals 95% of the WINEP3 required tonnage removal will be achieved by 2025, with the remainder being removed by the end of RBMP3 in 2027. It should be noted that although P removal starts immediately on scheme completion, the full year effect in terms of tonnage removed occurs one year after the scheme completion dates.

Figure 3-2: Historical and projected profile of Phosphorus removal



3.1.2 Update river water quality models

As part of the AMP6 NEP, we undertook some catchment-scale water quality 'Modelling Certainty' investigations (also known as 'Managing Uncertainty'). The primary objective of these investigations was to provide evidence of the impact that our STW nutrient discharges have on the water environment to inform, as appropriate, future investment plans (in particular PR19). The data from extensive river and effluent monitoring was used to assess the performance of the SAGIS-Simcat models on which the WINEP was developed.

Suitable river water quality sample locations were selected in consultation with stakeholders and local experts and then monitored from May 2016 to April 2017, with draft reports issued in December 2017 and the final versions in March 2018. However, the timing has meant that the SAGIS-Simcat models have not yet been updated, and thus the permits in WINEP3 are based upon the original 2010-2012 dataset.

Our study has highlighted inaccuracies in the models and a real need to utilise the modelling certainty data within SAGIS-Simcat to ensure that the apportionment is correct and Wessex Water's fair share can be calculated more accurately; although we still believe that SAGIS-Simcat remains the best tool available for informing nutrient removal investment decisions.

We have classified each site/scheme within the WINEP into a category, as shown in Table 3-1 below:

Table 3-1: Modelling certainty classification of phosphorus removal schemes in WINEP3

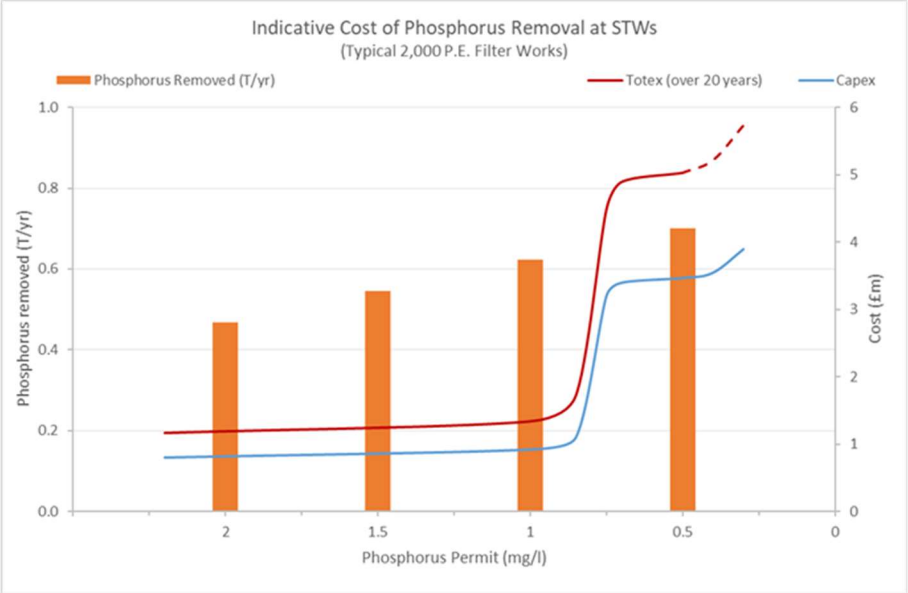
Traffic light	Explanation	Number of schemes in WINEP with WFD_IMP driver to achieve GES
Green	Good data and evidence Good model fit Permit will achieve Wessex Water's fair share of WFD GES	15
Amber	Good data and evidence Good model fit Permit over or under-predicts Wessex Water's fair share of WFD GES	8
Red	Poor data and evidence Good model fit Uncertain whether permit will achieve Wessex Water's fair share of WFD GES	22
Purple	Poor data and evidence Bad model fit Uncertain whether permit will achieve Wessex Water's fair share of WFD GES	18

We recommend that the SAGIS models are updated based upon the modelling certainty data, to refine the required permits. This approach would ensure that abortive/excessive costs are avoided at particular sites where improvements are not required (or to a lesser standard) or may be better suited elsewhere, as well as being more confident in the use of more novel technologies/solutions.

3.1.3 Proposed alternative asset solutions

Our PR19 technical and economic appraisals of the options for P removal have highlighted the step change in treatment costs for permit limits less than 1 mg/l, as shown in Figure 3-3 below. The main reason for the step change is that for tight permit limits there is normally a requirement to add tertiary treatment at the end of the works to ensure adequate solids removal[1]. Within the wastewater treatment technical arena it is agreed practice that achieving a phosphorus permit limit of 0.5 mg/l will require a tertiary filtration polishing stage, where chemical dosing is utilised[2]. In addition, pumping is nearly always required to fit the tertiary process within the existing hydraulic profile of the site, giving rise to additional capital and operating costs.

Figure 3-3: Indicative costs for phosphorus removal to achieve different consents



A further example for Wincanton sewage treatment works, which serves a population equivalent of 7,646, is given in Table 3-2 below. This shows that for this site, the additional cost for removing a further 0.4 tonnes of P per year is £4m with additional ongoing opex of c£90k per year.

Table 3-2: Phosphorus removal costs at Wincanton STW

P permit (mg/l)	**P removed** (tonnes/year)	**Capex** (£m)	**Opex** (£k/yr)
0.5	3.7	5.6	131
1	3.3	1.6	38

[1] Design of Municipal Wastewater Treatment Plants – WEF Manual of Practice Vol 2 (see Table 15.1)
[2] PR14 Investigations and trials to determine the feasibility of treating phosphorus at sewage treatment works down to or approaching 0.1mg/l within the UK - Trials Programme Final Report 24th June 2013

Figure 3-4 and Figure 3-5 below show the types of plant required for a permit of 1 mg/l P and less than 1 mg/l P respectively.

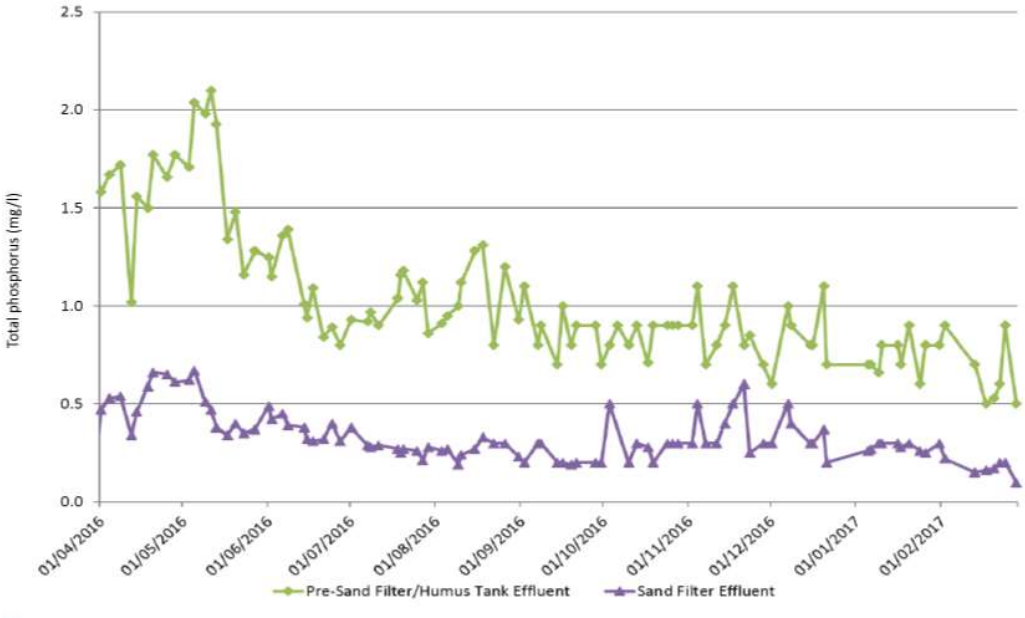
Figure 3-4: Chemical dosing plant for 1 mg/l P permit

Figure 3-5: Plant required for permit less than 1 mg/l – chemical dosing plant, tertiary sand filters and sludge tanks (pumping station not shown)

The National Phosphorus Technology Trials[3] carried out during AMP6 by all the water companies identified technologies which could reliably achieve total Phosphorus levels as low as 0.3 mg/l. The P1a trials reported the capital costs for the installation of these new technologies for a range of sizes of STWs. For a 10,000 p.e. STW the cost estimates ranged between £3 – 5million capex (excluding the cost for the unsuccessful technology). The P1b (Optimisation) trials had a lower capex, but were generally testing STWs which already had tertiary treatment processes in place. Our trial at Warminster STW is an example of this. It demonstrated the level of P removal achievable through a conventional secondary filter stage to a level of 0.70- 1.0 mg/l P, and the further improvement from a tertiary filtration stage to a level around 0.30 mg/l P.

[3] The National Chemical Investigations Programme 2015-2020 – Volume 3 Wastewater Technology Trials – UKWIR Report 18/EQ/01/14

Figure 3-6: Final effluent phosphorus at Warminster STW for the two process streams



WINEP3 includes 31 sites with permit limits of less than 1 mg/l. Of these, nine sites have Habitats Directive or other drivers which are not subject to cost benefit assessments and therefore we are not proposing any change to their proposed consent.

Our initial investigations have identified that the River Parrett and Dorset Stour catchments are best suited to a combination of catchment permitting and catchment offsetting. We propose that in the first instance the works with WFD drivers are constructed for a permit limit of 1 mg/l. Table 3-3 on the following page lists the works, the cost differences and the changes in tonnages of phosphorus removed.

Table 3-3: Proposed alternative asset solutions for WFD_IMP GES schemes with WINEP permits tighter than 1mg/l

Site	Catchment	WINEP3				Alternative Proposal (for 1mg/l permit)			
		P Permit (mg/l)	Modelling Certainty	P Removed (tpa)	Capex (£m)	P Removed (tpa)	Capex (£m)	P difference (tpa)	Capex difference (£m)
BISHOPS LYDEARD STW	Parrett	0.75	Purple	1.3	3.7	1.2	1.0	0.08	2.7
CREWKERNE EAST STW	Parrett	0.25	Green	5.4	6.2	4.5	6.2	0.85	0.0
HOLDENHURST STW	Dorset Stour	0.35	Purple	116.7	33.4	100.4	8.3	16.31	25.1
IWERNE MINSTER STW	Dorset Stour	0.5	Purple	0.7	3.5	0.6	0.9	0.08	2.7
MARNHULL (REED BEDS) STW	Dorset Stour	0.5	Purple	0.7	3.1	0.6	0.6	0.08	2.5
MERE STW	Dorset Stour	0.5	Purple	1.5	3.9	1.3	1.2	0.16	2.7
MILBORNE PORT STW	Parrett	0.75	Red	1.7	3.9	1.6	1.2	0.10	2.7
PALMERSFORD STW	Dorset Stour	0.35	Purple	39.5	13.7	34.0	0.2	5.52	13.5
SHAFTESBURY STW	Dorset Stour	0.35	Amber	6.2	8.5	5.4	0.2	0.87	8.3
SOUTH PETHERTON STW	Parrett	0.25	Red	3.8	4.2	3.2	1.4	0.60	2.7
TARRANT CRAWFORD STW	Dorset Stour	0.5	Amber	12.4	7.0	11.0	2.0	1.38	5.1
TAUNTON STW[1]	Parrett	0.4	Amber	8.4	6.9	0.0	0.0	8.38	6.9
TEMPLECOMBE STW	Dorset Stour	0.5	Purple	0.8	3.6	0.7	0.9	0.09	2.6
WINCANTON STW	Dorset Stour	0.5	Green	3.7	5.6	3.3	1.5	0.41	4.1
YEOVIL WITHOUT STW	Parrett	0.75	Purple	0.9	3.6	0.8	1.0	0.05	2.7
		Total:		203.8	110.8	168.8	26.6	35.0	84.2
		Total: (exc. Holdenhurst)		87.1	77.5	68.5	17.4	18.7	59.4

[1] There is an AMP6 NEP scheme at Taunton STW to achieve 1 mg/l by 31/03/2020.

As shown in Figure 3-3, for small to medium sized works there is minimal cost difference between targeting a permit limit of 1 mg/l or more relaxed limits (e.g. 2 mg/l), as the same process technology would be required, although often smaller works would require additional improvements (such as to primary settlement) as their low flows make them vulnerable to shock loads and variations in flow.

As such, we are also proposing alternative tighter permits for sites in the Parrett and Stour catchments where the WINEP3 has permits that are greater than 1 mg/l: with proposed permits of 1 mg/l for medium size works and 1.5 mg/l for small works. We are also offering to tighten permit limits on existing sites not included within the WINEP3, where this can be achieved by operational enhancement with minimal capital investment. All these sites are listed in Appendix C.

Capping permit limits to 1 mg/l in the Parrett and Dorset Stour catchment, and reducing permits to 1 mg/l (or 1.5 mg/l for small sites) would remove approximately 92% of the phosphorus required by WINEP3 at c54% of the capex cost as shown in Table 3-4 below.

Table 3-4: Comparison of phosphorus removed when consents are capped to 1 mg/l

	P removed (tonnes/year)	Capex (£m)	Opex (£m/yr)	AMP7 Totex (£m)
WINEP3	306.7	225.0	5.4	233.5
Alternative permits (not less than 1 mg/l as P for Parrett and Dorset Stour catchments)	284.7	139.8	3.7	149.2

Lower Dorset Stour

The lower reaches of the river Stour in Dorset receives discharges from five of our medium to large STWs, the largest of which is Holdenhurst STW serving Bournemouth (p.e.175,000).

By limiting permit limits to 1mg/l as discussed earlier, the amount of phosphorus required to be removed from these sites to meet the WFD_IMP objectives far exceeds that achievable through catchment offsetting or catchment wide permitting with stretch targets. Therefore, a site-specific approach is required for these works. Our alternative proposals for Holdenhurst STW are set out below.

It is not clear that the WFD_IMPg bundle of schemes for the lower Stour is cost beneficial. We also consider that the SAGIS model on which the proposed standards are based would benefit from further improvement. For example, the 'goodness of fit' for the model is uncertain, the evidential data is not good with no upstream and downstream WQ data, and so the accuracy of the model is questionable. We are also aware that the measured dry weather flows at several of these STWs are considerably lower than the permit values and that hence there is an opportunity to re-model and review the discharge standards proposed in the WINEP3.

