WSX17 - Annexes – Wastewater networks plus strategy and investment

Business plan 2025-2030

Wessex Water
YTL GROUP

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WSX17 - Annexes - Wastewater networks plus strategy and investment

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This supporting document is part of Wessex Water's business plan for 2025-2030.

Please see 'WSX00 – Navigation document' for where this document sits within our business plan submission.

More information can be found at wessexwater.co.uk.

A1 Enhancement Cases

We provide detail in the following pages to evidence our compliance with Ofwat’s Final Methodology Appendix 9 – Setting expenditure allowances Section A1.1 Enhancement assessment criteria.

Individual enhancement assessment case tables are provided for each of the material areas (as described in WSX16) of proposed enhancement investment in the Wastewater networks plus price control.

Enhancement case tables are provided for:

- Effective Sewerage
    - Storm overflows
    - Pollutions
    - Network Capacity & Growth
- Effective Water Recycling
    - WRC Capacity & Growth
    - Nutrients (Phosphorus & Nitrogen)
    - Sanitary Drivers
    - Chemicals
    - Flow
    - WRC Discharge Relocations
- Improving data and understanding
    - Continuous Water Quality Monitoring
    - Monitoring for Flow Compliance
    - Water Quality Investigations
- Partnership working
    - Catchment Partnership Projects
    - Flood Risk Management Projects
- M&G *(described in section A5 of this document)*
    - Enhancing our data and analytics capabilities
    - Supporting additional sampling and analytics due to legislative changes
    - Resilience to changes in communication networks
    - Managing the end of cellular services at private sewerage pumping stations

A1-1.1. Storm Overflows

This enhancement case table should be read in conjunction with WSX16 section 5.1 – Storm overflows.

	Requirement	See section / document (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (i.e. there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	5.1.1	Statutory government storm overflow discharge reduction plan (Environment Act); required to make improvements by a certain date; must prioritise highly sensitive areas first (bathing waters, SSSIs, etc) then move on to non-sensitive areas.
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	5.1.1	SODRP requires improvement over the next 25 years. Likely to cost c£3billion by 2050 for the best vale options (mostly attenuation). £400m in AMP8.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	5.1.2	Our complex computer models of the sewerage network assume that all assets are maintained and operating efficiently. The solutions for storm overflow improvements are to enhance the performance. We have also increased our groundwater inundation sealing programme to include a further £10.9m in base for infiltration sealing upstream of storm overflows.
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	Where previous enhancement investment improved performance, that reset the new baseline performance, but often not below 10 discharges per year. For example, AMP6 improvements in Bristol storm overflows did not bring the discharge frequency below 10. So further enhancement is required at those sites by 2050.
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	5.1.3	The core plan achieves the SODRP. Our preferred plan would eliminate untreated discharges, but that is unlikely to be buildable or affordable.
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	5.1.3	Yes, customers support improvements to our storm overflow.

G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	5.1.1	Yes. The government has imposed this requirement, so costs are not under management control.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	5.1.2 to 5.1.4	Yes.
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	5.1.2 to 5.1.4 and DWMP	Yes. Yes. Our third party auditors (Mott McDonald) statement can be found in our DWMP (Appendix D)
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	5.1.2 to 5.1.4 and DWMP	Yes, using available information. A research project (via UKWIR) is starting to try to substantiate fore benefits for sustainable drainage/separation).
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	5.1.2 to 5.1.4	Yes. The storm overflow performance commitment reflects the plan.
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	DWMP (Appendix D)	Yes. There are uncertainties in the benefits of separation and sustainable drainage. We have used attenuation solutions, which are the lowest cost and generally best value, where the benefit of separation are not available.
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	5.1.5	This only applies to partnership working which is described in section **Error! Reference source not found.**.
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	WSX30	We have considered DCP as discussed in WSX30 Direct Procurement for Customers assessment.
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	Commentary OUT1-5.	Nature based solutions were positively received.
Cost efficiency			

A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	5.1.3 to 5.1.5, WSX37 and WSX45 Annex A4-3	Most were costed through cost curves. Please see WSX37 Resilience, risk and decision making framework narrative and WSX45 Annex A4-3 Cost Benchmarking storm overflows.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	WSX02 Section 8 and WSX45 Annex A4-3	Through external benchmarking we have demonstrated that our cost estimates are efficient and competitive compared with the marketplace.
C	Does the company provide third party assurance for the robustness of the cost estimates?	WSX02 Section 8 and WSX45 Annex A4-3	Through external benchmarking we have demonstrated that our cost estimates are efficient and competitive compared with the marketplace.
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in Ofwat’s enhancement model approach?	5.1.1 to 5.1.5	Clearly this is a step change in enhancement. The SOEP supplementary letter highlighted that Wessex Water were in the top 3 companies needing to invest - due to the high percentage of high priority environments. Ofwat’s enhancement model needs to take this into account.
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	5.1.1 to 5.1.5	Under the SODRP/SOEP project, Stantec produced a supplementary letter listing the companies relative likely expenditure. Special factors for Wessex Water is that we have a high percentage of High Priority environments.
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	5.1.1 to 5.1.5	The scale of the number of improvements in the Wessex Water region is high compared to other companies as described above.
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	4.1, 4.2 and 5.1.7	Yes, by both performance commitment PC20 and price control deliverable PCDWW5.
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	Benefits are not material.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/aN/A. This only applies to partnership working which is described in section **Error! Reference source not found.**.

A1-1.2. Pollutions

This enhancement case table should be read in conjunction with WSX16 section 5.2 – Pollutions.

	Requirement	See section / document (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	2.6, 5.2.1	EA Environmental Performance Assessment Drainage & Wastewater Management Plan
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	2	EA Environmental Performance Assessment Drainage & Wastewater Management Plan
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	5.2.1	EA Environmental Performance Assessment, Total & Serious Performance Commitments primarily enhancement spend. £80m WRC improvements identified as base
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	WSX47 (OUT1-3 - 12 & OUT1-3 – 13)	No – new Performance Commitments for AMP8 and extension of previous Pollution Incident Reduction Plan
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Identified within Long Term Delivery Strategy to achieve zero pollutions by 2050
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.6 & 3.7	Customer Research illustrating support associated with provision of effective sewerage and great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	5.2.1	Bottom up cost assessment based on prior work
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	5.2.1	Pollution Incident Reduction Plan illustrating a multi-faceted approach including asset and engagement options.

B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	5.2.5 & DWMP	Mott MacDonald audit (contained in DWMP)
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	WSX37	Have used decision-support approach tool which uses financial, environmental, social, and human & intellectual capitals
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	WSX47 (OUT1-3 - 12 & OUT1-3 – 13)	Yes – detailed as part of Total and Serious Pollutions performance commitments
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	5.2.2	Yes – range of options considered as part of Pollution Incident Reduction Plan and compared against other WASC delivery to date
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	5.2.1	Range of solutions and prioritisation due to watercourse sensitivity
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	5.2.5 & DWMP	Bottom up costs based on AMP7 delivery and Marketplace challenge for smart monitoring options.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	5.2.5 & DWMP	Bottom up costs based on AMP7 delivery and Marketplace challenge for smart monitoring options.
C	Does the company provide third party assurance for the robustness of the cost estimates?	5.2.5 & DWMP	Mott MacDonald audit (contained in DWMP)
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a

E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	WSX47 (OUT1-3 - 12 & OUT1-3 – 13) & WSX47	Total & Serious Pollution performance commitments PCD for Pollutions (PCDWW35)
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	n/a
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.3. Network Capacity & Growth

This enhancement case table should be read in conjunction with WSX16 section 5.4 – Growth.

	Requirement	**See section / document** (WSX16 unless stated otherwise)	**Comment**
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	5.4.1	The investment is needed to meet our statutory obligation to service new development whilst maintaining standards of service to our existing customers.
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	5.4.1	Through liaison with local authorities we have a good picture of where and when development will occur and have assessed the off-site works needed to service this development. However the exact location and timing of development during the five year period is driven by factors outside management control – hence defined contingent schemes.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No, these are new development areas.
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	5.4.1	Yes and we have reduced to the low trajectory, based on recent events.
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.6 and 3.7	Customer Research – strong support to reduce storm overflows and improve river/coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	5.4.1	Through liaison with local authorities we have a good picture of where and when development will occur and have assessed the off-site works needed to service

			this development. However the exact location and timing of development during the five year period is driven by factors outside management control.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	5.4.2	
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	5.4.2	
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	5.4.2	
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	5.4.2	
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	5.4.2	
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?		Costs are not detailed estimates but are based on similar sized, recent development schemes.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?		

C	Does the company provide third party assurance for the robustness of the cost estimates?		
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?		
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?		
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?		
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	5.4.4	Customers will be protected if the investment is cancelled, delayed or reduced in scope through the cost reflective regulatory regime for new development.
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	WSX37	The chosen options are the lowest cost (i.e. no additional benefits) with benefits captured linked to the inherent benefit achieved by delivering the scope required to minimise risk and/or achieve the regulatory output.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.4. WRC Capacity & Growth

This enhancement case table should be read in conjunction with WSX16 section 6.1 – Capacity & growth.

	Requirement	**See section / document** (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	6.1.1 & WSX09 A3 CAC3	Additional capacity at WRCs required to accommodate growth in a timely manner, without planning restrictions and without reducing service levels for existing customers.
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	6.1.1 & WSX09 A3 CAC3	As above
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	WSX09 A3 CAC3	It is unclear how Ofwat will be modelling sewage treatment capacity.
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	WSX09 A3 CAC3	It is unclear how Ofwat will be modelling sewage treatment capacity.
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	6.1.1	Considered alignment where possible to other enhancement drivers. Sewer sealing (base maintenance activity) to delay/reduce scope of upgrades at some WRC, but now have concertina effect with EA considering DWF as an EPA metric.
Best option for customers			

A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	6.1.2 & WSX09 A3 CAC3	A range of options has been evaluated including: • tolerate/optimize • sewer sealing • transfers • asset solutions (grey / green)
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	6.1.2 & WSX17 A2-1	Detailed option assessment. Third-party technical assurance/benchmarking by Stantec
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	6.1.2 & WSX37	Have used decision-support approach tool which uses financial, environmental, social, and human & intellectual capitals
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	6.1.2	Related to PC Discharge Permit Compliance
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	6.1.2 & WSX17 A2-1	Detailed option assessment. Third-party technical assurance/benchmarking by Stantec
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	6.1.3	Mixture of bottom-up estimates and cost models.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	6.1.3 & WSX44	Select cost estimates and benchmarking undertaken by ChandlersKBS. Cost models built from representative sample of bottom-up estimates, which includes outturn data for comparable schemes.

C	Does the company provide third party assurance for the robustness of the cost estimates?	6.1.3 & WSX44	Benchmarking undertaken by ChandlersKBS
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	WSX09 A3 CAC3	It is unclear how Ofwat will be modelling sewage treatment capacity.
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	WSX09 A3 CAC3	It is unclear how Ofwat will be modelling sewage treatment capacity.
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	WSX09 A3 CAC3	It is unclear how Ofwat will be modelling sewage treatment capacity.
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	6.1.4 & WSX26	PC17 Discharge Permit Compliance PCDWW27 Growth at sewage treatment works (excluding sludge treatment)
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	WSX37	The chosen options are the lowest cost (i.e. no additional benefits) with benefits captured linked to the inherent benefit achieved by delivering the scope required to minimise risk and/or achieve the regulatory output.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.5. Nutrients (Phosphorus & Nitrogen)

This enhancement case table should be read in conjunction with WSX16 section 6.2 – Nutrients (Phosphorus & Nitrogen).

	Requirement	See section / document (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	6.2.1	Legislation and regulation (e.g. HD_IMP, HD_IMP_NN, SSSI_IMP, WFD_IMP, U_IMP, EnvAct_IMP) and supported by river water quality modelling
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	6.2.1	As above – required by legislation and regulatory guidance
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No – enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No – costs focussed on achieving new/changes to nutrient (phosphorus or nitrogen) limits over-and-above any activities or service levels funded through previous price reviews
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	6.2.1	As above – required by legislation and regulatory guidance
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	6.2.2	A range of options for nutrient reduction has been evaluated including:

			• tolerate/optimise • catchment management initiatives (source control / catchment nutrient balancing) • catchment permitting • transfers • asset solutions (grey / green)
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	6.2.2 & WSX17 A2-1	Detailed option assessment. Third-party technical assurance/benchmarking by Stantec
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	6.2.2 & WSX37	Have used decision-support approach tool which uses financial, environmental, social, and human & intellectual capitals
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	6.2.2 & WSX47	Included within PR24 WINEP to address risk/need. River Water Quality (Phosphorus) PC.
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	6.2.2 & WSX17 A2-1	Detailed option assessment. Third-party technical assurance/benchmarking by Stantec
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	6.2.13	Mixture of bottom-up estimates, cost models and cost curves.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	6.2.13 & WSX44	Select cost estimates and benchmarking undertaken by ChandlersKBS. Cost curves/models built from representative sample of bottom-up estimates, which includes outturn data for comparable schemes.

C	Does the company provide third party assurance for the robustness of the cost estimates?	6.2.13 & WSX44	Benchmarking undertaken by ChandlersKBS
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	6.2.14, WSX26 & WSX47	River Water Quality (Phosphorus) PC and PCDs for N and P removal WINEP outputs identified in EA's Environmental Performance Assessment
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	WSX37	The chosen options are the lowest cost (i.e. no additional benefits) with benefits captured linked to the inherent benefit achieved by delivering the scope required to minimise risk and/or achieve the regulatory output.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.6. Sanitary Drivers

This enhancement case table should be read in conjunction with WSX16 section 6.3 – Sanitary Drivers.

	Requirement	**See section / document** (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	6.3.1	Legislation and regulation (e.g. WFD_ND) and supported by river water quality modelling
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	6.3.1	As above – required by legislation and regulatory guidance. Refinement of growth forecasts to model an appropriate level of deterioration, and considered alignment where possible to other enhancement drivers.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No – enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No – costs focussed on achieving new/changes to sanitary limits over-and-above any activities or service levels funded through previous price reviews
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	6.3.1	As above – required by legislation and regulatory guidance. Considered alignment where possible to other enhancement drivers.
Best option for customers			

A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	6.3.2	A range of options has been evaluated including: • tolerate/optimise • catchment management initiatives (source control / catchment nutrient balancing) • catchment permitting • transfers • asset solutions (grey / green)
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	6.3.2 & WSX17 A2-1	Detailed option assessment. Third-party technical assurance/benchmarking by Stantec
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	6.3.2 & WSX37	Have used decision-support approach tool which uses financial, environmental, social, and human & intellectual capitals
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	6.3.2	Included within PR24 WINEP to address risk/need. Not connected to any specific Performance Commitments
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	6.3.2 & WSX17 A2-1	Detailed option assessment. Third-party technical assurance/benchmarking by Stantec
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	6.2.3	Mixture of bottom-up estimates and cost models.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	6.3.3 & WSX44	Select cost estimates and benchmarking undertaken by ChandlersKBS. Cost models built from representative sample of bottom-up estimates, which includes

			outturn data for comparable schemes.
C	Does the company provide third party assurance for the robustness of the cost estimates?	6.3.3 & WSX44	Benchmarking undertaken by ChandlersKBS
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	6.3.4 & WSX26	Sanitary covered within PCD for P removal WINEP outputs identified in EA's Environmental Performance Assessment
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	WSX37	The chosen options are the lowest cost (i.e. no additional benefits) with benefits captured linked to the inherent benefit achieved by delivering the scope required to minimise risk and/or achieve the regulatory output.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.7. Chemicals

This enhancement case table should be read in conjunction with WSX16 section 6.4 – Chemicals

	Requirement	**See section / document** (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	6.4.1	Statutory WFD_NDLS, WFD_ND or WFD_IMP drivers based on previous investigations (CIP3)
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	6.4.1	Based on CIP2 (AMP6) and CIP3 (AMP7) investigations
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No – enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No – costs focussed on step change in Chemical permits only
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research – limited feedback on chemicals and emerging contaminants
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	6.4.1	As above – required by legislation and regulatory guidance. Prescriptive permit requirements.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	6.4.2	A range of options for chemical removal has been evaluated including: • asset solutions – advanced filtration for chemical (metals) removal or chemical dosing at WRCs to meet cost effective permit limits

			• flexible permitting – the use of Operating Techniques Agreement and lower %ile compliance to achieve in-river targets • trialing new technologies for chemical removal.
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	6.4.2 & WSX17 A2-1	Detailed option assessment, based on prior CIP3 technology investigations. Third-party technical assurance/benchmarking by Stantec
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	6.4.2 & WSX37	Have used decision-support approach tool which uses financial, environmental, social, and human & intellectual capitals
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	6.4.2	Included within PR24 WINEP to address risk/need. Not connected to any specific Performance Commitments
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	6.4.2 & WSX17 A2-1	Detailed option assessment. Third-party technical assurance/benchmarking by Stantec
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	6.4.3	Mixture of bottom-up estimates and cost models.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	6.4.3 & WSX44	Select cost estimates and benchmarking undertaken by ChandlersKBS. Cost models built from representative sample of bottom-up estimates, which includes

			outturn data for comparable schemes.
C	Does the company provide third party assurance for the robustness of the cost estimates?	6.4.3 & WSX44	Benchmarking undertaken by ChandlersKBS
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	6.3.14 & WSX26	Not covered by PC or PCD, other than Discharge permit compliance. WINEP outputs identified in EA's Environmental Performance Assessment
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	WSX37	The chosen options are the lowest cost (i.e. no additional benefits) with benefits captured linked to the inherent benefit achieved by delivering the scope required to minimise risk and/or achieve the regulatory output.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.8. Flow

This enhancement case table should be read in conjunction with WSX16 section 6.5 – Flow.

	Requirement	See section / document (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	6.5.1	U_IMP5 driver from PR19 WINEP
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	6.5.1	As above – required by legislation and regulatory guidance.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No – enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	6.5.3	Completion of PR19/AMP7 scheme, seeking funding for over-and-above element due to change in design parameters from that included in PR19 plan.
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	6.5.3	As above – required by legislation and regulatory guidance. Delivery of FFT increase scheme phased to align with advancing DWF-element, to advance overall environmental improvements at lower overall costs.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	6.5.3	A range of options were evaluated, which were verified by an external design consultant for PR19.

B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	n/a	The scheme is a continuation/completion of a scheme included within our PR19 business plan.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	n/a	The scheme is a continuation/completion of a scheme included within our PR19 business plan.
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	6.5.3	Included within PR19 WINEP to address risk/need, however subsequent EA review highlighted FFT value required significant increase from that included in our PR19 plan.
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	6.5.3	The scheme is a continuation/completion of a scheme included within our PR19 business plan.
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	6.5.4	The scheme’s cost estimate is the most recent forecast, being developed to align with completion of detailed design and internal scheme governance and approval processes. It has been produced by our in-house estimating team, using supplier and tender prices for many areas.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	6.5.4	The scheme’s cost estimate is the most recent forecast, being developed to align with completion of detailed design and internal scheme governance and approval processes. It has been produced by our in-house estimating team,

			using supplier and tender prices for many areas.
C	Does the company provide third party assurance for the robustness of the cost estimates?	6.5.4	The scheme's cost estimate is the most recent forecast, being developed to align with completion of detailed design and internal scheme governance and approval processes. It has been produced by our in-house estimating team, using supplier and tender prices for many areas.
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	6.5.5 & WSX26	Covered within PCD for increase flow to full treatment. AMP7 PC.
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	n/a
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.9. WRC Discharge Relocations

This enhancement case table should be read in conjunction with WSX16 section 6.6 – WRC Discharge Relocations to Improve River Flows.

	Requirement	See section / document (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	6.6.1	Legislation and regulation (e.g. HD_IMP) and supported by river water flow modelling and ecological surveys
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	6.6.1	As above – required by legislation and regulatory guidance.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No – enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	New obligations identified by the EA.
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	6.6.1	As above – required by legislation and regulatory guidance.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	6.6.2	Requirement to relocate discharges as required by the EA, although exact location to be confirmed.

B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	6.6.2	Detailed option assessment.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	6.6.2 & WSX37	Have used decision-support approach tool which uses financial, environmental, social, and human & intellectual capitals
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	6.6.2	Included within PR24 WINEP to address risk/need. Not connected to any specific Performance Commitments
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	6.6.2	Detailed option assessment.
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	6.6.3	Costing tools that combine unit rates and site-specific adjustments.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	6.6.3	Same level of detail for estimates as would be developed for optioneering/feasibility schemes.
C	Does the company provide third party assurance for the robustness of the cost estimates?	n/a	n/a
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a

F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	6.6.4	Not covered by PC or PCD. WINEP outputs identified in EA's Environmental Performance Assessment
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	WSX37	The chosen options are the lowest cost (i.e. no additional benefits) with benefits captured linked to the inherent benefit achieved by delivering the scope required to minimise risk and/or achieve the regulatory output.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.10. Continuous Water Quality Monitoring

This enhancement case table should be read in conjunction with WSX16 section 7.1 – Continuous Water Quality Monitoring.

	Requirement	**See section / document** (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	7.1.1	The continuous water quality monitoring (CWQM) has statutory drivers under the Environment Act.
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	7.1.1	The timing for these investigations and deliverables has been directed by the EA's PR24 driver guidance in accordance with the relevant requirements.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	New obligation
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	New obligation
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	WSX54	Costs for CWQM have been informed by indicative unit costs that the Environment Agency incur to run their National Instrumentation Centre and comparative costs from external suppliers that have been used to validate unit costs.
Best option for customers			

A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	n/a	Continuous water quality monitoring follows prescribed EA guidance.
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	7.1.4	Costs for CWQM have been informed by indicative unit costs that the Environment Agency incur to run their National Instrumentation Centre and comparative costs from external suppliers that have been used to validate unit costs.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	7.1.4	Best value analysis undertaken using EDA tool
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	7.1.4	Included within PR24 WINEP to address risk/need. Not connected to any specific Performance Commitments
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	n/a	Continuous water quality monitoring follows prescribed EA guidance.
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	The water industry has been directed by Ofwat that DPC is not to be used for CWQM
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	7.1.4	CWQM costs have been developed using supplier information and informed by similar programmes administered by the EA.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	7.1.4	CWQM costs have been developed using supplier information and informed by similar programmes administered by the EA.

C	Does the company provide third party assurance for the robustness of the cost estimates?	7.1.4	CWQM costs have been developed using supplier information and informed by similar programmes administered by the EA.
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	WSX26	There is no specific Performance Commitment. We have not proposed a PCD as, whilst this area is in excess of the materiality threshold, given the late confirmation of the guidance in this area (August 2023), we have not had time to develop a full proposal for consideration. WINEP outputs identified in EA's Environmental Performance Assessment
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	n/a
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.11. Monitoring for Flow Compliance

This enhancement case table should be read in conjunction with WSX16 section 7.6 – Monitoring for Flow Compliance.

	Requirement	**See section / document** (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	7.6.1	Legislation and regulation (e.g. U_MON3/U_MON4)
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	7.6.1	As above – required by legislation and regulatory guidance.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No – enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No – however benefits from AMP7 scope investigations (U_INV2).
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	7.6.1	As above – required by legislation and regulatory guidance.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	7.6.2	Restricted options given regulatory guidance for MCERTs. AMP7 U_INV2 reports presented to EA to inform PR24 U_MON4.

B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	n/a	Restricted options given regulatory guidance for MCERTs.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	n/a	Single option for each site taken forward.
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	7.6.2	Included within PR24 WINEP to address risk/need. Not connected to any specific Performance Commitments
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	7.6.2	AMP7 scope investigations (U_INV2).
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	7.6.3	Costings for AMP7 scope investigations (U_INV2).
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	7.6.3	Costings for AMP7 scope investigations (U_INV2).
C	Does the company provide third party assurance for the robustness of the cost estimates?	n/a	n/a
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a

F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	7.6.4	Not covered by PC or PCD. WINEP outputs identified in EA's Environmental Performance Assessment
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	n/a
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.12. Water Quality Investigations

This enhancement case table should be read in conjunction with WSX16 section 7.7 – Water Quality Investigations.

	Requirement	**See section / document** (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	7.7	Investigations have statutory and non-statutory drivers where risks and issues have been identified by regulators. Requirements relate to the Environment Act, Habitats Regulations, Water Framework Directives, Bathing Waters and Shellfish Regulations.
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	7.7	The timing for these investigations has been directed by the EA's PR24 driver guidance in accordance with the relevant requirements.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.7	Customer Research illustrating support associated with provision of great river and coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	7.7	Costs have been developed through a bottom up approach based on previous similar work.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	n/a	Investigations scoping has been undertaken with regulators at a high level.

B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	7.7.5	Investigation costs have been developed through a bottom up approach based on previous similar work.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	7.7.5	Best value analysis undertaken using EDA tool. Investigations are single option and benefit assessment not required in guidance
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	7.7.5	N/a – not connected to any Performance Commitments
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	n/a	n/a
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	7.7.5	Investigations costs have been developed through a bottom up approach based on previous similar work.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	7.7.5	Costs have been developed through a bottom-up approach based on previous similar work.
C	Does the company provide third party assurance for the robustness of the cost estimates?	7.7.5	Our approach to costing investigations remains unchanged from PR19, using bottom-up cost assessments that were subject to consultant benchmarking at that time.
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a

E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	WSX26	WINEP outputs are included within the EA's Environmental performance Assessment. There is a PCD concerning the delivery of investigations.
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	n/a
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	n/a

A1-1.13. Catchment Partnership Projects

This enhancement case table should be read in conjunction with WSX16 section 8.1 – Catchment Partnership Projects.

	Requirement	**See section / document** (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	2.2 and 8.1	Projects have statutory and non-statutory drivers where risks and issues have been identified by regulators as not achieving the relevant status under WFD, Habitats Regulations or other.
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	2.2 and 8.1	Scale and timing align with WISER expectations, DWMP, CaBA Chalk Stream Strategy and alignment with projects that have secured FDGiA funding
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No - enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No - new obligations
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.6 and 3.7	Customer Research – strong support to reduce storm overflows and improve river/coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	2.3 and 8.1.5	Partnership working enables opportunities for co-funding and co-delivering solutions.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	2.2 and 8.1	Options covered in DWMP development and WINEP Options Development Reports,

B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	8.1.6	Catchment Partnership projects developed with partners.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	2.2 and 8.1.6	Best value analysis undertaken using EDA tool. Investigations are single option and benefit assessment not required in guidance
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	n/a	n/a
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	n/a	n/a
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	8.1.6	Catchment Partners have demonstrated a good track record in securing match funding.
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	N/A
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	2.2 and 8.1.6	Partners and stakeholders have informed the development of options and projects put forward. Customer and Stakeholder research and engagement was also conducted via DWMP development.
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	8.1.7	Catchment Partnership projects developed through bottom-up costing by partner based on previous project delivery.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	8.1.7	Catchment Partnership projects developed through bottom-up costing by partner based on previous project delivery.
C	Does the company provide third party assurance for the robustness of the cost estimates?	8.1.7	Partners have undertaken cost assurance prior to inclusion.
Need for enhancement model adjustment			

D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	8.1.7	WINEP outputs identified in EA's Environmental Performance Assessment Action Specification Forms (Catchment Partnership projects) will cover all deliverables attributable to WW funding.
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	8, 8.1.1 – 8.1.3	WINEP outputs identified in EA's Environmental Performance Assessment. Action Specification Forms will cover all deliverables attributable to WW funding.
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	8.1.1 – 8.1.3	Action Specification Forms will cover all deliverables attributable to WW funding.

A1-1.14. Flood Risk Management Projects

This enhancement case table should be read in conjunction with WSX16 section 8.2 – Flood Risk Management Projects.

	Requirement	See section / document (WSX16 unless stated otherwise)	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	2.2 and 8.2	Projects have statutory and non-statutory drivers where risks and issues have been identified by regulators as not achieving the relevant status under WFD, Habitats Regulations or other.
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	2.2 and 8.2	Scale and timing align with WISER expectations, DWMP, CaBA Chalk Stream Strategy and alignment with projects that have secured FDGiA funding
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No - enhancement only
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No - new obligations
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX54	Long Term Delivery Strategy
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX04 – 3.6 and 3.7	Customer Research – strong support to reduce storm overflows and improve river/coastal water quality
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	2.3 and 8.2.6	Partnership working enables opportunities for co-funding and co-delivering solutions.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	2.2 and 8.2	Options covered in DWMP development and WINEP Options Development Reports,

B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	8.2.7	Flood risk management partnership projects developed with RMAs and stakeholders.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	2.2 and 8.2.6	Best value analysis undertaken using EDA tool. Investigations are single option and benefit assessment not required in guidance
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	n/a	n/a
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	n/a	n/a
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	8.2	Flood resilience funding will come from Flood Defence Grant in Aid, Local Levy, Council budgets or other sources via Lead Local Flood Authorities or Environment Agency or other stakeholders.
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	2.2 and 8.2	Partners and stakeholders have informed the development of options and projects put forward. Customer and Stakeholder research and engagement was also conducted via DWMP development.
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	8.2.8	Flood risk management partnership projects developed by partners based on previous project delivery.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	8.2.7	Flood resilience project costs developed as part of DWMP process and are based around previous project delivery.
C	Does the company provide third party assurance for the robustness of the cost estimates?	8.2.7	Partners have undertaken cost assurance prior to inclusion.

Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	WSX47 – PCDWW28	PCD covering Reducing flooding risk to properties Flood resilience projects will be delivered in conjunction with LLFA Flood Defence GIA commitments.
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	8.2.1-8.2.5	Flood risk management partnership projects will contribute to increasing the flood resilience of drainage and wastewater infrastructure to meet the needs of our statutory roles and duties as set out by OFWAT and the EA in ‘A joint approach for how water companies should consider flood and coastal resilience in the context of their statutory roles and duties’
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	8.2.1 – 8.2.3	Flood resilience projects will be delivered in conjunction with LLFA Flood Defence GIA commitments.

A1-1.15. M&G – Enhancing our data and analytics capabilities

This enhancement case table should be read in conjunction with WSX17 section A4-1.1 – Enhancing our data and analytics capabilities.

	Requirement	See section	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	WSX10 – 7.2.3	The initiative has been identified to support our IT mission and is in line with the PR24 now and beyond guidance and Gartner
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	WSX10 – 7.2.18	The scale and timing are based on business need and considering Ofwat technology scenarios, Gartner priority matrix. and timescales. We have phased this work based on the above, technical dependencies and regulatory commitments. This will deliver the most efficient programme for our customers and stakeholders.
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	WSX10 – 7.2.22	No. Through our bottom-up approach we have a clear split between enhancement funding and maintenance projects to be delivered via base.
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No. The enhancement identified is new for AMP8 and is based on emerging technologies that have developed in AMP7 and are now mature enough for investment. This capability will likely be built upon in AMP9.
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX10 – 7.2.3	Needs have been clearly identified and we have already begun phasing activities, so we know the sequence of projects at a high level through AMP8 into AMP9.
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	WSX02-11 - 1.2.2	An Effective Sewerage System
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	WSX10 – 7.2.18	Using SWOT analysis and Porter's 5 Forces, technology changes are outside of management control. Since

			starting this process several AI tools including ChatGPT have been released which shows how quickly the technology landscape is moving. We have used our experience of project delivery to minimise the enhancement investment but at the same time ensure that we are keeping up with the rapid change in technology.
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	WSX10 – 7.2.8	We have looked at several options. Ultimately our initiatives are driven by technology changes, we have moved, where appropriate to a ‘cloud first’ approach this means we are more agnostic and its more about managing integrations. In the technology sphere there are several key players in the data and AI space, and we are working with a leading provider in Microsoft. The solution in this enhancement will fit into this eco system. Our System Architects are responsible for reviewing options and ensuring they are appropriately designed, aligned with our architecture principles and security policies.
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	WSX10 – 7.2.13	Costs have been estimate using our estimation tool. This is based on prior project delivery of similar schemes, and we have used Gartner to benchmark our costs to ensure we are providing value to customers.
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	n/a	The impact of this IT initiatives on carbon reduction is negligible
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	n/a	This technology initiative is supportive, whilst we track benefits are aligned to our mission and priorities. It’s not always possible to measure the direct impact on performance commitments.

E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	WSX10 – 7.2.11	Using our portfolio management framework, we have assessed this initiative and our proposing the most efficient and cost-effective solution.
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	n/a
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	WSX10 – 7.2.11	Yes – we have used our Portfolio management framework.
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	WSX10 – 7.2.11	Yes – We have used AMP6 and AMP7 project delivery to create our estimation tool.
C	Does the company provide third party assurance for the robustness of the cost estimates?	WSX10 – 7.2.13	We have used Gartner to benchmark our investments.
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	n/a	Not material
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	Not material

C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	Not material

A1-1.16. M&G – Supporting additional sampling and analytics due to legislative changes

This enhancement case table should be read in conjunction with WSX17 section A4-1.2 – Supporting additional sampling and analytics due to legislative changes

	Requirement	See section	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	WSX17 – A4 1.2	Legislative changes in sampling requirements
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	WSX17 – A4 1.2	Legislative changes in sampling requirements
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	WSX17 – A4 1.2	No. Legislative changes in sampling requirements
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	WSX17 – A4 1.2	No. Legislative changes in sampling requirements
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX17 – A4 1.2	Legislative changes in sampling requirements
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	n/a	n/a
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	WSX17 – A4 1.2	Yes. Legislative changes in sampling requirements
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	WSX17 – A4 1.2	Yes. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	WSX17 – A3 1.2	Yes. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects

C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?	WSX17 – A4 1.2	Yes. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	WSX17 – A4 1.2	Yes
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	WSX17 – A4 1.2	Yes. Proposing a larger expansion but only seeking funding to meet the legislative changes.
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	WSX17 – A4 1.2	Yes. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	WSX17 – A4 1.2	Yes. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	WSX17 – A4 1.2	Yes. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects
C	Does the company provide third party assurance for the robustness of the cost estimates?	WSX17 – A4 1.2	Yes. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a

Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	n/a	Not material
B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	Not material
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	Not material

A1-1.17. M&G – Resilience to changes in communication networks

This enhancement case table should be read in conjunction with WSX17 section A4-1.3 – Resilience to changes in communication networks.

	Requirement	See section	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	WSX17 – A4 1.3	Government target
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	WSX17 – A4 1.3	Government target
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	WSX17 – A4 1.3	No
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	WSX17 – A4 1.3	No
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX17 – A4 1.3	
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	n/a	Further investigation in AMP
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	WSX17 – A4 1.3	Government target & spreading over two AMPS
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	n/a	Further investigation in AMP
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	n/a	Further investigation in AMP
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital and other benefits that the options can deliver? Has it relied on	n/a	Further investigation in AMP

	robustly calculated and trackable benefits when proposing a best value option over a least cost one?		
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	n/a	Further investigation in AMP
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	n/a	Further investigation in AMP
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	n/a	Further investigation in AMP
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	WSX10 – 7.2.11	IT Portfolio Management
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	n/a	Further investigation in AMP
C	Does the company provide third party assurance for the robustness of the cost estimates?	n/a	Due to the unique nature of the programme the cost consultant could not provide an external cost benchmark
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	n/a	Not material

B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	Not material
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	Not material

A1-1.18. M&G – Managing the end of cellular services at private sewerage pumping stations

This enhancement case table should be read in conjunction with WSX17 section A4-1.4 – Managing the end of cellular services at private sewerage pumping stations.

	Requirement	See section	Comment
Need for enhancement investment			
A	Is there evidence that the proposed enhancement investment is required (ie there is a quantified problem requiring a step change in service levels)? This includes alignment agreed strategic planning framework or environmental programme where relevant.	WSX17 – A4 1.4	Government target
B	Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?	WSX17 – A4 1.4	Government target
C	Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance from base cost models?	n/a	No
D	Does the need and/or proposed enhancement investment overlap or duplicate with activities or service levels already funded at previous price reviews (either base or enhancement)?	n/a	No
E	Is the need clearly identified in the context of a robust long-term delivery strategy within a defined core adaptive pathway?	WSX17 – A4 1.4	
F	Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?	n/a	n/a
G	Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?	WSX17 – A4 1.4	Government target & Spreading over two AMPs
Best option for customers			
A	Has the company considered an appropriate number of options over a range of intervention types (both traditional and non-traditional) to meet the identified need?	WSX17 – A4 1.4	Solution was tendered
B	Has a robust cost–benefit appraisal been undertaken to select the proposed option? Is there evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?	WSX17 – A4 1.4	Solution was tendered
C	In the best value analysis, has the company fully considered the carbon impact (operational and embedded), natural capital	WSX17 – A4 1.4	Solution was tendered

	and other benefits that the options can deliver? Has it relied on robustly calculated and trackable benefits when proposing a best value option over a least cost one?		
D	Has the impact (incremental improvement) of the proposed option on the identified need been quantified, including the impact on performance commitments where applicable?	WSX17 – A4 1.4	Risk of pollution
E	Have the uncertainties relating to costs and benefit delivery been explored and mitigated? Have flexible, lower risk and modular solutions been assessed – including where forecast option utilisation will be low?	WSX17 – A4 1.4	Solution was tendered
F	Has the scale of forecast third party funding to be secured (where appropriate) been shown to be reliable and appropriate to the activity and outcomes being proposed?	WSX17 – A4 1.4	Solution was tendered
G	Has the company appropriately considered the scheme to be delivered as Direct Procurement for Customers (DPC) where applicable?	n/a	n/a
H	Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?	n/a	n/a
Cost efficiency			
A	Is it clear how the company has arrived at its option costs? Is there supporting evidence on the calculations and key assumptions used and why these are appropriate?	WSX17 – A4 1.4	Solution was tendered
B	Is there evidence that the cost estimates are efficient (for example using similar scheme outturn data, industry and/or external cost benchmarking)?	WSX17 – A4 1.4	Solution was tendered
C	Does the company provide third party assurance for the robustness of the cost estimates?	WSX17 – A4 1.4	Solution was tendered
Need for enhancement model adjustment			
D	Is there compelling evidence that the additional costs identified are not included in our enhancement model approach?	n/a	n/a
E	Is there compelling evidence that the allowances would, in the round, be insufficient to account for evidenced special factors without an enhancement model adjustment?	n/a	n/a
F	Is there compelling econometric or engineering evidence that the factor(s) identified would be a material driver of costs?	n/a	n/a
Customer protection			
A	Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?	n/a	Not material

B	Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?	n/a	Not material
C	Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?	n/a	Not material

A2 Storm Overflow Assessments

A2-1.1. Storm Overflows

The list of the 128 improvement schemes included in our PR24 plan is provided in the table below, many of which have a site-specific summary report on the following pages. The wetland options do not have summary options reports as these will be generic. Also, some rainfall related storm overflows do not have summary reports, as they were based on cost curves of the attenuation solution.

This is our PR24 submission and doesn’t match the draft WINEP of July 2023. We proposed deferring 48 improvement schemes, on the grounds of affordability, deliverability and financeability, but that was not agreed by Defra / EA. We therefore proposed to defer 20 larger schemes, or good/excellent bathing waters or not in high priority environments. We are proposing to improve 128 storm overflows by 2030. We anticipate these to be on the final WINEP and have populated the table below with the appropriate driver.

The final list and delivery dates for the PCD will relate to the WINEP in place at the time of the Final Determination.

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
MAIDEN BRADLEY WWTW (Site ID 13191C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ap	400608	31/03/2030
WELLINGTON WWTW (Site ID 13330S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cs	101332	31/03/2030
NEWSTEAD ROAD PUMPING STATION (Site ID 15552B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ek	400892	31/03/2030
GODMANSTONE STW (Site ID 17028B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002aq	401521	31/03/2030
HURDCOTT WASTEWATER TREATMENT WORKS (Site ID 13158S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002bg	040044	31/03/2030
CHEW STOKE WASTEWATER TREATMENT WORKS (Site ID 13058S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002dq	102937	31/03/2030
SHREWTON WATER RECYCLING CENTRE (Site ID 13275S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002bh	040080	31/03/2030
PUMPING STATION ADJACENT RIVENDELL (Site ID 17637Z)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	EPRAP38 27XC	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
CHICKSBRIDGE PS (Site ID 14415B)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	401592	31/03/2030
HORTON FARM PUMPING STATION (Site ID 14058B)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	401149	31/03/2030
BUTLEIGH SEWAGE TREATMENT WORKS (Site ID 13043S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002cx	071978	31/03/2030
BRADFORD ON TONE WWTW (Site ID 13032C)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002cy	070006	31/03/2030
MARTINSTOWN PS (Site ID 15497C)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002aw	401520	31/03/2030
PORTBURY WHARF STW (Site ID 13243C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dw	100385	31/03/2030
SYDLING ST.NICHOLAS WRC (Site ID 13303S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002ax	401025	31/03/2030
WICK ST LAWRENCE STW (Site ID 13346S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002dz	102350	31/03/2030
CRANBORNE SEWAGE TREATMENT WORKS (Site ID 13082S)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	040023	31/03/2030
BARFORD ST MARTIN WRC (Site ID 13015S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002dy	041560	31/03/2030
MEARE WASTEWATER TREATMENT WORKS (Site ID 13202S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002cv	EPRMP3728GG	31/03/2030
UBLEY WATER RECYCLING CENTRE (Site ID 13319S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002cp	101480	31/03/2030
SPANIEL'S BRIDGE PUMPING STATION (Site ID 14047B)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	NPSWQD 008925	31/03/2030
PUMPING STN ADJACENT THE PIDDLE INN (Site ID 17638Z)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	EPRAP3822XS	31/03/2030
FOVANT WATER RECYCLING CENTRE (Site ID 13129S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ba	401338	31/03/2030
IWERNE MINSTER WRC (Site ID 13163S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002at	401089	31/03/2030
WINSCOMBE WWTW (Site ID 13351S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002dp	071977	31/03/2030
MAIDEN NEWTON WATER RECYCLING CENTRE (Site ID 13192S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002au	041353	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
TOOTLE BRIDGE PUMPING STATION (Site ID 15316B)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	103177	31/03/2030
DURLSTON ROAD PS (Site ID 14244B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002eh	402252	31/03/2030
CHIDEOCK STW (Site ID 13060S)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001ah	401068	31/03/2030
MALMESBURY WWTW (Site ID 13193S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002cw	102361	31/03/2030
EVERSHOT COMBINED SEWER OVERFLOW (Site ID 16816C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dt	042430	31/03/2030
CAMP ROAD SPS (Site ID 14311B)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	401790	31/03/2030
CHEDDAR WASTEWATER TREATMENT WORKS (Site ID 13057S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002dr	071901	31/03/2030
BENNETTS ORCHARD PUMPING STATION (Site ID 15278B)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	102399	31/03/2030
RODWELL AVENUE CSO (Site ID 16857C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002el	400894	31/03/2030
BULBURY LANE PUMPING STATION (Site ID 14220B)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002ag	401452	31/03/2030
BOX MILL WASTEWATER TREATMENT WORKS (Site ID 13029S)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002aa	010528	31/03/2030
STOKE LANE COMBINED SEWER OVERFLOW (Site ID 16398C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ch	013106	31/03/2030
RECREATION GROUND 1 CSO (Site ID 16605C)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bm	101695	31/03/2030
2 CRANBROOK ROAD CSO (Site ID 17501C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002pa	100872	31/03/2030
CHARMOUTH SEWAGE DISPOSAL WORKS (Site ID 13056C)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001pj	401625	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
BUTCOMBE WATER RECYCLING CENTRE (Site ID 13042S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002cq	071124	31/03/2030
35 HILLSIDE ROAD CSO (Site ID 16831C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dv	100563	31/03/2030
KILVE WASTEWATER TREATMENT WORKS (Site ID 13168Z)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	102917	31/03/2030
BREWERY LANE CSO (Site ID 16673C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ci	102396	31/03/2030
TRUDOXHILL PUMPING STATION (Site ID 14113B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002do	102700	31/03/2030
RECREATION GROUND 2 CSO (Site ID 19052C)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bn	101679	31/03/2030
EVERSHOT WASTEWATER TREATMENT WORKS (Site ID 13120S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ds	042453	31/03/2030
BROADMAYNE WWTW (Site ID 13036S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002av	040725	31/03/2030
ILMINSTER WWTW (Site ID 13161S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ck	102395	31/03/2030
SHORE ROAD PS OVERFLOW (Site ID 15235B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001au	051290	31/03/2030
WESTBURY ON TRYM STORM OVERFLOW (Site ID 16381C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cl	101829	31/03/2030
PORLOCK WASTEWATER TREATMENT WORKS (Site ID 13515Z)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002en	100318	31/03/2030
WEST TOWN ROAD PUMPING STATION (Site ID 14583B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002pc	102067	31/03/2030
ROMAN ROAD COMBINED SEWER OVERFLOW (Site ID 17030C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cz	401188	31/03/2030
TOLLER PORCORUM WRC (Site ID 13316C)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002ar	400607	31/03/2030
BERKELEY AVENUE CSO (Site ID 16768C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bv	013129	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
HOME FARM CSO (Site ID 16779C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bw	010772	31/03/2030
MILL LANE COMBINED SEWER OVERFLOW (Site ID 16790C)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002er	021680	31/03/2030
WELTON HOLLOW CSO (Site ID 16774C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bx	100080	31/03/2030
HYDE LANE PUMPING STATION (Site ID 15435B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cm	103186	31/03/2030
224 HENLEAZE ROAD CSO (Site ID 16379C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002by	100479	31/03/2030
ST GEORGES PARK 1 CSO (Site ID 16342C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002db	102883	31/03/2030
DOWNTON SEWAGE TREATMENT WORKS (Site ID 13099S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002az	041354	31/03/2030
GREAT SOMERFORD WWTW (Site ID 13137S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002cu	102840	31/03/2030
LADYE BAY PUMPING STATION (Site ID 15621B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001al	102489	31/03/2030
TERRACE WOOD CSO (Site ID 16302C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bz	013134	31/03/2030
MILBORNE ST.ANDREW (Site ID 13212S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002as	042116	31/03/2030
SHIREHAMPTON ROAD CSO (Site ID 16394C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ca	100455	31/03/2030
MINEHEAD SEWAGE TREATMENT WORKS (Site ID 13215S)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001aa	100386	31/03/2030
BLAGDON WASTEWATER TREATMENT WORKS (Site ID 13025S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002co	070005	31/03/2030
STANLEY GREEN ROAD CSO (Site ID 16613C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002pd	400743	31/03/2030
WATCHET SEWAGE TREATMENT WORKS (Site ID 19705S)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002eb	101940	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
MERLIN CLOSE CSO (Site ID 19030C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cb	013101	31/03/2030
CALVESWATER PUMPING STATION (Site ID 14439B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bi	401094	31/03/2030
MERE WATER RECYCLING CENTRE (Site ID 13207S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002am	040059	31/03/2030
LONG CLOSE CSO (Site ID 16582C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ct	100081	31/03/2030
LANGFORD PUMPING STATION (Site ID 15580B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cc	012883	31/03/2030
GLEN COTTAGE CSO (Site ID 19723C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002pe	102592	31/03/2030
NORTH CURRY MAIN PUMPING STATION (Site ID 15440B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dk	101806	31/03/2030
11 NEWCOMBE ROAD CSO (Site ID 16384C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cd	013102	31/03/2030
ABBEY ROAD COMBINED SEWER OVERFLOW (Site ID 16365C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ce	013103	31/03/2030
GLOUCESTER ROAD CSO (Site ID 19293C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dc	013053	31/03/2030
STATION ROAD CSO (Site ID 16640C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dl	401165	31/03/2030
CORFE CASTLE STW (Site ID 13077S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ec	041324	31/03/2030
BILBROOK PUMPING STATION (Site ID 15516B)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ef	101656	31/03/2030
BICKNOLLER CSO (Site ID 16888C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dm	102303	31/03/2030
LULWORTH BEACH PUMPING STATION (Site ID 14588B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001ag	401864	31/03/2030
SWANAGE TUNNEL 3 (Site ID 19541S)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001af	400785	31/03/2030
PUNCKNOWLE WRC (Site ID 13250S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002an	042618	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
DONYATT WATER RECYCLING CENTRE (Site ID 13095S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cf	102390	31/03/2030
35 KINGS ROAD (Site ID 16795C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002be	400689	31/03/2030
CLEMENTS LANE COMBINED SEWER OF (Site ID 16652C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ao	401431	31/03/2030
DRUID WOOD COMBINED SEWER OVERFLOW (Site ID 16424C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002cg	100842	31/03/2030
WAREHAM WASTEWATER TREATMENT WORKS (Site ID 13324S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ea	401336	31/03/2030
RUSHCOMBE BOTTOM PUMPING STATION (Site ID 15051B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002pf	401393	31/03/2030
SPRING LANE CSO (Site ID 16861C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ei	400896	31/03/2030
COOMBE PUMPING STATION (Site ID 14252B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001ap	401199	31/03/2030
CHRISTCHURCH SEWAGE TREATMENT WORKS (Site ID 13066S)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001ad	401355	31/03/2030
16 HIGH STREET CSO (Site ID 16793C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bb	400683	31/03/2030
MOORLAND WAY PUMPING STATION (Site ID 14265B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ep	401241	31/03/2030
CHICKERELL ROAD CSO (Site ID 16848C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ej	400893	31/03/2030
STOKE HILL PUMPING STATION (Site ID 14110B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dg	102699	31/03/2030
WATERY LANE PUMPING STATION (Site ID 14261B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001av	041159	31/03/2030
EBBLAKE PUMPING STATION (Site ID 15052B)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002bo	400643	31/03/2030
BOSCOMBE NO.1 PUMPING STATION (Site ID 15002B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001at	400551	31/03/2030
HIGH STREET CSO (Site ID 16866C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002pk	41274	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
250 HENLEAZE ROAD CSO (Site ID 16378C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bq	100473	31/03/2030
MIDSOMER NORTON CSO (Site ID 19985C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002br	101866	31/03/2030
RAILWAY COTTAGES PUMPING STATION (Site ID 14273B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dh	401164	31/03/2030
BLACK ROCKS CSO (Site ID 13340C)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001am	101579	31/03/2030
GREAT WISHFORD WRC (Site ID 13353S)	High priority	EnvAct_IMP2 Storm overflows - No ecological harm (Wetland treatment). 08WW101002bj	041799	31/03/2030
KINSON SEWAGE TREATMENT WORKS (Site ID 13172S)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002ed	401495	31/03/2030
LYTCHETT LANE PUMPING STATION (Site ID 19699B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bc	401064	31/03/2030
SEATOWN PUMPING STATION (Site ID 14413B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001ph	43190	31/03/2030
BLACKNOLL (Site ID 14222B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bf	401166	31/03/2030
WARDCLIFFE ROAD CSO (Site ID 16863C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002em	400898	31/03/2030
56 HOTWELL ROAD CSO (Site ID 16197C)	Frequency to 10 discharges per year. Not officially a High Priority as too far away. WSX consider this a high priority.	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bk	102900	31/03/2030
IFORD BRIDGE SEWAGE PUMPING STATION (Site ID 15007B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001aj	401244	31/03/2030
SOUTHWELL PS (Site ID 15673B)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001aq	040686	31/03/2030
FORDINGBRIDGE WRC (Site ID 13128S)	High priority	EnvAct_IMP2 (proposed) Storm overflows - No ecological harm (Wetland treatment).	401342	31/03/2030
COOPER DEAN COMBINED SEWER OVERFLOW (Site ID 18015C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002dj	041221	31/03/2030
WESTBURY ROAD COMBINED SEWER OF (Site ID 16367C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bt	013105	31/03/2030

Sites	Environmental sensitivity category	Proposed final WINEP Primary Driver code, Description and WINEP improvement ID	Permit ID	Completion Date
TAUNTON TRULL EAST BROOK CSO (Site ID 16730C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002bu	100522	31/03/2030
KINGS ARMS PS, STOBOROUGH (Site ID 14216B)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002du	401198	31/03/2030
LANGTON HERRING WRC (Site ID 13176C)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002df	040049	31/03/2030
MELCOMBE AVENUE CSO (Site ID 16855C)	Bathing Water	EnvAct_IMP3 Storm overflows - Bathing Water improvements. 08WW101001an	401191	31/03/2030
LYTCHETT MINSTER STW (Site ID 13190S)	High priority	EnvAct_IMP4 Storm overflows - Frequency improvements. 08WW101002eq	401242	31/03/2030

The following sections contain the summary reports we have produced for many of the AMP8 storm overflow improvements. The costs included in A2-1.2 to A2-1.41 are indicative capex costs at 2022/23 price base. They are indicative, because outline designs have not been undertaken. Hence the cost range for the recommended option.

A2-1.2. SO improvement: ABBEY ROAD O/S NO.123

Unique ref: 16365C

Catchment ID: 23013

Catchment name: AVONMOUTH STW CATCHMENT

Capex cost range: £1.3m to £2.1m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

ABBEY ROAD O/S NO.123 is a gravity storm overflow that predominantly spills as a result of large upstream subcatchments. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by the head of the catchment, and downstream by a weir.

Spills at this site discharge to River Trym located approximately 416m away.

Need

This site has been investigated due to association with RNAG (reason for not achieving good ecological status) and event duration monitoring (EDM) data suggests it spills on average 25.5 times per year. The hydraulic model predicts 44 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3258.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120196
- The solution involves domestic and business customer education, suds, attenuation (300 m3)
- Estimated financial cost: £9.8 million.
- Embodied carbon has been calculated as 32 tCO2e and operational carbon as 0.29 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120197
- The solution involves attenuation (380m3)
- Estimated financial cost: £1.7 million.
- Embodied carbon has been calculated as 17 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120198
- The solution involves suds
- The solution achieves 36 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1801m3
- 5% contributing area removal through SuDS - 1647m3
- 10% contributing area removal through SuDS - 1486m3
- 25% contributing area removal through SuDS - 1005m3
- 50% contributing area removal through SuDS - 365m3
- Disconnect all surface water separation opportunities - 1816m3
- Increase pipe capacity - 1816m3
- Remove infiltration - 1816m3
- Improve maintenance - 1495m3
- Increase FFT - 1816m3
- Prevent new development - 1816m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 261m3 would need to be addressed to meet the higher level of protection, while there is currently 0.05m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.3. SO improvement: HENLEAZE ROAD

Unique ref: 16378C

Catchment ID: 23013

Catchment name: AVONMOUTH STW CATCHMENT

Capex cost range: £1.6m to £2.7m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

HENLEAZE ROAD is a gravity storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by another overflow, and downstream by another overflow.

Spills at this site discharge to River Trym located approximately 355m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 16.0 times per year. The hydraulic model predicts 37 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3261.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120220
- The solution involves reduced per capita consumption (pcc) and attenuation (122m3)
- Estimated financial cost: £1.0 million.
- Embodied carbon has been calculated as 9 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

Solution ID: 120221

- The solution involves attenuation (500m3)
- Estimated financial cost: £1.8 million.
- Embodied carbon has been calculated as 21 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120222
- The solution involves suds
- The solution achieves 24 spills in the period of interest.
- Estimated financial cost: £79.4 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 210 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 579m3
- 5% contributing area removal through SuDS - 539m3
- 10% contributing area removal through SuDS - 491m3
- 25% contributing area removal through SuDS - 375m3
- 50% contributing area removal through SuDS - 199m3
- Disconnect all surface water separation opportunities - 583m3
- Increase pipe capacity - 585m3
- Remove infiltration - 585m3
- Improve maintenance - 575m3
- Increase FFT - 585m3
- Prevent new development - 585m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 307m3 would need to be addressed to meet the higher level of protection, while there is currently 0.36m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.4. SO improvement: HENLEZE RD OS EASTFIELD IN

Unique ref: 16379C

Catchment ID: 23013

Catchment name: AVONMOUTH STW CATCHMENT

Capex cost range: £1.8m to £3m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

HENLEZE RD OS EASTFIELD IN is a gravity storm overflow that predominantly spills as a result of at joining point of two combined networks. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by the head of the catchment, and downstream by overflow 16378c.

Spills at this site discharge to River Trym located approximately 503m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 36.0 times per year. The hydraulic model predicts 43 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3262.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120214
- The solution involves conveyance and attenuation (260m3) and reduced pcc
- Estimated financial cost: £2.0 million.
- Embodied carbon has been calculated as 12 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120215
- The solution involves conveyance and attenuation (280m3)
- Estimated financial cost: £2.0 million. Costs excludes a fine screen.
- Embodied carbon has been calculated as 13 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120216
- The solution involves suds
- The solution achieves 36 spills in the period of interest.
- Estimated financial cost: £60.5 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 208 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 119m3
- 5% contributing area removal through SuDS - 113m3
- 10% contributing area removal through SuDS - 106m3
- 25% contributing area removal through SuDS - 81m3
- 50% contributing area removal through SuDS - 39m3
- Disconnect all surface water separation opportunities - 121m3
- Increase pipe capacity - 120m3
- Remove infiltration - 120m3
- Improve maintenance - 121m3
- Increase FFT - 121m3
- Prevent new development - 121m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 0m3 would need to be addressed to meet the higher level of protection, while there is currently 0.08m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.5. SO improvement: NEWCOMBE RD O/S NO.11

Unique ref:	16384C
Catchment ID:	23013
Catchment name:	AVONMOUTH STW CATCHMENT
Capex cost range:	£1.1m to £1.8m was updated mid-cost of £ 3.1m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

NEWCOMBE RD O/S NO.11 is a gravity storm overflow that predominantly spills as a result of joining of two network branches. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by overflow 16398C, and downstream by overflow 16365c.

Spills at this site discharge to River Trym located approximately 652m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 25.8 times per year. The hydraulic model predicts 29 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3265.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120193
- The solution involves domestic and business customer education, suds, attenuation
- Estimated financial cost: £115.3 million.
- Embodied carbon has been calculated as 158 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120194
- The solution involves attenuation
- Estimated financial cost: £3.1 million.
- Embodied carbon has been calculated as 14 tCO_2e and operational carbon as 0 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120195
- The solution involves suds
- The solution achieves 11 spills in the period of interest.
- Estimated financial cost: £151.2 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 145 tCO_2e and operational carbon as 0 tCO_2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1876m3
- 5% contributing area removal through SuDS - 1830m3
- 10% contributing area removal through SuDS - 1719m3
- 25% contributing area removal through SuDS - 1257m3
- 50% contributing area removal through SuDS - 560m3
- Disconnect all surface water separation opportunities - 1884m3
- Increase pipe capacity - 1883m3
- Remove infiltration - 1883m3
- Improve maintenance - 1987m3
- Increase FFT - 1892m3
- Prevent new development - 1892m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 788m3 would need to be addressed to meet the higher level of protection, while there is currently 0.05m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

SO IMPROVEMENT: 100 SHIREHAMPTON RD

Unique ref: 16394C

Catchment ID: 23013

Catchment name: AVONMOUTH STW CATCHMENT

Capex cost range: £1.1m to £1.8m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

100 SHIREHAMPTON RD is a gravity storm overflow that predominantly spills as a result of large upstream sub-catchments. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by the head of the catchment, and downstream by a pumping station.

Spills at this site discharge to River Trym located approximately 71m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 34.0 times per year. The hydraulic model predicts 10 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3266.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- - Solution ID: 120184
- - The solution involves suds, attenuation (144m3) and reduced pcc
- - Estimated financial cost: £32.2 million.
- - Embodied carbon has been calculated as 100 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120185
- The solution involves attenuation (180m3)
- Estimated financial cost: £1.1 million.
- Embodied carbon has been calculated as 11 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120186
- The solution involves suds
- The solution achieves 16 spills in the period of interest.
- Estimated financial cost: £31.2 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 90 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 223m3
- 5% contributing area removal through SuDS - 203m3
- 10% contributing area removal through SuDS - 183m3
- 25% contributing area removal through SuDS - 124m3
- 50% contributing area removal through SuDS - 40m3
- Disconnect all surface water separation opportunities - 219m3
- Increase pipe capacity - 222m3
- Remove infiltration - 222m3
- Improve maintenance - 220m3
- Increase FFT - 224m3
- Prevent new development - 224m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 0m3 would need to be addressed to meet the higher level of protection, while there is currently 0.11m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.6. SO improvement: STOKE LANE O/S NO.124

Unique ref:	16398C
Catchment ID:	23013
Catchment name:	AVONMOUTH STW CATCHMENT
Capex cost range:	£1.3m to £2.1m. Updated mid-cost is £3.1m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

STOKE LANE O/S NO.124 is a gravity storm overflow that predominantly spills as a result of flow exceeds ds orifice. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by the head of the catchment, and downstream by a weir.

Spills at this site discharge to River Trym located approximately 790m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 52.0 times per year. The hydraulic model predicts 45 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3267.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120190
- The solution involves reduced pcc and attenuation (540m3)
- Estimated financial cost: £3.1 million.
- Embodied carbon has been calculated as 31 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120191
- The solution involves attenuation (600m3)
- Estimated financial cost: £3.2 million.
- Embodied carbon has been calculated as 36 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120192
- The solution involves suds
- The solution achieves 48 spills in the period of interest.
- Estimated financial cost: £91.1 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 120 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 3015m3
- 5% contributing area removal through SuDS - 2830m3
- 10% contributing area removal through SuDS - 2637m3
- 25% contributing area removal through SuDS - 2061m3
- 50% contributing area removal through SuDS - 1143m3
- Disconnect all surface water separation opportunities - 3020m3
- Increase pipe capacity - 3019m3
- Remove infiltration - 3019m3
- Improve maintenance - 2896m3
- Increase FFT - 3027m3
- Prevent new development - 3027m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 44m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.7. SO improvement: MILL LANE COMBINED SEWER OVERFLOW

Unique ref: 16790C

Catchment ID: 23016

Catchment name: BATH STW CATCHMENT

Capex cost range: £2.3m to £3.8m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

MILL LANE COMBINED SEWER OVERFLOW is a gravity storm overflow that predominantly spills as a result of limited by downstream orifice. It is located near the top of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by a pumping station, and downstream by another overflow.

Spills at this site discharge to Midford Brook located approximately 375m away.

Need

This site has been investigated due to frequent discharge to a high amenity waterbody and EDM data suggests it spills on average 38.0 times per year. The hydraulic model predicts 55 spills per year and the objective of this investigation is to reduce the spill frequency to 10 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3323.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170345
- The solution involves reduced pcc, suds and attenuation (168m3)
- Estimated financial cost: £14.8 million.

- Embodied carbon has been calculated as 24 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170346
- The solution involves attenuation (229m3)
- Estimated financial cost: £2.3 million.
- Embodied carbon has been calculated as 13 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 170347
- The solution involves suds
- The solution achieves 6 spills in the period of interest.
- Estimated financial cost: £13.8 million.
- Embodied carbon has been calculated as 13 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 266m3
- 5% contributing area removal through SuDS - 244m3
- 10% contributing area removal through SuDS - 219m3
- 25% contributing area removal through SuDS - 146m3
- 50% contributing area removal through SuDS - 41m3
- Disconnect all surface water separation opportunities - 269m3
- Increase pipe capacity - 272m3
- Remove infiltration - 260m3
- Improve maintenance - 278m3
- Increase FFT - 272m3
- Prevent new development - 272m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 703m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.8. SO improvement: BLAGDON SETTLED STORM O/F

Unique ref: 13025S

Catchment ID: 23025

Catchment name: BLAGDON STW CATCHMENT

Capex cost range: £2.6m to £4.3m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

BLAGDON SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the bottom of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by a pumping station, and downstream by none.

Spills at this site discharge to River Congresbury Yeo located approximately 1m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 33.0 times per year. The hydraulic model predicts 45 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3294.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows,C00196 (C9851) - CSO Compliance.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145272
- The solution involves domestic and business customer education, sewer groundwater infiltration reduction, attenuation (1260m3)
- Estimated financial cost: £3.2 million.
- Embodied carbon has been calculated as 43 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145273
- The solution involves storage with pumped return (1312 m3)
- Estimated financial cost: £3.1 million.
- Embodied carbon has been calculated as 44 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145274
- The solution involves suds
- The solution achieves 48 spills in the period of interest.
- Estimated financial cost: £11.7 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 0 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 5045m3
- 5% contributing area removal through SuDS - 4914m3
- 10% contributing area removal through SuDS - 4597m3
- 25% contributing area removal through SuDS - 3714m3
- 50% contributing area removal through SuDS - 2191m3
- Disconnect all surface water separation opportunities - 5199m3
- Increase pipe capacity - 0m3
- Remove infiltration - 2968m3
- Improve maintenance - 5198m3
- Increase FFT - 2717m3
- Prevent new development - 2717m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 2961m3 would need to be addressed to meet the higher level of protection, while there is currently 0.30m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.9. SO improvement: CHEW STOKE SETTLED STORM O/F

Unique ref: 13058S

Catchment ID: 23058

Catchment name: CHEW STOKE STW CATCHMENT

Capex cost range: £1.9m to £3.7m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

CHEW STOKE SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the bottom of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by a pumping station, and downstream.

Spills at this site discharge to River Chew located approximately 21m away.

Need

This site has been investigated due to frequent discharge to a high amenity waterbody and EDM data suggests it spills on average 171.0 times per year. The hydraulic model predicts 57 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3200.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170294
- The solution involves reduced pcc and remove sewer ground infiltration
- Estimated financial cost: £7.0 million.
- Embodied carbon has been calculated as 0 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170295
- The solution involves attenuation
- Estimated financial cost: £3.7 million.
- Embodied carbon has been calculated as 57 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 170296
- The solution involves suds
- The solution achieves 17 spills in the period of interest.
- Estimated financial cost: £44.5 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 99 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 369m3
- 5% contributing area removal through SuDS - 369m3
- 10% contributing area removal through SuDS - 369m3
- 25% contributing area removal through SuDS - 369m3
- 50% contributing area removal through SuDS - 369m3
- Disconnect all surface water separation opportunities - 369m3
- Increase pipe capacity - 879m3
- Remove infiltration - 369m3
- Improve maintenance - 369m3
- Increase FFT - 369m3
- Prevent new development - 369m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 659m3 would need to be addressed to meet the higher level of protection, while there is currently 0.37m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.10. SO improvement: CHIDEOCK SETTLED STORM O/F

Unique ref:	13060S
Catchment ID:	23060
Catchment name:	CHIDEOCK STW CATCHMENT
Capex cost range:	£2.6m to £4.4m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

CHIDEOCK SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of inadequate volume of storm tank. It is located near the top of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by storage, and downstream by storage.

Spills at this site discharge to River Winniford located approximately 0m away.

Need

This site has been investigated due to frequent discharge to a bathing water and EDM data suggests it spills on average 62.4 times per year. The hydraulic model predicts 21 spills per year and the objective of this investigation is to reduce the spill frequency to 1 per bathing season. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3206.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145212
- The solution involves domestic and business customer education, sw source control measures - 5%, sewer groundwater infiltration reduction & attenuation increase storage of storm tank (by 1444.12 m3)
- Estimated financial cost: £5.9 million.
- Embodied carbon has been calculated as 52 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145213
- The solution involves increase storage at existing storm tank (by 1587 m3)
- Estimated financial cost: £3.4 million.
- Embodied carbon has been calculated as 51 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145214
- The solution involves suds
- The solution achieves 4 spills in the period of interest.
- Estimated financial cost: £6.3 million.
- Embodied carbon has been calculated as 40 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 3471m^3
- 5% contributing area removal through SuDS - 3360m^3
- 10% contributing area removal through SuDS - 3231m^3
- 25% contributing area removal through SuDS - 2800m^3
- 50% contributing area removal through SuDS - 2011m^3
- Disconnect all surface water separation opportunities - 0m^3
- Increase pipe capacity - 3830m^3
- Remove infiltration - 1060m^3
- Improve maintenance - 3505m^3
- Increase FFT - 1437m^3
- Prevent new development - 1437m^3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 0 per bathing season and the amount of additional freeboard available beyond that needed to achieve 2 per bathing season. The results of these tests suggest an additional 2459m3 would need to be addressed to meet the higher level of protection, while there is currently 0.67m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.11. SO improvement: CORFE CASTLE SETTLED STORM O/F

Unique ref: 13077S

Catchment ID: 23077

Catchment name: CORFE CASTLE STW CATCHMENT

Capex cost range: £1.2m to £2m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

CORFE CASTLE SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of flow backing up from the stw ps. It is located near the bottom of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by a pumping station, and downstream by none.