Holdenhurst

Holdenhurst STW is our largest STW in the Dorset Stour catchment and has two lines in the WINEP3 related to phosphorus improvements, as shown in Table 3-5 below.

Table 3-5: Phosphorus-related drivers in WINEP3 for Holdenhurst STW

Unique ID	Driver Code (Primary)	Completion Date	Level of Certainty?	Proposed Permit Limit (mg/l)	Quantitative km River Length Improved
7WW200456	U_IMP2	31/03/2025	Amber	1	3.4
7WW200457	WFD_IMPg	22/12/2024	Amber	0.35	3.4

Holdenhurst STW discharges just 3.4 km from the tidal limit of the R Stour. In addition to driving significant capital investment, the operational impacts of the proposed WFD standard of 0.35 mg/l P will include large quantities of chemical dosing, additional sludge and additional transport, all of which would generate significant environmental dis-benefits.

An alternative more sustainable approach includes:

- implementation of the UWWTD 1.0mg/l P permit requirements
- further monitoring to develop and verify the SAGIS model
- scenario modelling to optimise the WFD_IMPg requirements in the lower Stour, taking account of lower DWFs
- 'optimisation' of the Holdenhurst STW performance, to stretch the P removal process (required under UWWTD) as far as possible, and to identify the 'gap' of further improvement required (under WFD)
- implementation of WFD P improvements by December 2027.

The deferral of this scheme would delay the ultimate (WFD) improvement of 3.4 km of the River Stour to 2027, whilst ensuring that any future investment is based on sound science and is cost beneficial. In the meantime, a 1 mg/l permit would reduce the amount of phosphorus discharging into the river by at least 73t/a (based on current measured DWF), and would also satisfy any potential UWWTD requirements. This compares with the total removal required by the combined UWWTD and WFD drivers of 85 t/a.

3.1.4 Catchment wide permitting and catchment interventions

The aim of the catchment wide permitting with stretch targets and catchment interventions is to deliver phosphorus reductions at least equivalent to the shortfall highlighted above, as well as wider environmental benefits.

Catchment wide permitting

As mentioned in Section 2 above, in the current investment period, we have successfully adopted a catchment wide approach to phosphorus removal Bristol Avon catchment. This involves an agreed phosphorus tonnage reduction target for a group of sewage treatment works and stretch targets for each site.

We propose to extend this innovative approach to the Dorset Stour and Parrett river catchments. We would aim to have an Operating Technique Agreement in place by April 2020.

Catchment interventions

We have carried out a preliminary assessment of the potential for catchment management to deliver the reductions required in the Dorset Stour and Parrett (including the Upper Tone) catchments.

The methodology adopted for the preliminary assessment involves the following steps:

- Desktop study of
    - land holdings
    - soils
    - geology
    - watercourses
    - agricultural loadings
    - cropping SAGIS outputs
    - nitrate vulnerable zone maps
    - rainfall
- Use of Farmscoper[4] to consider scenarios of farm numbers, take up and scope of catchment services
- Catchment walkovers
- Re-run of Farmscoper
- Analysis and conclusions.

In Appendix B we provide a copy of our preliminary assessment of the opportunities for the Dorset Stour catchment, including relevant background mapping and Farmscoper results. This preliminary assessment is provided to illustrate the process we have adopted. More detailed investigations would be carried out during the preliminary phase of the project.

The overall conclusion of this preliminary assessment is that catchment interventions have the potential to reduce phosphorus at lower cost than asset solutions for very low permit levels. The extent of reduction and cost effectiveness is very dependent on the take up from farmers, and the input from advisors. It will be necessary to undertake a trial of this

[4] Farmscoper is a decision support tool developed by ADAS on behalf of Defra that can be used to assess diffuse agricultural pollutant loads on a farm and quantify the impacts of farm mitigation methods on these pollutants.

approach over up to five years to maximise the engagement, take up and environmental benefits.

In order to verify the effectiveness of the catchment activities on the river water quality, there may be some benefit in installing in stream monitoring stations at key locations. We will discuss the advantages, disadvantages and potential locations with the local EA.

3.1.5 Overall tonnages of P removed

Through a combination of asset solutions, catchment permitting and catchment offsetting the following required phosphorus removal would be delivered, as shown in Figure 3-7, with the reduction breakdown as shown in Figure 3-8.

Figure 3-7: PR19 phosphorus removal proposals

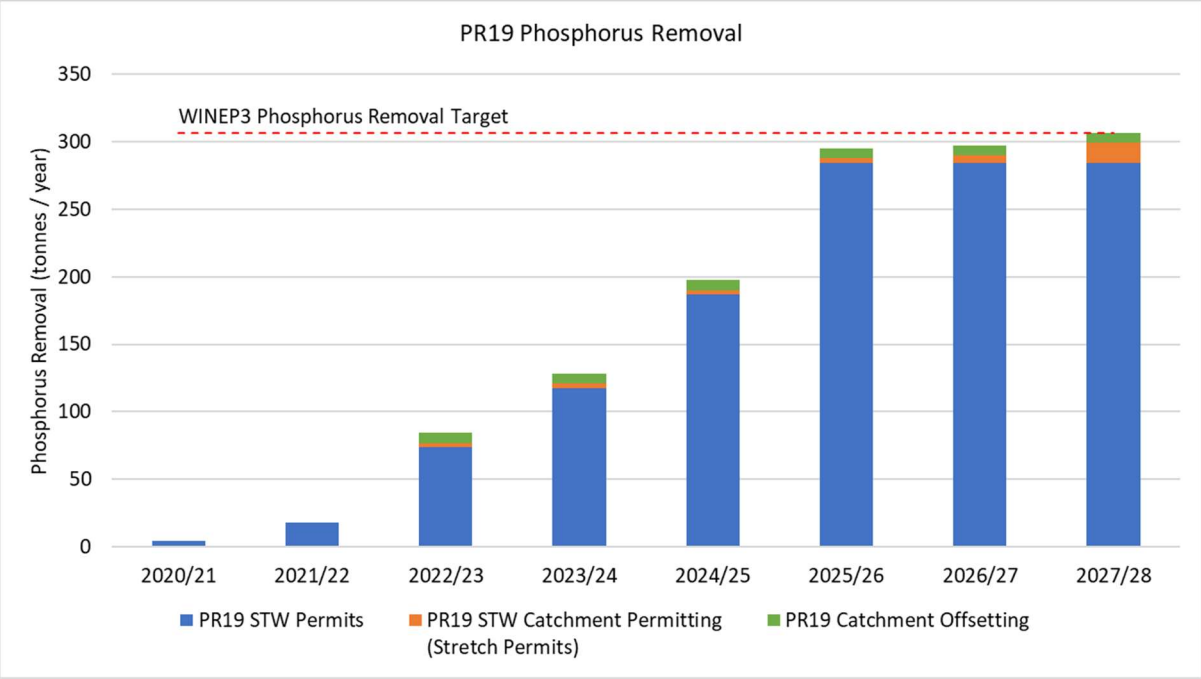
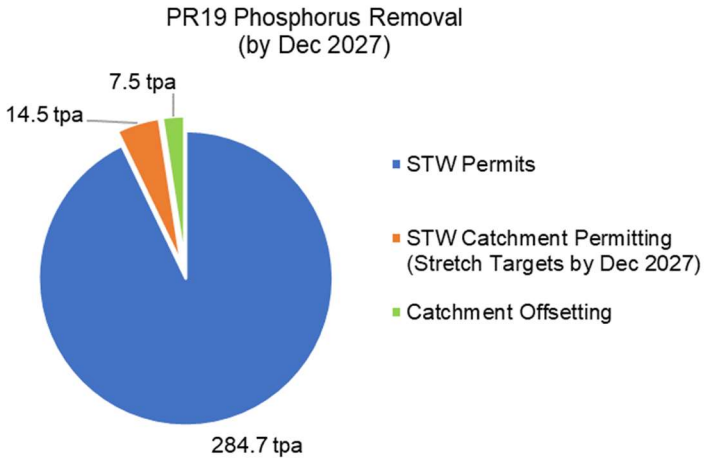


Figure 3-8: PR19 phosphorus removal breakdown



Reductions achieved by the tightening of permits for existing works would begin in 2020, with further reductions through stretch permits of these accruing around 2022/23, some two years earlier than the WINEP3 baseline. Additional reductions would be achieved through catchment management offsetting starting around 2023. The majority of benefits would arise on the commissioning of the main schemes in December 2024 and the remainder by 2027.

We recognise that there is considerable uncertainty about the outcomes of catchment management offsetting, so it will be necessary to monitor progress throughout the period 2020 to 2025. Should the results of more refined modelling and progress with offsetting indicate that further action is required, additional asset schemes could be initiated for construction between April 2025 and December 2027. Thus, there is a robust fall-back position with regard to WFD targets in 2027.

3.1.6 Wider benefits

A key part of the catchment trials will be to evaluate the wider benefits of a holistic catchment approach. We will develop a natural capital accounting system to capture and report these benefits during PR19. Our aspiration is to develop a natural capital net gain performance commitment for PR24.

We envisage that the wider benefits will include:

- reduced run off
- reduced soil erosion and therefore silting of rivers
- improved soil condition
- biodiversity enhancements
- reductions in other pollutants such as pesticides
- reduced nitrogen leaching
- better engagement with farmers and communities about water
- reduced energy and chemical use at sewage treatment works, thus reducing the carbon footprint
- reduced sludge quantities at sewage treatment works.

We propose to have a workstream within the phosphorus removal programme to develop a framework – to be agreed with the EA and NE – as to how to measure and report on these wider benefits.

As an example, we considered the additional benefits that would be generated in the Shreen sub catchment of the River Stour. Table 3-6 shows the additional benefits derived from Farmscoper. For further details refer to Appendix B.

Table 3-6: Catchment management benefits in the Shreen sub-catchment of the River Stour

	Catchment baseline	Reduction	Reduction as % of baseline
Nitrate	68,472 kg	2,141 kg	3.1%
Phosphorus	1,321 kg	165 kg	12.5%
Sediment	552,793 kg	94,366 kg	17.1%
Ammonia	46,397 kg	302 kg	0.7%
Methane	176,095 kg	630 kg	0.4%
Nitrous Oxide	22,248 kg	658 kg	3.0%
Pesticides	120 units	5 units	4.2%
Faecal Indicator Organisms	103,371 x10^9 cfu	4,208 x10^9 cfu	4.1%
Soil Carbon	305,502 t	2,297 t	0.8%
Energy Use	2,719,059 kg CO_2	67,133 kg CO_2	2.5%

25-year Environment Plan

The 25-year Environment Plan launched by Defra in January 2018 includes policies that this programme can contribute to. Table 3-7 on the following page highlights the relevant policies and how this programme could assist in their delivery.

We strongly support the direction of travel set by the 25 year Environment Plan, and we are keen to align our investment strategy with the plan in a way that accelerates delivery of environmental benefit, and optimises the cost of delivery for society as a whole, by enabling better collaboration with partners, including customers, on environmental matters. We see the next decade as pivotal to enabling the 25 year plan, with the need for greater evidence on environmental response to Natural Capital or behavioural solutions.

The use of markets to expose opportunity and cost, together with the government's objective to improve the allocation of public monies and/or private capital to environmental improvement offer some great opportunities to accelerate environmental gain at no extra financial costs to society, in particular by supporting greater focus on the value of resource efficiency, and a blend of asset and alternative solutions.

Table 3-7: 25-year Environment Plan

25-year Environment Plan		Link to our proposals
Outcome	**Policy**	
Using and managing land sustainably	• Improving how we manage and incentivise land management • Designing and delivering and new environmental land management system • Introducing new farming rules for famers • Working with farmers to use fertilisers efficiently • Exploring new and innovative funding and delivery mechanisms as part of a new environmental land management system. These may include private payments for eco-system services, reverse auctions and conservation covenants	• Using EnTrade to deliver land management changes where appropriate • Offering additional incentives for enhanced agricultural activities • Providing expert advice on nutrient management through our Catchment Delivery Team
Recovering nature and enhancing the beauty of landscapes	• Exploring how to give individuals and organisations the chance to deliver lasting conservation	• Provision of biodiversity advice in addition to agronomic information to enable the delivery of multiple benefits, not just nutrient reductions. • Potentially including biodiversity delivery within the EnTrade platform
Increasing resource efficiency and reducing pollution and waste	• Reducing the impact of wastewater (to create better outcomes for the customer and environment)	• Encourage the efficient use of on-farm resources, e.g. slurries, and minimise the leaching/run off from fertilisers through advice, equipment calibration and on-farm measures such as cover crops and buffer strips • Ensuring that investment at sewage treatment assets will deliver the greatest length of river benefit • Ensuring investment at sewage treatment assets is cost effective and explores all sustainable options, including offsetting
Reducing pollution	• Minimising the risk of chemical contamination in our water • Ensuring we continue to maintain clean recreational waters and warning about temporary pollution	• As above, provision of agronomic advice and mechanisms, including the EnTrade trading platform to reduce levels of nutrient leaching and runoff into the water environment

3.1.7 Revised costs

The table below sets out the revised costs of the proposed approach.

Table 3-8: Revised costs for proposed approach (alternative permits, catchment-wide permitting and offsetting)

	Totex 2020 – 2025 £m	Variance £m
WINEP3	234	-
Alternative proposals	182	52

The cost of the catchment interventions has been assessed bottom up by a detailed build-up of the individual activities and their unit costs and by a top-down assessment such that the whole life totex of the alternative is no greater than the whole life totex of the baseline. An allowance has been made for developing and writing the new permits and associated Operating Technique Agreements for the Parrett and Dorset Stour catchments.

Revised cost benefit analysis

The EA have carried our cost befits analysis in accordance with their methodology and considering whole operational catchments. Their conclusions are summarised in the table below.

Under the alternative approach the cost will reduce and the benefits will increase. It will be necessary to assess the value of the wider benefits mentioned above, but we expect the cost to reduce by circa 20% and the benefits to increase by up to 10%. Thus the net benefits and benefit/cost ratio should increase significantly.