Spills at this site discharge to River Corfe located approximately 96m away.

Need

This site has been investigated due to frequent discharge to a shellfish water and EDM data suggests it spills on average 25.2 times per year. The hydraulic model predicts 245 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3219.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135113
- The solution involves customer incentive, domestic and business customer education, attenuation (315.1 m3)
- Estimated financial cost: £1.5 million.
- Embodied carbon has been calculated as 15 tCO2e and operational carbon as 0.29 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135114
- The solution involves attenuation (371.45 m3)
- Estimated financial cost: £1.6 million.
- Embodied carbon has been calculated as 17 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135115
- The solution involves suds
- The solution achieves 9 spills in the period of interest.
- Estimated financial cost: £10.8 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 32 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 832m3
- 5% contributing area removal through SuDS - 1315m3
- 10% contributing area removal through SuDS - 1216m3
- 25% contributing area removal through SuDS - 1003m3
- 50% contributing area removal through SuDS - 597m3
- Disconnect all surface water separation opportunities - 1420m3
- Increase pipe capacity - 1384m3
- Remove infiltration - 663m3
- Improve maintenance - 1857m3
- Increase FFT - 0m3
- Prevent new development - 0m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 1236m3 would need to be addressed to meet the higher level of protection, while there is currently 1.12m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.12. SO improvement: CORFE MULLEN - RUSHCOMBE BOTTOM, HIGH BLANDFORD RD

Unique ref:	15051B
Catchment ID:	23078
Catchment name:	CORFE MULLEN STW CATCHMENT
Capex cost range:	£1m to £1.7m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

CORFE MULLEN - RUSHCOMBE BOTTOM, HIGH BLANDFORD RD is a pumping station overflow that predominantly spills as a result of backup flow from the pumping station. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by a pumping station, and downstream by another overflow.

Spills at this site discharge to Rushcombe Stream located approximately 22m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 19.5 times per year. The hydraulic model predicts 18 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3207.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135110
- The solution involves domestic and business customer education, sw source control measures - 50%, attenuation (98.9 m3)

- Estimated financial cost: £11.3 million.
- Embodied carbon has been calculated as 19 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135111
- The solution involves attenuation (236.5 m3)
- Estimated financial cost: £1.3 million.
- Embodied carbon has been calculated as 13 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135112
- The solution involves suds
- The solution achieves 12 spills in the period of interest.
- Estimated financial cost: £10.4 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 11 tCO_2e and operational carbon as 0 tCO_2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 974m3
- 5% contributing area removal through SuDS - 917m3
- 10% contributing area removal through SuDS - 848m3
- 25% contributing area removal through SuDS - 604m3
- 50% contributing area removal through SuDS - 175m3
- Disconnect all surface water separation opportunities - 983m3
- Increase pipe capacity - 142m3
- Remove infiltration - 983m3
- Improve maintenance - 1113m3
- Increase FFT - 983m3
- Prevent new development - 983m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 927m3 would need to be addressed to meet the higher level of protection, while there is currently 0.50m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.13. SO improvement: DORCHESTER - 35 KINGS ROAD

Unique ref:	16795C
Catchment ID:	23096
Catchment name:	DORCHESTER STW CATCHMENT
Capex cost range:	£1.1m to £1.8m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

DORCHESTER - 35 KINGS ROAD is a gravity storm overflow that predominantly spills as a result of incapacity in pipes downstream the problem location. It is located near the middle of the catchment in a predominantly commercial part of the catchment. Upstream the hydraulically significant extent is limited by another overflow, and downstream by another overflow.

Spills at this site discharge to Mill Stream located approximately 453m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 22.4 times per year. The hydraulic model predicts 18 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3310.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135179
- The solution involves domestic and business customer education, sw source control measures - 50%, attenuation (154.14 m3)
- Estimated financial cost: £88.6 million.

- Embodied carbon has been calculated as 382 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135180
- The solution involves attenuation (286.26 m^3)
- Estimated financial cost: £1.4 million.
- Embodied carbon has been calculated as 14 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135181
- The solution involves suds
- The solution achieves 14 spills in the period of interest.
- Estimated financial cost: £87.5 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 372 tCO_2e and operational carbon as 0 tCO_2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1932m3
- 5% contributing area removal through SuDS - 1848m3
- 10% contributing area removal through SuDS - 1734m3
- 25% contributing area removal through SuDS - 1339m3
- 50% contributing area removal through SuDS - 551m3
- Disconnect all surface water separation opportunities - 1561m3
- Increase pipe capacity - 6m3
- Remove infiltration - 1904m3
- Improve maintenance - 1976m3
- Increase FFT - 1948m3
- Prevent new development - 1948m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 1828m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.14. SO improvement: FORDINGTON - 16 HIGH STREET

Unique ref: 16793C

Catchment ID: 23096

Catchment name: DORCHESTER STW CATCHMENT

Capex cost range: £1.3m to £2.1m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

FORDINGTON - 16 HIGH STREET is a gravity storm overflow that predominantly spills as a result of incapacity in pipes d/s causing backing up of flow. It is located near the middle of the catchment in a predominantly commercial part of the catchment. Upstream the hydraulically significant extent is limited by another overflow, and downstream by another overflow.

Spills at this site discharge to Mill Stream located approximately 29m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 18.6 times per year. The hydraulic model predicts 7 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3309.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135176
- The solution involves domestic and business customer education, sw source control measures - 50%, attenuation (352.26m3)
- Estimated financial cost: £33.3 million.

- Embodied carbon has been calculated as 162 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135177
- The solution involves attenuation (386.46m3)
- Estimated financial cost: £1.6 million.
- Embodied carbon has been calculated as 18 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135178
- The solution involves suds
- The solution achieves 8 spills in the period of interest.
- Estimated financial cost: £31.8 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 146 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 4142m3
- 5% contributing area removal through SuDS - 3831m3
- 10% contributing area removal through SuDS - 3494m3
- 25% contributing area removal through SuDS - 2324m3
- 50% contributing area removal through SuDS - 605m3
- Disconnect all surface water separation opportunities - 4109m3
- Increase pipe capacity - 0m3
- Remove infiltration - 3796m3
- Improve maintenance - 3801m3
- Increase FFT - 4162m3
- Prevent new development - 4162m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 3381m3 would need to be addressed to meet the higher level of protection, while there is currently 0.12m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.15. SO improvement: EVERSHOT SETTLED STORM O/F

Unique ref: 13120S

Catchment ID: 23120

Catchment name: EVERSHOT STW CATCHMENT

Capex cost range: £1.2m to £2m for option A (hybrid approach)

Delivery AMP: AMP8

Site overview

EVERSHOT SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of lack of capacity of storm tank. It is located near the bottom of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by weir, and downstream by outfall.

Spills at this site discharge directly to the River Frome.

Need

This site has been investigated due to frequent discharge to a high amenity waterbody and EDM data suggests it spills on average 45.8 times per year. The hydraulic model predicts 45 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3298.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145275
- The solution involves domestic and business customer education, suds 5%, attenuation (300 m3)
- Estimated financial cost: £1.5 million.
- Embodied carbon has been calculated as 22 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145276
- The solution involves attenuation (336 m3)
- Estimated financial cost: £1.5 million.
- Embodied carbon has been calculated as 16 tCO2e and operational carbon as 0.29 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145277
- The solution involves suds
- The solution achieves 27 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1145m3
- 5% contributing area removal through SuDS - 1111m3
- 10% contributing area removal through SuDS - 1074m3
- 25% contributing area removal through SuDS - 943m3
- 50% contributing area removal through SuDS - 669m3
- Disconnect all surface water separation opportunities - 1148m3
- Increase pipe capacity - 3498m3
- Remove infiltration - 1070m3
- Improve maintenance - 1145m3
- Increase FFT - 564m3
- Prevent new development - 564m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 99m3 would need to be addressed to meet the higher level of protection, while there is currently 0.10m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a hybrid separation approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.16. SO improvement: FOVANT SETTLED STORM O/F

Unique ref: 13129S

Catchment ID: 23129

Catchment name: FOVANT STW CATCHMENT

Capex cost range: £2.9m to £4.8m for option A (hybrid approach)

Delivery AMP: AMP8

Site overview

FOVANT SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of lack of existing storm storage at WRC. It is located near the bottom of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by weir, and downstream by outfall.

Spills at this site discharge directly to Fovant Brook.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 81.0 times per year. The hydraulic model predicts 13 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3301.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111003
- The solution involves reduced pcc + suds 5% + attenuation (additional 1342m3 storage was added to existing tank at st99309004)
- Estimated financial cost: £3.7 million.
- Embodied carbon has been calculated as 45 tCO_2e and operational carbon as 0.28 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111004
- The solution involves attenuation (additional 1695m3 storage was added to existing tank at st99309004)
- Estimated financial cost: £3.5 million.
- Embodied carbon has been calculated as 53 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 111005
- The solution involves suds
- The solution achieves 8 spills in the period of interest.
- Estimated financial cost: £14.9 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 40 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 3823m3
- 5% contributing area removal through SuDS - 3780m3
- 10% contributing area removal through SuDS - 3608m3
- 25% contributing area removal through SuDS - 3078m3
- 50% contributing area removal through SuDS - 2159m3
- Disconnect all surface water separation opportunities - 0m3
- Increase pipe capacity - 0m3
- Remove infiltration - 0m3
- Improve maintenance - 3850m3
- Increase FFT - 3953m3
- Prevent new development - 3953m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 0m3 would need to be addressed to meet the higher level of protection, while there is currently 1.15m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a hybrid separation approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.17. SO improvement: GODMANSTONE STW

Unique ref: 17028B

Catchment ID: 27028

Catchment name: GODMANSTONE STW CATCHMENT

Capex cost range: £1.5m to £2.5m for option A (hybrid approach)

Delivery AMP: AMP8

Site overview

GODMANSTONE STW is a storm and emergency overflow that predominantly spills as a result of has high additional flow with is nearly equal to fft and causes spilling. It is located near the bottom of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by a pumping station, and downstream by none.

Spills at this site discharge to River Cerne located approximately 16m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 0.0 times per year. The hydraulic model predicts 53 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3308.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135185
- The solution involves domestic and business customer education, sw source control measures - 5%, attenuation (537.18 m3)
- Estimated financial cost: £1.9 million.

- Embodied carbon has been calculated as 23 tCO_2e and operational carbon as 0.28 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135186
- The solution involves attenuation (555.86 m3)
- Estimated financial cost: £1.9 million.
- Embodied carbon has been calculated as 23 tCO_2e and operational carbon as 0.28 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135187
- The solution involves suds
- The solution achieves 88 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1932m3
- 5% contributing area removal through SuDS - 1927m3
- 10% contributing area removal through SuDS - 1923m3
- 25% contributing area removal through SuDS - 1914m3
- 50% contributing area removal through SuDS - 1899m3
- Disconnect all surface water separation opportunities - 0m3
- Increase pipe capacity - 1927m3
- Remove infiltration - 0m3
- Improve maintenance - 1930m3
- Increase FFT - 1654m3
- Prevent new development - 1654m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 1m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a hybrid approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.18. SO improvement: ILMINSTER - BREWERY LANE

Unique ref:	16673C
Catchment ID:	23161
Catchment name:	ILMINSTER STW CATCHMENT
Capex cost range:	£1.6m to £2.7m. Updated mid-cost is £3.4m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

ILMINSTER - BREWERY LANE is a gravity storm overflow that predominantly spills as a result of ds network surcharged. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by the head of the catchment, and downstream by overflow 16674c.

Spills at this site discharge to Shudrick Stream located approximately 16m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 48.5 times per year. The hydraulic model predicts 23 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3241.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120169
- The solution involves suds 50%, reduced pcc and attenuation (1500m3)
- Estimated financial cost: £21.2 million.
- Embodied carbon has been calculated as 209 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120170
- The solution involves attenuation (1600m3)
- Estimated financial cost: £3.4 million.
- Embodied carbon has been calculated as 49 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120171
- The solution involves suds
- The solution achieves 23 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance..

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 3235m3
- 5% contributing area removal through SuDS - 2993m3
- 10% contributing area removal through SuDS - 2748m3
- 25% contributing area removal through SuDS - 2020m3
- 50% contributing area removal through SuDS - 970m3
- Disconnect all surface water separation opportunities - 3240m3
- Increase pipe capacity - 198m3
- Remove infiltration - 3207m3
- Improve maintenance - 2348m3
- Increase FFT - 3241m3
- Prevent new development - 3241m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 2126m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.19. SO improvement: ILMINSTER SETTLED STORM O/F

Unique ref: 13161S

Catchment ID: 23161

Catchment name: ILMINSTER STW CATCHMENT

Capex cost range: £3m to £5m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

ILMINSTER SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of lack of capacity at wrc. It is located near the bottom of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by a weir, and downstream by a weir.

Spills at this site discharge to River Isle located approximately 57m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 44.0 times per year. The hydraulic model predicts 25 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3240.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120166
- The solution involves reduced pcc and attenuation (1774m3)
- Estimated financial cost: £3.8 million.
- Embodied carbon has been calculated as 55 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 120167
- The solution involves attenuation (2007m3)
- Estimated financial cost: £3.9 million.
- Embodied carbon has been calculated as 60 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 120168
- The solution involves suds
- The solution achieves 19 spills in the period of interest.
- Estimated financial cost: £66.4 million. n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1799m3
- 5% contributing area removal through SuDS - 1657m3
- 10% contributing area removal through SuDS - 1562m3
- 25% contributing area removal through SuDS - 1173m3
- 50% contributing area removal through SuDS - 591m3
- Disconnect all surface water separation opportunities - 1894m3
- Increase pipe capacity - 2912m3
- Remove infiltration - 1331m3
- Improve maintenance - 1903m3
- Increase FFT - 341m3
- Prevent new development - 341m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 3m3 would need to be addressed to meet the higher level of protection, while there is currently 0.83m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.20. SO improvement: Maiden Bradley STW

Unique ref: 13191C

Catchment ID: 23191

Catchment name: MAIDEN BRADLEY STW CATCHMENT

Capex cost range: £1.8m to £3m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

Maiden Bradley STW is a storm overflow only that predominantly spills as a result of lack of existing storm storage at wrc pass forward flow limited by flow to fft. It is located near the bottom of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by cso, and downstream by outfall.

Spills at this site discharge to soakaway.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 0.0 times per year. The hydraulic model predicts 76 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3295.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111000
- The solution involves reduced ppc + attenuation (storage tank with pumped return 623m3)
- Estimated financial cost: £2.1 million.
- Embodied carbon has been calculated as 25 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111001
- The solution involves attenuation (storage tank with pumped return - 630m3)
- Estimated financial cost: £2.1 million.
- Embodied carbon has been calculated as 25 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 111002
- The solution involves suds
- The solution achieves 71 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 457m3
- 5% contributing area removal through SuDS - 435m3
- 10% contributing area removal through SuDS - 415m3
- 25% contributing area removal through SuDS - 352m3
- 50% contributing area removal through SuDS - 246m3
- Disconnect all surface water separation opportunities - 0m3
- Increase pipe capacity - 0m3
- Remove infiltration - 450m3
- Improve maintenance - 448m3
- Increase FFT - 365m3
- Prevent new development - 365m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 57m3 would need to be addressed to meet the higher level of protection, while there is currently 0.07m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed

A2-1.21. SO improvement: BILBROOK SPS

Unique ref: 15516B

Catchment ID: 23215

Catchment name: MINEHEAD STW CATCHMENT

Capex cost range: £0.6m to £1.1m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

BILBROOK SPS is a pumping station overflow that predominantly spills as a result of backing up flow from the pumping station. It is located near the top of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by the head of the catchment, and downstream by a pumping station.

Spills at this site discharge to River Pill located approximately 10m away.

Need

This site has been investigated due to frequent discharge to a bathing water and EDM data suggests it spills on average 25.2 times per year. The hydraulic model predicts 16 spills per year and the objective of this investigation is to reduce the spill frequency to 2 per bathing season. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3204.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135101
- The solution involves domestic and business customer education, attenuation (77.7 m3)
- Estimated financial cost: £0.8 million.
- Embodied carbon has been calculated as 8 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135102
- The solution involves attenuation (77.7 m3)
- Estimated financial cost: £0.8 million.
- Embodied carbon has been calculated as 8 tCO2e and operational carbon as 0.29 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135103
- The solution involves suds
- The solution achieves 0 spills in the period of interest.
- Estimated financial cost: £1.5 million.
- Embodied carbon has been calculated as 4 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 133m3
- 5% contributing area removal through SuDS - 123m3
- 10% contributing area removal through SuDS - 114m3
- 25% contributing area removal through SuDS - 86m3
- 50% contributing area removal through SuDS - 41m3
- Disconnect all surface water separation opportunities - 132m3
- Increase pipe capacity - 118m3
- Remove infiltration - 132m3
- Improve maintenance - 126m3
- Increase FFT - 132m3
- Prevent new development - 132m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 0 per bathing season and the amount of additional freeboard available beyond that needed to achieve 2 per bathing season. The results of these tests suggest an additional 62m3 would need to be addressed to meet the higher level of protection, while there is currently 0.10m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.22. SO improvement: MINEHEAD STW SETTLED STORM O/F

Unique ref: 13215S

Catchment ID: 23215

Catchment name: MINEHEAD STW CATCHMENT

Capex cost range: £3.6m to £6m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

MINEHEAD STW SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of less storage capacity at the treatment works. It is located near the bottom of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by a pumping station, and downstream by none.

Spills at this site discharge to Bristol Channel located approximately 68m away.

Need

This site has been investigated due to frequent discharge to a bathing water and EDM data suggests it spills on average 33.6 times per year. The hydraulic model predicts 28 spills per year and the objective of this investigation is to reduce the spill frequency to 2 per bathing season. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3203.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135107
- The solution involves domestic and business customer education, sw source control measures - 50%, attenuation (392.7 m3)
- Estimated financial cost: £129.0 million.

- Embodied carbon has been calculated as 415 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135108
- The solution involves attenuation (2713.2 m3)
- Estimated financial cost: £4.6 million.
- Embodied carbon has been calculated as 74 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135109
- The solution involves suds
- The solution achieves 2 spills in the period of interest.
- Estimated financial cost: £127.4 million.
- Embodied carbon has been calculated as 397 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 3872m3
- 5% contributing area removal through SuDS - 3496m3
- 10% contributing area removal through SuDS - 3075m3
- 25% contributing area removal through SuDS - 1842m3
- 50% contributing area removal through SuDS - 0m3
- Disconnect all surface water separation opportunities - 4325m3
- Increase pipe capacity - 4327m3
- Remove infiltration - 3266m3
- Improve maintenance - 4543m3
- Increase FFT - 0m3
- Prevent new development - 0m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 0 per bathing season and the amount of additional freeboard available beyond that needed to achieve 2 per bathing season. The results of these tests suggest an additional 1554m3 would need to be addressed to meet the higher level of protection, while there is currently 1.24m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.23. SO improvement: POOLE - SHORE ROAD SPS

Unique ref: 15235B

Catchment ID: 23242

Catchment name: POOLE STW CATCHMENT

Capex cost range: £1m to £1.7m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

POOLE - SHORE ROAD SPS is a pumping station overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the middle of the catchment in a predominantly commercial part of the catchment. Upstream the hydraulically significant extent is limited by storage tank, and downstream by outfall.

Spills at this site discharge to Poole Bay located approximately 8304m away.

Need

This site has been investigated due to frequent discharge to a bathing water and EDM data suggests it spills on average 43.6 times per year. The hydraulic model predicts 44 spills per year and the objective of this investigation is to reduce the spill frequency to 1 per bathing season. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3210.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows,C9909 - SPS Consent Compliance.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145239
- The solution involves domestic and business customer education, suds, attenuation (144 m3)
- Estimated financial cost: £1030.7 million.
- Embodied carbon has been calculated as 112 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145240
- The solution involves storage with pumped return (243 m3)
- Estimated financial cost: £1.3 million.
- Embodied carbon has been calculated as 13 tCO_2e and operational carbon as 0 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145241
- The solution involves suds
- The solution achieves 6 spills in the period of interest.
- Estimated financial cost: £1029.7 million.
- Embodied carbon has been calculated as 103 tCO_2e and operational carbon as 0 tCO_2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 450m3
- 5% contributing area removal through SuDS - 225m3
- 10% contributing area removal through SuDS - 225m3
- 25% contributing area removal through SuDS - 150m3
- 50% contributing area removal through SuDS - 75m3
- Disconnect all surface water separation opportunities - 300m3
- Increase pipe capacity - 196m3
- Remove infiltration - 300m3
- Improve maintenance - 101m3
- Increase FFT - 150m3
- Prevent new development - 150m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 0 per bathing season and the amount of additional freeboard available beyond that needed to achieve 2 per bathing season. The results of these tests suggest an additional 75m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.24. SO improvement: PORTISHEAD - HILLSIDE RD REDCLIFF BAY

Unique ref: 16831C

Catchment ID: 23243

Catchment name: PORTBURY WHARF STW CATCHMENT

Capex cost range: £2.4m to £4m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

PORTISHEAD - HILLSIDE RD REDCLIFF BAY is a gravity storm overflow that predominantly spills as a result of Insufficient capacity due to the pipe which holds water. It is located near the top of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by Weir.

Spills at this site discharge to Severn Estuary located approximately 114m away.

Need

This site has been investigated due to frequent discharge to a high amenity waterbody and EDM data suggests it spills on average 49.2 times per year. The hydraulic model predicts 54 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3330.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138016
- The solution involves domestic and business customer education, attenuation (956 m3)
- Estimated financial cost: £2.8 million.

- Embodied carbon has been calculated as 0 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138017
- The solution involves attenuation (1092 m3)
- Estimated financial cost: £2.8 million.
- Embodied carbon has been calculated as 0 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 138018
- The solution involves SUDS
- The solution achieves 4 spills in the period of interest.
- Estimated financial cost: £4.9 million.
- Embodied carbon has been calculated as 0 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 2003m3
- 5% contributing area removal through SuDS - 2172m3
- 10% contributing area removal through SuDS - 1793m3
- 25% contributing area removal through SuDS - 1467m3
- 50% contributing area removal through SuDS - 968m3
- Disconnect all surface water separation opportunities - 2016m3
- Increase pipe capacity - 931m3
- Remove infiltration - 1871m3
- Improve maintenance - 2219m3
- Increase FFT - 2252m3
- Prevent new development - 2252m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 174m3 would need to be addressed to meet the higher level of protection, while there is currently 0.09m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.25. SO improvement: MIDSOMER NORTON - BERKELEY AVENUE SO

Unique ref:	16768C
Catchment ID:	23252
Catchment name:	RADSTOCK STW CATCHMENT
Capex cost range:	£0.5m to £0.9m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

MIDSOMER NORTON - BERKELEY AVENUE SO is a gravity storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by weir.

Spills at this site discharge to Wellow Brook located approximately 20m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 38.0 times per year. The hydraulic model predicts 9 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3251.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145254
- The solution involves domestic and business customer education, suds, attenuation (inline storage)
- Estimated financial cost: £8.0 million.
- Embodied carbon has been calculated as 8 tCO_2e and operational carbon as 0 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145255
- The solution involves attenuation
- Estimated financial cost: £0.7 million.
- Embodied carbon has been calculated as 9 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145256
- The solution involves suds
- The solution achieves 9 spills in the period of interest.
- Estimated financial cost: £7.9 million.
- Embodied carbon has been calculated as 0 tCO_2e and operational carbon as 0 tCO_2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 261m3
- 5% contributing area removal through SuDS - 234m3
- 10% contributing area removal through SuDS - 212m3
- 25% contributing area removal through SuDS - 139m3
- 50% contributing area removal through SuDS - 48m3
- Disconnect all surface water separation opportunities - 262m3
- Increase pipe capacity - 0m3
- Remove infiltration - 229m3
- Improve maintenance - 265m3
- Increase FFT - 265m3
- Prevent new development - 265m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 39m3 would need to be addressed to meet the higher level of protection, while there is currently 0.80m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.26. SO improvement: MIDSOMER NORTON - OLD STW SO

Unique ref: 16774C

Catchment ID: 23252

Catchment name: RADSTOCK STW CATCHMENT

Capex cost range: £2.7m to £4.6m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

MIDSOMER NORTON - OLD STW SO is a gravity storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the middle of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by weir, and downstream by weir.

Spills at this site discharge to Wellow Brook located approximately 93m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 37.4 times per year. The hydraulic model predicts 35 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3253.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145260
- The solution involves domestic and business customer education, attenuation (1237.5m3)
- Estimated financial cost: £3.2 million.
- Embodied carbon has been calculated as 42 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145261
- The solution involves storage with pumped return (1446.5 m3)
- Estimated financial cost: £3.2 million.
- Embodied carbon has been calculated as 47 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145262
- The solution involves suds
- The solution achieves 30 spills in the period of interest.
- Estimated financial cost: £63.4 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 182 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 3885m3
- 5% contributing area removal through SuDS - 3675m3
- 10% contributing area removal through SuDS - 3374m3
- 25% contributing area removal through SuDS - 2564m3
- 50% contributing area removal through SuDS - 1201m3
- Disconnect all surface water separation opportunities - 3900m3
- Increase pipe capacity - 6113m3
- Remove infiltration - 2850m3
- Improve maintenance - 3910m3
- Increase FFT - 0m3
- Prevent new development - 0m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 1035m3 would need to be addressed to meet the higher level of protection, while there is currently 0.12m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.27. SO improvement: STON EASTON - Field Nr.WELLOW BROOK/TERRACE WOOD SO

Unique ref:	16302C
Catchment ID:	23252
Catchment name:	RADSTOCK STW CATCHMENT
Capex cost range:	£1.8m to £3m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

STON EASTON - Field Nr.WELLOW BROOK/TERRACE WOOD SO is a gravity storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the top of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by weir, and downstream by weir.

Spills at this site discharge to Wellow Brook located approximately 56m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 35.0 times per year. The hydraulic model predicts 95 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3250.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145251
- The solution involves domestic and business customer education, attenuation (496 m3)
- Estimated financial cost: £1.8 million.
- Embodied carbon has been calculated as 21 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145252
- The solution involves storage with pumped return (601.4 m3)
- Estimated financial cost: £2.0 million.
- Embodied carbon has been calculated as 24 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145253
- The solution involves suds
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 921m3
- 5% contributing area removal through SuDS - 869m3
- 10% contributing area removal through SuDS - 811m3
- 25% contributing area removal through SuDS - 638m3
- 50% contributing area removal through SuDS - 344m3
- Disconnect all surface water separation opportunities - 921m3
- Increase pipe capacity - 221m3
- Remove infiltration - 631m3
- Improve maintenance - 946m3
- Increase FFT - 922m3
- Prevent new development - 922m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 28m3 would need to be addressed to meet the higher level of protection, while there is currently 0.13m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.28. SO improvement: STON EASTON - S.of HOME FARM opp ESTATE OFFICE

Unique ref:	16779C
Catchment ID:	23252
Catchment name:	RADSTOCK STW CATCHMENT
Capex cost range:	£1m to £1.7m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

STON EASTON - S.of HOME FARM opp ESTATE OFFICE is a gravity storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the top of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by csO.

Spills at this site discharge to Midford Brook located approximately 8m away.

Need

This site has been investigated due to association with RNAG and EDM data suggests it spills on average 38.0 times per year. The hydraulic model predicts 31 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3255.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145266
- The solution involves domestic and business customer education, suds, attenuation (77.09 m3)
- Estimated financial cost: £1.7 million.
- Embodied carbon has been calculated as 26 tCO2e and operational carbon as 0.29 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145267
- The solution involves storage with pumped return (133.64 m3)
- Estimated financial cost: £1.2 million.
- Embodied carbon has been calculated as 9 tCO2e and operational carbon as 0.29 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145268
- The solution involves suds
- The solution achieves 28 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 669m3
- 5% contributing area removal through SuDS - 598m3
- 10% contributing area removal through SuDS - 541m3
- 25% contributing area removal through SuDS - 383m3
- 50% contributing area removal through SuDS - 167m3
- Disconnect all surface water separation opportunities - 665m3
- Increase pipe capacity - 77m3
- Remove infiltration - 644m3
- Improve maintenance - 671m3
- Increase FFT - 667m3
- Prevent new development - 667m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 153m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.29. SO improvement: DURLSTON ROAD PS

Unique ref:	14244B
Catchment ID:	29541
Catchment name:	SWANAGE STW CATCHMENT
Capex cost range:	£2.1m to £3.6m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

DURLSTON ROAD PS is a pumping station overflow that predominantly spills as a result of lack of hydraulic capacity at pumping station. It is located near the top of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by the head of the catchment, and downstream by a pumping station.

Spills at this site discharge to English Channel located approximately 159m away.

Need

This site has been investigated due to frequent discharge to a high amenity waterbody and EDM data suggests it spills on average 63.0 times per year. The hydraulic model predicts 50 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3324.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170351
- The solution involves reduced pcc, suds and attenuation (465m3)
- Estimated financial cost: £5.7 million.
- Embodied carbon has been calculated as 61 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170352
- The solution involves attenuation (581m3)
- Estimated financial cost: £2.1 million.
- Embodied carbon has been calculated as 19 tCO_2e and operational carbon as 0 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 170353
- The solution involves suds
- The solution only achieves 12 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 870m3
- 5% contributing area removal through SuDS - 791m3
- 10% contributing area removal through SuDS - 712m3
- 25% contributing area removal through SuDS - 491m3
- 50% contributing area removal through SuDS - 212m3
- Disconnect all surface water separation opportunities - 665m3
- Increase pipe capacity - 77m3
- Remove infiltration - 644m3
- Improve maintenance - 671m3
- Increase FFT - 667m3
- Prevent new development - 667m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 440m3 would need to be addressed to meet the higher level of protection, while there is currently 0.04m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.30. SO improvement: STOBOROUGH - KINGS ARMS SPS

Unique ref:	14216B
Catchment ID:	23324
Catchment name:	WAREHAM STW CATCHMENT
Capex cost range:	£2.3m to £3.9m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

STOBOROUGH - KINGS ARMS SPS is a pumping station overflow that predominantly spills as a result of insufficient capacity due to flat pipe which holds water. It is located near the middle of the catchment in a predominantly commercial part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by pump.

Spills at this site discharge to River Frome located approximately 4m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 10.4 times per year. The hydraulic model predicts 25 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3287.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138008
- The solution involves domestic and business customer education, attenuation (1185.85 m3), sw source control measures - 10%
- Estimated financial cost: £3.8 million.

- Embodied carbon has been calculated as 42 tCO_2e and operational carbon as 0.28 tCO_2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138009
- The solution involves attenuation (1282 m3)
- Estimated financial cost: £3.0 million.
- Embodied carbon has been calculated as 43 tCO_2e and operational carbon as 0.28 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 138010
- The solution involves suds
- The solution achieves 17 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 300m3
- 5% contributing area removal through SuDS - 278m3
- 10% contributing area removal through SuDS - 254m3
- 25% contributing area removal through SuDS - 187m3
- 50% contributing area removal through SuDS - 79m3
- Disconnect all surface water separation opportunities - 300m3
- Increase pipe capacity - 29m3
- Remove infiltration - 302m3
- Improve maintenance - 375m3
- Increase FFT - 302m3
- Prevent new development - 302m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 0m3 would need to be addressed to meet the higher level of protection, while there is currently 0.70m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.31. SO improvement: WAREHAM SETTLED STORM O/F

Unique ref: 13324S

Catchment ID: 23324

Catchment name: WAREHAM STW CATCHMENT

Capex cost range: £3m to £5m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

WAREHAM SETTLED STORM O/F is a settled storm overflow that predominantly spills as a result of backing of water from immediate downstream. It is located near the bottom of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by weir, and downstream by outfall.

Spills at this site discharge to River Piddle located approximately 0m away.

Need

This site has been investigated due to frequent discharge to a bathing water and EDM data suggests it spills on average 21.0 times per year. The hydraulic model predicts 17 spills per year and the objective of this investigation is to reduce the spill frequency to 1 per bathing season. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3212.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138001
- The solution involves domestic and business customer education, attenuation(1784.5 m3)
- Estimated financial cost: £3.6 million.
- Embodied carbon has been calculated as 56 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138002
- The solution involves attenuation (2004.5 m3)
- Estimated financial cost: £3.9 million.
- Embodied carbon has been calculated as 60 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 138003
- The solution involves suds
- The solution achieves 4 spills in the period of interest.
- Estimated financial cost: £152.2 million.
- Embodied carbon has been calculated as 111 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 3786m3
- 5% contributing area removal through SuDS - 3644m3
- 10% contributing area removal through SuDS - 3507m3
- 25% contributing area removal through SuDS - 3014m3
- 50% contributing area removal through SuDS - 2129m3
- Disconnect all surface water separation opportunities - 3753m3
- Increase pipe capacity - 4054m3
- Remove infiltration - 3252m3
- Improve maintenance - 4068m3
- Increase FFT - 0m3
- Prevent new development - 0m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 0 per bathing season and the amount of additional freeboard available beyond that needed to achieve 2 per bathing season. The results of these tests suggest an additional 3838m3 would need to be addressed to meet the higher level of protection, while there is currently 1.18m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.32. SO improvement: WARMINSTER - CALVESWATER SPS

Unique ref:	14439B
Catchment ID:	23325
Catchment name:	WARMINSTER STW CATCHMENT
Capex cost range:	£1.4m to £2.9m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

WARMINSTER - CALVESWATER SPS is a pumping station overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the middle of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by cso, and downstream by storage.