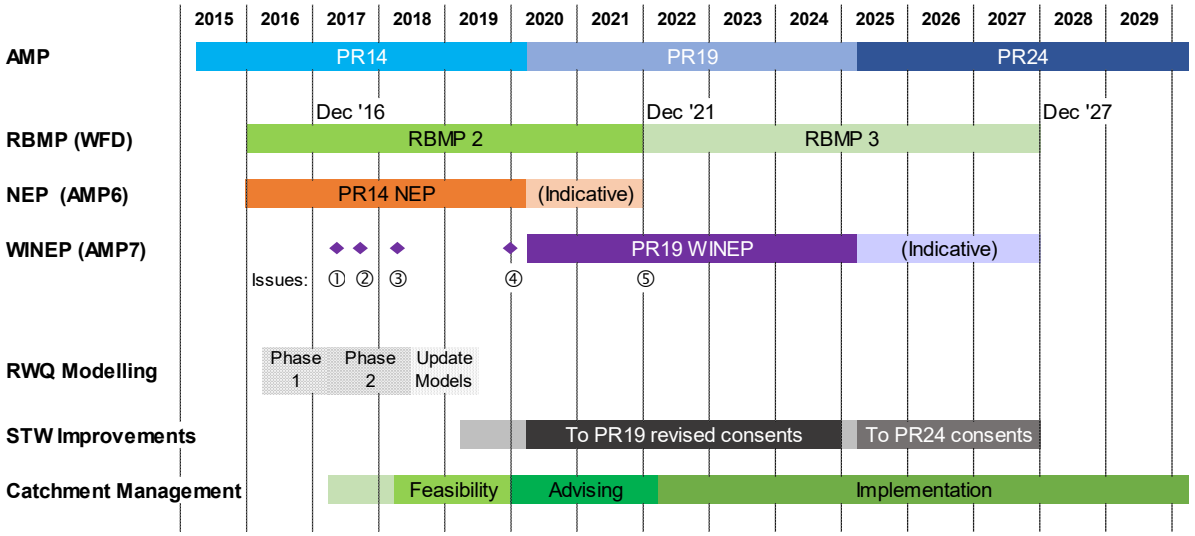
Catchment	NPV of costs £m	NPV of benefits £m	Net benefits £m	Benefit/cost ratio
Dorset Stour	166	214	47	1.3
Parrett	102	141	39	1.4
Total	268	355	86	1.3
Alternative approach - indicative	~ 214	~ 390	176	1.8

3.1.8 Proposed timeline and risk management

We propose that the catchment trials run for five years in parallel with the reduced asset solutions, as shown in Figure 3-9 below. Our experience indicates that there would need to be a two-year lead in period and therefore benefits would start to accrue from 2022.

Annual reviews would be carried out as well as major reviews in 2023 and 2024 to inform any changes required for the next price control period.

Figure 3-9: Proposed timeline for phosphorus removal



There is a risk that the catchment interventions will not deliver the tonnage of P removal required or that the reductions per water body will not match the original requirements in WINEP3. There is also a risk that the cost of catchment work will increase.

We propose that these risks are managed by:

- regular reviews of progress. The Wessex Water Catchment panel, which include the EA and Natural England, would be the main vehicle to reviewing progress and agreeing changes in the strategy
- a major review of progress in 2023 prior to the development of the PR24 WINEP. If necessary it would be possible to include additional asset solutions at that stage and still deliver the revised solutions by 2027 (the end of the River Basin Management Plan).

3.1.9 Potential changes to the WINEP

Changes to WINEP3 would comprise:

a) Revised permit limits of 1 mg/l for 21 sites and 1.5 mg/l for 6 sites in WINEP3:
   - 15 sites capped at 1 mg/l (from tighter permits in WINEP3)
   - 6 sites tightened to 1 mg/l (from less stringent permits in WINEP3)
   - 1 site capped at 1.5 mg/l (from a tighter permit in WINEP3)
   - 5 sites tightened to 1.5 mg/l (from less stringent permits in WINEP3)

b) Additional lines in WINEP for tightening consents on existing sites:
   - 7 sites tightened to 1 mg/l
   - 1 site tightened to 1.5 mg/l.

   For ease of reference the sites are listed in Appendix C.

c) Additional lines for catchment management interventions. One line per catchment, with the scope of the trials to be agreed with the local EA team

d) Additional lines for catchment wide permitting. One line per catchment, indicating which sites will be included and their stretch targets. This would be a similar approach to the Bristol Avon catchment wide permit in the PR14 NEP.

We recognise that the preparation of the permits for these sites is more complex than standard permits and that it will involve significant input from ourselves and the EA. We would be amenable to exploring an enhanced pre-application service approach if this was required.

3.2 WFD Nitrogen removal

Under WFD nitrogen reduction WINEP3 includes three sites, which discharge to groundwater. We have already worked with the EA to propose alternative solutions for these sites. The alternatives have already been included in WINEP3 and will involve:

- Catchment management
- Investigations
- Trials.

The technologies to be trialled will be identified through the desk study investigation and in discussion with the EA. These may include glucose dosing of effluent to enhance in-situ bioremediation, trial of a constructed wetland or trials of new processes, such as using biocatalyst composites. The trials will be run over a two-year period to allow sufficient time for analysis and reporting to inform PR24, with delivery of the agreed preferred solution by 2027 to meet the RBMP3.

3.3 Other programme constraints

As mentioned in our submission to the EA in January 2018, a further constraint on delivery of the programme is the uncertainty about when the need for the projects will be confirmed.

Our understanding is that WFD uncertain (amber) schemes will require a ministerial decision about affordability for final sign off, which we understand will be in 2021, prior to the start of RBMP3 in January 2022. Thus, these schemes may not be confirmed and change from amber to green until December 2021.

Based on Table 2-1 above there is over £150m of WINEP3 that is categorised as indicative (amber); although this value drops under our alternative approach. To ensure delivery by the regulatory completion date and to make sure that schemes are delivered as efficiently as possible, we would request that this uncertainty is resolved before the beginning of the price control period i.e. in 2019 at the latest.

4. Flow drivers

The EA identified five drivers for flow related improvement measures for the WINEP3 for PR19. These drivers are required to protect the environment by ensuring that permitted flows to full treatment are passed through the main treatment processes and that storm overflows receive sufficient storage and settlement. In developing the WINEP3 we worked closely with the EA to review all the potential flow improvement requirements at our STWs, and to promote only those where the evidence of the need was clear. Where the evidence was uncertain we proposed that further investigations should be carried out in AMP7 to inform the potential need to implement improvements in AMP8. This approach has been agreed with the EA and is reflected in the WINEP3. It is described in more detail below:

4.1 Flow drivers

U_IMP5 – FFT increase

As part of the review process for FFT compliance, we have assessed the need for an increase in permitted FFT at over **100** STWs. This was carried out by analysing 15-minute flow data for two years at each of these STWs. This assessment resulted in an agreed EA / Wessex Water list of **13** STWs that require a permit FFT increase, these have been included in the WINEP3.

An additional 37 STWs have been identified as potentially spilling to storm on dry days, but we currently do not have the evidence to confirm this. Confirmation as to whether or not an increase in permitted FFT is required can only be determined with the installation of Event and Duration Monitors (EDMs). Our investigations in AMP7, based on the evidence from the installation of these EDMs will identify any further STWs needing an increase in permitted FFT, which will then be included in our PR24 business plan.

U_IMP6 – Storm Storage

The EA's guidance for PR19 requires that storm storage should be provided for a minimum of either 68L/hd or 2 hours retention at maximum flow through the storm tank(s). We have reviewed all of our STWs that have a FFT permit with storm tanks and those that spill directly to the watercourse to identify those STWs that require additional storm storage. This review covered over **200** of our STWs, and has resulted in **18** STWs being included in the WINEP3.

U_MON3 – EDM installation

U_MON4 and U_INV2 – MCerts installations

These flow drivers are to provide better flow information to both support our PR24 business plan and also to enable flow compliance to be assessed from 1st Jan 2026. We consider that the installation of these new monitors is key to confirming flow compliance and protection of the environment.

For existing MCerts flowmeter installations our approach is two-pronged. Where we know of flowmeters which do not comply with FFT flow measurement requirements, we will replace them during AMP7. In the majority of cases however, our plan is to survey the existing MCerts installations, using the U_INV2 flow driver, to determine their suitability for

measuring FFT flow compliance. Flowmeters identified by the surveys as not being capable of achieving the required accuracy of flow measurement will be replaced during AMP8. This approach has been discussed and agreed with the EA, and is reflected in WINEP3.

4.2 Conclusion

Therefore, given the previous work with the EA in developing and agreeing our approach to flow improvement works, we are not proposing any further changes to the flow schemes listed in the WINEP3. We believe they include an appropriate mixture of scheme implementation and, where required, further investigations to inform PR24.

5. Outcomes and performance commitments

In May 2018 we submitted to Ofwat the definition of the performance commitments that will be used to monitor delivery of our outcomes in PR19.

Our environmental outcome is *Protecting and enhancing the environment and natural capital*.

5.1 Environmental performance commitments

There are four performance commitments relevant to the river water quality programme. Brief details of the performance commitments are set our below along with an explanation of how they will hold us to account for the proposed revised approach outlined in this document.

Performance Commitment	What does this mean?	Unit of measurement	Forecast for 2020	Target for 2025	Incentive type	Relationship to revised proposals
Treatment works compliance	Ensuring our treatment works return wastewater back to the environment meeting the allowed levels.	% of works that are compliant with numeric permits	99.4	100	Underperformance payments only	A common performance commitment that will monitor our performance against permit limits for P
Working with catchment partners to improve natural capital	Delivering projects with partners that have wider benefits to the natural environment as well as protecting our water supplies and local rivers.	Number of schemes	29 in 2016-17	36	Outperformance and underperformance payments	Monitors number of catchment projects that are delivered and captures the associated natural capital benefits,
Kilometres of river improved – (WINEP)	The improvements made to waterbodies in our region through the delivery of our statutory obligations	Km of river improved	n/a	771	Underperformance payments only	Monitoring of delivery of the agreed WINEP
Kilometres of river improved (non-WINEP)	Improving river quality by reducing the amount of unwanted nutrients.	Km of river improved above the legal requirement	n/a	>0	Outperformance payments only	This PC will incentivise delivery of environmental improvements beyond our obligations

6. Summary of proposals

The table below provides a summary of our proposals, based on the details provided above.

Heading	Summary
Brief description	Water Industry National Environment Programme (WINEP) Water Framework Directive (WFD) Phosphorus removal programme, which will provide river water quality and wider environmental improvements.
Value (totex) 2020-25	£182m
Price control	Wastewater network plus
Need for cost adjustment	Our understanding is that cost allowances for environmental enhancement schemes under WINEP, such as phosphorus removal, will be assessed by Ofwat based on the business plan tables and submission. Thus we did not include a cost adjustment claim for this programme in the submission in May 2018.
Management control	As mentioned in section 4 above we have worked hard with the EA to agree a phased programme for the Wastewater flow programme, and do not consider that there are any further opportunities to phase this programme. This document sets out our proposals for phasing the phosphorus removal programme.
Need for investment	The requirements of the WINEP are statutory obligations. The WINEP will deliver environmental improvements and the water company contribution to the next River Basin Management Plan (2022 to 2027). Our customer research has shown very strong support for environmental improvements in our region. The customer research and WINEP have both been discussed in detail with our customer challenge group (the Wessex Water Partnership).
Best option for customers	We have considered the full range of options for all the WINEP drivers; the evidence of our options assessment process will be provided in our business plan submission in September 2018. Our innovative alternative proposals for phosphorus removal comprises a combination of asset and catchment solutions. Adopting this approach meets customer priorities for environmental improvements, and is in line with the

Heading	Summary
	preferences of our customers that the means of delivery are sustainable and holistic. This phased approach will deliver at least the same tonnage of phosphorus removed by Dec 2027 as the baseline included in WINEP3 issued in March 2018. However, the cost over the five years of the next price control period will be £52m less totex than WINEP3. Furthermore, the catchment interventions will achieve wider benefits than just phosphorus reduction and will assist in beginning to deliver the government's 25-year Environment Plan. Thus we consider that this approach is the best value option for customers and for the environment. Risk has been assessed. We are proposing a programme of river water quality modelling improvements to ensure that investments are made based on the best available scientific information. The phased programme provides sufficient flexibility such that should further asset interventions be required after 2025, they can still be delivered by the end of 2027 (which coincides with the end of River Basin Management Plan).
Robust and efficient costs	We have challenged the scope and cost estimates for all PR19 projects. The vast majority of the costs have been benchmarked externally and third part assurance is underway. The evidence will be provided in our business plan submission in September 2018.
Customer protection	Our business plan includes four performance commitments specifically related to river water quality that will be used to hold us to account for delivery of the programme.
Affordability	The full cost of WINEP3 was included in our draft business plan. Customer acceptability testing has just been finished and the testing has shown very high levels of acceptability for our plan. The testing is designed to test the affordability of our overall package of service improvements and bill impacts, including statutory obligations.
Board assurance	To date Board assurance includes: • discussion of WINEP at meeting of non-executive directors in April 2018

Heading	Summary
	• overall agreement of the draft business plan at WWSL Board in May 2018. The programme will form part of our business plan submission in September 2018, which will be subject to full Board assurance before submission.

In addition in the following table we have added a cross check against the criteria for assessing water company proposals included in the EA guidance dated 6 June 2018.

EA guidance	Response
1. Confirmation that delayed measures will be complete by 31 Dec 2027	We confirm that all measures will be completed by 31 Dec 2027.
2. Evidence that a delay in implementing a measure will lead to additional environmental/customer/ natural capital outcomes - e.g. more km river enhanced, biodiversity / habitat enhancements, improved natural flood management	In sections 3.1.6 and 3.1.7 we set out the additional benefits that our proposed approach will deliver. The alternative approach will also enable an early start to delivery of the government's 25-year Environment Plan
3. Evidence that a delay in implementing a measure will lead to less overall cost/value for money	As explained in section 3.1.7, the proposed approach is lower cost, will provide a higher net benefit and greater benefit/cost ratio.
4. Details on the effectiveness of any proposed alternative or innovative approach	In in sections 3.1.3 to 3.1.5 we set out the proposed approach and the evidence of its effectiveness. We have assessed the risk that the required objectives are not achieved. Our approach is adaptive such that additional catchment work or asset solutions can be introduced if required, based also on the findings of improved river water quality modelling.
5. Assurance that regulatory requirements will still be met	We confirm that our statutory obligations will be met.
6. Assurance that the delay will not increase the infraction risk to the UK by failing to be legally compliant.	We are unable to assure the proposed approach will increase the risk of infraction. We consider that this is a topic for the EA and Defra to assure.

Appendix A – Joint letter from Defra/EA/Ofwat & EA guidance

Department for Environment Food & Rural Affairs

Environment Agency

Ofwat

Our ref:
Your ref:
Date: 23 May 2018

To: Regulatory Contacts in Water and Sewerage Companies in England

PR19: Water Industry National Environment Programme (WINEP)

On 29 March 2018, you were sent the Water Industry National Environment Programme (WINEP) which sets out the measures that both the Environment Agency (EA) and Natural England expect you to deliver for the period 2020-2025.

We have set an ambitious programme of work and we expect all water companies to meet the objectives in WINEP by 2025 as the water sector continues to play an important role in protecting the environment.

At the same time, however, we recognise that for some of you the practicalities of delivering a large programme could stifle innovation and catchment approaches, add additional affordability pressures and inhibit some areas of long term, sustainable investment in natural resilience.

Defra, Ofwat and EA have agreed that we will consider cases of genuine need to extend the timeframe for delivery to support long term sustainable outcomes and to maximise environmental benefit. These will be on an exception basis and where the proposals would comply with legal obligations.

The investment areas that could be considered for delivery beyond 2025 are:

- Water Framework Directive enhancements (where you are seeking to ensure innovation, partnerships, multiple benefits and catchment approaches), and
- Wastewater flow programme (where you can demonstrate that there are clear and well-defined prioritisation criteria based on environmental risk).

We restate the proposal made by the EA on release of the WINEP at the end of March 2018 regarding alternative or innovative approaches. The measures in the WINEP represent the basic requirements needed for each of the environmental drivers. They also present an opportunity to develop alternative approaches that will achieve benefits for customers, biodiversity, forestry, communities or our natural capital.

What you need to do

If you can demonstrate that a longer time frame would result in better environmental outcomes for less overall cost/value for money, then the EA and Ofwat will review each case. We will assess whether a longer period of investment meets legal obligations whilst having the best outcomes for the environment.

Innovative approaches to delivering better outcomes, working in partnership, aligning investment and delivering a mix of hard engineering and softer catchment measures are welcome where there is a compelling case and firm commitment.

Early dialogue to discuss proposals with regulators is essential to ensure viable business plans are submitted on time. A case for a delayed delivery of WINEP measures that does not have sufficient evidence risks being rejected.

A case with supporting evidence should be submitted to the EA and Ofwat in parallel by 30 June, for a decision by 30 July on whether it meets environmental outcomes and offers a better outcome for the environment and customers. The EA will engage with Ofwat prior to sending a decision to the company by the end of July for inclusion within Business Plans. Through the determination process Ofwat may also then take a view on affordability and integration with other aspects of the business plan.

Signed

Kirstin Green
Deputy Director, Water Quality
Defra

John Russell
Senior Director, Strategy and planning
Ofwat

Tony Grayling
Director, Sustainable Business and Development
Acting Executive Director
Environment Agency

PR19 Extending the timeframe for delivery for the WINEP3 Water Framework Directive enhancements and the wastewater flow programme

06 June 18 v0.4

Background

On 29 March 2018, water companies were sent the Water Industry National Environment Programme (WINEP) which sets out the measures that both the Environment Agency and Natural England expect companies to deliver for the period 2020-2025. On 23 May 2018 Defra, Ofwat and the Environment Agency jointly wrote to the water companies advising them of the opportunity to extend the timeframe for delivery of parts of the WINEP in order to achieve better, more sustainable outcomes. Timeframes for delivery beyond 2025 will be agreed on an exception basis where the proposals comply with legal obligations.

In order to take up the opportunity to extend the delivery timeframes water companies must submit a business case with supporting evidence to the Environment Agency and Ofwat by the 30 June. We will send a decision back to water companies by the end of July.

This briefing identifies the areas where delivery beyond 2025 can be considered and the criteria that we will use to determine whether measures are eligible for an extended timeframe. Meeting these criteria does not guarantee that an extended timeframe will be agreed as the final decision will be made jointly by the Environment Agency and Ofwat.

What drivers and measures are eligible for delivery beyond 2025?

Some aspects of the WINEP3 have been excluded from the opportunity to extend timeframes i.e. those drivers which were not available for extensions before the original Secretary of State decision.

Two investment areas can be considered for delivery beyond 2025:

Water Framework Directive enhancements:

- WFD_IMP: Wastewater measures or alternative measures only
- LWFD: Wastewater measures or alternative measures only

The following drivers are not included: WFD_IMP_CHEM, WFD_IMP_FISH, WFD_IMP_WRflow, and WFD_IMP_WRHMWB. Chemicals has been specifically excluded because

a) We have a well-defined programme which we have developed with the water companies.

b) We have taken little action on chemicals so far and delaying these measures could increase infraction risk.

Environment Agency

Wastewater flow programme:

- Requests for extensions to the wastewater flow programme should only relate to U_IMP5 and U_IMP6 drivers.

What are the criteria for assessing water company proposals?

Water Framework Directive enhancements:

Water company proposals to extend delivery of WFD IMP measures beyond 2025 must include:

1. Confirmation that delayed measures will be complete by 31 Dec 2027.
2. Evidence that a delay in implementing a measure will lead to additional environmental/customer/ natural capital outcomes - e.g. more km river enhanced, biodiversity / habitat enhancements, improved natural flood management.
3. Evidence that a delay in implementing a measure will lead to less overall cost/value for money
4. Details on the effectiveness of any proposed alterative or innovative approach.
5. Assurance that regulatory requirements will still be met
6. Assurance that the delay will not increase the infraction risk to the UK by failing to be legally compliant.

WFD_IMP measures would not be considered for timeframe extensions if there is an improvement, monitoring or prevent deterioration at the same site that is not WFD_IMP. If the non WFD_IMP driver is related to Natural England then the potential timeframe extension should be discussed with them.

Wastewater flow programme:

The delivery of flow programme measures can be extended up to December 2030. The criteria for eligibility for timeframe extension are:

- Category 1 – WwTW where other quality or growth or maintenance schemes are planned for AMP7, this allows synergies to be realised and also prevents other planned improvements from being implemented and followed later by flow driver improvements.
- Category 2 – WwTW discharging into waterbodies failing for parameters associated with storm sewage discharges, e.g. invertebrates, DO, ammonia rather than just P. For storm tank outputs there must also be a requirement for a 25% or more increase in capacity.
- Category 3 – Where a WwTW doesn't fit into either of the above categories.

We expect all three categories of flow compliance measures to be delivered within AMP7 except where these are related to significant growth measures (category 1). The water company must submit evidence to demonstrate the growth measure cannot be delivered in its entirety within AMP7, but will span into AMP8.

If there is another driver, which is amber or green in certainty, alongside the flow compliance measure we expect the flow compliance measure to be delivered in AMP7.

The water companies may submit evidence to show that they view category 3 measures as unaffordable. Affordability discussions should not impact category 1 and category 2 measures. Any timeframe extension requests related to affordability concerns for category 3 will be passed to Ofwat for a view.

Environment Agency

Who is undertaking the review?

Timeframe extension requests should be by exception and we are expecting only a small number of proposals from the water companies. To reduce pressure on Area colleagues the review will be led by E&B and National Operations including Account Managers. We expect water companies to liaise with their Account Managers early on their proposals.

Anyone receiving water companies' timeframe extension proposals should email them to the PR19 Delivery inbox. These will be circulated to Environment and Business functional leads and Account Managers who will both take a view on the proposals. These will be discussed at an internal consistency panel meeting in mid-July.

What is the process for feeding back to companies and updating the WINEP?

The WINEP will not be updated and released on 30 July. This update will happen at a later date. The precise timescale and process is still to be confirmed but we will share this as soon as we are able.

Contacts

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Appendix B – Phosphorus desk study for River Stour

Stour Catchment

Potential for phosphorus offsetting

Executive summary

A three stage process has been taken for the 'screening', 'opportunity assessment', and 'scoping' of potential phosphorus offsetting opportunities (see figure 1).

Following the initial screening of the works in the Stour catchment requiring phosphorus removal, 5 were identified as possible sites where phosphorus offsetting may be a suitable option. The initial screening was based upon required phosphorus removal and annualised TOTEX per kg of phosphorus removed at the asset. The identified works are: Iwerne Minster STW in the Iwerne sub-catchment, Marnhull (Reed Beds) STW in the Stour (Middel u/s Pimperne Brook) sub-catchment, Mere STW in the Shreen sub-catchment, Templecombe STW in the Bow Brook North sub-catchment and Wincanton STW in the Cale sub-catchment (see figure 2).

This note has three elements. Firstly, the results of the second stage of 'opportunity assessment' for the Stour are reported. Secondly, the method for the scoping stage, using Farmscoper are provided, with a worked example. Finally, notes are provided on how the scoping process may be followed through to support delivery and quantification.

For the Stour, opportunities for phosphorus offsetting come in the form of a proposed 'hybrid-option'. This is where phosphorus is removed at a works down to 1mg/l and the remaining balance is offset within the catchment.

Assessment of the opportunity for offsetting was carried out by simply expressing the target offsetting quantity as a percentage of estimated agricultural phosphorus loading in the associated waterbody catchment. Arbitrarily, any value much above 10% was considered as probably not viable for offsetting. Soils and land-use data was used to provide context.

Table 1 is a summary of the opportunity assessment. The main points to take from this assessment are:

- Offsetting for 'Marnhull (Reed Beds)' in Stour (Middle), 'Mere STW' in Shreen Water and 'Templecombe STW' in Bow Brook North, is potentially viable.
- Offsetting for Wincanton STW in the Cale is border-line possible.
- Offsetting for 'Iwerne Minster STW ' in Iwerne appears to be unviable.

It is important that before any investment decisions are made, a more detailed scoping of these catchments is required. This is achieved using Farmscoper, the method for which is presented in this note using the Shreen Water sub-catchment as a worked example.

Finally, notes are provided on how this scoping process may be followed through to delivery and quantification to support advisors in delivering offsetting in a joined up, cost-effective and impactful manner. Some points are provided on how the issue of using Farmscoper at smaller spatial scales for quantification can be overcome.

Table 1: Summary of initial opportunity scoping for phosphorus offsetting in the Stour catchment

Site	Waterbody	Target (kg/yr)	Offsetting viable?	Reason
Iwerne Minster Stw	Iwerne	80	Probably not	Target 38% of estimated agri. Baseline. 97% well drained soils ~93% "int." agriculture
Marnhull (Reed Beds) Stw	Stour (Middle u/s Pimperne Brook)	80	Possibly	Target 2.6% of estimated agri. Baseline. 56% well drained soils ~82% "int." agriculture
Mere Stw	Shreen Water (including Ashfield Water)	164	Possibly	Target 9.9% of estimated agri. Baseline. 49% well drained soils and 48% slowly permeable ~88% "int." agriculture
Templecombe Stw	Bow Brook North	90	Possibly	Target 7.2% of estimated agri. Baseline. 67% slowly permeable soils ~74% "int." agriculture
Wincanton Stw	Cale	410	Possibly	Target 11.5% of estimated agri. Baseline. 71% slowly permeable soils ~91% "int." agriculture

1. Introduction and details of Stour waterbodies and possible phosphorus offsetting

A three stage process has been adopted in assessing the scope for phosphorus offsetting in the Stour (figure 1). Stage 1, the initial screening, was based upon the required phosphorus removal and annualised TOTEX per kg of phosphorus to be removed. Stage 2 was a cursory assessment of the viability of offsetting in the associated catchments to achieve the quantity reductions required. The final stage was a more involved scoping of catchments using Farmscoper, informed by detailed desktop studies, catchment walkovers, available agricultural datasets and expert advice, to assess the realistic quantities of phosphorus that may be offset and the associated cost.

Following the initial screening of potential phosphorus offsetting sites for the Stour catchment, 5 sites were identified (see table 2 and figure 2). These are examples of sites where an offsetting/asset 'hybrid-solution' may be possible. The proposed phosphorus 'hybrid-solution' is phosphorus removal at treatment works to 1mg/l, combined with catchment management in the associated waterbody catchment to offset the difference between 1mg/l and the proposed WINEP concentration. The rationale for this is the 'step-change in costs when targeting below a 1mg/l consent', which at small treatment works can be non-cost-effective.

The purpose of this document is to report the results of the stage 2 'cursory opportunity assessment' for the phosphorus offsetting in the Stour catchment, provide the method and an example of the in-depth scoping. There is are some notes on how this process may aid delivery and quantification.

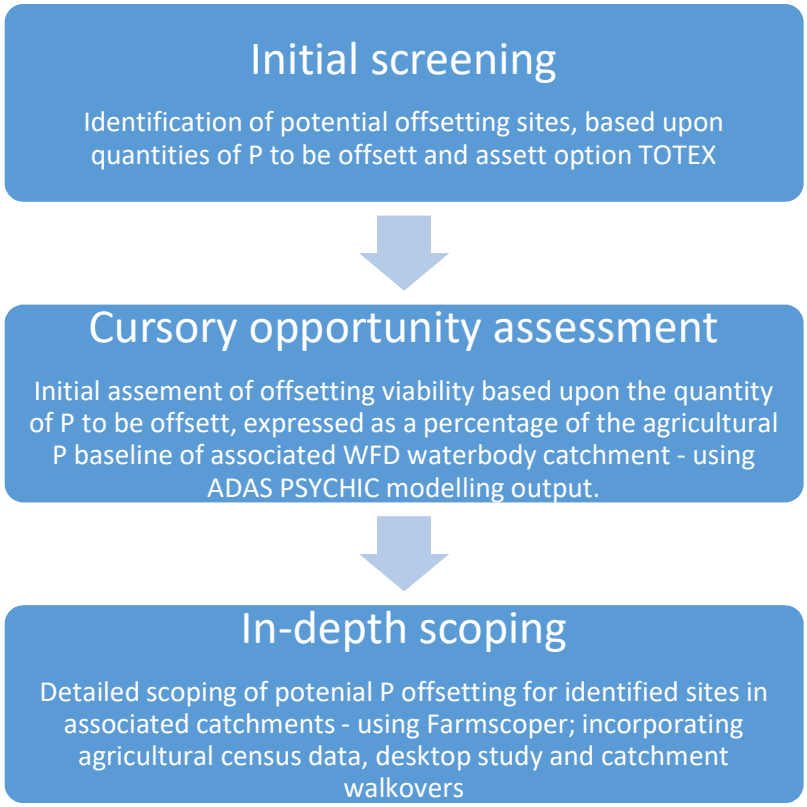

Figure 1: Screening, assessment and scoping process for phosphorus offsetting

Table 2 lists the works identified from the initial screening and associated waterbody catchments. Table 2 also provides the calculated amounts of phosphorous that would require offsetting for each works.