Spills at this site discharge to River Were located approximately 223m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 27.8 times per year. The hydraulic model predicts 9 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3213.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C9909 - SPS Consent Compliance.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145221
- The solution involves domestic and customer education, attenuation (308.89 m3)
- Estimated financial cost: £1.4 million.
- Embodied carbon has been calculated as 15 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145222
- The solution involves storage with pumped return (320.195 m3)
- Estimated financial cost: £1.5 million.
- Embodied carbon has been calculated as 16 tCO2e and operational carbon as 0.29 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145223
- The solution involves suds
- The solution achieves 9 spills in the period of interest.
- Estimated financial cost: £36.6 million.
- Embodied carbon has been calculated as 149 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 605m3
- 5% contributing area removal through SuDS - 585m3
- 10% contributing area removal through SuDS - 535m3
- 25% contributing area removal through SuDS - 384m3
- 50% contributing area removal through SuDS - 217m3
- Disconnect all surface water separation opportunities - 625m3
- Increase pipe capacity - 2093m3
- Remove infiltration - 634m3
- Improve maintenance - 947m3
- Increase FFT - 633m3
- Prevent new development - 633m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 52m3 would need to be addressed to meet the higher level of protection, while there is currently 0.02m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.33. SO improvement: BICKNOLLER S.O.

Unique ref: 16888C

Catchment ID: 29705

Catchment name: WATCHET STW CATCHMENT

Capex cost range: £0.9m to £1.5m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

BICKNOLLER S.O. is a gravity storm overflow that predominantly spills as a result of incapacity of pipes. It is located near the top of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by weir.

Spills at this site discharge to Doniford Stream located approximately 95m away.

Need

This site has been investigated due to frequent discharge to a high amenity waterbody and EDM data suggests it spills on average 25.0 times per year. The hydraulic model predicts 36 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3216.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145200
- The solution involves domestic and business customer education, attenuation (69.19 m3)
- Estimated financial cost: £0.8 million.
- Embodied carbon has been calculated as 7 tCO2e and operational carbon as 0.29 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145201
- The solution involves attenuation (86.5 m3)
- Estimated financial cost: £0.8 million.
- Embodied carbon has been calculated as 8 tCO2e and operational carbon as 0.29 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145202
- The solution involves suds
- The solution achieves 24 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 198m3
- 5% contributing area removal through SuDS - 189m3
- 10% contributing area removal through SuDS - 180m3
- 25% contributing area removal through SuDS - 148m3
- 50% contributing area removal through SuDS - 87m3
- Disconnect all surface water separation opportunities - 199m3
- Increase pipe capacity - 0m3
- Remove infiltration - 179m3
- Improve maintenance - 179m3
- Increase FFT - 198m3
- Prevent new development - 198m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 15m3 would need to be addressed to meet the higher level of protection, while there is currently 0.28m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.34. SO improvement: WATCHET - STW

Unique ref: 19705S

Catchment ID: 29705

Catchment name: WATCHET STW CATCHMENT

Capex cost range: £2.2m to £3.7m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

WATCHET - STW is a settled storm overflow that predominantly spills as a result of inadequate volume of storm tank. It is located near the bottom of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by weir, and downstream by outfall.

Spills at this site discharge to Bristol Channel located approximately 37m away.

Need

This site has been investigated due to frequent discharge to a bathing water and EDM data suggests it spills on average 31.4 times per year. The hydraulic model predicts 26 spills per year and the objective of this investigation is to reduce the spill frequency to 1 per bathing season. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3218.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145209
- The solution involves domestic and business customer education, attenuation (1461 m3)
- Estimated financial cost: £2.8 million.
- Embodied carbon has been calculated as 28 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 145210
- The solution involves attenuation (1502.2 m3)
- Estimated financial cost: £2.8 million.
- Embodied carbon has been calculated as 29 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 145211
- The solution involves suds
- The solution achieves 5 spills in the period of interest.
- Estimated financial cost: £48.5 million.
- Embodied carbon has been calculated as 211 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 2495m3
- 5% contributing area removal through SuDS - 2536m3
- 10% contributing area removal through SuDS - 2314m3
- 25% contributing area removal through SuDS - 172m3
- 50% contributing area removal through SuDS - 885m3
- Disconnect all surface water separation opportunities - 2763m3
- Increase pipe capacity - 4167m3
- Remove infiltration - 2406m3
- Improve maintenance - 2765m3
- Increase FFT - 0m3
- Prevent new development - 0m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 0 per bathing season and the amount of additional freeboard available beyond that needed to achieve 2 per bathing season. The results of these tests suggest an additional 4430m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.35. SO improvement: GLEN COTTAGE CSO

Unique ref: 19723C

Catchment ID: 23332

Catchment name: WELLS STW CATCHMENT

Capex cost range: £0.5m to £0.8m for option A (hybrid approach)

Delivery AMP: AMP8

Site overview

GLEN COTTAGE CSO is a gravity storm overflow that predominantly spills as a result of lack of hydraulic capacity. It is located near the middle of the catchment in a predominantly rural part of the catchment. Upstream the hydraulically significant extent is limited by another overflow, and downstream by a pumping station.

Spills at this site discharge to River Axe located approximately 18m away.

Need

This site has been investigated due to frequent discharge to a high amenity waterbody and EDM data suggests it spills on average 26.4 times per year. The hydraulic model predicts 17 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3226.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: .

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170357
- The solution involves separation and attenuation (9m3)
- Estimated financial cost: £0.6 million.
- Embodied carbon has been calculated as 3 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 170358
- The solution involves attenuation (11m3)
- Estimated financial cost: £0.5 million.
- Embodied carbon has been calculated as 3 tCO2e and operational carbon as 0 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 170359
- The solution involves suds
- The solution achieves 19 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 80m3
- 5% contributing area removal through SuDS - 78m3
- 10% contributing area removal through SuDS - 74m3
- 25% contributing area removal through SuDS - 61m3
- 50% contributing area removal through SuDS - 29m3
- Disconnect all surface water separation opportunities - 81m3
- Increase pipe capacity - 0m3
- Remove infiltration - 81m3
- Improve maintenance - 81m3
- Increase FFT - 81m3
- Prevent new development - 81m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 69m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a hybrid separation approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.36. SO improvement: WESTON SUPER MARE - BLACK ROCK

Unique ref:	13340C
Catchment ID:	29155
Catchment name:	WESTON SUPER MARE STW CATCHMENT
Capex cost range:	£10.8m to £18.1m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

WESTON SUPER MARE - BLACK ROCK is a gravity storm overflow that predominantly spills as a result of flood backing up from the downstream stw inlet sps, there is a sediment depth of 500 mm applied to the pipes may resulted in insufficient capacity. It is located near the bottom of the catchment in a predominantly commercial part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by pump.

Spills at this site discharge to River Axe located approximately 1706m away.

Need

This site has been investigated due to frequent discharge to a bathing water and EDM data suggests it spills on average 14.6 times per year. The hydraulic model predicts 5 spills per year and the objective of this investigation is to reduce the spill frequency to 1 per bathing season. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3220.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138004
- The solution involves suds 25%
- Estimated financial cost: £2020.0 million.
- Embodied carbon has been calculated as 897 tCO2e and operational carbon as 0 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 138005
- The solution involves attenuation (4519 m3)
- Estimated financial cost: £14.0 million.
- Embodied carbon has been calculated as 780 tCO2e and operational carbon as 0.26 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 138006
- The solution involves suds
- The solution achieves 1 spills in the period of interest.
- Estimated financial cost: £2,020.0 million.
- Embodied carbon has been calculated as 897 tCO2e and operational carbon as 0 tCO2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 35915m3
- 5% contributing area removal through SuDS - 31784m3
- 10% contributing area removal through SuDS - 26689m3
- 25% contributing area removal through SuDS - 11128m3
- 50% contributing area removal through SuDS - 0m3
- Disconnect all surface water separation opportunities - 18991m3
- Increase pipe capacity - 0m3
- Remove infiltration - 31305m3
- Improve maintenance - 32450m3
- Increase FFT - 1265m3
- Prevent new development - 1265m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 0 per bathing season and the amount of additional freeboard available beyond that needed to achieve 2 per bathing season. The results of these tests suggest an additional 187828m3 would need to be addressed to meet the higher level of protection, while there is currently 0.00m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.37. SO improvement: WEYMOUTH - CHICKERELL ROAD

Unique ref:	16848C
Catchment ID:	23342
Catchment name:	WEYMOUTH STW CATCHMENT
Capex cost range:	£1.9m to £3.2m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

WEYMOUTH - CHICKERELL ROAD is a gravity storm overflow that predominantly spills as a result of insufficient capacity due to flat pipe which holds water. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by another overflow, and downstream by another overflow.

Spills at this site discharge to Weymouth Harbour located approximately 528m away.

Need

This site has been investigated due to frequent discharge to a shellfish water and EDM data suggests it spills on average 17.2 times per year. The hydraulic model predicts 58 spills per year and the objective of this investigation is to reduce the spill frequency to 10 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3230.

Previous investigations

This site has been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives. The following project (s) have also looked at this site and should be checked before the options are progressed further: C00193 - Frequently Spilling Overflows.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135128
- The solution involves domestic and business customer education, attenuation (856.8 m3)
- Estimated financial cost: £2.4 million.
- Embodied carbon has been calculated as 32 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135129
- The solution involves attenuation (897.6 m3)
- Estimated financial cost: £2.5 million.
- Embodied carbon has been calculated as 33 tCO_2e and operational carbon as 0.28 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135130
- The solution involves suds
- The solution achieves 39 spills in the period of interest.
- Estimated financial cost: £38.5 million. n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 600m3
- 5% contributing area removal through SuDS - 572m3
- 10% contributing area removal through SuDS - 537m3
- 25% contributing area removal through SuDS - 419m3
- 50% contributing area removal through SuDS - 218m3
- Disconnect all surface water separation opportunities - 500m3
- Increase pipe capacity - 185m3
- Remove infiltration - 604m3
- Improve maintenance - 619m3
- Increase FFT - 603m3
- Prevent new development - 603m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 330m3 would need to be addressed to meet the higher level of protection, while there is currently 0.18m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.38. SO improvement: WEYMOUTH ROMAN ROAD NEW

Unique ref:	17030C
Catchment ID:	23342
Catchment name:	WEYMOUTH STW CATCHMENT
Capex cost range:	£3.2m to £5.4m for option A (hybrid approach)
Delivery AMP:	AMP8

Site overview

WEYMOUTH ROMAN ROAD NEW is a gravity storm overflow that predominantly spills as a result of overflow weir level being low than the soffit level of the outgoing conduit. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by another overflow, and downstream by another overflow.

Spills at this site discharge to Radipole Lake located approximately 412m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 40.0 times per year. The hydraulic model predicts 24 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3284.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135158
- The solution involves domestic and business customer education, sw source control measures - 5%, attenuation (1436.16 m3)
- Estimated financial cost: £5.4 million.
- Embodied carbon has been calculated as 23 tCO2e and operational carbon as 0.29 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 135159
- The solution involves attenuation (1612.8 m3)
- Estimated financial cost: £3.4 million.
- Embodied carbon has been calculated as 11 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 135160
- The solution involves suds
- The solution achieves 14 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 262m3
- 5% contributing area removal through SuDS - 230m3
- 10% contributing area removal through SuDS - 201m3
- 25% contributing area removal through SuDS - 124m3
- 50% contributing area removal through SuDS - 43m3
- Disconnect all surface water separation opportunities - 263m3
- Increase pipe capacity - 39m3
- Remove infiltration - 263m3
- Improve maintenance - 263m3
- Increase FFT - 263m3
- Prevent new development - 263m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 149m3 would need to be addressed to meet the higher level of protection, while there is currently 0.10m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a hybrid separation approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.39. SO improvement: BOVINGTON - LYTCHETT LANE SPS

Unique ref:	19699B
Catchment ID:	23359
Catchment name:	WOOL STW CATCHMENT
Capex cost range:	£0.9m to £1.4m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

BOVINGTON - LYTCHETT LANE SPS is a pumping station overflow that predominantly spills as a result of lack of existing storm storage at sy84872901. It is located near the middle of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by pump.

Spills at this site discharge to River Frome located approximately 3m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 12.5 times per year. The hydraulic model predicts 17 spills per year and the objective of this investigation is to reduce the spill frequency to 5 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3305.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111010
- The solution involves attenuation (additional 158m3 storage was added to existing tank at sy84872901) + suds 50%
- Estimated financial cost: £5.8 million.
- Embodied carbon has been calculated as 24 tCO2e and operational carbon as 0.29 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111011
- The solution involves attenuation (additional 173m3 storage was added to existing tank at sy84872901)
- Estimated financial cost: £1.1 million.
- Embodied carbon has been calculated as 11 tCO2e and operational carbon as 0.29 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 111012
- The solution involves suds
- The solution achieves 15 spills in the period of interest.
- Estimated financial cost: n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1651m3
- 5% contributing area removal through SuDS - 1506m3
- 10% contributing area removal through SuDS - 1345m3
- 25% contributing area removal through SuDS - 924m3
- 50% contributing area removal through SuDS - 388m3
- Disconnect all surface water separation opportunities - 1659m3
- Increase pipe capacity - 1591m3
- Remove infiltration - 1618m3
- Improve maintenance - 1501m3
- Increase FFT - 1659m3
- Prevent new development - 1659m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 106m3 would need to be addressed to meet the higher level of protection, while there is currently 1.39m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.40. SO improvement: WOOL - EAST BURTON RD / RAILWAY COTTAGES SPS

Unique ref: 14273B

Catchment ID: 23359

Catchment name: WOOL STW CATCHMENT

Capex cost range: £1.5m to £2.6m for option B (traditional approach)

Delivery AMP: AMP8

Site overview

WOOL - EAST BURTON RD / RAILWAY COTTAGES SPS is a pumping station overflow that predominantly spills as a result of lack of existing storm storage at sy848629aa. It is located near the bottom of the catchment in a predominantly residential part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by pump.

Spills at this site discharge to River Frome located approximately 54m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 15.5 times per year. The hydraulic model predicts 11 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3303.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111007
- The solution involves attenuation (280m3) and domestic and business customer education
- Estimated financial cost: £1.4 million.
- Embodied carbon has been calculated as 24 tCO2e and operational carbon as 0.28 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111008
- The solution involves attenuation (304m3)
- Estimated financial cost: £1.4 million.
- Embodied carbon has been calculated as 24 tCO2e and operational carbon as 0.28 tCO2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 111009
- The solution involves suds
- The solution achieves 18 spills in the period of interest.
- Estimated financial cost: £39.5 million. n/a as solution does not deliver target performance.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 2501m3
- 5% contributing area removal through SuDS - 2440m3
- 10% contributing area removal through SuDS - 2366m3
- 25% contributing area removal through SuDS - 1931m3
- 50% contributing area removal through SuDS - 1167m3
- Disconnect all surface water separation opportunities - 2670m3
- Increase pipe capacity - 3770m3
- Remove infiltration - 2032m3
- Improve maintenance - 2208m3
- Increase FFT - 2579m3
- Prevent new development - 2579m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 334m3 would need to be addressed to meet the higher level of protection, while there is currently 0.18m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A2-1.41. SO improvement: WOOL - STATION ROAD

Unique ref:	16640C
Catchment ID:	23359
Catchment name:	WOOL STW CATCHMENT
Capex cost range:	£1m to £1.6m for option B (traditional approach)
Delivery AMP:	AMP8

Site overview

WOOL - STATION ROAD is a gravity storm overflow that predominantly spills as a result of lack of hydraulic capacity storm network. It is located near the bottom of the catchment in a predominantly industrial part of the catchment. Upstream the hydraulically significant extent is limited by head of the catchment, and downstream by cso.

Spills at this site discharge to River Frome located approximately 130m away.

Need

This site has been investigated due to frequent discharge to a chalk stream and EDM data suggests it spills on average 25.3 times per year. The hydraulic model predicts 18 spills per year and the objective of this investigation is to reduce the spill frequency to 8 per year. The solutions will be assessed against model performance, where this differs from EDM data then additional investigations may be required to ensure the suitability of the proposed options.

The need ID assigned to this investigation is 3304.

Previous investigations

This site has not been investigated previously as part of the DWMP. Where appropriate these options have been checked to see if they can be refined to meet the objectives.

Methodology

This assessment has been undertaken on a 2050 design horizon model including planned growth and creep as assessed in the DWMP. Capital schemes that are partially built are included; however proposed schemes are not.

Hybrid option – solution A

The following solution has been developed using a step-by-step process involving generic options, unconstrained options, constrained options, and finally feasible options as identified here. It prioritises different option types on a range of factors in addition to performance. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111013
- The solution involves domestic and business customer education + suds 5% + attenuation (216m3)
- Estimated financial cost: £2.9 million.
- Embodied carbon has been calculated as 16 tCO2e and operational carbon as 0.29 tCO2e per year.

Traditional option – solution B

The following solution has been developed using traditional approaches only. Financial costs and carbon costs have been calculated using high level cost curves and should be treated as indicative only.

- Solution ID: 111014
- The solution involves attenuation (storage tank with pumped return - 229.5m3)
- Estimated financial cost: £1.3 million.
- Embodied carbon has been calculated as 13 tCO_2e and operational carbon as 0.29 tCO_2e per year.

Sustainable option – solution C

The following option uses SuDS studio data to assess how much contributing area can be removed using SuDS. The option will either identify the area requiring removal to achieve the target spill frequency, or the residual spill volume to be addressed if all SuDS opportunities are implemented.

- Solution ID: 111015
- The solution involves suds
- The solution achieves 18 spills in the period of interest.
- Estimated financial cost: £4.1 million. n/a as solution does not deliver target performance.
- Embodied carbon has been calculated as 9 tCO_2e and operational carbon as 0 tCO_2e per year.

Sensitivity testing

Additional sensitivity testing has been undertaken as part of this assessment. The first part was a high-level assessment of different option types that disregarded buildability and budget but does indicate the potential for that option type to achieve the target spill frequency. The list below shows the residual spill volume associated with 11 such tests:

- 10% reduction in PCC - 1267m3
- 5% contributing area removal through SuDS - 1268m3
- 10% contributing area removal through SuDS - 1213m3
- 25% contributing area removal through SuDS - 1022m3
- 50% contributing area removal through SuDS - 619m3
- Disconnect all surface water separation opportunities - 1327m3
- Increase pipe capacity - 1593m3
- Remove infiltration - 987m3
- Improve maintenance - 1144m3
- Increase FFT - 1318m3
- Prevent new development - 1318m3

Additional sensitivity testing was applied to options A, B and C above. These assessed the residual spill volume that would need to be addressed to achieve 1 per year and the amount of additional freeboard available beyond that needed to achieve 10 per year. The results of these tests suggest an additional 8m3 would need to be addressed to meet the higher level of protection, while there is currently 0.21m of available freeboard at the overflow which could be used without exceeding the lower level of protection.

Conclusion

It is recommended that a traditional approach be adopted to reduce the number of spills at this location. The solution identified here is high level and it is recommended that more detailed investigations regarding model performance and buildability are undertaken before the final design is developed.

A3 WRC Assessments

The following pages contain summaries from detailed WRC assessments, following the various options screening assessments referred to in WSX16. These are preceded by technical assurance of our treatment technology selections and design criteria. For summary site reports of all WRCs refer to section A8.

The WRC Assessments are grouped accordingly:

- Nutrients
    - Abbotsbury WRC
    - Blackheath WRC
    - Collingbourne Ducis WRC
    - Dorchester WRC
    - Lytchett Minster WRC
    - Maiden Bradley WRC
    - Poole WRC
    - Wareham WRC
    - Wool WRC
- Sanitary
    - Blackheath WRC
    - Cannington WRC
    - Devizes WRC
    - Haselbury Plucknett WRC
    - Leyhill WRC
    - North Petherton WRC
    - Potterne WRC
    - Ringwood WRC
    - Royal Wootton Bassett WRC
    - South Perrott WRC
    - South Petherton WRC
    - Sparkford WRC
- Septic Tanks
    - Ashwicke WRC
    - Dunwear WRC
    - Lottisham WRC
- Discharge Relocations
    - Ratfyn WRC
    - Shrewton WRC

All plans are subject to change and should only ever be considered high level.

Any shown expansions of sites into neighbouring land is purely indicative. No discussions have been had with neighbouring owners or tenants, with assumed land values (including consideration for biodiversity net gain) and planning permission costs/conditions being used for scheme estimates. Engagement and/or updates to costs may lead to changes to any presented solutions, as part of our aspiration for best-value solutions.

A3-1. Technical Assurance/Benchmarking

We engaged Stantec UK Ltd. to undertake a technical review of our wastewater treatment programme, in particular a review of our internal guidance for the basis of design and technologies for future permits for our proposed PR24 interventions. The assessment guidelines include generic guidelines and solution technology assessment guidance for varying permit/treatment requirements including phosphorus (itself including tertiary solids removal technologies to meet low limits), nitrogen, combined phosphorus and nitrogen, ammonia and chemical micropollutants. For each area, Stantec provided feedback, affirming that our approach was consistent with the wider water industry.

The review by Stantec also included a more in-depth review of scope for several schemes, although it should be noted that these scopes may have been superseded by more detailed optioneering and/or emergent risks and issues subsequent to Stantec's review.

Their technical memos are included in the following pages, along with our comments/actions in response, for example to update our basis of design guidance to inform our PR24 proposals or aspects to consider in more detail as schemes progress into design during AMP8.

Stantec **Memo**

To:	Andrew Gulliford	From:	Daniel Rusev Birchwood
Project/File:	Wessex Water PR24 Benchmarking	Date:	7 February 2023

Reference: Process Benchmarking - Stantec comments

Wessex Water shared their Enhanced Driver Delivery Scope spreadsheet and its wastewater treatment solution assessment guidance with Stantec for comments and responses to their PR24 proposed interventions. This MS Excel spreadsheet lists WxW wastewater solution guidance for PR24 in rows and this memo refers to Stantec's review of the specific guidelines in the row numbers as *lines (i.e., line number stated = source spreadsheet row number)*.

The assessment guidelines include Generic Guidelines and solution technology assessment guidance for categories of pollution including Phosphorous (itself including TSR technologies to meet low limits), Nitrogen, Nitrogen and Phosphorous, Ammonia and Chemical Micropollutants. For each section Stantec have provided feedback outlined below and Actions for Wessex Water to respond / confirm queries on the design approach.

Generic Guidelines:
For line 7 on TP chemical dosing Iron and Aluminium permits, Stantec questioned whether the assumed Aluminium permit of 2 mg/L was correct as it was a high value. The Wessex response was that if the limit is any lower than that, aluminium dosing would not be used. **ACTION** for WxW to review this guideline against a 1 mg/L Al permit.

Typically based on receiving waters forming part of SSSI and approach taken by Natural England excluding use of Aluminium in these environments

WxW assessment guidelines (Line 9) state that growth of 0.5% for domestic/commercial and 1% for trade be used as standard assumptions. Stantec recommend running analytical scenarios to determine what the impacts of the growth will be. A more accurate assessment should ideally consider planning permissions granted and housing projects that have started construction. Analytical scenarios should vary the percentages of growth expected. **ACTION** for WxW to run scenarios and include outputs into the guideline.

Sensitivity exercise to be undertaken at different growth predictions

The assessment guideline of Line 16 requires that where DWF is exceeded, all permits will be tightened. Stantec's observation is that tightening of permits resulting from DWF exceedance will also impact SAGIS modelling undertaken by the EA and/or Wessex Water. This may lead to changes in consents and would affect the overall river body. **ACTION** for WxW to input DWF increases into SAGIS.

SAGIS modelling to be run on all sites with DWF increase, process model to be re-run for ant subsequent permit changes

The Line 19 assessment guidelines state that by 2050, all process units must be less than or equal to their relevant wastewater design standard loading rates. Stantec recommend that some sensitivity

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Reference: Process Benchmarking - Stantec comments

analysis is added to these assessments (for example a 10% reduction in headroom (10% increase in loading) on design standards), as design standards are typically conservative. **ACTION** for WxW to implement some sensitivity analysis for design guidance.

Sensitivity exercise to be undertaken

The Line 20 assessment guideline states that "Where additional biological capacity is required then assume in the first instance that a 'like for like' process is used" Stantec recommends also considering staging of treatment, e.g., use of tertiary treatment, as it may be more cost effective and produce better value outcomes. **ACTION** for WxW to confirm if alternative treatment processes have been considered.

This has been undertaken, original wording in guideline needs updating to reflect this, e.g. tertiary or alternative secondary treatment has been reviewed where proven to be cost effective.

The Line 21 WxW Assessment Guideline states that "Any temporary plant will be removed and replaced by appropriately sized assets (like for like) to comply with the design standard loadings rates at 2050." Stantec questioned how these replacements are going to be funded. **ACTION** for WxW to confirm that the new asset funding for temporary plant replacement will come from the capital maintenance budget, rather than WINEP.

WxW to confirm

The Line 23 WxW assessment guideline states that "when a site has a septic tank and the PE is predicted to exceed 250 by 2050, in this instance allow for the wholesale replacement of the septic tank with a PST (line 23)." Stantec recommends that sludge storage is also added where septic tanks are replaced with PSTs. **ACTION** for WxW to confirm that they have considered the sludge storage requirement and access arrangements.

Sludge storage has been allowed for

For the WxW activated sludge plant process assessment guidelines presented on lines 24 and 25 of WxW process assessment guidance Stantec recommends that the mass flux of the final tanks is also included as part of these assessments. **ACTION** for WxW to confirm that they have considered mass flux.

Mass flux has been assessed on all ASP sites

The Line 26 guideline states that "For sites with fixed film biological processes with a tightening of the ammonia permit, assume a "like for like" process can achieve a 95%ile permit concentration of 5 mg/l AmmN" . Stantec believes that there is an opportunity to use increased recirculation to achieve an ammonia compliance with 3 mg/L 95%ile. **ACTION** for WxW to respond to this.

WW design standards allow for any fixed film process to achieve 5mg/l AmmN permit on 95%ile basis, and hence the guidance given in statement. Recirculation is only really appropriate for TFs which have sufficient media volume to achieve a 5 mg/l permit. WxW experience is that new build TFs can achieve 3-4 mg/l provided, no trade, consistent load, etc. Existing TFs designed for 5 mg/l, tend to much closer to the permit and I wouldn't be convinced that recirc would improve their performance dramatically.

The Line 27 guideline states that "Where an existing tertiary nitrification plant needs replacement, size an MBBR as the replacement process (line 27)." Stantec believes there is an alternative biofilm technology option to use nitrifying SAFFs. **ACTION** for WxW to respond to this.

MBBR as WxW experience is that they have better resilience to load fluctuations than SAFs & RBCs

Reference: Process Benchmarking - Stantec comments

The line 28 guideline states that "Assume sites with aerated COUFs installed for nitrification can only achieve a 50% reduction in the applied ammonia load Stantec has asked for a reference to the data for the claim of effective limit of nitrification being 50%. **ACTION** for WxW to reference data used for this assumption.

Data is available – Glastonbury good example. Plus poor response to fluctuating loads.

Phosphorous Guidelines:

For permits higher than 1.5 mg/L, Stantec believe that algae bioreactors and wetlands can be considered. **ACTION** for WxW to confirm if these are being considered.

Wetlands have been considered

The Phosphorus Guidelines for treating down to 1.0mg/l average TP include the statement that "Grit removal to comply with DS422 where grit identified as an issue." Stantec advise that other water companies install grit removal for sites >5k PE. **ACTION** for WxW to confirm for what PE is grit removal considered for these TP solutions.

This is a miss understanding of DS422. Grit removal is removed for sites >5000PE but for smaller sites with a known grit problem or with mechanical screens being installed then grit removal is required.

The Phosphorus Guidelines for treating down to 1.0mg/l average TP include the statement that "Total P monitor is installed on sites with new P permits". Stantec advise that this can be omitted for sites with permits >1 mg/L, as it is lower risk. **ACTION** for WxW to confirm if P monitor is needed for limits >1 mg/L.

Guidance in DS438 is that TP monitors are only installed on sites with Permits <1mg/l unless site specific conditions occur which require one.

The Phosphorus Guidelines for treating down to 1.0mg/l average TP include the statement that "If existing FE has SS > 20 mg/l on 95%ile basis then a tertiary solids removal (TSR) process to be installed, either PCF or MMF." Stantec believe that reed beds or enhanced reed beds can also be installed. **ACTION** for WxW to confirm if reed beds are considered for SS removal.

Reed beds have been considered but discounted due to large land take required

The Phosphorus Guidelines for treating down to 1.0mg/l average TP include the statement "Provide 2mm 6D screening if not present on site." Stantec are questioning what drives this need. **ACTION** for WxW to confirm why 6mm 2D screens are installed and to confirm that this is not impacting the scope as screens are already installed.

Related to rag blocking desludge pumps in PSTs leading to iron rich sludge carry over to downstream processes. Has caused problems with iron breakthrough in FE

The Phosphorus Guidelines for treating 0.8mg/l down to 0.25mg/l average TP include the statement that "Potable water supply (if not available on site) should be connected for sites with P permits" Stantec recommends that water bowsers may be used instead of potable water. **ACTION** for WxW to confirm where new potable water supply is far away, will water bowser be considered.

Need to review what our current policy is with respect to mobile water bowsers.

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Reference: Process Benchmarking - Stantec comments

The Phosphorus Guidelines for treating 0.8mg/l down to 0.25mg/l average TP include the statement “Additional upstream treatment process capacity to be provided when backwash flows cause the existing process units to exceed their hydraulic loading capacity; in the case of biological treatment then "Like for Like process". Stantec recommends that Lamella backwash treatment can also be provided. **ACTION** for WxW to confirm that Lamella is considered for backwash treatment instead of increasing the biological treatment capacity.

Siltbuster have done some trials based on samples from an existing MMF site (chase Will up on this?). Concern that recycling lamella effluent back through TSR plant will lead an accumulation of fine solids that will breakthrough the TSR and lead to permit failure.

The Phosphorus Guidelines for treating 0.8mg/l down to 0.25mg/l average TP include the statement “For sites with multiple Dortmund HSTs, check that one tank can be taken off line for cleaning and that the remaining online tanks can pass winter Qav whilst staying compliant with the DS retention and HLR requirements; if this is not possible then add additional capacity to achieve the DS requirements (either UFC or radial flow tanks) (line 43).” Stantec recommends that the Opex lines for Dortmund tanks are increased to include complete emptying. **ACTION** for WxW to confirm that it is possible for Dortmund tanks to be desludged and increase opex lines.

The assumption is that tanks will be taken off line and completely emptied for cleaning on a quarterly basis. Cheek this is allowed for in Opex estimate.

The Phosphorus Guidelines for TSR technologies include the statement “Where existing aerated or unaerated COUF sand filters are in use …, the existing technology will be retained.” Stantec recommends that RTC is installed to prevent nutrient deficiency. **ACTION** for WxW to confirm that RTC is added to prevent nutrient deficiency. **ACTION** for Narinder Sunner to send paper to Andrew Gulliford.

Not required as guidelines state this rule is only applicable if the site is already achieving the proposed TP permit.

The Phosphorus Guidelines for TSR technologies include the statement “TSR technologies to meet >0.25 mg/L P permits are Ballasted media - either Comag or Actiflo” Stantec recommend that Filterclear or Mecana on ASP can be used as an alternative technology solution. **ACTION** for WxW to confirm that Mecana can be used on ASP only down to 0.2 mg/L.

This category is <0.25 to 0.1 mg/l TP, we don’t have any 0.2 TP permits proposed. Permits so far are either 0.25 or 0.1 mg/l TP. We would also need to understand what evidence the 0.2 mg/l assertion for Filterclear or Mecana is based upon. We would rule out Mecana with a direct ferric dose.

Nitrogen Guidelines:

The Nitrogen Guidelines for 15mg/l TN solutions include the statement “To meet 15 mg/L N and 0.25-1 mg/L P add tertiary plant to existing works to target 3 mg/l AmmN plus denitrification COUF sand filters + carbon source”. Stantec believe that additional biological processes can also achieve these limits. **ACTION** for WxW to confirm that additional biological processes are considered.

This has been undertaken, original wording in guideline needs updating to reflect this, e.g. tertiary or additional secondary treatment has been reviewed where proven to be cost effective.

Reference: Process Benchmarking - Stantec comments

The Nitrogen Guidelines for 5mg/l TN solutions include the statement "ASP (4 stage Bardenpho). Assume carbon source required." Stantec believe that Tertiary treatment is also required if a permit lower than 5mg/L is implemented. **ACTION** for WxW to add TSR if a permit lower than 5mg/L is implemented.

Lowest permit is 8.4 mg/l so action not required.

Nitrogen and Phosphorous Guidelines:

The Nitrogen and Phosphorus Guidelines for 15mg/l TN and 0.25-1mg/l TP solutions include the statement "To meet 15 mg/L N and 0.25-1 mg/L P add tertiary plant to existing works to target 3 mg/l AmmN plus denitrification COUF sand filters + carbon source". Stantec believe that additional biological processes can also achieve these limits. **ACTION** for WxW to confirm that additional biological processes are considered.

This has been undertaken, original wording in guideline needs updating to reflect this, e.g. tertiary or additional secondary treatment has been reviewed where proven to be cost effective.