Table 2: Potential phosphorus offsetting sites and associated waterbodies in the Stour catchment

Waterbody name	Waterbody area (ha)	Site	Possible offsetting target (kg)
Iwerne	1932	Iwerne Minster Stw	80
Stour (Middle u/s Pimperne Brook)	7244	Marnhull (Reed Beds) Stw	80
Shreen Water (including Ashfield Water)	3121	Mere Stw	164
Bow Brook North	2056	Templecombe Stw	90
Cale	6460	Wincanton Stw	410

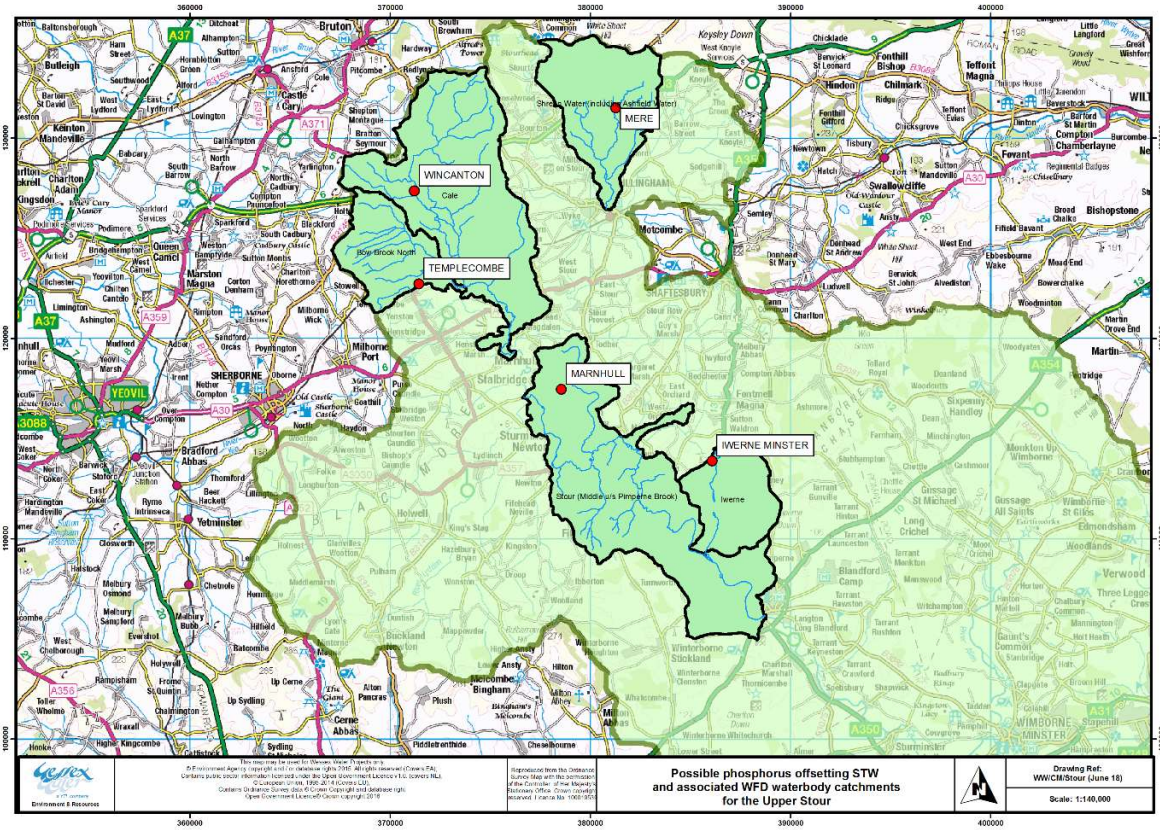

Figure 2: Map of potential phosphorus offsetting sites and associated waterbodies in the Stour catchment

2. Stage 2 'opportunity assessment' method

This Stage 2 opportunity assessment was based upon a desktop study, carried out using the following available datasets.

- Wessex Water (WW) treatment works phosphorus removal costing spreadsheet (J. Rayers 24/05/18)
- The ADAS 2010 PSYCHIC modelled output for the agricultural phosphorus loading (used under CaBA agreement)
- The Cranfield NSRI NATMAP soil series data for soil drainage status
- British Geological Survey hydrogeological layer (used under CaBA agreement)
- CEH 2007 Landuse data (used under CaBA agreement)
- RPA's CROME 2017 cropping data

Phosphorus offsetting quantities (taken from the WW costing spreadsheet) were used in conjunction with the PSYCHIC estimated agricultural phosphorus loadings to give an indication of the percentage of agricultural loading that would need to be reduced to offset the treatment works, in catchment. Anything much greater than 10% would suggest that phosphorus offsetting is probably not viable. The remaining datasets were used to provide context and explanation to the assessment and to help sense check the potential opportunity for phosphorus offsetting.

a. Stour PSYCHIC 2010

Table 3 and figure 3 present the results of the PSYCHIC (ADAS 2010) analysis of agricultural phosphorus loading in the Stour catchment. From this it appears that:

- Offsetting for 'Marnhull (Reed Beds)' in the Stour (Middle), 'Mere STW' in the Shreen Water and 'Templecombe STW' in the Bow Brook North, is potentially viable.
- Offsetting for Wincanton STW in the Cale is border-line possible.
- Offsetting for 'Iwerne Minster STW ' in Iwerne appears to be unviable.

Table 3: Required phosphorus offsetting for each waterbody, as a percentage of estimated agricultural loading (based upon the ADAS 2010 PSYCHIC modelled output)

Waterbody name	Waterbody area (ha)	PSYCHIC 2010 est. P load (kg)	Possible offsetting target (kg)	Target as percentage of baseline
Iwerne	1932	210	80	38%
Stour (Middle u/s Pimperne Brook)	7244	3067	80	2.6%
Shreen Water (including Ashfield Water)	3121	1644	164	9.9%
Bow Brook North	2056	1255	90	7.2%
Cale	6460	3572	410	11.5%

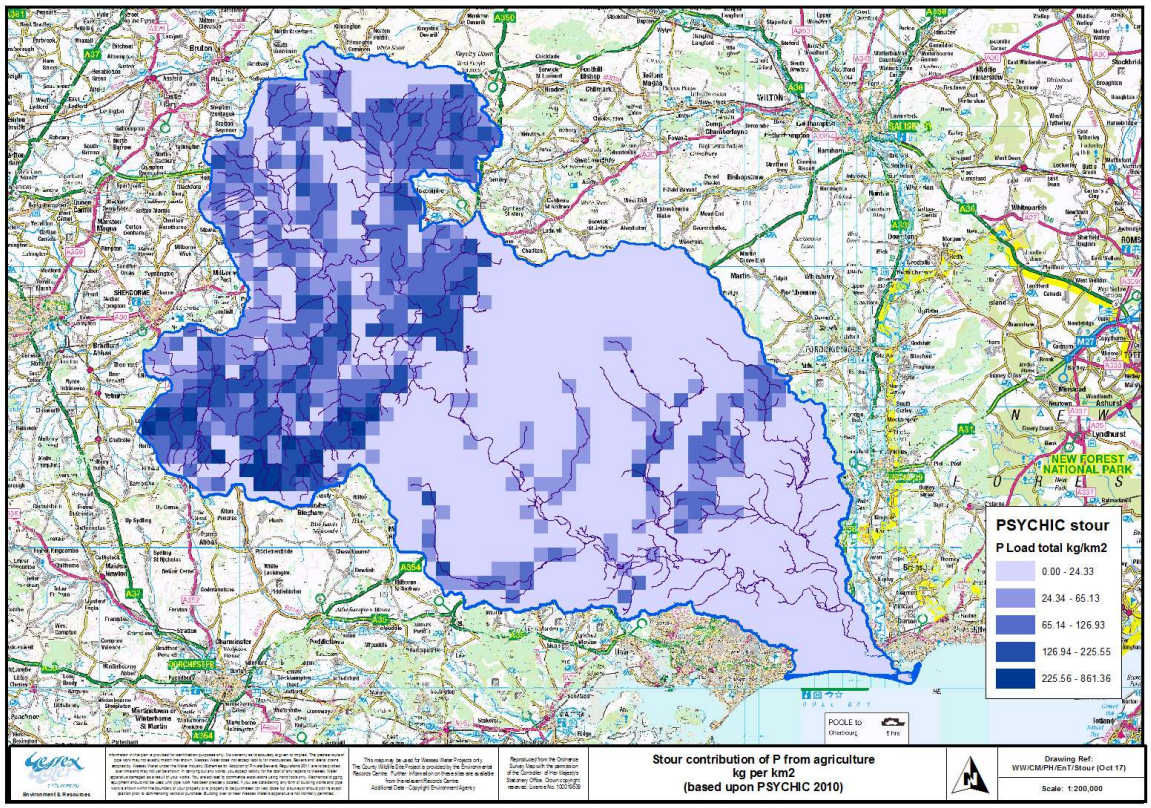

Figure 3: Map of the ADAS 2010 PSYCHIC modelling for the Stour catchment

b. Stour soils and geology

Table 4 and figure 4 present the results of the soil drainage analysis for the various shortlisted waterbody catchments for the Stour. Soil drainage is a key factor when considering catchment management of phosphorus. This is because less-permeable soils tend to result in a greater loss of phosphorus, due to the phosphorus bound to soil being lost through erosion of the soil washed into watercourses. However although less is lost in freely draining catchments it is arguable that a greater percentage of that which is lost is preventable cost-effectively. This is due to it being easier to disrupt overland flow pathway than preferential flow. Therefore freely draining catchments shouldn't necessarily be automatically ruled out, but it is important to be realistic about what may be achieved.

From figure 4 it is clear that there is a split in the soil drainage status of the Stour, between the upper Stour catchments and the middle and lower Stour catchments. This reflects the pattern of estimated agricultural P losses provided by the PSYCHIC modelled outputs (figure 3) and may be explained by the catchment's geology – see figure 5 which shows that middle Stour are predominantly chalk.

The shortlisted sub-catchments are located towards the upper end of the Stour. Two of the shortlisted waterbody catchments in the Stour have a greater proportion of slowly permeable soils than well drained. The Iwerne, which is predominantly free draining and the Stour (Middle u/s Pimperne Brook) and Shreen Water catchments are split between free draining and slowly permeable soils.

For the Iwerne, the predominantly well drained soils are most likely a key factor in the modelled low P loading from agriculture. And it is the low loading combined with the relatively small size of the waterbody that means there is most likely not enough P from agriculture to offset the target.

For the Stour Middle and Shreen, the geographical splits between well-drained and slowly permeable soils, suggest that the success of phosphorus offsetting in these catchments will require carful targeting of measures.

Table 4: Soil drainage by area for the potential hybrid solution waterbodies of the Stour catchment

	Area (ha)	Area (%)
Bow Brook North	**2026**	**100.00%**
Affected by groundwater	262	12.93%
Slowly permeable	1354	66.84%
Well drained	410	20.23%
Cale	**6414**	**100.00%**
Affected by groundwater	746	11.64%
Lake	1	0.01%
Slowly permeable	4575	71.32%
Well drained	1067	16.64%
#N/A	25	0.39%
Iwerne	**1932**	**100.00%**
Affected by groundwater	38	1.95%
Lake	4	0.22%
Moderately permeable	13	0.65%
Well drained	1877	97.18%
Shreen Water (including Ashfield Water)	**3086**	**100.00%**
Lake	1	0.04%
Moderately permeable	111	3.59%
Slowly permeable	1470	47.63%
Well drained	1504	48.74%
Stour (Middle u/s Pimperne Brook)	**7244**	**100.00%**
Affected by groundwater	702	9.69%
Lake	0	0.00%
Permeable	113	1.56%
Slowly permeable	2401	33.14%
Well drained	4028	55.60%