The Nitrogen and Phosphorus Guidelines for 15mg/l TN and 0.25-1mg/l TP solutions include the statement Guidelines state that "ASP (5 stage Bardenpho) - assume EBPR can achieve 1.0 mg/l P and for <1.0 mg/l P coag. dosing u/s of a tertiary MMF is required." Stantec believe that dosing into ASP is also possible. **ACTION** for WxW to confirm if they have considered dosing into ASP.

It has been considered but discounted where FSTs have insufficient capacity to accommodate the additional inert solids loading. In addition, still a level of uncertainty whether achieving <1 mg/l TP is viable without tertiary TSR.

The Nitrogen and Phosphorus Guidelines for 15mg/l TN and 0.25-1mg/l TP solutions and for 15mg/l TN and 0.25-1mg/l TP solution guidelines do not mention the Nereda batch- granular sludge technology as an option for achieving 8.4-10 mg/L N and 0.25 - 1 mg/L P permits. Stantec believe that a Nereda type process combined with downstream tertiary treatment can achieve these limits. **ACTION** for WxW to confirm if they have considered Nereda plus TSR.

Nereda has been considered but discounted due to on going concerns with effluent quality in terms of recycling solids from TSR back through Nereda plant. In addition, complexity of plant and operational input make the process onerous to operate.

Chemical (Micropollutant) Guidelines:

The Chemical (Micropollutant) Guidelines do not take into account the need to pilot technologies for the removal of chemicals and Stantec's risk assessments on these solutions recommends piloting due to site specific chemical micropollutant profile variations and source and partitioning uncertainties. **ACTION** for WxW to include pilot trial in the CAPEX for each chemical.

Pilot plants to be included in scope.

The Chemical (Micropollutant) Guidelines are missing a strategy to handle the sludge that will contain the various micropollutants. **ACTION** for WxW to confirm their sludge strategy and how they will manage the liquors route to avoid build-up of micropollutants. The main emerging risks are PFAS and in addition to chemical micropollutants, microplastics are also an emerging risk. Advanced thermal technologies are capable of treating digested sludge to remove both but the requirement to treat these

Reference: Process Benchmarking - Stantec comments

pollutants if required, will probably lead to the biosolids to land beginning to close and any N and P recycling to come from N and P recovery technologies.

We don't have any PFAS permits. Sludge strategy to manage chemicals – what is out strategy? In theory all of the micro pollutants removed by on site processes will be transported off site via the sludge route - Question for JR / Wesley ?

The Chemical (Micropollutant) Cypermethrin Guidelines state that to meet cypermethrin permits, ASP sites will implement multimedia filter (MMF). Stantec's approach allows for the opportunity to install a GAC bed as well if the particular treatment works discharge EQS and cypermethrin profile also needs dissolved cypermethrin to be removed. **ACTION** for WxW to confirm if they want to include GAC and add a risk reserve fund for solution development at cypermethrin sites. For example, Cypermethrin treatment to permit requirements may be satisfied by use of Filterclear as quaternary solids removal and GAC media adsorption provision at some wastewater treatment works. Cypermethrin is both hydrophobic and lipophilic and so strongly absorbs into organic solids (VSS). If a wastewater treatment works has very low EQS, treatment provisions at other wastewater treatment works might need to include upgrading biotreatment to MBR, to provide membrane filtration to exclude solids.

Do we want to include GAC as an additional process?

The Chemical (Micropollutant) Cypermethrin Guidelines state that to meet cypermethrin permits, fixed film sites will implement primary and secondary coagulant dosing + MMF. Stantec believes that a conversion to ASP + GAC may be required depending on the permit. **ACTION** for WxW to confirm if they want to include ASP conversion and GAC for trickling filters sites.

I don't think we do, as it strongly absorbs to biosolids then coag dosing plus TSR should prove effective. However residual risk that insufficient removal without conversion to ASP. WxW to manage risk.

The Chemical (Micropollutant) Fluoranthene Guidelines state that to meet fluoranthene permits, ASP sites will employ primary and secondary coagulant dosing + MMF. Fluoranthene is hydrophobic but does not partition as strongly as cypermethrin into VSS. However, 70% Fluoranthene removal has been reported for conventional primary and secondary wastewater treatment. Stantec believe that the addition of GAC is also a possible requirement depending on the sources, load and partitioning of fluoranthene at a given wastewater treatment works. **ACTION** for WxW to confirm if they wish to consider GAC as part of the solution set for fluoranthene removal.

Do we want to include GAC as an additional process?

The Chemical (Micropollutant) Fluoranthene Guidelines have not referenced emerging technologies that have demonstrated for fluoranthene. Stantec has recommended Arvia Rosalox process.

The Chemical (Micropollutant) Heavy Metals Guidelines state that to meet the Zinc permits, Fe dosing will be replaced with Al based dosing. Most transition metals are capable of biosorption into activated sludge floc and biofilm which is also affected by pH. Other fates for some transition metals in sewage is deposition as metal sulphides when sulphate is reduced to sulphide in the sewer or in the hoppers of primary treatment settlement tanks if these are septic. These lead to a need to provide a mass balance of metals across a wastewater treatment works, including return liquors, for micropollutants that can partition into organic solids or precipitate out, which includes heavy metals as well hydrophobic and lipophilic organic carbon compounds. Stantec asked WxW if such a study has been undertaken in development of the micropollutant solutions and in particular, for the heavy metals. **ACTION** for WxW to confirm if mass balance has been undertaken with respect to Zinc, Copper and Nickel. This will also include interstage sampling to understand the fate of metals on site. **ACTION** for WxW to confirm if they

Reference: Process Benchmarking - Stantec comments

want to consider precipitation + tertiary treatment for the removal of zinc should a mass balance show that switching dosing chemicals is not sufficient. **ACTION** for Narinder Sunner to send precipitation curves to Andrew Gulliford.

Mass balance has not been undertaken. Interstage sampling has not been undertaken, sampling limited to crude and FE only. Conversion to ASP + TSR seems the most appropriate solution at this stage. Only 2 sites under consideration: Devizes (Nickel + zinc, Ni looks compliant with permit already, Zn border line potential switch from ferric to PAC) and Castle Cary (copper, Cu currently borderline with permit – Amp7 scheme of coag dosing + TSR will improve performance).

The Chemical (Micropollutant) Heavy Metals Guidelines do not mention specific strategies to handle copper (Cu). Stantec recommend pH adjustment to precipitate the metal followed by tertiary treatment and/or use of specific precipitants. Stantec note that metal sulphide precipitation is used in the mining industry but in wastewater treatment, this is likely to require low REDOX precipitation followed by reaeration before final discharge, to restore dissolved oxygen levels. **ACTION** for WxW to confirm if they want to include jar testing and coagulation testing for Metal removal. This will show if this is a viable strategy for copper removal.

As above Castle Cary the only site for Cu, given site is currently borderline achieving proposed permit the Amp7 scheme will improve this. Worst case convert to ASP to maximise bio-flocculation. Therefore jar testing not proposed – cost for ASP conversion?

US EPA report ASP removal efficiencies of 50-79% Cu & 74-95% Zn.

The Chemical (Micropollutant) Guidelines mention technologies for the removal of PFOS. A PFOS permit was not shared with Stantec in the list of PR24 chemical limits. **ACTION** for WxW to confirm that the PFOS site has dropped off the list.

To be confirmed

Best regards,

Stantec UK Limited

Daniel Rusev
Process Engineer
daniel.rusev@stantec.com

Attachment: [Attachment]

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Stantec **Memo**

To:	Andrew Gulliford	From:	Daniel Rusev
			Birchwood
Project/File:	Wessex Water PR24 Technical Review	Date:	14 February 2023

Reference: Technical review of WINEP Schemes

On 9th February 2023, a meeting between Wessex Water (WxW) and Stantec took place to technically review nine of the WINEP schemes with low Total Phosphorous (TP) limits. WxW presented the proposed programme for each of the 9 sites and Stantec technical directors and Principal civil engineer asked questions on the scope of the scheme, the layout on the site and the proposed technologies to meet the new permit for the discussed sites in order to come up with recommendations and opportunities for WxW to improve the schemes.

This memo aims to summarise the change of permits and the proposed works as well as the recommendations and actions arising from that meeting. Each site will be discussed separately, and actions and recommendations will be clearly marked. For each site Stantec have provided feedback outlined below and Actions for Wessex Water to respond / confirm queries on the design approach.

Abbotsbury:
The site has a PE of approximately 1,200, DWF of 300 m^3/d and an FFT of 9.4 l/s.
The current permit is 12mg/L BOD, 24mg/L TSS, 5 mg/L Ammonia and a 0.8mg/L TP.
In AMP8, the DWF will increase to 370 m^3/d and the FFT will increase to 15.3 l/s. The permit is tightened to 10mg/L BOD, 20mg/L TSS, 4mg/L Ammonia and a 0.25 mg/L TP.

The asset development plan is to install a new Primary settlement tank (PST) with a primary chemical dose applied upstream of it and the existing PSTs, new Trickling filter (TF) and a new humus tank (HT) to treat 40% of the new incoming flows. The existing works will treat the other 60% of total flow and flows will combine after secondary settlement to be pumped to 2 new Moving Bed Biological Reactors (MBBRs) for nitrification. Then a secondary chemical trim dose will be applied for TP removal before the effluent is passed through tertiary treatment in the form of Multimedia Filters (MMFs) and discharged.

As recirculation will be installed as part of the upgrade, there is an **OPPORTUNITY** to recirculate at a high rate to achieve the 4 mg/L ammonia permit without installing MBBRs. Additionally, there is a **RISK** that the existing works will not be able to hydraulically pass the flows if the new equipment is taken out of service (OOS). It was agreed that temporary process units will be installed when the need for taking new equipment OOS arises. **ACTION** WxW to take this OOS risk into account when purchasing new land to allow for the temporary equipment to be installed.

The recirculate option would still require load to be removed from the existing filters, as they are both organically and hydraulically overloaded. So this would still require the construction of an additional trickling filter and you would also need to refurbish the existing TFs (so new filter arms, siphons, media, underdrains, ventilation etc.); not withstanding the existing tertiary sand filters are currently responsible for the site achieving its ammonia permit.

Noted, potential for increased land purchase to accommodate temp plant?

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7 February 2023
Andrew Gulliford
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Reference: **Process Benchmarking - Stantec comments**

Amesbury:
The site has a PE of approximately 12,500, DWF of 1811 m^3/d and an FFT of 63 l/s.
The current permit is 20mg/L BOD, 30mg/L TSS, 10 mg/L Ammonia and a 1mg/L TP.
In AMP8, the DWF will increase to 3150 m^3/d and the FFT will increase to 84 l/s. The permit is tightened to 17mg/L BOD, 25mg/L TSS, 8mg/L Ammonia and a 0.25 mg/L TP.

The asset development plan is to install a new Storm Tank and a new Humus Tank with new tertiary treatment (tertiary nitrification) provided by 2 new MBBRs, followed by a secondary chemical (coagulant) dose for TP removal, before the effluent is passed through quaternary Multimedia Filters (MMFs) and discharged. Currently the primary metal coagulant dose for TP compliance is applied upstream of the existing PSTs.

Stantec commented that process units and pipework may not be able to take the additional flows. **RECOMMENDATION** WxW consider addition of another PST and another TF (rock or plastic media). WxW response: PSTs have sufficient capacity at the new FFT. **ACTION** for Wessex to check pipework on site is able to handle new flows and the site is able to take 1 unit OOS at FFT.

If a new PST and TF are installed, there is an **OPPORTUNITY** to recirculate at a high rate to achieve the 8 mg/L ammonia permit without installing MBBRs.

Confirm what we have done in relation to hydraulics.

Ref recirculation, again the existing TFs are sized to achieve a 10 mg/l Ammn – current performance is good with 95%ile of around 5 mg/l but with individual samples up to 9 mg/l. To comply with WxW DS to achieve a 8 mg/l, we would need 2x additional 28.5 m dia TFs for which there is no space. Recirc potentially an option but to be clear the existing TFs would **not** be compliant with DS loading rates and so I would want to make sure that the existing filters were in optimum condition so refurb required (so new filter arms, siphons, media, underdrains, ventilation etc.)

Blackheath:
The site has a PE of approximately 7,000, DWF of 1200 m^3/d and an FFT of 51 l/s.
The current permit is 20mg/L BOD, 30mg/L TSS, 7 mg/L Ammonia and no TP permit.
In AMP8, the DWF will increase to 1350 m^3/d and the FFT will not increase. The permit will then tighten to 18mg/L BOD, 27mg/L TSS, 6mg/L Ammonia and introduce new requirements to achieve a total nitrogen (TN) of 10 mg/L and 0.25 mg/L TP.

The asset development plan is to install a new Storm Tank and a new HT and introduce tertiary nitrification in the form of 2 new MBBRs, followed by denitrifying sand filters with methanol dosing. A primary chemical dose will be applied upstream of the PSTs and a secondary chemical trim dose will be applied before the effluent is passed through Multimedia Filters (MMFs) and discharged.

Stantec commented that it is possible to achieve the permits within the biological P and N removal process. **RECOMMENDATION** for WxW to consider this as an alternative solution as it will negate the need for MBBRs and denitrifying sand filters. An **OPPORTUNITY** exists to build a new circular ASP with an integrated Final settlement tank (FST). Following its completion and commissioning another circular ASP + FST can be built to allow for redundancy. Finally, as the area planned for the new assets is in a flood zone, there is an **ACTION** for WxW to provide flood compensation elsewhere. An **OPPORTUNITY** exists to carry out flood modelling to show that the new assets are not in the flood zone.

It's a small site for a BNR? BNR would still require the methanol dosing plus the ferric & TSR to achieve the low TP. Circular ASPs present their own issues, the internal FST is difficult to maintain, there is no

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access to interconnecting pipework between the aeration lane and FST, etc. We would need reference sites for review where this suggested process has achieved a 10 mg/l TN permit? I'm not convinced 2x circular ASPs are going to be much cheaper than what we are proposing?

Fovant:
The site has a PE of approximately 1,700, DWF of 343 m^3/d and an FFT of 10.6 l/s.
The current permit is 17mg/L BOD, 30mg/L TSS, 5 mg/L Ammonia and 1mg/L TP with 5 mg/L Fe as an absolute limit.
In AMP8, the DWF and the FFT will not increase. Only the TP permit is tightened to either 0.5 or 0.25 mg/L TP.

Currently there are two TFs on site, one taking 30% and the other taking 70% of the total flow. The asset development plan for AMP8 is for a new TF to be built, replacing the one taking 30% of the flow, with a new HT and recirculation pumping station plus introduction of a second chemical dosing point for TP compliance which will be installed upstream of new MMFs. Currently primary dose is applied upstream of the existing PSTs.

There is an **OPPORTUNITY** to *extend* the existing nitrifying sand filters to achieve the 0.5 mg/L TP permit (due to their replacement having to be funded by capital maintenance and thus not being funded under the P driver). **ACTION** WxW to produce the supporting evidence for why the nitrifying sand filters cannot be extended to meet these needs.

The two AMP6 sites where we have specifically dose u/s of TASF are Calne (12 month calendar average for 2022 is 0.88 mg/l TP) and Wotton Bassett (12 month calendar average for 2022 of 0.53 mg/l). So based on this there is no guarantee to achieve 0.5 mg/l TP. Fovant currently giving 0.53mg/l rolling 12 month average for Jan 2023 so would not meet the AMP8 permit.

Fordingbridge:
The site has a PE of approximately 12,300, DWF of 2,700 m^3/d and an FFT of 79.2 l/s.
The current permit is 20mg/L BOD, 30mg/L TSS, 10 mg/L Ammonia and 1mg/L TP permit.
In AMP8, the DWF and the FFT will not increase but the TP permit is tightened to 0.25 mg/L TP with an associated 6 mg/L absolute Fe limit.

The asset development plan for AMP8 is to install a new TF and HT with a new recirculation PS, the latter taking flows from new tertiary treatment discharge in the form of new MMFs. The existing chemical dosing plant for TP removal will be replaced by a higher capacity system which will include a secondary ferric dose upstream of the MMFs. The existing Drum thickeners will be upgraded due to the additional sludge production arising from the new wastewater treatment assets. Two new sludge holding tanks for pre- and post-thickened sludge will also be provided.

There is a flood zone on the existing works boundary to the south, where the new MMF is to be located. **ACTION** for WxW to consider the purchase of land area not in the flood zone in order to avoid flood risk.

Look at land purchase location

Collingbourne:
The site has a PE of approximately 1,700, DWF of 227 m^3/d and is a Treat all Flows site.
The current permit is 25mg/L BOD, 35mg/L TSS, 20 mg/L Ammonia.
In AMP8, the DWF and the FFT will not increase, but new permits of 8.4mg/L TN and 0.25 mg/L TP will be applied.

Reference: Process Benchmarking - Stantec comments

The asset development plan for AMP8 is to install a new asset stream consisting of inlet works, new PS to feed a new PST, new TF and new HT. Downstream of the new TF-HT, the flows from the new process stream will combine with the flow from the existing works to feed a new tertiary nitrification stage consisting of MBBRs for ammonia removal down to 3mg/L. These assets will be followed by new downstream assets in the form of denitrifying sand filters with methanol dosing to achieve the new TN permit, with the new TP permit being met by P removal being uprated by introduction of a secondary chemical trim dose, to be applied upstream of new MMFs.

There is an **OPPORTUNITY** to consider ASP / oxidation ditch + FST integrated unit solution for the TN and P removal. This will allow for methanol to be included as a risk item. This will remove the requirement for MBBR and TF. There is an **OPPORTUNITY** to consider a small Nereda process as an alternative technology offering TN and P removal.

Similar response to Blackheath regarding BNR technology. You still require the methanol dosing plus the ferric & TSR to achieve the low TP. Ref Nereda, there are on-going concerns with effluent quality in terms of recycling solids from TSR back through Nereda plant. In addition, complexity of plant and operational input make the process onerous to operate. We would still want 2x process streams for redundancy.

Hindon:
The site has a PE of approximately 700, DWF of 110 m^3/d and an FFT of 5.8 l/s FFT.
The current permit is 20mg/L BOD, 35mg/L TSS, 10 mg/L Ammonia.
In AMP8, the DWF and the FFT will not increase but a new permit of 0.25 mg/L TP will be applied.

The asset development plan for AMP8 is to upgrade existing assets with a new parallel treatment stream consisting of a new inlet screen, new TF, new HT, the effluent of which will then combine with existing treatment stream flows to feed a new tertiary treatment stage provided by MMFs. TP removal will be provided by installing two stage chemical dosing, the first stage as pre-precipitation before primary treatment with a second trim dose applied upstream of the new MMFs. A new recirculation PS will be provided for the combined old and new treatment stream flows. The solution includes provision for telemetry and connection of new utilities (power supply and a 220m potable water rising main).

During the meeting, it became apparent that the new TF is included in the P driver scope. Stantec's **RECOMMENDATION** is for WxW to include it within the capital maintenance scope. **ACTION** WxW to consider if more road for site access needs to be included in the scope of the project.

Look at access requirements

Warminster:
The site has a DWF of 5,500 m^3/d and an FFT of 141 l/s FFT. Its current permit is 16mg/L BOD, 30mg/L TSS, 3 mg/L Ammonia and a TP permit of 0.5 mg/L. In AMP8, the DWF and the FFT will not increase but a new TP permit of 0.25 mg/L will be applied.

The site existing asset profile consists of two parallel treatment streams in which 1/3 of the inlet flow goes to a TF stream for biological treatment and 2/3 of the inlet flow goes to an oxidation ditch for biological treatment. The asset development plan for AMP8 is to install a new PST and two more TF on the TF stream and a new selector and a new oxidation ditch with a new return activated sludge PS. Additionally, new MMFs will be installed with an upstream chemical dosing point to reduce the TP to the permit level. The backwash from the MMFs will go to the oxidation ditch stream only.

Reference: Process Benchmarking - Stantec comments

Stantec made a **RECOMMENDATION** for WxW to install a bigger oxidation ditch instead of building new TFs. If WxW pursue the option of a bigger oxidation ditch, a new FST may also be needed.

So in essence don't increase the size of both process streams, send more flow to a larger ASP.

Taunton:
The site has a DWF of 30,595 m^3/d and is a treat all flows site. The current permit is 15mg/L BOD, 30mg/L TSS, 3 mg/L Ammonia and a TP permit of 1 mg/L. In AMP8, the DWF and the FFT will not increase but a new TP permit of 0.25 mg/L will be applied.

The plan for AMP8 is for a new MMF pumping station to be installed along with new second point chemical trim dosing upstream of the MMFs.

Stantec made a **GENERAL RECOMMENDATION** for WxW to carry out hydraulic checks on all MMF sites to investigate if the backwash liquors will pose a challenge for the new assets. Additionally, there was a **RECOMMENDATION** for WxW to investigate the cutoff for installing MMFs on small sites, as they may be expensive. **ACTION** for WxW to check the best value solution for smaller sites.

General Advisory Information not requiring action.
During the call, Stantec also advised WxW that new TP solutions for permits more stringent than 1mg/l will be highly dependent on the suspended solids variation from biotreatment. Site specific factors such as biofilter sloughing can affect that variation and produce a different particle size distribution for their solids discharge than activated sludge plants. In addition to any site-specific variation in suspended solids discharge onto TP trim dosing and tertiary filtration for removal of those solids, septicity occurring in the network or in primary treatment can lead to increased metal coagulant demand above typical expectations. *These risk factors are normally accommodated by the headroom built into existing empirical design procedures* but may exceed them if they become extreme. These risks should become understood during new plant commissioning.

Best regards,

Stantec UK Limited

Daniel Rusev
Process Engineer
daniel.rusev@stantec.com

Attachment: [Attachment]

Design with community in mind

A3-2. Nutrients

A3-2.1. Abbotsbury WRC

Abbotsbury WRC is located within the Chesil and Fleet Lagoon sub catchment, which is a SAC an also subject to nutrient neutrality requirements under the LURB.

Abbotsbury WRC serves a population equivalent of 1,162, and its current discharge permit is:

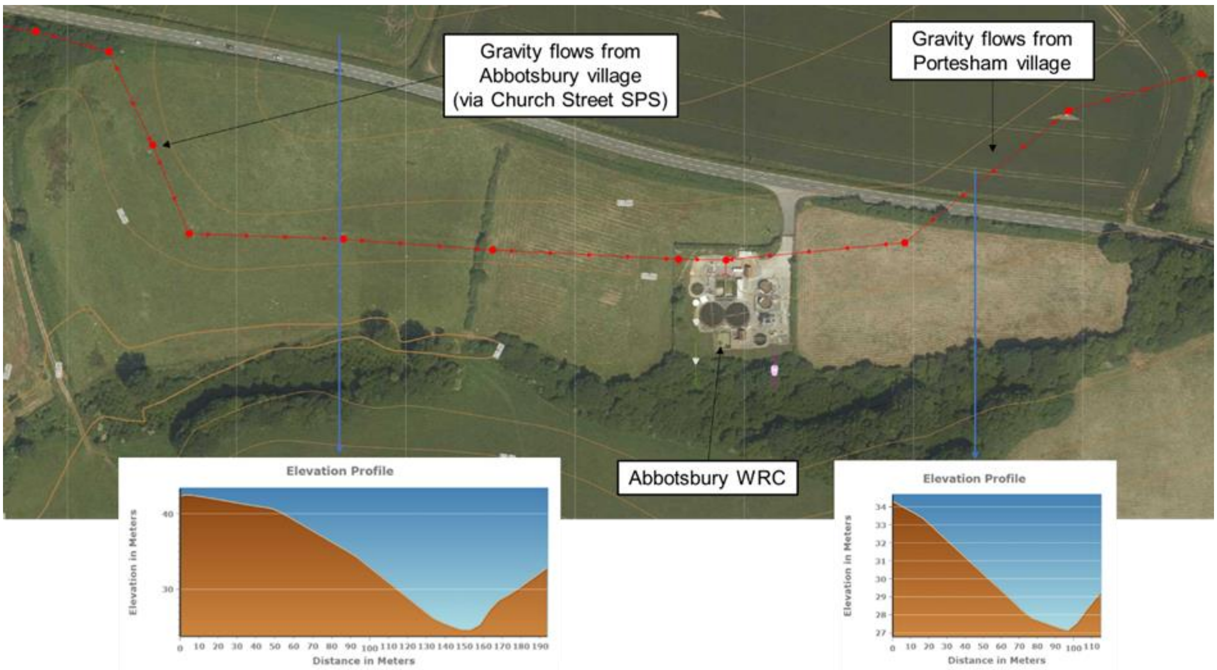
Dry Weather Flow (DWF)	300 m^3/d
Full Passed Forward (FPF):	9.4 l/s
BOD	12 mg/l (95%ile)
Suspended Solids	24 mg/l (95%ile)
Ammonia	5 mg/l (95%ile)
Phosphorus	0.81 mg/l (mean)

Abbotsbury WRC discharges into a small stream that discharges into the head of the Fleet lagoon. Whilst Wessex Water's WRCs only contribute 10% of the incoming nutrient load to the lagoon, there is strong evidence of nitrogen and particularly phosphorus retention and re-cycling within the Fleet lagoon. Without a significant reduction by all sectors the lagoon will not reach favourable condition.

Treatment Upgrades (Green)

To achieve a nitrogen permit of 10mg/l at Abbotsbury WRC through an integrated constructed wetlands would require a wetlands with an effective area of approximately 4Ha (excluding any peripheral area such as the banks of the wetlands and repurposing any excavation spoil for landscaping). The two fields immediately to the west of the WRC total approximately 3.5Ha.

Figure 1 - Abbotsbury WRC Location Plan



As can be seen in the figure, the topography is also not favourable to construction of a wetlands. The contour lines shown on the plan are at 5 metre spacings, and elevation profiles are shown for two cross-sections to the west and east of the WRC. To construct a wetlands would require significant earthwork.

It should also be noted that we do not have confidence that an integrated constructed wetlands could reliably achieve much less than 10mg/l N or 0.25mg/l P as a permit (rather than a stretch target), should more stringent permits be identified in the future.

Treatment Upgrades (Grey)
As described in Section 6 of the WSX16 document, the PR24 WINEP includes a technology/process trials to assess treatment options for nitrogen, as part of a national investigation under the PR24 WINEP WFD_INV_N-Tal driver. In recognition of the need for improvement at Abbotsbury WRC, we have proposed that one of the trials is undertaken at the WRC.

Discharge Relocation
Whilst the site already has a relatively tight phosphorus permit, even with a new nitrogen permit and more stringent phosphorus permit there will be a positive input of load into the lagoon.

One of the considerations is to relocate the discharge completely out of the Fleet lagoon, which will also negate the need for either a phosphorus or nitrogen permit at the site.

Any discharge would need to be sufficiently located to avoid impact The Chesil & The Fleet SAC, which extends approximately 500m out from Chesil Beach. This SAC also abuts Lyme Bay and Torbay SAC to the west, approximately at the head of the Fleet lagoon.

The 2km long effluent disposal main from Weymouth WRC (c.90,000pe) is piped under the lagoon, and discharges approximately 1km out to sea. Despite being of substantially smaller discharges, it is envisaged that any outfall from Abbotsbury WRC would need to extend a similar distance out from the coast, resulting in a total length of c.3.5km.

Proposal
In discussions with the EA and NE, it has been agreed that Abbotsbury WRC gets a 0.5mg/l permit, which we believe we can tolerate based on current site performance. This also is a no regrets approach in anticipation of a potential requirement for further nutrient (P and or N) reduction

Within the WINEP there is an investigation to ultimately produce a plan of actions in partnership with other catchment users that will address the elevation of nitrogen and phosphorus concentrations in The Fleet, specially derived from Wessex Water discharges, including feasibility of actions achieving net zero on the Total N and Total P load entering the lagoon from these assets. This investigation would also include monitoring the flow contributions of Abbotsbury WRC to its receiving watercourse to help evaluate the potential impact should the discharge be relocated elsewhere.

The WFD_INV_N-Tal technology trial would provide valuable input to this appraisal.

A3-2.2. Blackheath WRC

Blackheath WRC serves a population equivalent of 6,445, and its current discharge permit is:

Dry Weather Flow (DWF)	1,200 m^3/d
Full Passed Forward (FPF):	51 l/s
BOD	18 mg/l (95%ile)
Suspended Solids	27 mg/l (95%ile)
Ammonia	6 mg/l (95%ile)

The southern portion of the WRC is within Morden Bog and Hyde Heath SSSI, Dorset Heathlands SPA and Ramsar areas, as shown in the figure below. Aside from a small area of grassland to the north, the WRC is bordered by established woodlands, with Wareham Forest to the south.

Figure 2 - Blackheath WRC Location Plan 1

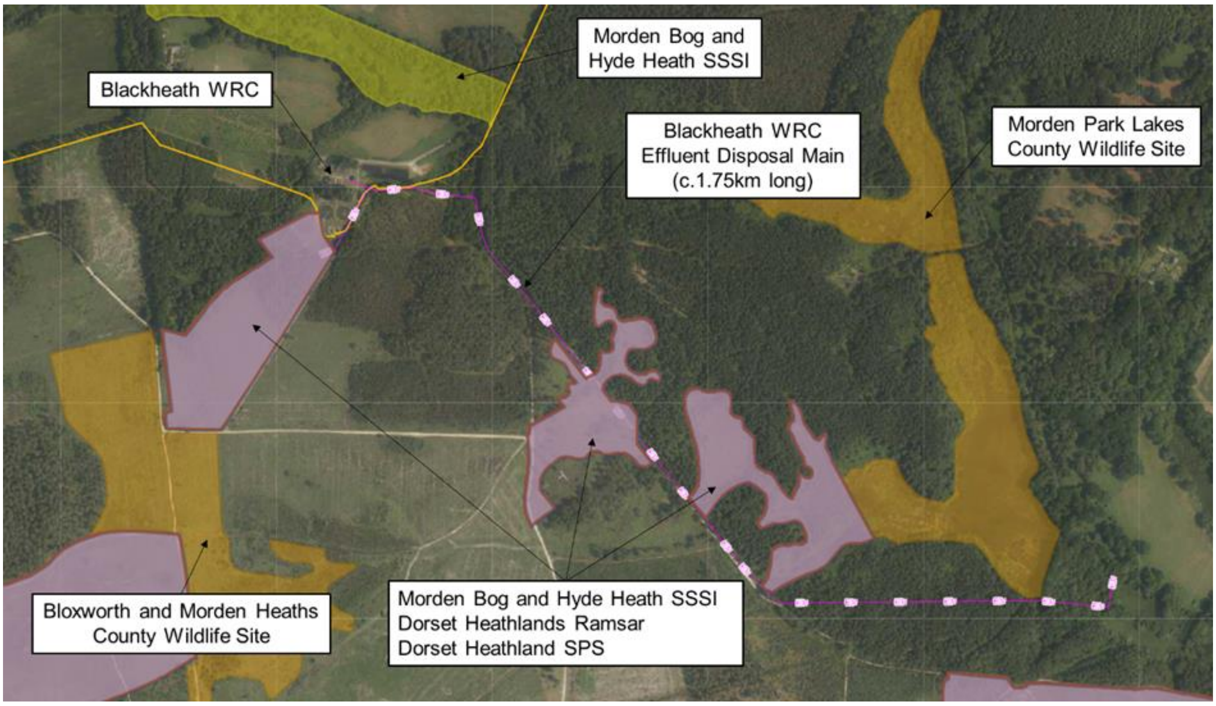
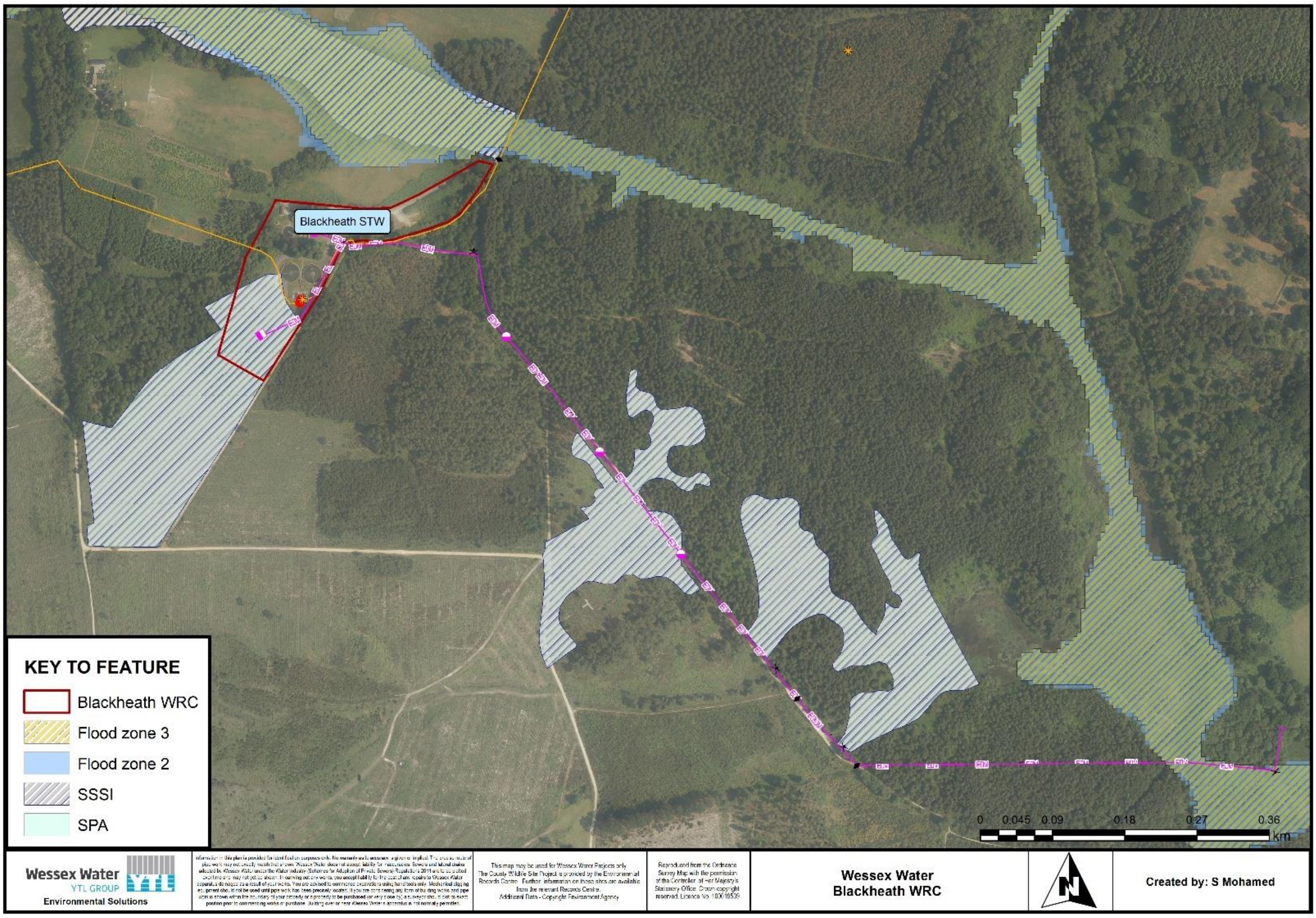


Figure 3 - Blackheath WRC Location Plan 2



Treatment Upgrades

To achieve the required N and P permits, substantial upgrades at the WRC are required. The proposed treatment upgrade includes:

- De-nitrifying sand filters with methanol dosing
- Tertiary solids removal (for P)
- Additional sludge treatment

and associated ancillaries including pumping stations, standby power provision, kiosks etc. as well as land purchase of the field to the north of the WRC.