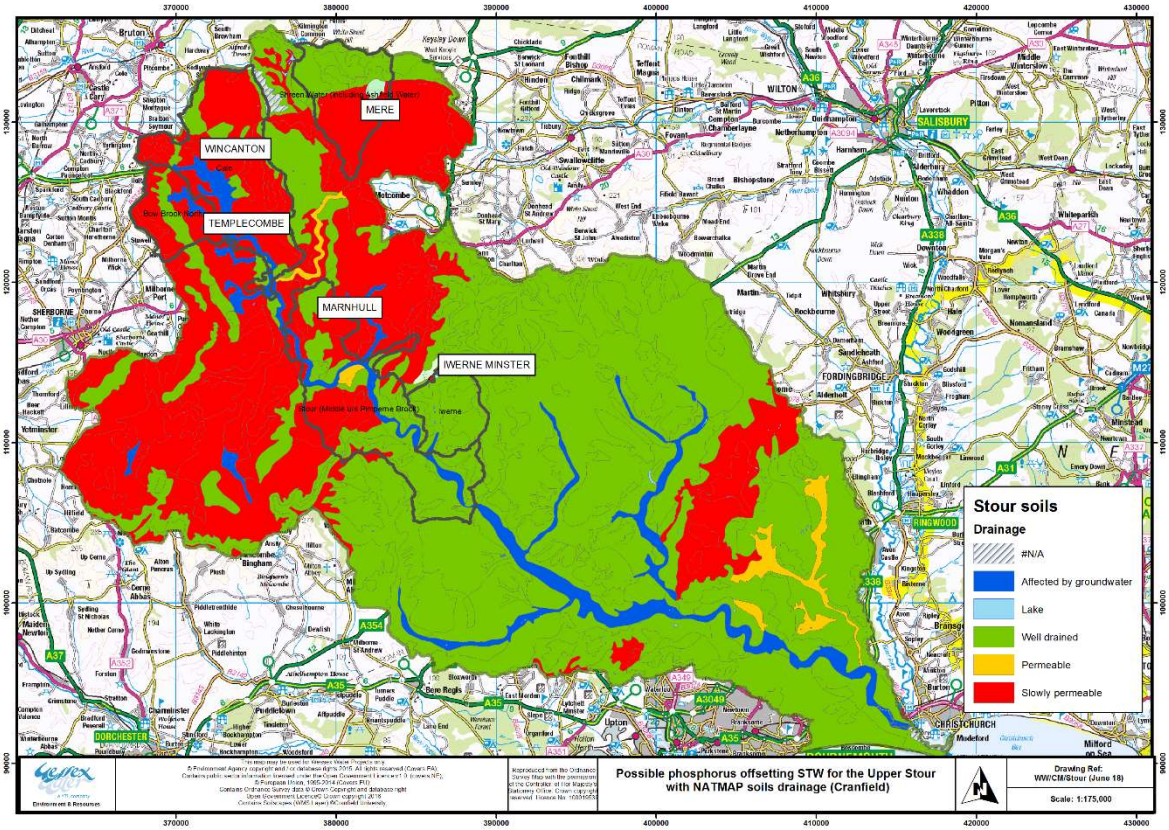

Figure 4: Map of soil drainage for the Stour catchment

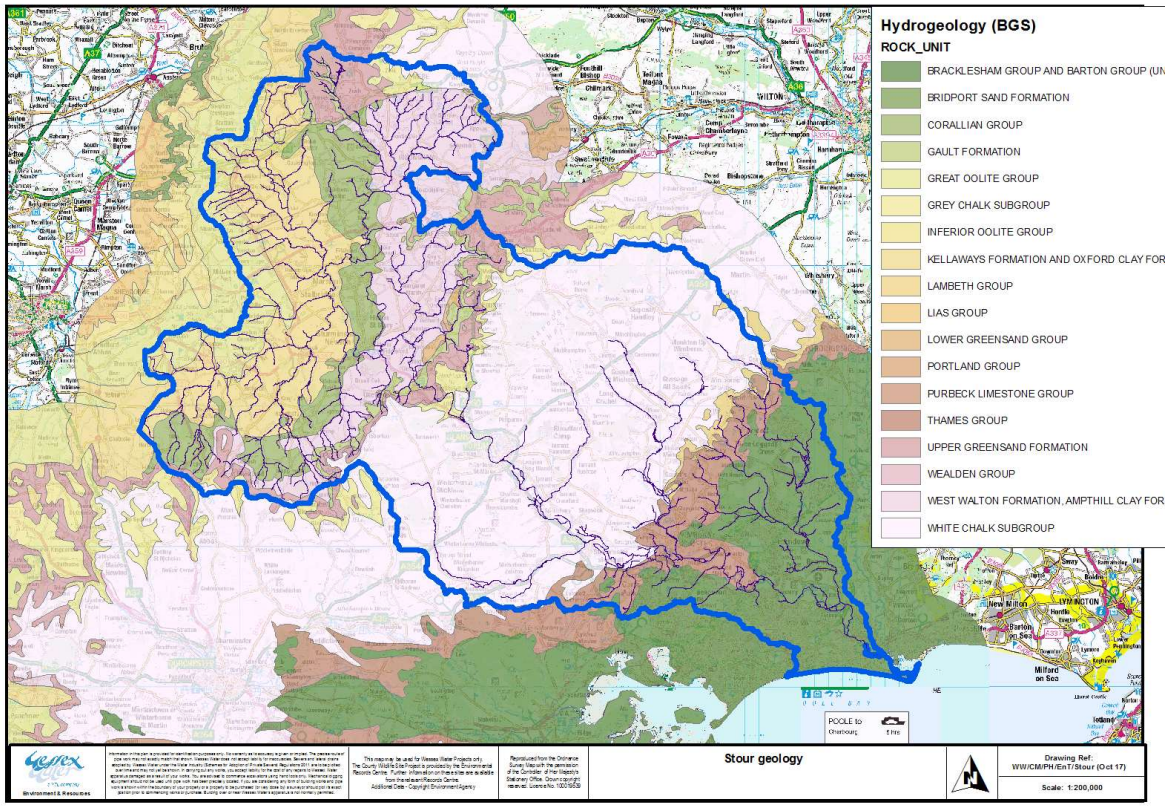

Figure 5: Map of the Stour catchment hydrogeology

c. Land use

Table 5 and figure 6 present the results of the CEH 2007 land use dataset for the various shortlisted waterbody catchments of the Stour; and figure 7 the RPA's CROME cropping 2017 dataset. Again, from figures 6 and 7, it is apparent that there is a pattern in Stour farming, which matches that of the geology. As would be expected farming in the well-drained chalk middle catchments is predominantly arable, whilst Farming in the slowly permeable soils of upper catchments is pastoral.

For the shortlisted sub-catchments (excluding the Iwerne) there are high percentages of 'improved grassland' (see table 6). 'Improved grassland' is grassland improved by management practices such as top dressing with fertilisers or organic manures. As such this suggest good opportunity for offsetting measures.

Table 5: Land use by area for the potential phosphorus offsetting waterbodies of the Stour catchment (CEH 2007)

	Area (ha)	Area (%)
Bow Brook North	**2026**	**100.00%**
Arable and horticulture	668	32.97%
Broad leaved, mixed and yew woodland	87	4.27%
Built up areas and gardens	40	1.98%
Coniferous woodland	4	0.22%
Dwarf shrub heath	1	0.04%
Freshwater	1	0.03%
Improved grassland	1177	58.08%
Inland rock	1	0.02%
Neutral grassland	17	0.82%
Rough low-productivity grassland	32	1.58%
Cale	**6414**	**100.00%**
Arable and horticulture	1971	30.74%
Broad leaved, mixed and yew woodland	170	2.65%
Built up areas and gardens	194	3.02%
Coniferous woodland	94	1.47%
Dwarf shrub heath	0	0.00%
Fen marsh and swamp	1	0.01%
Freshwater	11	0.16%
Improved grassland	3816	59.49%
Inland rock	0	0.00%
Neutral grassland	68	1.06%
Rough low-productivity grassland	90	1.40%
Iwerne	**1932**	**100.00%**
Arable and horticulture	1122	58.09%
Broad leaved, mixed and yew woodland	189	9.81%
Built up areas and gardens	40	2.09%
Calcareous grassland	1	0.03%
Coniferous woodland	17	0.90%
Freshwater	3	0.14%
Improved grassland	457	23.68%
Inland rock	5	0.25%

Neutral grassland	2	0.10%
Rough low-productivity grassland	95	4.91%
Shreen Water (including Ashfield Water)	**3086**	**100.00%**
Arable and horticulture	1439	46.64%
Broad leaved, mixed and yew woodland	60	1.93%
Built up areas and gardens	167	5.40%
Calcareous grassland	195	6.32%
Coniferous woodland	22	0.72%
Dwarf shrub heath	1	0.04%
Freshwater	1	0.04%
Improved grassland	1150	37.26%
Neutral grassland	21	0.68%
Rough low-productivity grassland	31	0.99%
Stour (Middle u/s Pimperne Brook)	**7244**	**100.00%**
Arable and horticulture	2915	40.24%
Broad leaved, mixed and yew woodland	769	10.61%
Built up areas and gardens	357	4.93%
Calcareous grassland	20	0.28%
Coniferous woodland	41	0.56%
Freshwater	4	0.05%
Improved grassland	2787	38.46%
Inland rock	15	0.21%
Neutral grassland	105	1.45%
Rough low-productivity grassland	232	3.20%

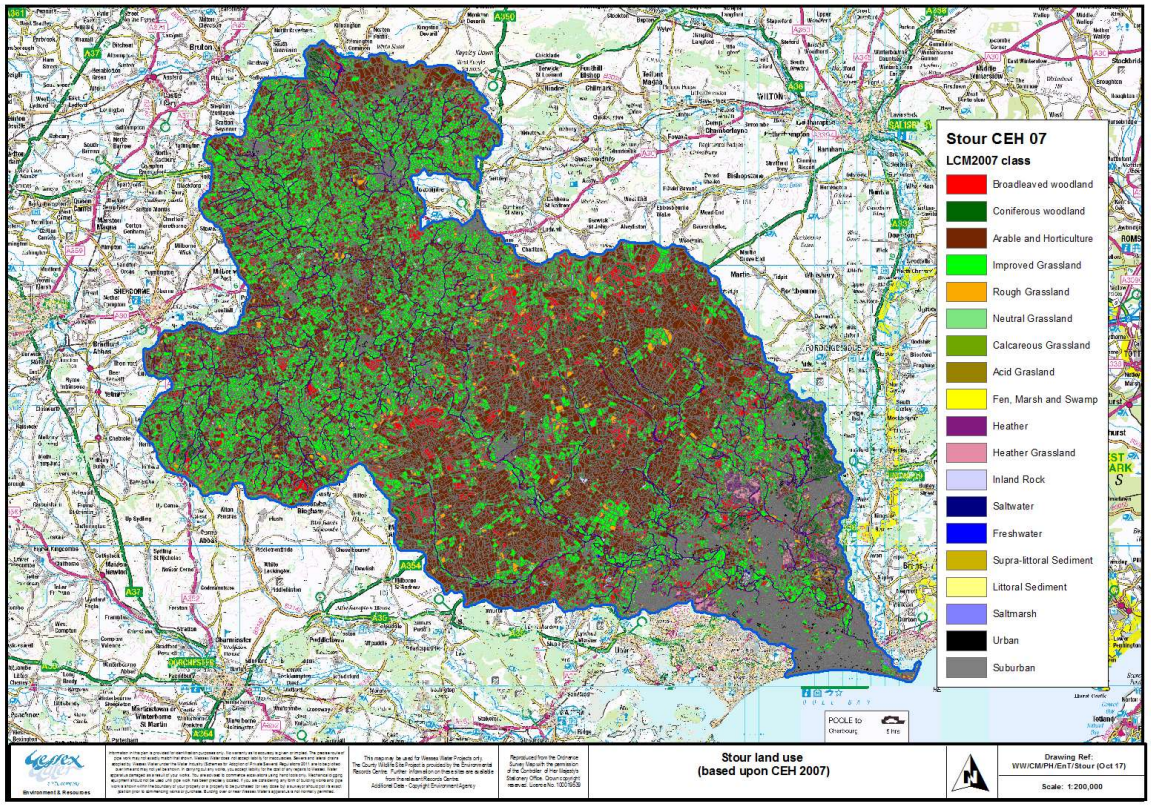

Figure 6: Map of Landuse for the Stour catchment (CEH 2007)

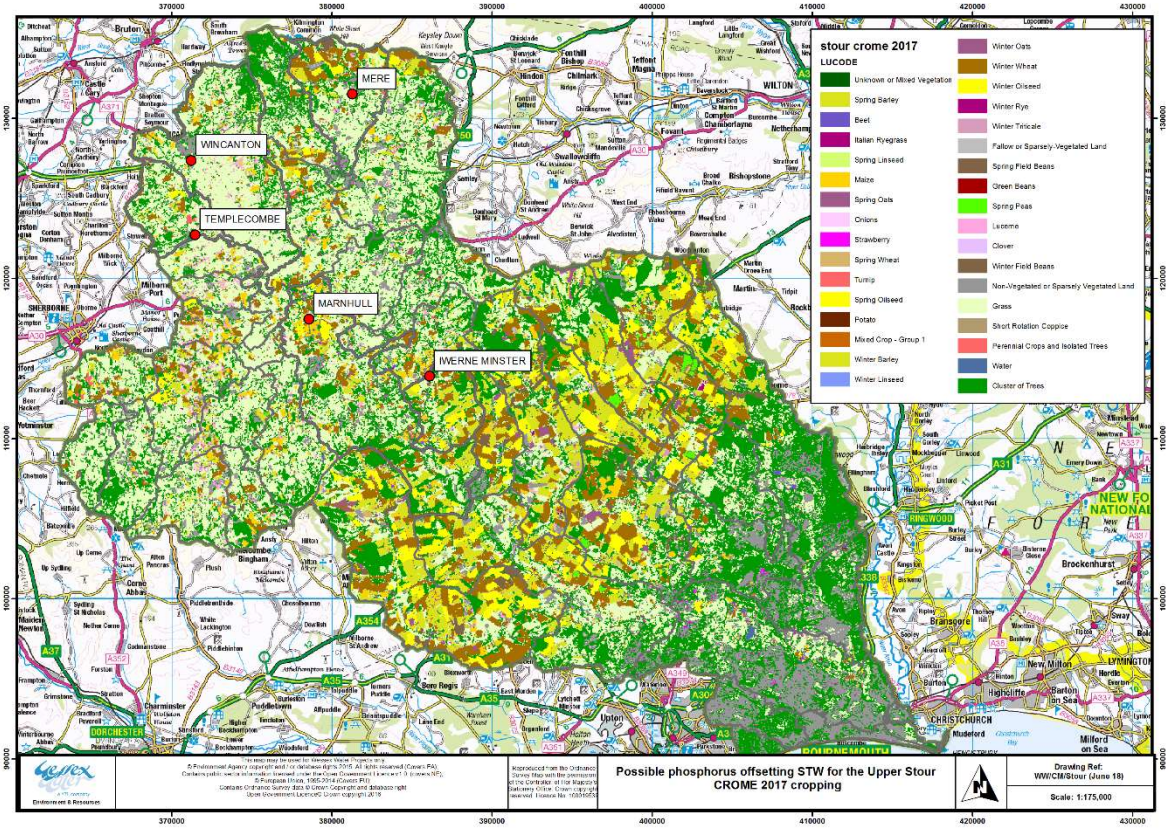

Figure 7: Map of 2017 cropping in the Stour catchment (RPA CROME 2017)

3. Example Stage 3 Farmscoper scoping

For those sub-catchments that appear to be viable for phosphorus offsetting, an in-depth scoping process is the next step. One way of achieving this is to use the ADAS Farmscoper tool. In this section an example of how this can be achieved is provided. Richard Gooday of ADAS, one of the authors and current lead of Farmscoper, was consulted on the process taken.

a. Method

1. An initial run of 'Farmscoper v4 WFD upscale' was carried out for the associated WFD cycle 2 waterbody catchment, incorporating the Agricultural 2015 census data and built in soils, rainfall, fertiliser rate etc. data.
2. Detailed desktop study used to check assumptions made within Farmscoper (such as percentage of fields with a watercourse) and to provide context to outputs. Datasets used include: RPA's CLAD land holdings, Cranfield Soils, BGS geology, watercourse maps, ADAS PSYCHIC, SAGIS, RPA's CROME, NVZ maps, rainfall maps and agri-environmental scheme maps.
3. Catchment walkovers were carried out. The purpose of these were to check the types of farming practice within a catchment and (using a list of cost-effective measures generated from the initial Farmscoper run) check the suitability of measures to the catchment and assumptions regarding prior uptake of measures.
4. Advisors currently active in the catchments (CSF and Wessex Water) were consulted on the list of measures and prior uptake levels.
5. Information collected during the desktop study, catchment walkovers and expert consultation was used to augment and re-run Farmscoper for the given catchments.
6. Outputs from the re-run Farmscoper runs were used in the following way to complete the scoping:
    a. Measures ordered based upon cost-effectiveness in terms of £ per kg of N loss reduced.
    b. Three levels of measure uptake were applied to the results, 10%, 25% and 50%. This was to demonstrate the impact of measure uptake upon the outcome of the offsetting.
    c. Wessex Water overhead costs were added to the measures costs. The overhead costs were scaled based upon catchment size, number of land holdings within the catchment, and degree of isolation from other potential P offsetting catchments. Within these overheads, measure costs ignored within Farmscoper or treated as no cost to the Farmer were accounted for. These were mostly related to the nutrient management planning 'advice only' measures, which although require no payment to farmers, incur a cost to Wessex Water due to soil testing, running of tools such as Planet, MannerNPK, Farmscoper etc, and writing nutrient management plans.
    d. Finally the cumulative kg offset was plotted against cumulative cost as a marginal cost curve. This could then be used to read-off the potential cost of the targeted offsetting phosphorus reduction. This is carried out on the 25% measure uptake curve, as this was deemed most realistic.