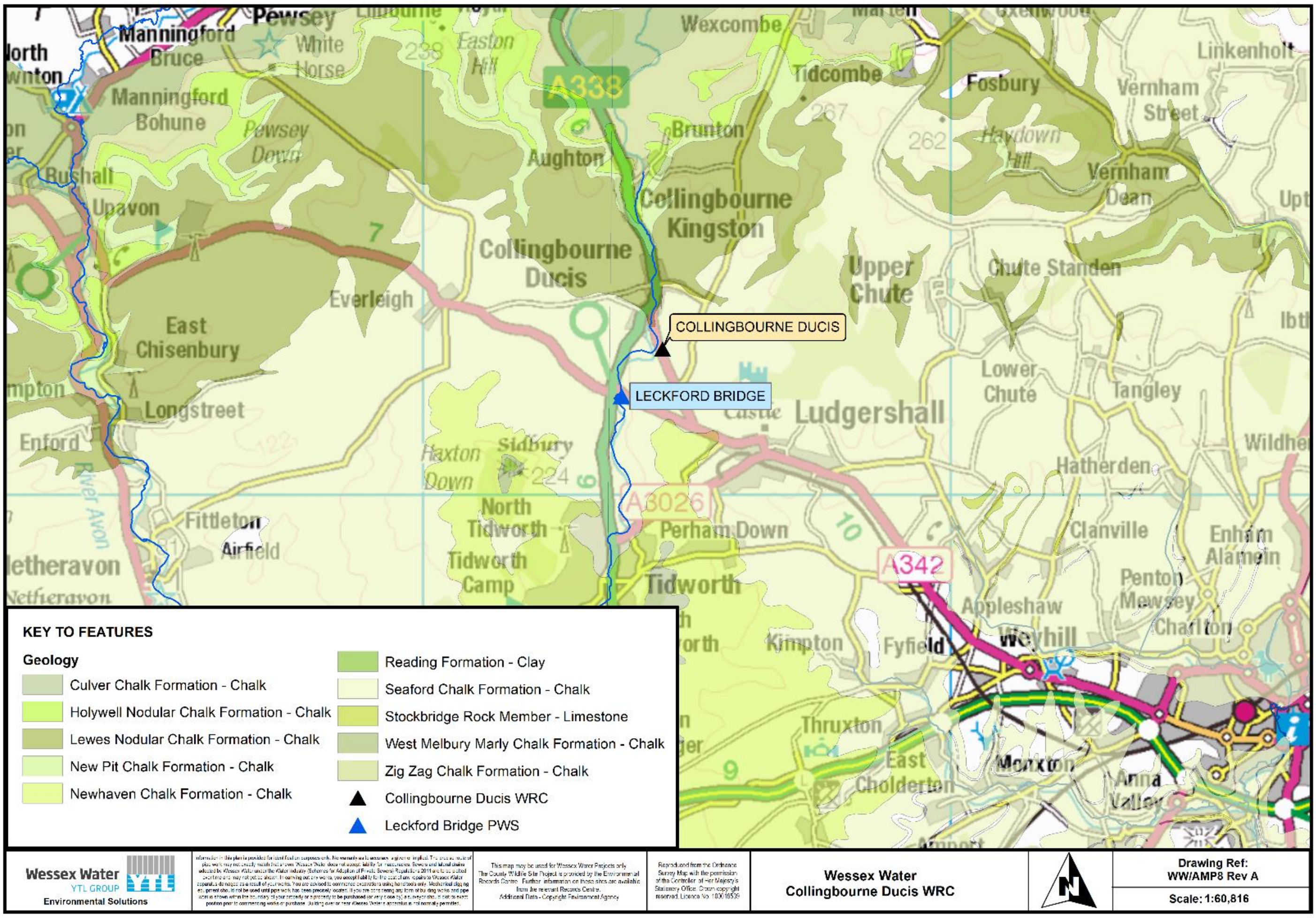
A3-2.3. Collingbourne Ducis WRC

Collingbourne Ducis WRC serves a population equivalent of 1,403, and its current discharge permit is:

Dry Weather Flow (DWF)	227 m^3/d
Full Passed Forward (FPF):	N/A
BOD	25 mg/l (95%ile)
Suspended Solids	35 mg/l (95%ile)
Ammonia	30 mg/l (95%iile)

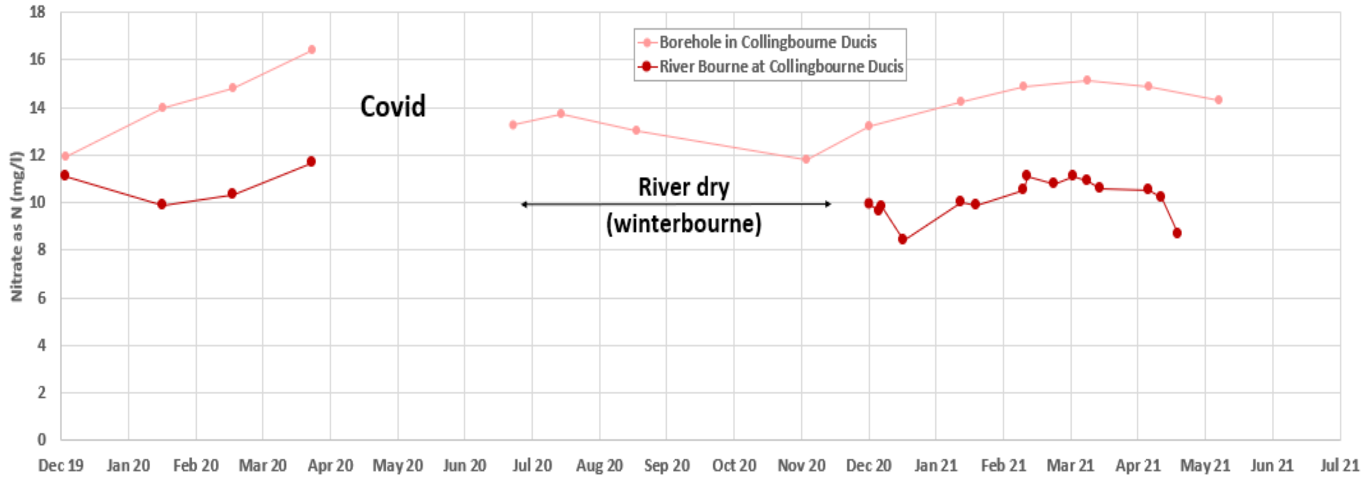
The WRC is located in the Hampshire Avon. As shown in the figure below, the WRC is located in the chalk strata level and within the DrPWA of nearby Leckford Bridge public water supply.

Figure 4 - The location of Collingbourne Ducis WRC in relation to the local geology outcrops and observation boreholes



As part of AMP7 investigations, two observation boreholes were implemented to monitor nitrate levels in the groundwater at near the WRC.

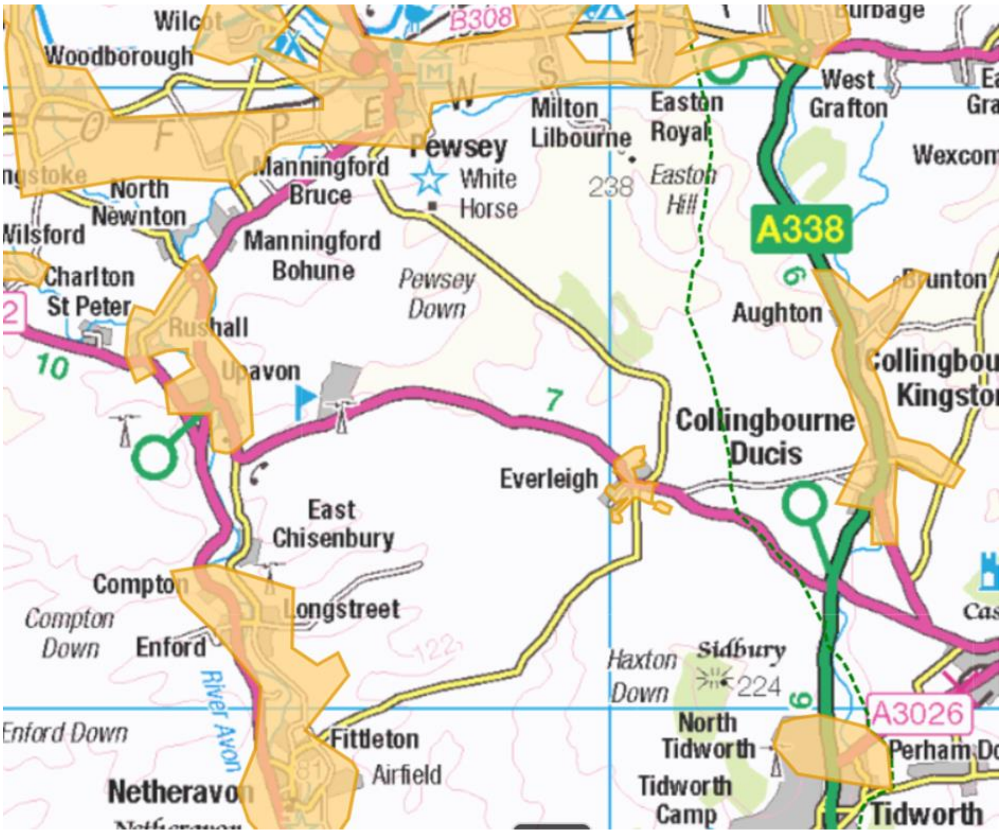
Figure 5 - Groundwater Nitrate levels near Collingbourne Ducis WRC



Transfer

The nearest WRC to Collingbourne Ducis WRC is Everleigh WRC, some 4km away (as the crow flies). The site serves a population equivalent of 165 and would require a wholesale rebuild to accommodate any transferred flows. The following figure shows the potential sewerage connection points, other nearby WRCs include Pewsey (9.5km to the north), Netheravon (10km to the west) and Tidworth (5km to the south, operated by Thames Water).

Figure 6 - Potential transfer catchments for Collingbourne Ducis WRC



A potential option is for Collingbourne Ducis to pump to Everleigh, which in turn could pump to Netheravon.

Whilst the WRC has a DWF permit of 227m^3/d, average Q90 flows over the past five years have been around 170m^3/d. There are significant concerns over pumping such low flows (2l/s) over any of the potential transfer lengths, particularly as they are likely to lead to septicity issues, leading to this option being discounted.

Enhance Treatment Capacity (Green)

Two wetlands' options were assessed by Mott MacDonald:

- Option 1: Within existing available land (0.6Ha)

The modelling indicates that it would not be possible to achieve the 8.4mg/l nitrogen performance target within the available land that is owned by Wessex Water.

- Option 2: Area required to meet the performance target (3Ha)

A considerable amount of additional land would be required to meet the target due to the high nitrogen mass loading.

The following block plans illustrate the land take and configuration of the proposed wetlands.

Figure 7 - Collingbourne Ducis WRC wetlands layout - Option 1 (within existing available land)

Figure 8 - Collingbourne Ducis WRC wetlands layout - Option 2 (area required to meet the performance target)

High level capex costs have been derived for the two options:

Table 1 – Collingbourne Ducis WRC – Indicative capex costs for wetlands

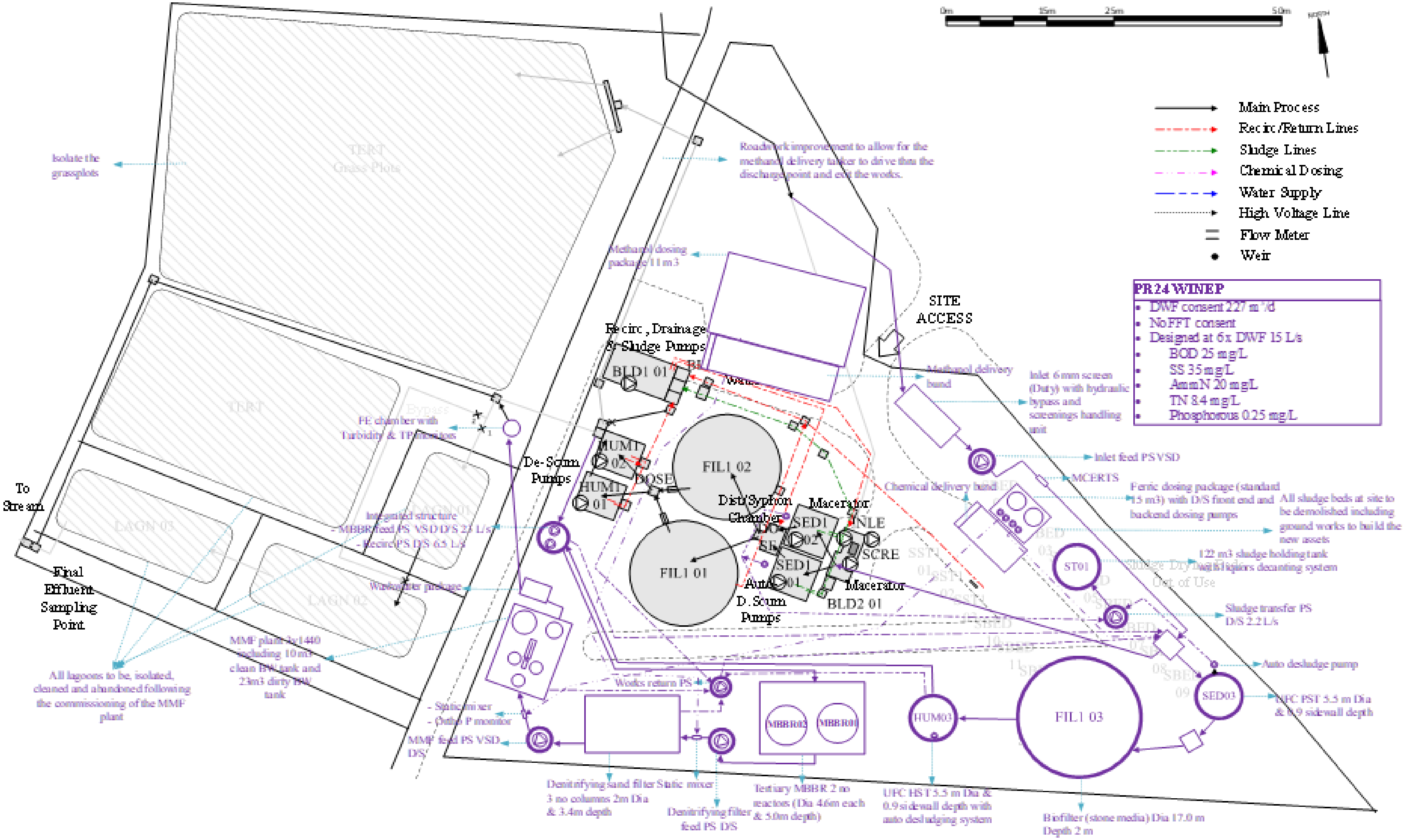
	Option 1 Within existing available land	Option 2 Area required to meet performance target
Area	0.6 Ha	3 Ha
Nitrogen Target	35 mg/l	8.4 mg/l
Capex	£1.73 m	£7.11 m

The above costs include indicative remediation costs associated with the existing (unused) grass plots for Option 1 and land purchase costs for Option 2, both of which were excluded from Mott MacDonald's evaluation.

Enhance Treatment Capacity (Grey)

As noted earlier, we are aware of the potential for a phosphorus permit at Collingbourne Ducis, to potentially as low as 0.25mg/l. A combined option was developed to cover both nitrogen and phosphorus requirements, with a layout as shown on the following page.

Figure 9 - Collingbourne Ducis WRC 'grey' treatment upgrade



A high-level capex cost has been derived for this option.

Table 2 – Collingbourne Ducis WRC – Indicative capex cost for ‘grey’ treatment upgrade

	‘Grey’ Option for N&P
Capex	£21m

In implementing any AMP8 solution for N-removal we need to be cognisant of potential future P-removal requirements.

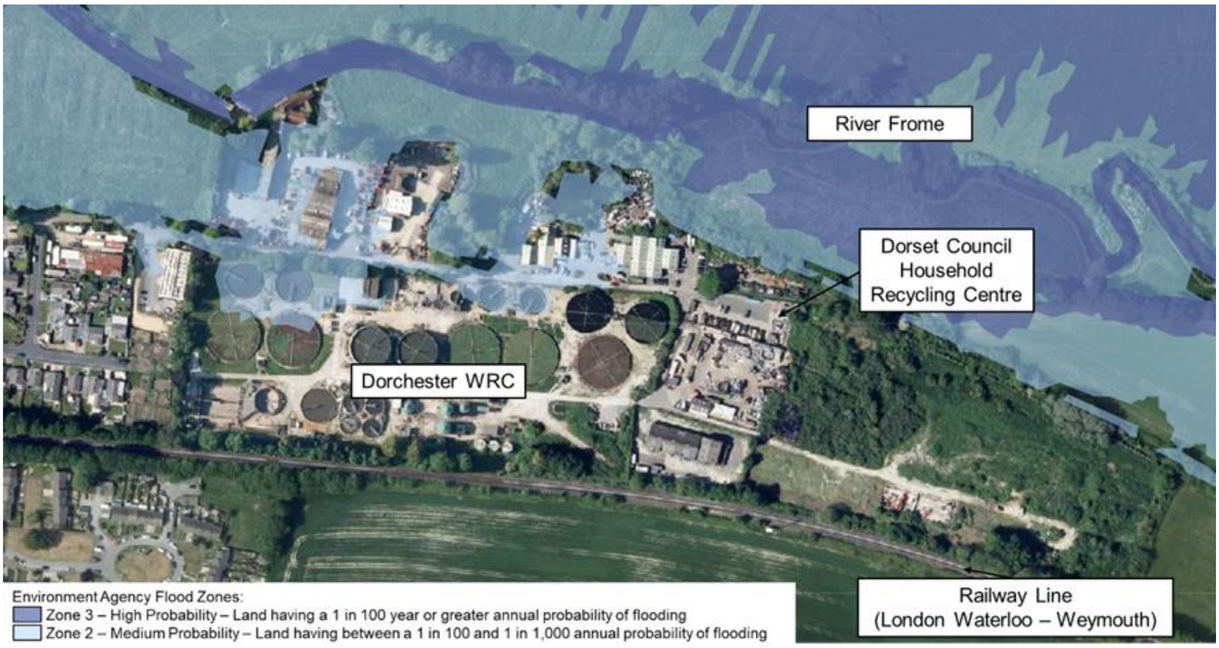
A3-2.4. Dorchester WRC

Dorchester WRC serves a population equivalent of 35,749, and its current discharge permit is:

Dry Weather Flow (DWF)	9,450 m^3/d
Full Passed Forward (FPF):	294 l/s
BOD	15 mg/l (95%ile)
Suspended Solids	30 mg/l (95%ile)
Ammonia	5 mg/l (95%ile)
Phosphorus	1mg/l (mean) (tightening to 0.8mg/l by 31/03/25)

We currently offset 40 tonnes of nitrogen per year around and upstream of Dorchester WRC in lieu of a nitrogen removal plant at the WRC (for a permit of 15mg/l), as agreed with the EA, however the new LURB driver requires improvements to the point-source discharge.

Figure 10 - Dorchester WRC Location plan



Treatment Upgrades

In the absence of being able to use CNB and, given the size, location and site constraints of the WRC as shown in , the only feasible option to achieve the N & P PR24 drivers is to enhance treatment capacity through a 'grey' solution. Wessex Water owns the area of land to the east of the site and propose for the new treatment facility will be located here. Initially consideration was given to re-use of existing assets, however this would result in extensive interstage pumping between the existing and new assets, as well as provision of temporary treatment during the construction stage to allow for the re-purposing of assets. Two options have been considered further, with their main scope items listed below:

1) Activated Sludge Plant (ASP) with tertiary denitrification and phosphorus removal

- Primary settlement tanks
- ASP Final settlement tanks
- De-nitrifying sand filters with methanol dosing

- Tertiary solids removal (for P)
- Additional sludge treatment

2) Biological Nutrient Removal (BNR) Plant with tertiary phosphorus removal

- Primary settlement tanks
- BNR
- Final settlement tanks
- Tertiary solids removal (for P)
- Additional sludge treatment

and associated ancillaries including pumping stations, standby power provision, kiosks etc.

Catchment Nutrient Balancing

We currently offset 40 tonnes of nitrogen per year around and upstream of Dorchester WRC in lieu of a nitrogen removal plant at the WRC, as agreed with the EA.

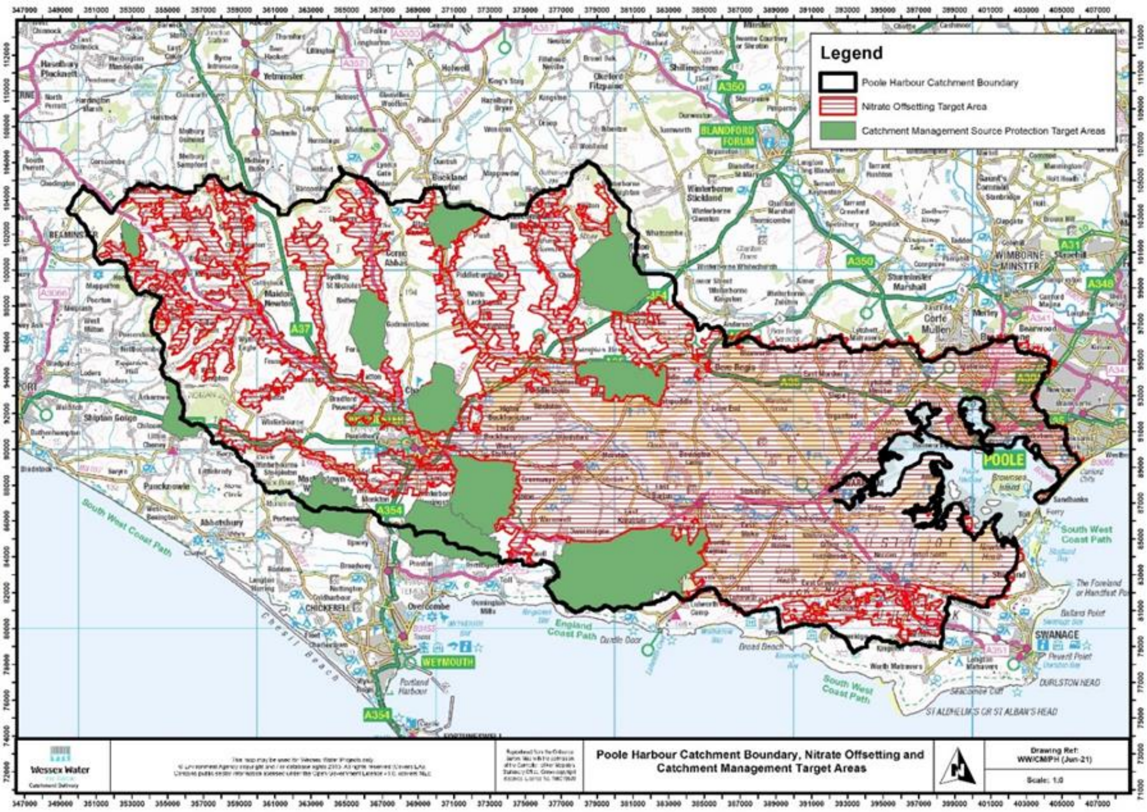
In AMP7 we have a performance commitment to further reduce nutrients beyond our permitted requirements, particularly for nitrogen in the Poole Harbour catchment. Claimable catchment offsetting is by an approved catchment measures list and associated removal rates as agreed with EA for CNB. This excludes any reduction measures that farmers are obliged to do already under current legislation/regulations or are already funded from other agri-environment schemes. For the performance commitment, nitrogen savings can be claimed from anywhere within the Poole Harbour catchment, but;

- Only once the legal requirement of 40t (plus 10%, as Wessex Water self-imposed uncertainty factor) = total of 44t has been achieved (related to Dorchester WRC), and,
- Not from within any Wessex Water target areas where catchment management is actively being undertaken for drinking water source protection.

The claimable target and associated performance commitment outperformance payment quantity is signed off by our Catchment Panel, which comprises representatives from regulators and a range of stakeholder groups. The performance commitment is reportable on calendar years, with our relevant CNB load offset as below:

- 2020 – 45.2t
- 2021 – 58.6t
- 2022 – 63.5t

Figure 11 - Target areas of current nitrogen CNB in Poole Harbour catchment



With farmers having their own nutrient reduction targets, other sectors also looking for land (e.g., council/developers for wetlands), as well as increases to food prices, there is an anticipation that offsetting costs are likely to escalate. Whilst we accept the long-term uncertainty of CNB, through our performance commitment work, however, we have demonstrated that there is still the cost-effective potential for us to claim nitrogen credits over-and-above farmers' own targets, as well as supporting them in achieving their targets. Should, for whatever reason, CNB cease to be financially or environmentally attractive then the option remains for asset-based improvements. These asset upgrades could also be timed to coincide with capacity improvements or capital maintenance activities at the WRC.

CNB, however, is not valid for UWWTR or LURB requirements, with both requiring improvements to specific point source discharges.

A3-2.5. Lytchett Minster WRC

Lytchett Minster WRC serves a population equivalent of 8,714, and its current discharge permit is:

Dry Weather Flow (DWF)	1,600 m^3/d
Full Passed Forward (FPF):	55.5 l/s
BOD	30 mg/l (95%ile) *(25mg/l or %-removal for UWWTR)*
Suspended Solids	40 mg/l (95%ile)
Ammonia	50 mg/l (95%ile)

The WRC principally comprises a primary settlement tank, oxidation ditch and a final settlement tank followed by a UV disinfection plant. The site recently underwent a major capital maintenance scheme following failure of the oxidation ditch liner, requiring substantive temporary treatment in rented adjacent land so that the liner could be replaced. The WRC itself is on rented land with a number of restrictions that might affect works, including no erection of any buildings except those shown on certain plans from 1969 and 2002 (the latter being when the UV plant was installed).

The WRC is constrained on most sides by designated areas, such as the Poole Harbour SSSI, Ramsar and SPA, as shown in the figure below. Immediately north of the WRC is the RSPB's Lytchett Fields Nature Reserve, and the RSPB have recently improved a bird lookout to the east of the site overlooking Lytchett Bay.

Figure 12 - Lytchett Minster WRC Location Plan

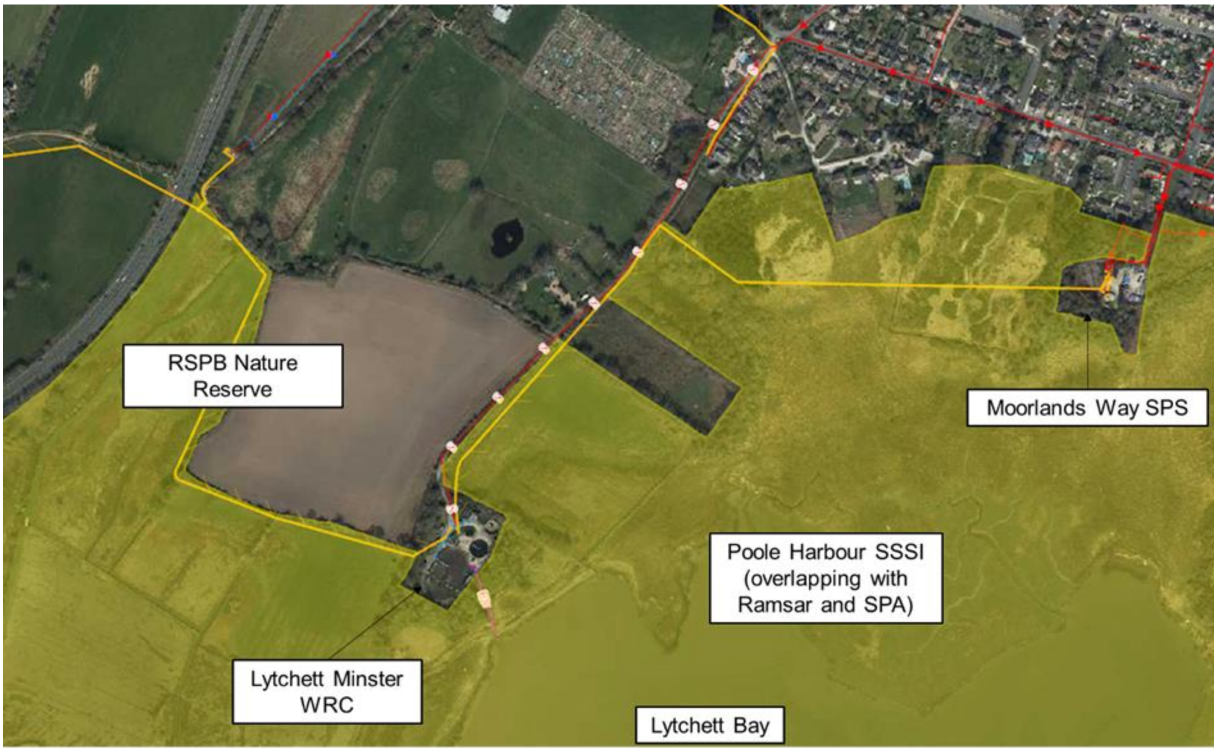
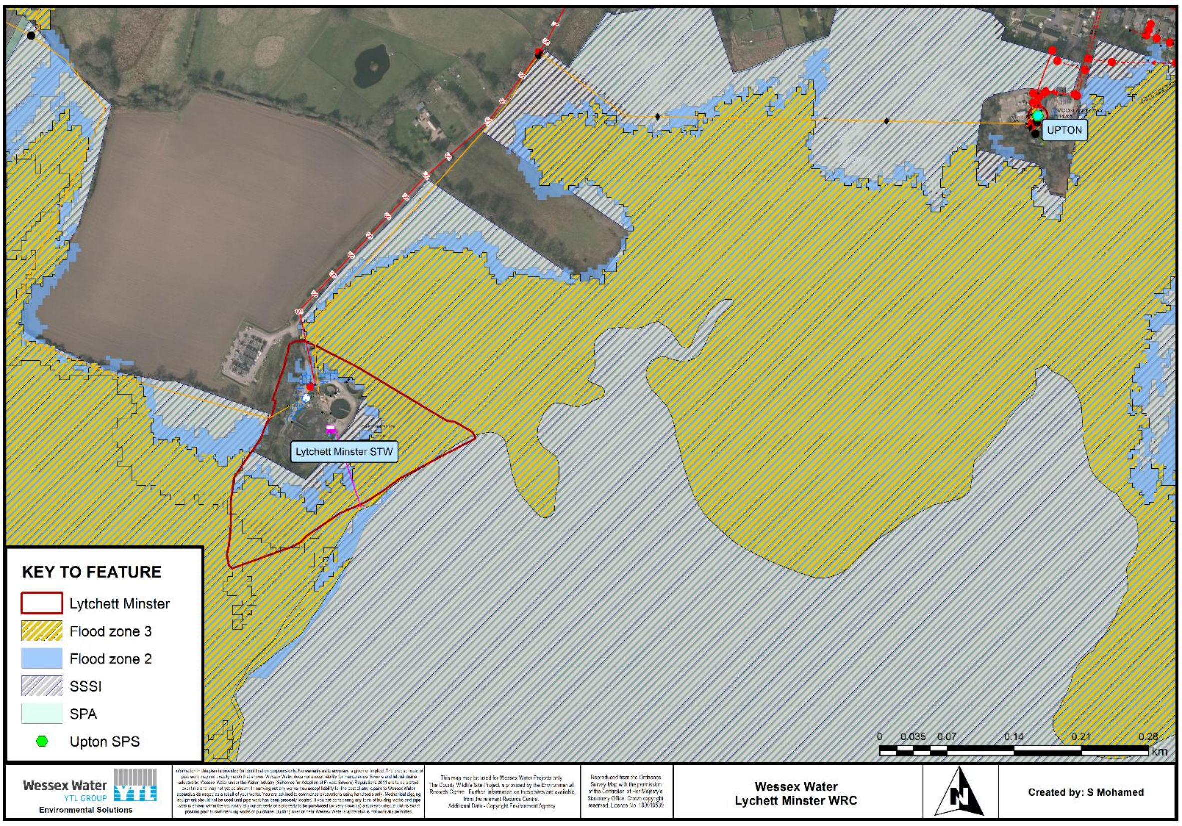


Figure 13 - Lytchett Minster WRC Flood Zones



Most of the SSSI area shown on the plan is also in the Zone 3 flood zone, classified as high probability of flooding with the land having a 1 in 100 year or greater annual probability of flooding.

Treatment Upgrades

Whilst there is local interest in creating an integrated constructed wetland in the nature reserve field to the north of the site the area is of insufficient size to achieve the required 10mg/l N permit or the 0.25mg/l P permit.

Three site-based 'grey' solutions have been considered:

1) Retention of existing Oxidation Ditch with tertiary denitrification and phosphorus removal
    - Retain existing oxidation ditch
    - De-nitrifying sand filters with methanol dosing
    - Tertiary solids removal (for P)
    - Additional sludge treatment
2) Activated Sludge Plant (ASP) with tertiary denitrification and phosphorus removal
    - Primary settlement tanks
    - ASP
    - Final settlement tanks
    - De-nitrifying sand filters with methanol dosing
    - Tertiary solids removal (for P)
    - Additional sludge treatment
3) Biological Nutrient Removal (BNR) Plant with tertiary phosphorus removal
    - Primary settlement tanks
    - BNR
    - Final settlement tanks

- Tertiary solids removal (for P)
- Additional sludge treatment

and associated ancillaries including pumping stations, standby power provision, kiosks etc. as well as land purchase.

Whilst Option 1 re-uses existing assets, this would result in extensive interstage pumping between the existing and new assets. For options 2 & 3 there is the opportunity to rebuild the UV disinfection plant; the plant is c.20 years old and will be nearing the end of its design life by the end of AMP8. High level sketches of the three options are included in on the following page, with indicative comparative costs between the three options shown.

Table 3 – Lytchett Minster WRC Treatment upgrade costs

Option*	Capex (£m)	Opex (£k/yr)	30-Yr WLC
1) Oxidation Ditch	45	650	57.0
+ UV replacement and other capital maintenance	15	150	17.8
Total	60	800	74.7
2) ASP	56	950	73.5
3) BNR	57	800	71.7

* All options include equivalent levels of risk and capital maintenance needs to provide holistic comparison and demonstrate cost efficiencies for including UV replacement alongside P&N scope.

Figure 14 - Lytchett Minster WRC Treatment upgrade options for combined N&P drivers – Option 1

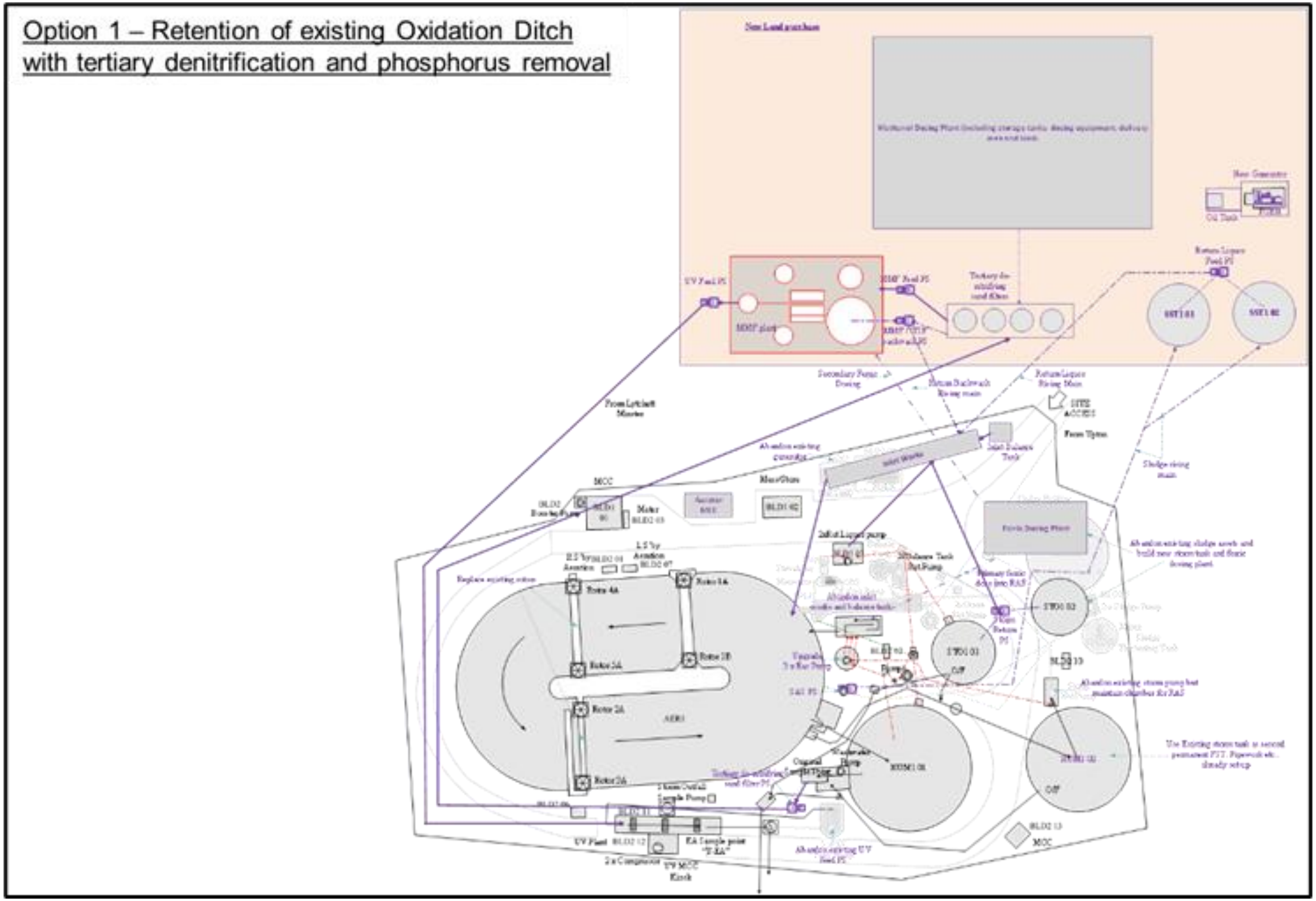


Figure 155 - Lytchett Minster WRC Treatment upgrade options for combined N&P drivers – Option 2

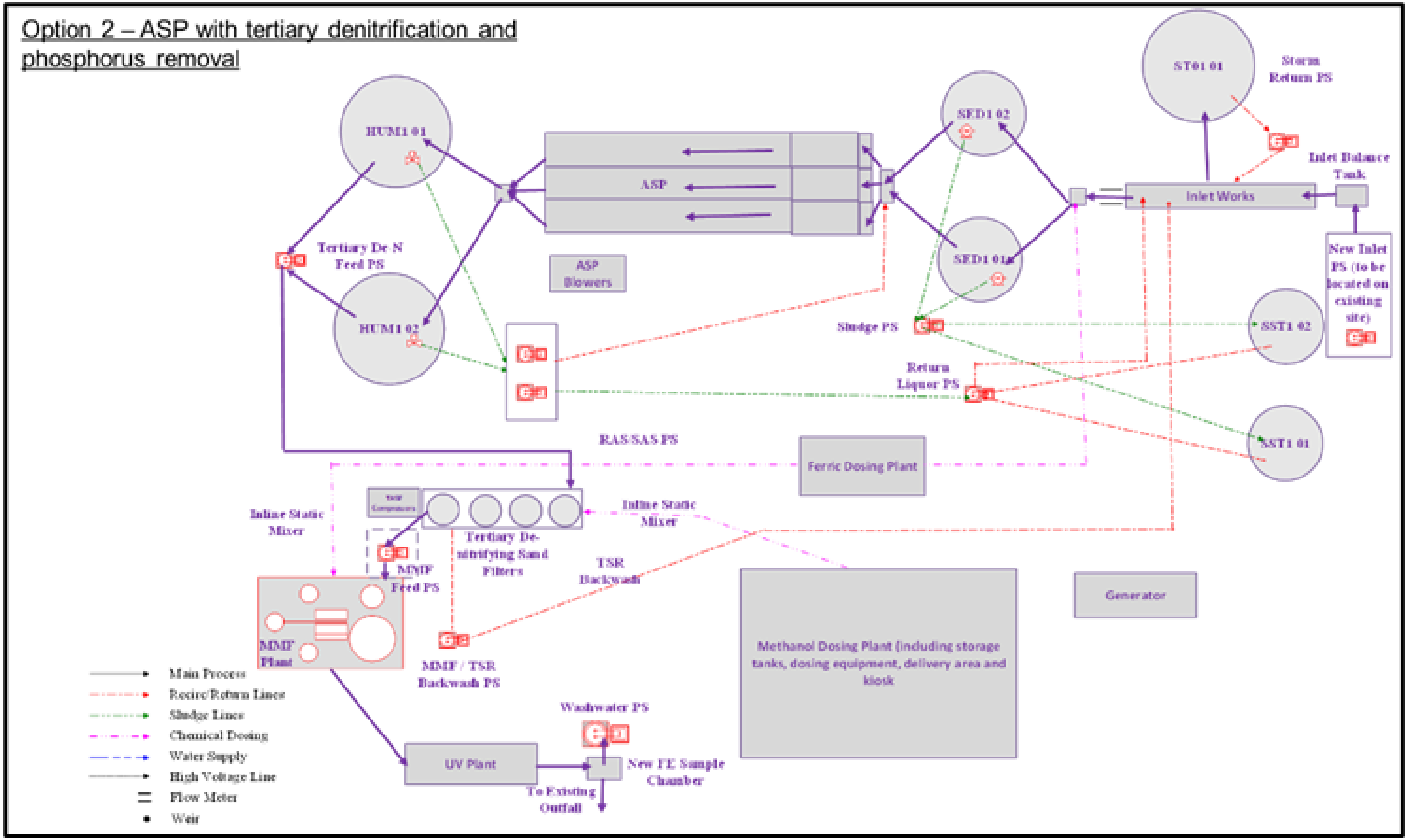
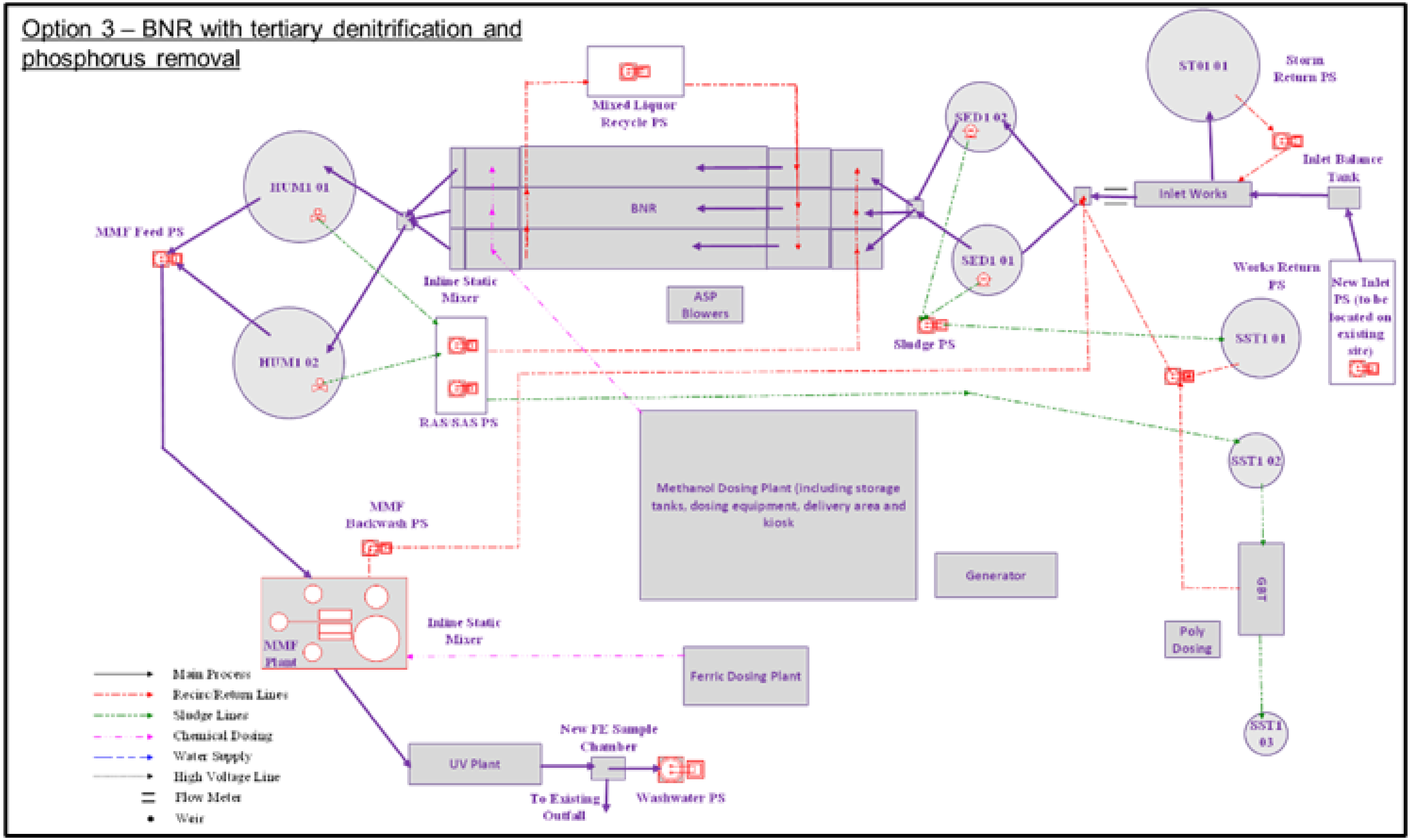


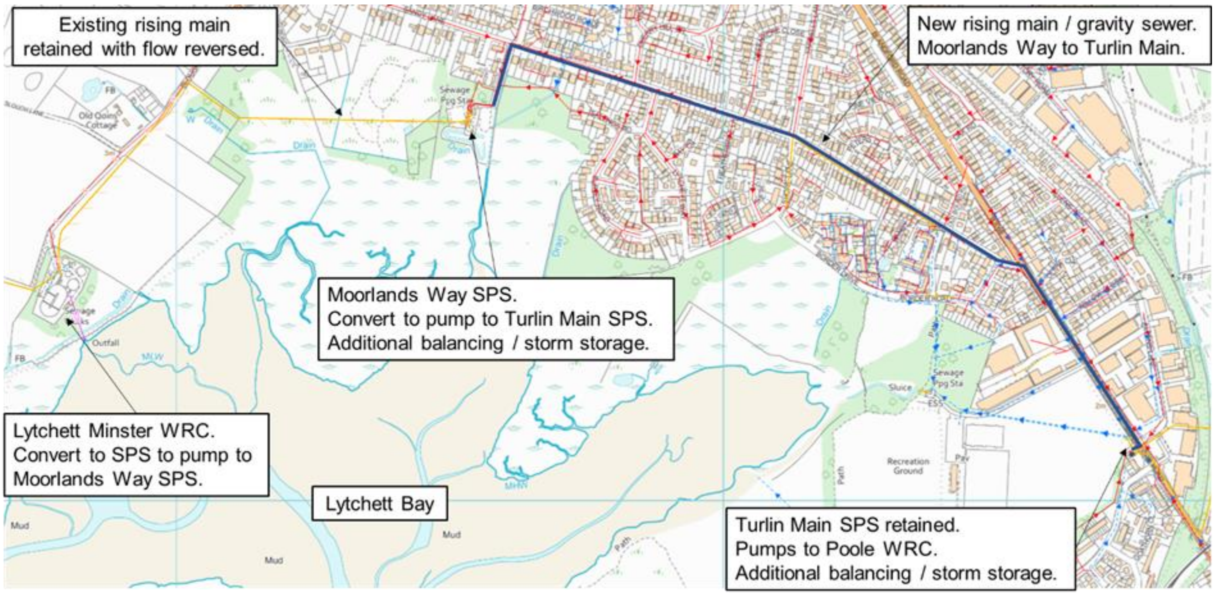
Figure 166 - Lytchett Minster WRC Treatment upgrade options for combined N&P drivers – Option 3



Transfer

An alternative option is the transfer of Lytchett Minster WRC into the Poole WRC catchment, as shown.

Figure 177 - Lytchett Minster WRC Transfer of flows to Poole WRC catchment



The transfer is subject to a more detailed review of land availability near the SPSs. Moorlands Way SPS is surrounded on all sides by designated areas, such as the Poole Harbour SSSI, Ramsar and SPA, as shown in the earlier location plan figure. The Dorset Heathland SPA is immediately adjacent to the SPS.

If transferred, Lytchett Minster WRC would represent approximately 10% of the flow arriving at Poole WRC, and is both the best value and least cost solution. It is however, predicated on an understanding that Poole WRC would need to be upgraded ahead of the transfer operation. As described earlier, based on the current design and construction programme the upgrades at Poole WRC will not be completed by the 31/03/2020 regulatory date for HD_IMP or HD_IMP_NN, which will have a knock-on impact on achieving the date for Lytchett Minster WRC if progressing with the transfer option.

A3-2.6. Maiden Bradley WRC

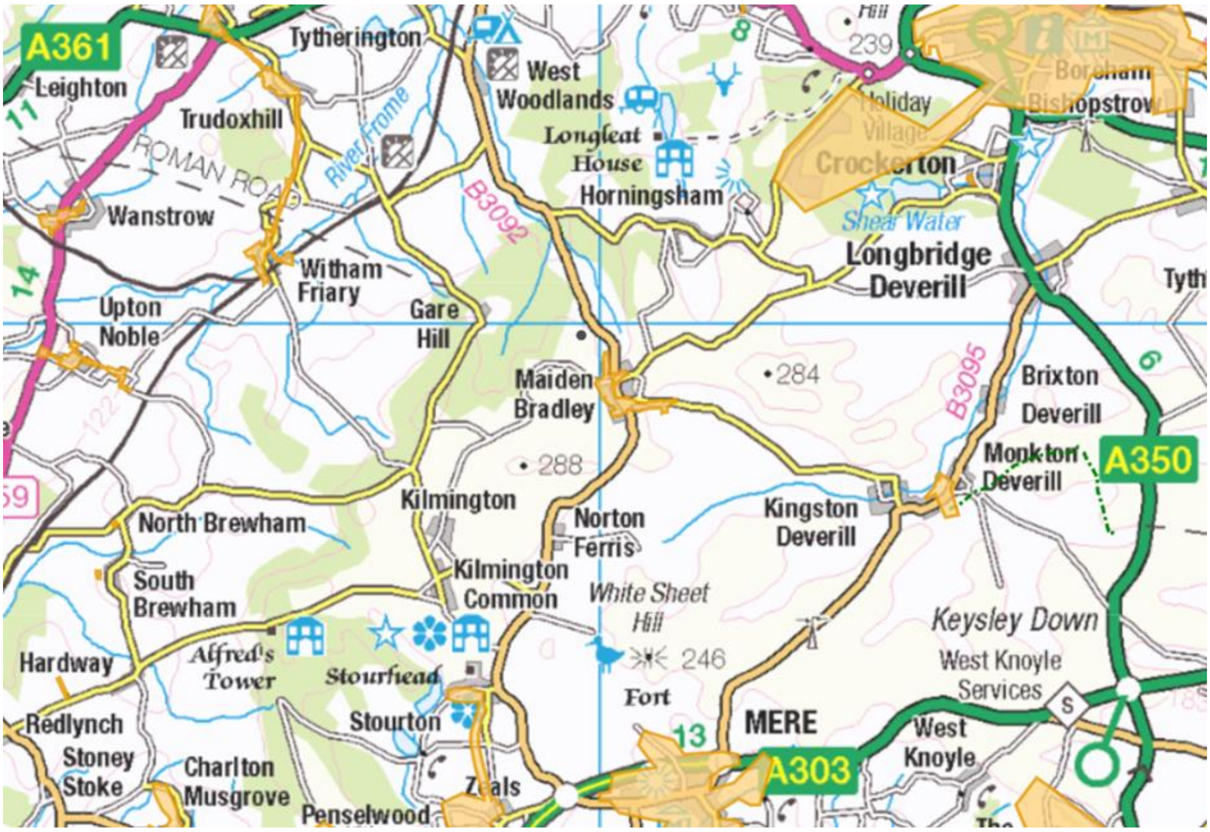
Maiden Bradley WRC serves a population equivalent of 326, and its current discharge permit is:

Dry Weather Flow (DWF)	57 m^3/d
Full Passed Forward (FPF):	2.2 l/s
BOD	40 mg/l (95%ile)
Suspended Solids	60 mg/l (95%ile)

Transfer

There are no WRC catchments within a 4km radius of Maiden Bradley WRC. The nearest potential sewerage connection point (considering network capacity) is some 5km away, for Bourton WRC to the southwest.

Figure 18 - Potential transfer catchments for Maiden Bradley WRC



Whilst the WRC has a DWF permit of 57m^3/d, average Q90 flows over the past five years have been around 25m^3/d. There are very significant concerns over pumping such low flows (<0.5l/s) over any of the potential transfer lengths, particularly as they are likely to lead to septicity issues, leading to this option being discounted.

Enhance Treatment Capacity (Green)

Unlike Collingbourne Ducis, there is no Wessex Water owned land available at Maiden Bradley for wetland creation. Two potential land parcels were identified for consideration, both to meet the 8.4mg/l performance target:

- Option 1: Arable land to the east of WRC (1.7Ha)
- Option 2: Pastoral land to the northeast of WRC (1.7Ha)

The following block plans illustrate the land take and configuration of the proposed wetlands.

Figure 19 - Maiden Bradley WRC wetlands layout - Option 1 (east of WRC)

Figure 20 - Maiden Bradley WRC wetlands layout - Option 2 (northeast of WRC)

A high-level capex cost has been derived for the wetlands. Without further design and initiating dialogue with the appropriate landowners it is not possible to refine the cost comparison between options.

Table 4 – Maiden Bradley WRC – Indicative capex costs for wetlands

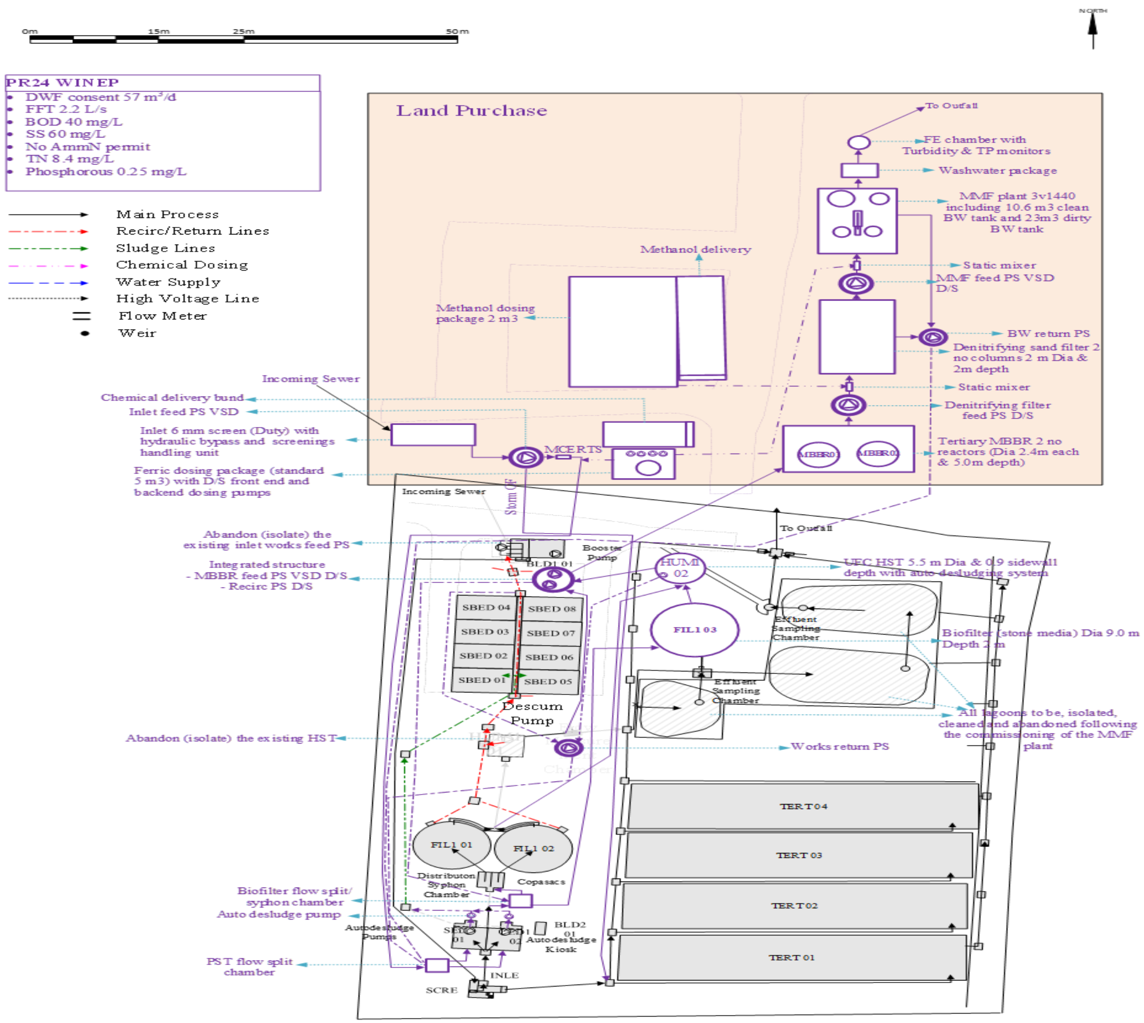
	Option 1 / Option 2
Area	1.7 Ha
Nitrogen Target	8.4 mg/l
Capex	£3.00m

An indicative allowance has been included for land purchase costs, which had been excluded from Mott MacDonald's evaluation.

Enhance Treatment Capacity (Grey)

As noted earlier, we are aware of the potential for a phosphorus permit at Maiden Bradley to potentially as low as 0.25mg/l. A combined option was developed to cover both nitrogen and phosphorus requirements, with a layout as shown on the following page.

Figure 21 - Maiden Bradley WRC 'grey' treatment upgrade



A high-level capex cost has been derived for this option.

Table 5 – Maiden Bradley WRC – Indicative capex cost for 'grey' treatment upgrade

	'Grey' Option for N&P
Capex	£18m

In implementing any AMP8 solution for N-removal we need to be cognisant of potential future P-removal requirements.

A3-2.7. Poole WRC

A portion of the executive summary from Poole WRC Nutrient Reduction Options Appraisal Report (AMP7 WINEP 7WW300207) is copied below.

The options being considered involve:

- the implementation of improvements to the treatment process for an improved discharge quality from Poole WRC, through a tighter discharge consent reduced to a total phosphorus down to 0.25mg/l and total nitrogen of 5mg/l (tightened from the existing 10mg/l permit),
- the full relocation of the discharge outfall from its current location in Holes Bay to a new location outside Poole Harbour, in the English Channel,
- the partial relocation of the discharge via an effluent reuse scheme taking flows to the River Stour in Dorset which would act as an environmental buffer and allow downstream re-abstraction and treatment for drinking water use. Flows into Poole Harbour and the Stour would require similar levels of nutrient removal.

A number of treatment improvement options were considered for the new/tightened nutrient permits, resulting in a Ballasted Activated Sludge (BioMag®) option being determined to have the lowest CapEx over the options, and a comparable NPV with a Granular Activated Sludge (Nereda®) option over a 50-year horizon, as summarised below.

	N: 5mg/l & P: 0.25mg/l		N: 5mg/l & P: 0.5mg/l		N: 5mg/l & P: 1mg/l	
Option Title	CAPEX (£m)	OPEX (£m/year)	CAPEX (£m)	OPEX (£m/year)	CAPEX (£m)	OPEX (£m/year)
Granular Activated Sludge – Nereda®	115.3	2.3	115.1	2.2	102.5	1.7
Ballasted Activated Sludge – BioMag®	95.9	2.7	95.7	2.6	88.5	2.2

Although the BioMag process has marginally the lowest WLC, future expansion to treat all flows will not be possible for this option. It is recommended at this stage to consider the Nereda option for further development, as it provides the opportunity to expand the process to full treatment at a later stage within the current site footprint.

Whilst a c.17km long sea outfall completely removes Poole WRC nutrient discharges from Poole Harbour, it has double the costs in terms of WLC when compared with all the other treatment options. The carbon footprint is also extremely substantial.

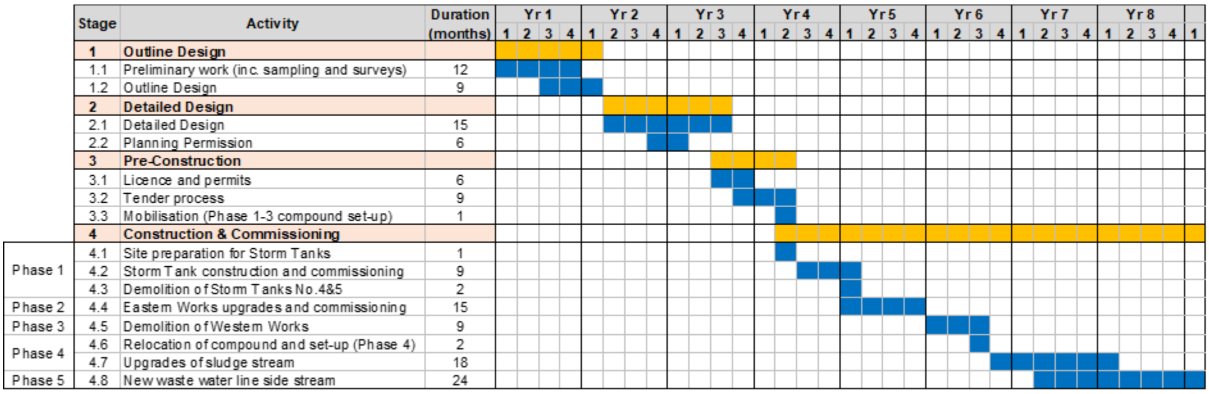
An effluent transfer from Poole WRC to the River Stour via a c.7km pipeline will augment flows in the River Stour, and allow downstream re-abstraction for drinking water use. The partial transfer of flows away from Poole Harbour will also significantly reduce the nutrient load being discharged into the Harbour, however does not entirely remove the need for phosphorus and nitrogen reduction at Poole WRC to meet the required targets. There will also be a requirement for nutrient removal on the discharge into the Stour.

A holistic approach is recommended to ensure the right solution(s) with appropriate permit(s) are progressed for the benefit of customers and the environment. It is recommended that there is targeted nutrient removal at Poole WRC, with any further treatment at the discharge to the River Stour to be more of a polishing nature, which could promote discharging through a nature based solution such as an integrated constructed wetlands.

The conclusion was for a full treatment upgrade at Poole WRC. For further details, please refer to appraisal report itself. It should also be noted that alternative options are continuing to be considered, including expansion and/or relocation of elements of the site outside of the current land ownership boundary. These were outside of the scope of the AMP7 options appraisal. It should also be noted that any financial values above have been copied directly from the appraisal report and have not been updated to reflect subsequent design considerations.

The report highlighted that the existing space on site is too limited to accommodate a new process without demolishing/relocating existing assets, which significantly impacts on the construction sequencing. The figure below shows the high-level programme from the report, listing the sequencing and duration of the main key activities. The programme is provided to give an indication of the scheme length from any start and will need to be developed further once the treatment option design is complete, to account for any construction requirements identified as part of the design.

Figure 22 - High level delivery and construction programme for Poole WRC N&P upgrades



According to the WINEP profiling guidance, the regulatory date for the HD_IMP driver is 31/03/2030. The HD_IMP_NN driver also has a regulatory date of 31/03/2030, being 7 years from when it is assumed the LURB will pass into law. Whilst the WRC already achieves the 10mg/l N permit, upgrades are required for the 0.25mg/l P permit. As can be seen from the above programme, the complexities specifically at Poole WRC mean that, even with any transitional funding in 2023/24 & 2024/25 as per Ofwat's PR24 Final Methodology achieving the 31/03/2030 date for either driver will not be possible. The N&P upgrades will also need to be cognisant of proposed storm overflow improvement works at the WRC associated with the Environment Act Storm Overflow Reduction Plan (also with a 31/03/2030 date). Consideration also needs to be given to any process trials using the final effluent based at the WRC and ultimately the construction of a pumping station as part of the Poole WRC Strategic Resource Option, which involves transferring a proportion of effluent flows to the Dorset Stour, albeit this scheme is not currently due for delivery until AMP9. All these elements will be competing for the same land at the same time, and will require detailed construction sequencing and interface plans to be developed. A further consideration is the potential implications with improvements at Lytchett Minster WRC, where the proposal is for the WRC to transfer flows into the Poole WRC catchment. This option had already been considered when we were considering the implications of the WRC exceeding the UWWTR 10,000 population threshold. During the construction of the HD_IMP and HD_IMP_NN schemes at Poole WRC, however, it is proposed that there will be a slight reduction in treatment load capacity whilst one of the treatment streams is taken offline and demolished as part of the construction sequencing, i.e. Wessex Water will be accepting more compliance risk, to reduce both the cost and duration of the scheme. This reduction in capacity means that Poole will not be able to accept the flows or loads from Lytchett Minster until the upgrades at Poole WRC are complete.