Throughout the scoping process a driving principle is that measures which disrupt phosphorus pathways go hand in hand with reducing the amount of phosphorus entering the system. This is because it is understood that if just 'pathway disrupting measures' are put in place without reducing the P entering the system, then the pathway disrupting measures may eventually become saturated and act as sources rather than sinks of phosphorus. This elevates the need to properly costs and account for nutrient management planning within the scoping, not just for those measures directly related to NMP but for the overall management of P.

It is perceived that to get farmers to carry out the NMP 'advice only' measures, a certain amount of 'paid' measures will be required and wrapped up as a package. As such a 1:2 overhead:payments ratio was aimed at for in the scoping.

Having sufficient advisors in place is critical to the success of any phosphorus offsetting.

b. Worked example

Figure 8 is an example result of the scoping for the Shreen catchment. Cumulative offset P per year (x-axis) is plotted against cumulative cost per year (y-axis). The three curves represent three levels of measure uptake. Each point on the curves represents the reduction individual measures have for different farm type/setting. The increasing steepness of the curves reflect the decreasing cost-effectiveness of measures.

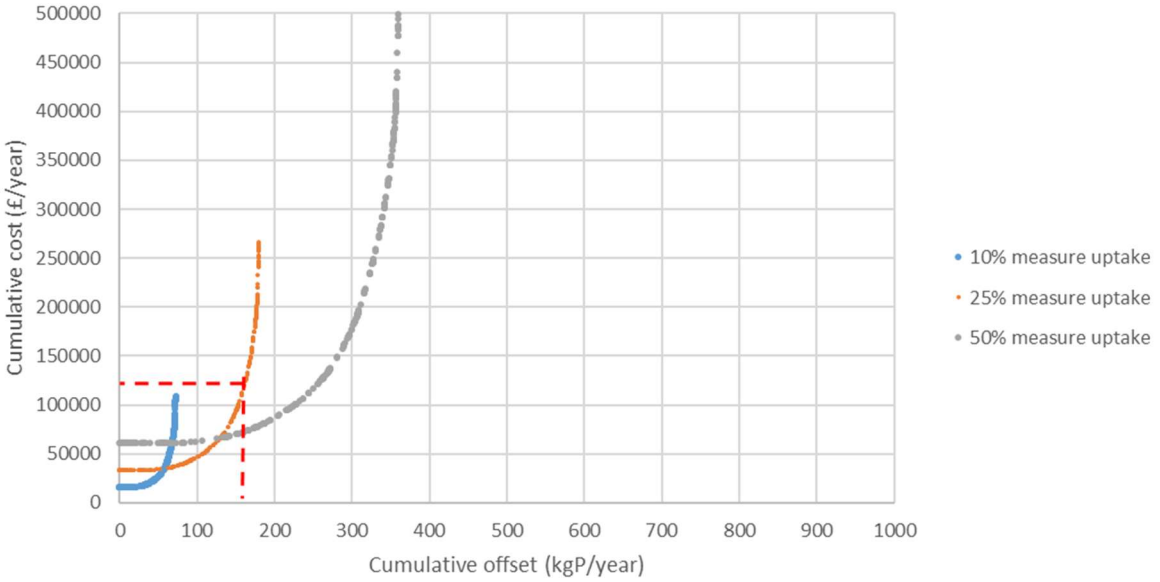

Figure 8: Scoped phosphorus offsetting for the Shreen catchment

It should be noted that the use of the Shreen sub-catchment here is purely illustrative and should not be taken to indicate in any way that there is more or less of an appetite to deliver phosphorus offsetting here than any other catchment. It should also be noted that the curves for every catchment will be very different depending upon: size of catchment, farming practices, soils, rainfall, percentage of fields with watercourses and prior uptake of measures.

Additional benefits: in addition to phosphorus offsetting being more cost-effective (in some cases) than a complete asset solution, there are other environmental benefits. Many of the measures that could be used for P offsetting also have natural flood management and biodiversity benefits.

For some parameters Farmscoper provides estimates of the reductions resulting from the phosphorus loss reducing measures. Table 6 is derived from the Farmscoper run of the Shreen sub-catchment. Unsurprisingly, sediment losses show the greatest reductions. There are also significant reductions in Faecal Indicator Organisms (FIO), nitrate and pesticide losses.

Table 6: Additional reductions of proposed measures in the Shreen sub-catchment as determined by Farmscoper

	Nitrate (kg)	Sediment (kg)	Ammonia (kg)	Methane (kg)	Nitrous Oxide (kg)	Pesticides (Units)	FIOs (10^9 cfu)	Soil Carbon (t)	Energy Use (kg CO_2)
Catchment baseline	68472	552793	46397	176095	22248	120	103371	305502	2719059
Reduction	2141	94366	302	630	658	5	4208	2297	67133
Reduction as % of baseline	3.13	17	0.65	0.36	2.96	3.77	4.07	0.75	2.47

4. Delivery and quantification

Farmscoper may be used to aid delivery and provide quantification. It can be used to help target farms in settings (farm type, soil drainage, rainfall band etc.) where measures are estimated to have the greatest impact.

For measures suitable to a catchment wide scheme approach such as cover crops etc. Farmscoper may be used to generate the effectiveness values element of an EnTrade auction/scheme.

Where a more 'whole farm' approach is more suitable, Farmscoper can be run for individual farms using specific information gathered for that farm to support an experienced advisor's 'boots on the ground' visual assessment of what is required. A bespoke shortlist of measures generated in Farmscoper can help ensure that the measures an advisor is proposing are cost-effective and help targeting by improving understanding of the farm source apportion of P loss (see figure 9).

Farmscoper may also be used to quantify the impact of delivered measures. Farmscoper has been criticised for working better at catchment rather than farm scale. It could be argued that if a measure is delivered widely enough across a catchment then this negates the issue. However, 'guidance for applying Farmscoper at small spatial scales' is now provided with the latest version of Farmscoper. Possible steps to overcoming the issue of working at smaller spatial scales could include 1) augmenting the P estimated P losses for a specific farm/field based upon soil P analysis and, 2) back working the inbuilt connectivity factor and applying localised connectivity factor for given measure. The connectivity factor could be taken from SCIMAP (see figure 10). SCIMAP may also be used to help target measures.

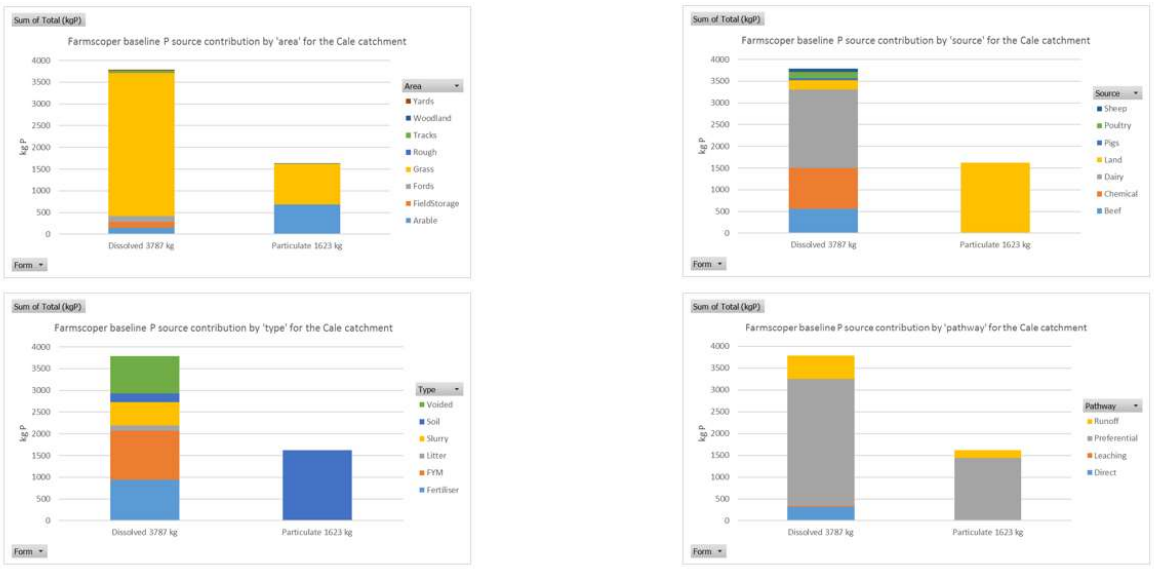

Figure 9: Example source apportionment of P losses by 'area', 'source', 'type' and 'pathway' – derived from Farmscoper.

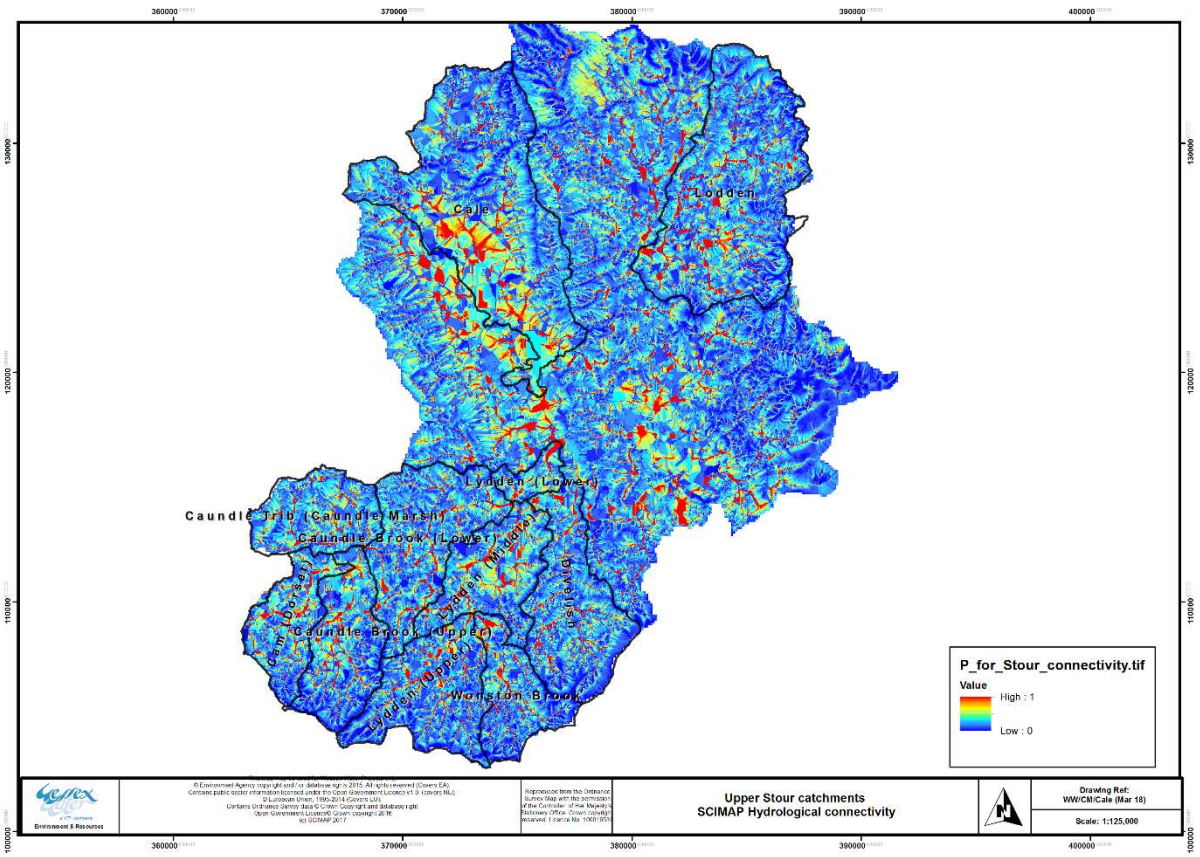

Figure 10: Stour hydrological connectivity taken from SCIMAP

Appendix C – Proposed PR19 phosphorus limits

Proposed phosphorus limits in the Parrett catchment, with complementary catchment offsetting:

Site	Primary Driver	P permits (mg/l)			
		Current Permit	WINEP3 Permit	Proposed PR19 Permit	Indicative Stretch Permit
Sites in WINEP3:					
BISHOPS LYDEARD STW	WFD_IMPg		0.75	1	0.8
BROADWAY STW	HD_IMP		0.5	0.5	
CASTLE CARY STW	HD_IMP		0.5	0.5	
CHARD STW	HD_IMP		0.5	0.5	
CHARLTON HORETHORNE STW	WFD_IMPg		3	1.5	1
CREWKERNE EAST STW	WFD_IMPg		0.25	1	0.8
EAST CHINNOCK STW	WFD_IMPg		1.9	1.5	1
HARDINGTON MANDEVILLE STW	WFD_IMPg		1.3	1.5	1
ILMINSTER STW	HD_IMP		1	1	0.8
LANGPORT STW	WFD_IMPg		3.8	1	0.8
MARTOCK STW	WFD_IMPg		3.3	1	0.8
MERRIOTT STW	WFD_IMPg		1.1	1	0.8
MILBORNE PORT STW	WFD_IMPg		0.75	1	0.8
MILVERTON STW	WFD_IMPg		1	1	0.8
NETHER STOWEY STW	WFD_IMPg		1	1	0.8
SHERBORNE STW	HD_IMP	2	0.5	0.5	
SOMERTON STW	HD_IMP		0.5	0.5	
SOUTH PETHERTON STW	WFD_IMPg		0.25	1	0.8
STOGURSEY STW	WFD_IMPg		2.1	1.5	
TAUNTON STW	WFD_IMPg	1	0.4	1	0.8
TRENT STW	WFD_IMPg		3.2	1.5	1
WELLINGTON STW	HD_IMP	2	1	1	0.8
WIVELISCOMBE (HILLSMOOR) STW	WFD_IMPg		1	1	0.8
WIVELISCOMBE (STYLES) STW	WFD_IMPg		1	1	0.8
YEOVIL (PEN MILL) STW	HD_IMP	2	0.65	0.65	
YEOVIL WITHOUT STW	WFD_IMPg		0.75	1	0.8
Sites not in WINEP3:					
Bruton STW		2		1	0.8
Ilchester STW		2.5		1	0.8
Pilton STW		2		1	0.8
Sparkford STW		2.5		1	0.8
Thornford STW		2		1.5	1

Proposed phosphorus limits in the Dorset Stour catchment, with complementary catchment offsetting:

Site	Primary Driver	P consents (mg/l)			
		Current Permit	WINEP3 Permit	Proposed PR19 Permit	Indicative Stretch Permit
Sites in WINEP3:					
HAZELBURY BRYAN STW	WFD_IMPg		2.2	1.5	0.8
HOLDENHURST STW	WFD_IMPg		0.35	1	0.8
IWERNE MINSTER STW	WFD_IMPg		0.5	1	0.8
KINSON STW	WFD_IMPg		1.5	1	0.8
MARNHULL (COMMON) STW	WFD_IMPg		3	1	0.8
MARNHULL (REED BEDS) STW	WFD_IMPg		0.5	1	0.8
MERE STW	WFD_IMPg		0.5	1	0.8
PALMERSFORD STW	WFD_IMPg		0.35	1	0.8
SHAFTESBURY STW	WFD_IMPg		0.35	1	0.8
TARRANT CRAWFORD STW	WFD_IMPg		0.5	1	0.8
TEMPLECOMBE STW	WFD_IMPg		0.5	1	0.8
WIMBORNE STW	U_IMP2		2	1	
WINCANTON STW	WFD_IMPg		0.5	1	0.8
Sites not in WINEP3:					
Cranborne STW		2		1	0.8
Stourton Caundle STW		1.5		1	0.8
Sturminster Newton STW		2		1	0.8

Retained WINEP3 phosphorus limits for other catchments:

Site	Catchment	Primary Driver	P permits (mg/l	
			Current Permit	WINEP3 Permit
BLAGDON STW	North Somerset	WFD_IMPg		0.5
CERNE ABBAS STW	Poole Harbour	WFD_IMPg		0.8
CHARFIELD STW	South Gloucestershire	WFD_IMPg		1
CHEDDAR STW	Brue and Axe	WFD_IMPg	2	0.7
CORFE CASTLE STW	Poole Harbour	WFD_IMPg		1.3
DORCHESTER STW	Poole Harbour	WFD_ND	1	0.7
EVERCREECH STW	Brue and Axe	HD_IMP	1.8	1
GLASTONBURY STW	Brue and Axe	WFD_IMPg	2	0.8
LEYHILL STW	South Gloucestershire	WFD_IMPg		1
NORTH NIBLEY STW	South Gloucestershire	WFD_IMPg		1
PIDDLEHINTON STW	Poole Harbour	WFD_ND		4
PUNCKNOWLE STW	West Dorset	WFD_IMPg		2.5
RADSTOCK STW	Bristol Avon	WFD_IMPg	1	0.7
RODE STW	Bristol Avon	WFD_IMPg		2
ROWDE STW	Bristol Avon	WFD_IMPg		0.5
SHEPTON MALLET STW	Brue and Axe	WFD_IMPg	2	0.25
TRENT STW	Parrett	WFD_IMPg		3.2
TROWBRIDGE STW	Bristol Avon	WFD_IMPg	0.8	0.5
UBLEY STW	North Somerset	SSSI_ND		0.5
WARMINSTER STW	Hampshire Avon	HD_IMP	1	0.5
WELLS STW	Brue and Axe	HD_IMP	2	1
WICKWAR STW	South Gloucestershire	WFD_IMPg		1
WINSCOMBE STW	Brue and Axe	WFD_IMPg		0.5
WOTTON UNDER EDGE STW	South Gloucestershire	WFD_IMPg		1
WRINGTON STW	North Somerset	WFD_IMPg		1

Annex 1 – Reply from EA and Ofwat dated 12 July

Environment Agency Ofwat

Andy Pymer
Managing Director
Wessex Water

Our Ref:
Your Ref:
Date: 12 July 2018

Dear Andy,

PR19: Water Industry National Environment Programme (WINEP)

Many thanks for the proposals for the timeframe extensions for Wessex Water WINEP3. We have reviewed your proposals carefully.

Water Framework Directive enhancements
We found the proposals made by Wessex Water regarding timeframe extensions in the Dorset Stour and Parrett catchments well thought out. We support the approach of long term catchment interventions alongside cost effective and optimised asset solutions, phased over the period 2020 to 2027. We are pleased that Wessex Water have recognised the uncertainty associated with catchment nutrient balancing (offsetting) and are proposing monitoring and, if necessary, additional asset measures to ensure WFD targets are met with by 2027.

We note that Wessex Water are proposing to embed some of the RBMP2 measures in the Dorset Stour within their approach. Under RBMP2 we have previously said that it is feasible and worthwhile (based on costs and benefits) for some Stour waterbodies to have an objective of good. We seek confirmation that the objective will stay at good since we have not seen new evidence to show that it is now not feasible or disproportionately expensive. Once this confirmation is received then we can update the 2021 deadline to 2027 based on a more sustainable solution delivering wider benefits.

This confirmation will also enable us to accept the Wessex Water proposals for WFD enhancement with the following caveats that are listed in the Annex below.

Wastewater flow programme
Thank you for confirming that Wessex Water are not seeking any further phasing of the Wastewater flow programme beyond that already embedded within WINEP3.

Kind Regards

Anne Dacey
Deputy Director, Integrated Water Planning
Environment Agency

Trevor Bishop
Director Strategy and Policy
Ofwat

CC.
Kirstin Green, Deputy Director Water Quality, Defra

Annex: Conditions of acceptance for timeframe extensions to WFD improvement measures

Conditions in italics are from our draft Catchment Nutrient Balancing (CNB) Principles paper. This is to give you early sight. Once approved we will start to implement these CNB criteria:

a) Wessex Water should develop specific measures and bring these to the Environment Agency for discussion and agreement.
   - *Measures must be in the same geographical location as the conventional treatment. That is the measures must be in the same catchment as the conventional treatment preferably upstream*
   - Measure proposals should incorporate monitoring to show the progress of meeting environmental outcomes. Timeframes for proposed monitoring will require review as 2023 is likely to be too late to inform any PR24 WINEP requirements.
   - *Proposed measures should be over and above the measures that the agricultural sector must complete to meet their polluter pays obligations and should not replace their obligation.*
   - *Any catchment based measures / catchment nutrient balancing measures should be designed to achieve an outcome which is at least as great in terms of nutrient reduction as a conventional treatment approach. Appropriate safeguards need to be put in place to manage the uncertainty risks associated with new solutions; this could include, for example, targeting a greater improvement. Evidence should be collated to demonstrate that the desired environmental outcome will be obtained.*
   - *Catchment land management proposals should be evidence based and measurable.*

b) *Any catchment land management and alternative treatment proposals will be considered as a trial over an agreed defined time period and reviewed at the end of the trial.*

c) *Any catchment land management proposals or innovative treatment measures (e.g. reed beds) will be regulated as part of the water discharge environmental permit of the Waste Water Treatment Works that the proposal is providing the alternative measure for*
   - *Wessex Water accepts full ownership of the measure and the risks, including the obligation to reduce the nutrient load as well as all other obligations contained within the permit.*

d) *If the other sector, which is being funded as a consequence of the these catchment measure proposals, later decides to not accept this funding mechanism and wishes to claim the outcomes for themselves then the company must be prepared to develop an alternative measure.*

e) Your PR19 business plan should include the commitment to delivering the performance expectations set out in the WISER for permit compliance and pollution incidents.

f) Ambition for PR24 must not be curtailed due to work being extended from PR19.

Annex 2 – Our response dated 30 July 2018

Wessex Water
YTL GROUP

Anne Dacey
Deputy Director, Integrated Water Planning,
Environment Agency

Trevor Bishop
Director Strategy and Policy,
Ofwat

Direct line: 01225 526348
Email: andy.pymer@wessexwater.co.uk

Date: 30 July 2018

Dear Anne and Trevor,

Alternative approaches to delivery of the PR19 Water Industry National Environment Programme (WINEP)

Thank you very much for your letter dated 12 July 2018 in response to our submission on 19 June about our proposals for timeframe extensions for the PR19 WINEP.

We are pleased that you found the proposals well thought out, and that you support the approach of long term catchment interventions alongside cost effective and optimised asset solutions, phased over the period 2020 to 2027.

With regard to your point about the water body objectives for the Dorset Stour, we confirm that the Water Framework Directive objective will remain as a status of good.

The potential changes to the WINEP were summarised in section 3.1.9 (page 29 and 30) of our submission. The asset solutions for the alternative permit limits will be constructed by December 2021 and December 2024, as per the completion dates in WINEP3. In parallel we will implement catchment interventions and catchment wide permitting over the period 2022 to 2027.

We have worked through the list of conditions in the annex to your letter. The table overleaf provides our response to each of the conditions. We confirm that we will comply with all of the conditions.

One of these conditions is a commitment to the delivery of the performance expectations set out in WISER in our PR19 submission. The EA has been clear to us that WISER must be interpreted to mean 100.0% compliance with discharge permits in every year, a level which no company has ever consistently achieved before. Our plan confirms this as a target and includes a cost adjustment claim to allow sufficient expenditure to increase STW capacity in our region above that which we believe Ofwat's cost models are likely to allow. We are grateful that the EA has provided a letter of support for this claim and we consider it to be an integral part of our stated commitment to deliver on the performance expectations set out in

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WISER, and therefore by extension our ability to meet the conditions that Ofwat and the EA have set out for the alternative approach to WINEP delivery.

We trust this provides you with the confirmation required in order to amend the WINEP. Should you require any further information please do not hesitate to contact us.

Yours sincerely

Best regards,
Andy

Andy Pymer
Managing Director

Response to conditions of acceptance for timeframe extensions to WFD improvement measures

Conditions in italics are from the EA's draft Catchment Nutrient Balancing (CNB) Principles paper.

EA conditions	WSX response
a) Wessex Water should develop specific measures and bring these to the Environment Agency for discussion and agreement.	We will develop the specific catchment measures and agree them with our local EA contact. We anticipate working with the EA to develop an Operating Technique Agreement for each of these catchment solutions.
• *Measures must be in the same geographical location as the conventional treatment. That is the measures must be in the same catchment as the conventional treatment preferably upstream*	Agreed.
• Measure proposals should incorporate monitoring to show the progress of meeting environmental outcomes. Timeframes for proposed monitoring will require review as 2023 is likely to be too late to inform any PR24 WINEP requirements.	Our proposals include monitoring and we will review the timetable for the monitoring such that data is available to inform PR24. We will agree the monitoring with our local EA contact.
• *Proposed measures should be over and above the measures that the agricultural sector must complete to meet their polluter pays obligations and should not replace their obligation.*	Agreed.
• *Any catchment based measures / catchment nutrient balancing measures should be designed to achieve an outcome which is at least as great in terms of nutrient reduction as a conventional treatment approach. Appropriate safeguards need to be put in place to manage the uncertainty risks associated with new solutions; this could include, for example, targeting a greater improvement. Evidence should be collated to demonstrate that the desired environmental outcome will be obtained.*	Agreed. Our proposals include the development of a framework for quantifying the benefits of catchment interventions.
• *Catchment land management proposals should be evidence*	Agreed.

EA conditions	WSX response
based and measurable.	
b) *Any catchment land management and alternative treatment proposals will be considered as a trial over an agreed defined time period and reviewed at the end of the trial.*	Agreed.
c) *Any catchment land management proposals or innovative treatment measures (e.g. reed beds) will be regulated as part of the water discharge environmental permit of the Waste Water Treatment Works that the proposal is providing the alternative measure for* • *Wessex Water accepts full ownership of the measure and the risks, including the obligation to reduce the nutrient load as well as all other obligations contained within the permit.*	Agreed. Agreed.
d) *If the other sector, which is being funded as a consequence of the these catchment measure proposals, later decides to not accept this funding mechanism and wishes to claim the outcomes for themselves then the company must be prepared to develop an alternative measure.*	Agreed, subject to a suitable notice period and timeframes for development of the alternative.
e) Your PR19 business plan should include the commitment to delivering the performance expectations set out in the WISER for permit compliance and pollution incidents.	Permit compliance is a common asset health performance commitment in Ofwat's PR19 methodology rather than a measure of environmental performance, nevertheless we have set the target as 100% in every year of the AMP to make clear our targeted performance level. Our PR19 submission includes a cost adjustment claim for STW capacity expenditure above that which we expect Ofwat's models will derive. The claim has been supported by the EA. We regard the cost adjustment claim as an intrinsic part of our plan commitment to delivery of the performance expectations in the WINEP, and therefore by extension our ability to meet this condition. For pollutions we state in our plan that: • Although we have been a consistent industry leader in terms of

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EA conditions	WSX response
	the number of pollution incidents per 10,000km of sewer, our board is clear that we aim to have zero pollutions (of any category), in accordance with the statutory obligation on us. • In addition WISER sets out the EA's expectations for excellent performance. We will plan to meet the performance targets set out in WISER, including: o no serious (category 1 and 2) pollutions. o 40% reduction in all pollution incidents compared with the number of incidents recorded in 2016, which requires a reduction from 75 pollutions in 2016 to 45 by 2025, equivalent to 13 incidents per 10,000 km of sewer. Our plan enables us, and we plan to meet the 40% reduction target in a way that is in the long-term interests of customers. o high levels of self-reporting. We have had detailed discussions about these performance expectations with our EA account manager, Jeremy Bailey, and understand that our plan satisfies condition (e).
f) Ambition for PR24 must not be curtailed due to work being extended from PR19.	We confirm that the extension of the WFD proposals to 2027 will not affect our ability to meet plans for PR24. Our aim is to continue to be an environmental leader.

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