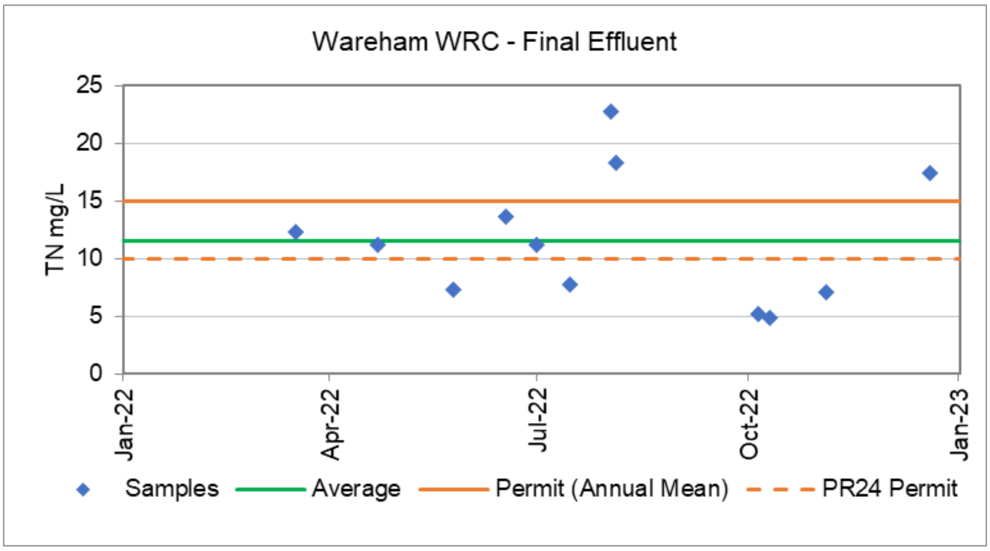
A3-2.8. Wareham WRC

Wareham WRC serves a population equivalent of 12,978, and its current discharge permit is:

Dry Weather Flow (DWF)	2,502 m^3/d
Full Passed Forward (FPF):	102 l/s
BOD	30 mg/l (95%ile)
Suspended Solids	45 mg/l (95%ile)
Ammonia	15 mg/l (95%ile)
Nitrogen	15 mg/l (mean)

The nitrogen permit came into effect in December 2021, and the site has been achieving an average of 11.5mg/l in 2022, as shown in the figure belowFigure 23 - Wareham WRC Nitrogen Performance. The nitrogen permit came into effect in December 2021, and the site has been achieving an average of 11.5mg/l in 2022.

Figure 23 - Wareham WRC Nitrogen Performance



The WRC has only been operating to its current permit for a year with limited samples. Whilst there have been a handful of samples between 5-8mg/l there have also been a number of high readings that push the average up.

It is considered that, through additional methanol dosing and Wessex Water accepting more risk, the new PR24 WINEP permit of 10mg/l could be achieved.

As described in Section 6 of the WSX16 document, the PR24 WINEP includes a Technology/process trials to assess treatment options for nitrogen, as part of a national investigation under the PR24 WINEP WFD_INV_N-Tal driver. We have promoted optimisation of N-removal at Wareham WRC as part of this investigation.

Recognition does, however, need to be made about the upcoming PR24 WINEP P permit at Wareham, and the design will take into consideration whether beyond 10mg/l for N may be required in the future. This may include selecting a phosphorus removal option most suited to overall nutrient reduction that may not be best value / least cost solely for the upcoming P permit.

A3-2.9. Wool WRC

Wool WRC serves a population equivalent of 8,126, and its current discharge permit is:

Dry Weather Flow (DWF)	2,205 m^3/d
Full Passed Forward (FPF):	N/A
BOD	25 mg/l (95%ile)
Suspended Solids	40 mg/l (95%ile)
Ammonia	20 mg/l (95%ile)
Phosphorus	1 mg/l (mean)

The site has no FPF permit and is required to treat all flows.

The WRC receives pumped flows from Bovington, Lulworth, East Burton, Winfrith and Blacknoll. The site was last upgraded in 2005 to treat the increased flow from West Lulworth (related to a Bathing Water Directive driver) and to meet the phosphorus standard for the River Frome.

Figure 24 - Wool WRC Location Plan 1

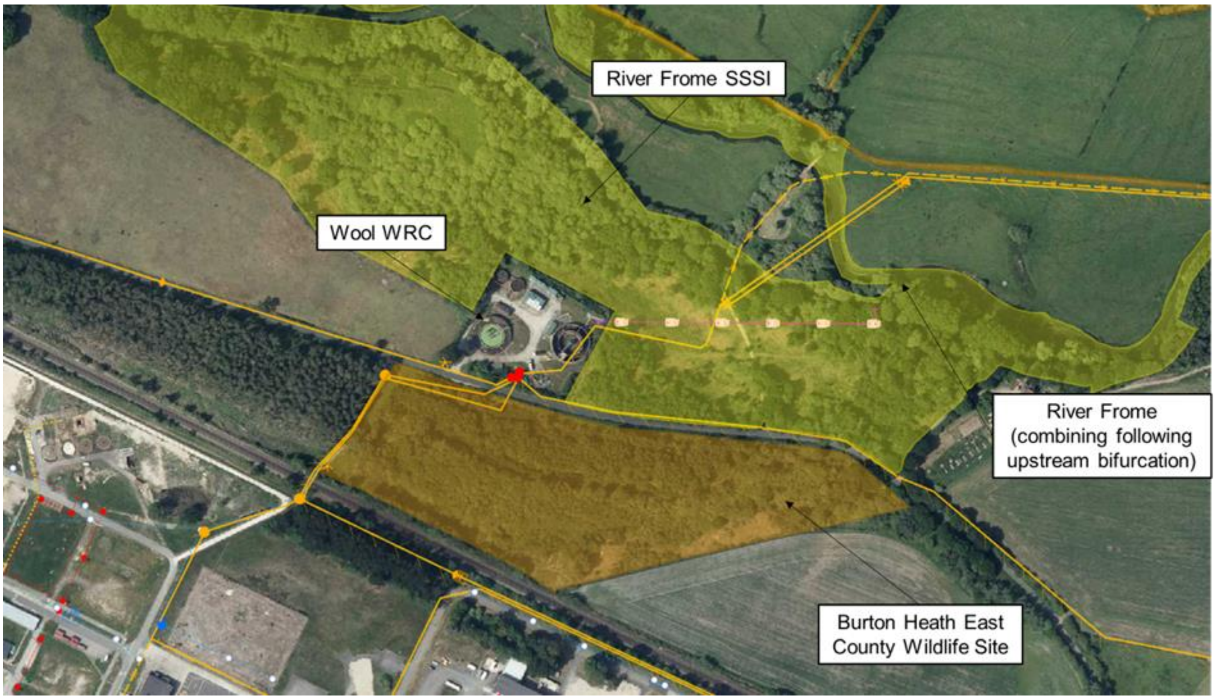
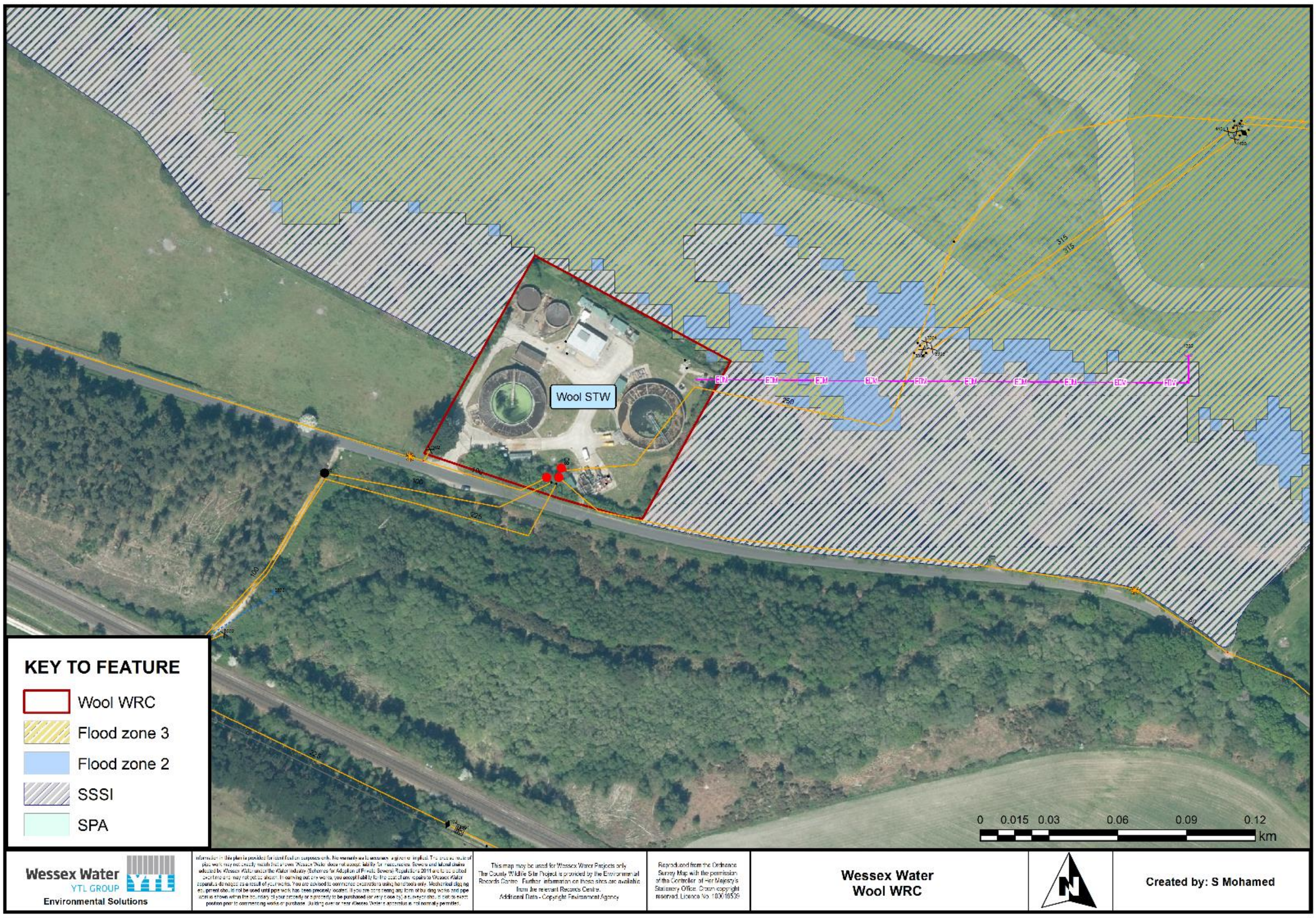


Figure 25 - Wool WRC Location Plan 2



The area of grassland to the immediate west of the site is approximately 4.5Ha, which is too small to accommodate an integrated constructed wetlands to achieve either the upcoming nitrogen or phosphorus permits.

The site currently has two ringed doughnut shaped ASPs, with the outer annulus being the ASP and the inner portion being the FST. These assets perform adequately to meet the site's current permit requirements, however for the PR24 WINEP phosphorus driver they will be significantly overloaded due to the increased flows from the backwash from any tertiary solids removal process.

Treatment Upgrades

The ASPs are reaching the end of their design life and are likely to need replacing within the next 10-15 years. The proposal is thus for a wholesale rebuild of the site, to take advantage of the synergies offered by multiple drivers. It should be noted that in the absence of the N or P driver it is unlikely that these tanks would be replaced in AMP8 under capital maintenance.

The proposed treatment upgrade includes:

- Activated Sludge Plant (ASP)
- Primary settlement tanks
- ASP
- Final settlement tanks
- De-nitrifying sand filters with methanol dosing

- Tertiary solids removal (for P)
- Additional sludge treatment

and associated ancillaries including pumping stations, standby power provision, kiosks etc. as well as land purchase. Similar to Lytchett Minster WRC, a new BNR process is likely to be cost-comparable with a conventional new ASP process over a 30-yr whole life cost.

A3-3. Sanitary

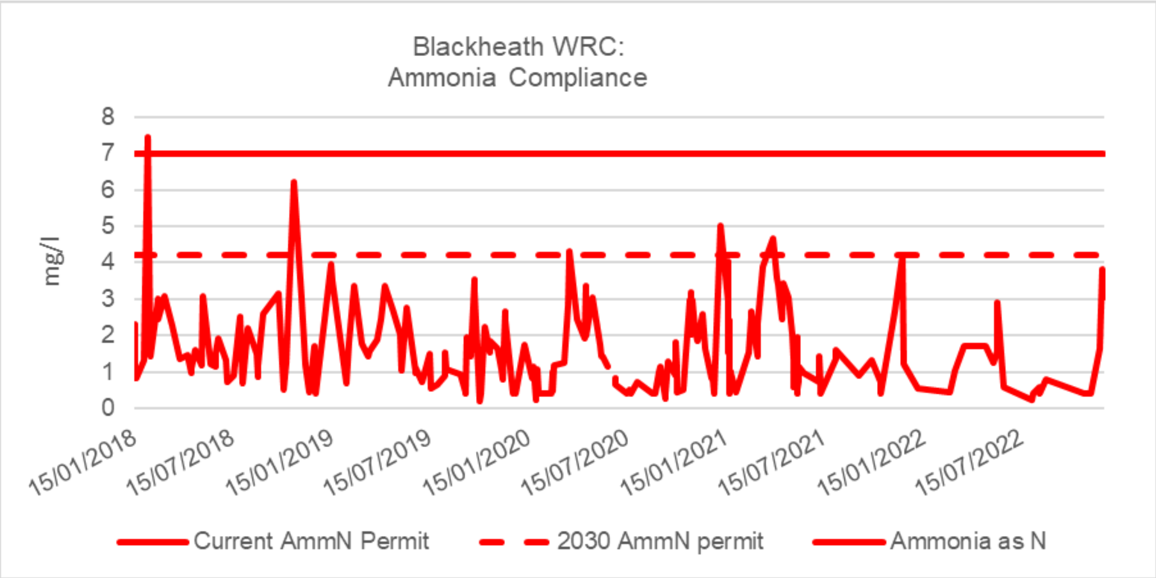
A3-3.1. Blackheath WRC

Blackheath WRC is a conventional trickling filter works serving a population of 6,445.

The WRC is also anticipated to require a Phosphorus and Nitrogen permit (by 2030) through the Levelling-up and Regeneration Bill.

Compliance with future permit limits
Compliance with current ammonia permit limit is very good however it would struggle to consistently meet the future ammonia permit limit as evidenced in the figure below.

Figure 26 - Blackheath WRC Ammonia Compliance



Potential solutions
It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Figure 27 - Blackheath WRC: Proposed treatment upgrades

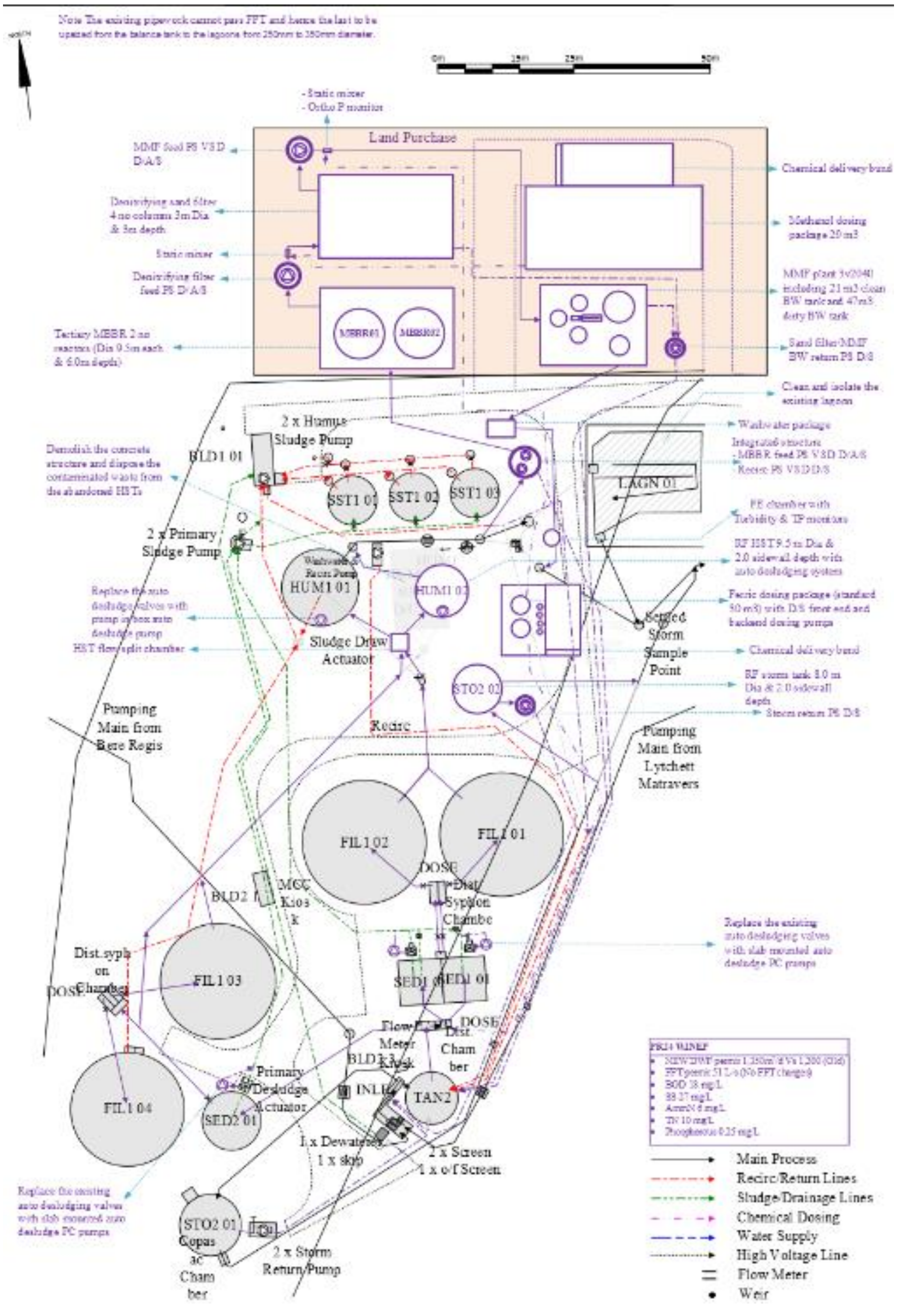


Table 6 - Blackheath WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Refurbishment of existing biofilter distributors may improve performance. Biofilters are generally unsuitable for permits <5mg/l ammonia – Tertiary nitrification may be required.
Tertiary solids removal - Build	No tertiary solids removal currently on site. Additional solids will be produced by the required tertiary nitrification process therefore this may require tertiary solids removal.

A3-3.2. Bowerhill WRC

Bowerhill WRC is an Activated Sludge plant with single point chemical dosing for Phosphorus removal serving a population of 10,556.

The WRC is also anticipated to require a tightening of its phosphorus permit through the Water Framework Directive and Environment Act.

Compliance with future permit limits

Compliance with current permit limits is very good however it would struggle to consistently meet the future ammonia and BOD permit limits as evidenced by the figures below.

Figure 28 - Bowerhill WRC Ammonia compliance

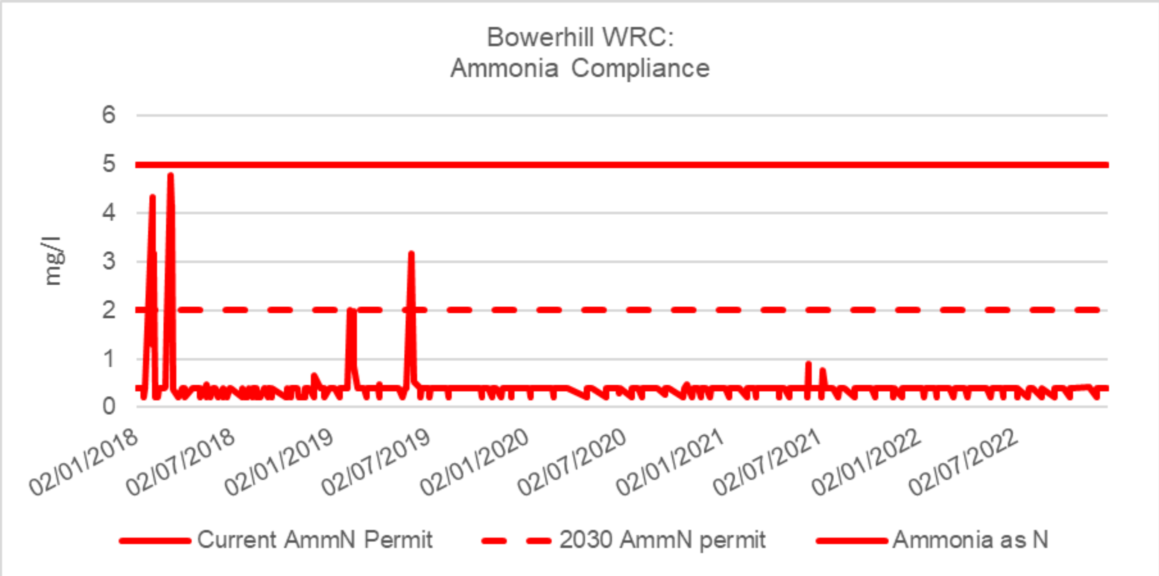
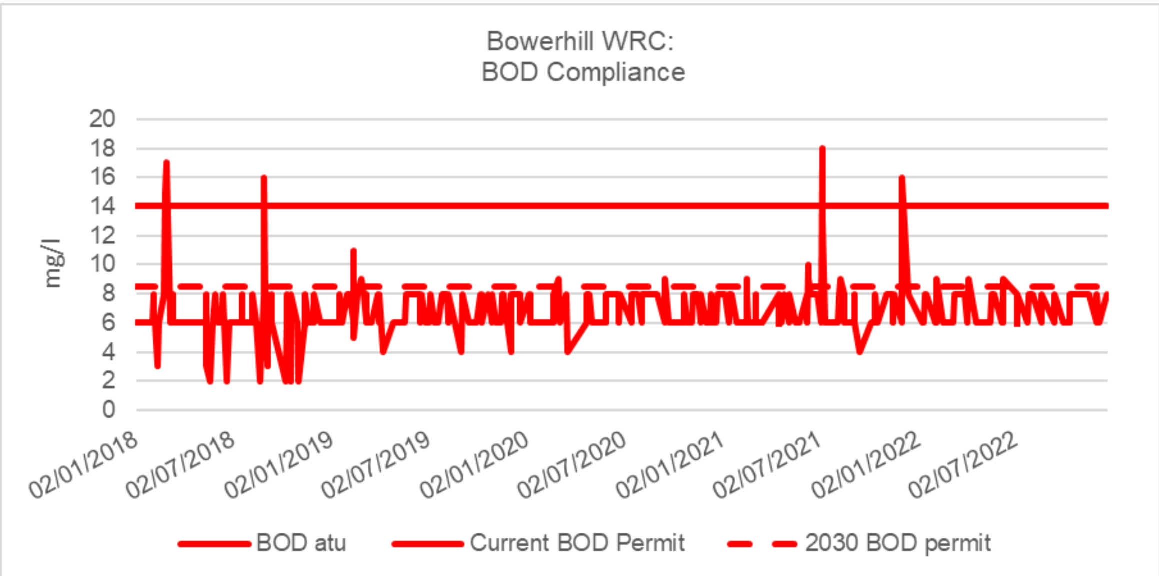


Figure 29 - Bowerhill WRC BOD compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 7 - Bowerhill WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Optimisation of existing activated sludge plant is necessary to ensure improved nitrification. Additional biological treatment capacity maybe required due to increased flows from backwash of Tertiary solids removal required for BOD compliance.
Tertiary Solids removal - build	No current tertiary solids removal on site, this may be required to meet the tightened BOD permit.

A3-3.3. Cannington WRC

Cannington WRC is a conventional trickling works with Ultra-Violet treatment serving a population of 4,469.

The WRC is also anticipated to require phosphorus removal through the Water Framework Directive and Environment Act. It is also anticipated to exceed it's Dry Weather Flow permit by 2050.

Compliance with future permit limits

Compliance with both current and future ammonia and BOD permit limits is very good as evidenced by the figures below. Investment in this WRC is likely to be driven by Dry weather flow exceedances and Phosphorus removal requirements.

Figure 30 - Cannington WRC Ammonia compliance

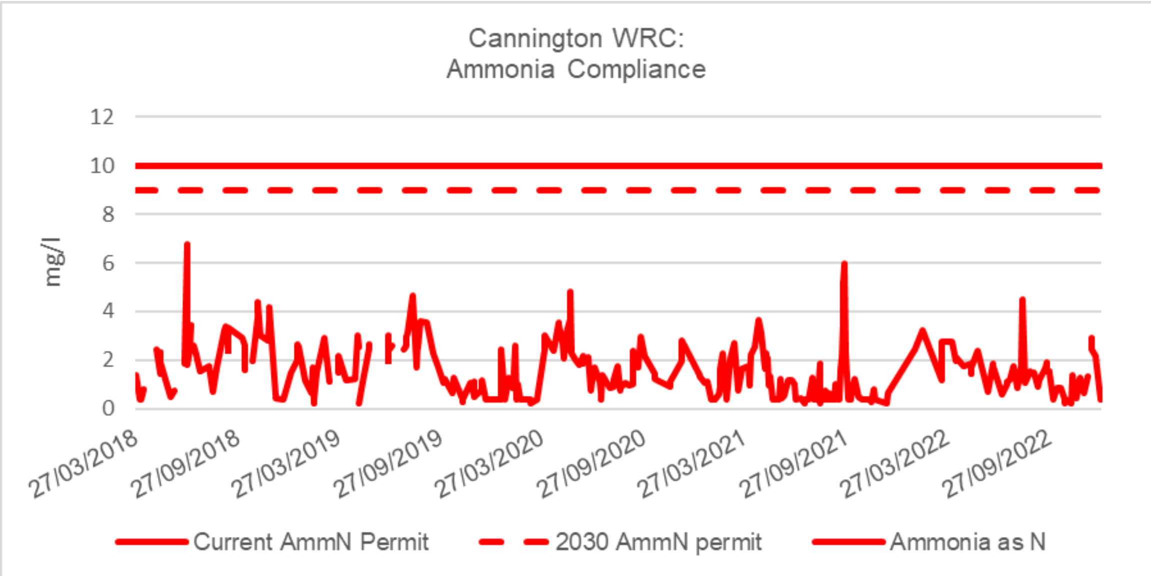
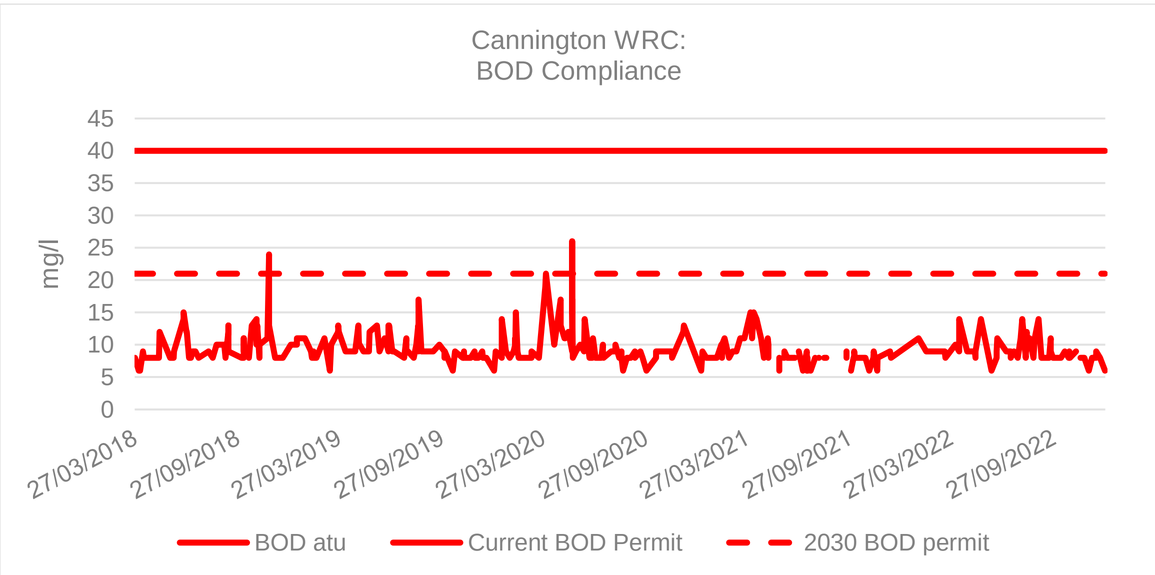


Figure 31 - Cannington WRC BOD compliance



A3-3.4. Devizes WRC

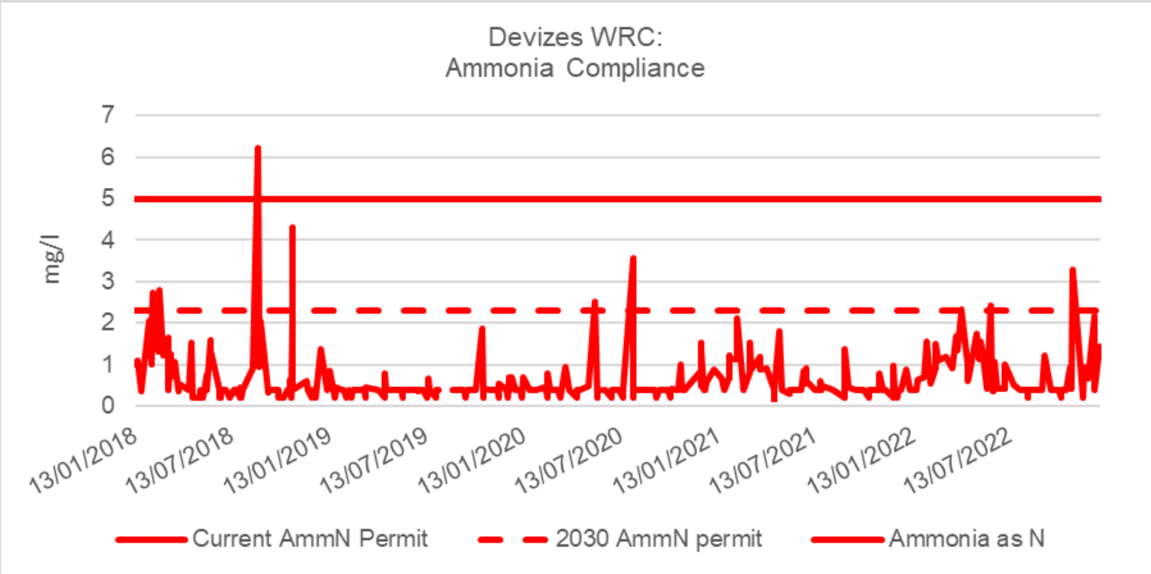
Devizes WRC is a conventional trickling works with single point chemical dosing for Phosphorus removal serving a population of 14,757.

The WRC is also anticipated to require phosphorus removal through the Water Framework Directive and Environment Act. It is also anticipated to require chemical permits for Cypermethrin, dissolved Zinc and dissolved Copper (by 2030).

Compliance with future permit limits

Compliance with current ammonia permit is very good however it would struggle to consistently meet the future ammonia permit as evidenced by the figure below.

Figure 32 - Devizes WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 8 - Devizes WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Biofilters are generally unsuitable for ammonia permits <5mg/l therefore tertiary nitrification may be required.
Tertiary solids removal – optimise and build	Additional solids will be produced by the required tertiary nitrification process this may require additional tertiary solids removal.

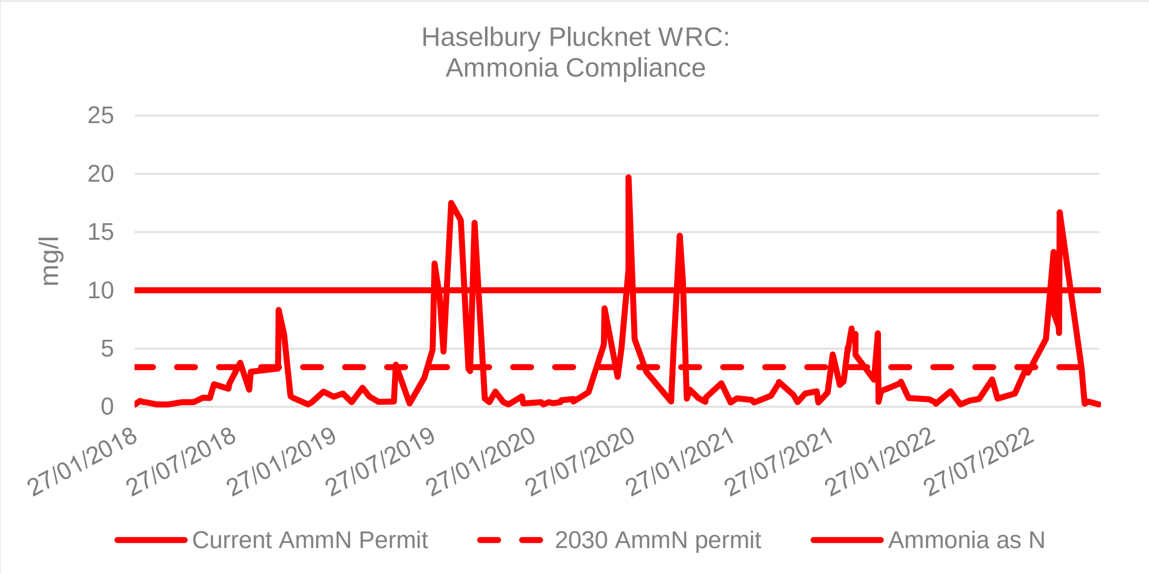
A3-3.5. Haselbury Plucknett WRC

Haselbury Plucknett WRC consists of Primary settlement, Rotating Biological Contactors and Humus settlement, serving a population of 970.

Compliance with future permit limits

Compliance with current ammonia permit limit is very good however it would struggle to consistently meet the future ammonia permit limit as evidenced by the figure below.

Figure 33 - Haselbury Plucknett WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 9 - Haselbury Plucknett WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Biofilters are generally unsuitable for ammonia permits <5mg/l. Tertiary nitrification may be required.
Tertiary solids removal – Build	Additional solids will be produced by the required tertiary nitrification process this may require tertiary solids removal.

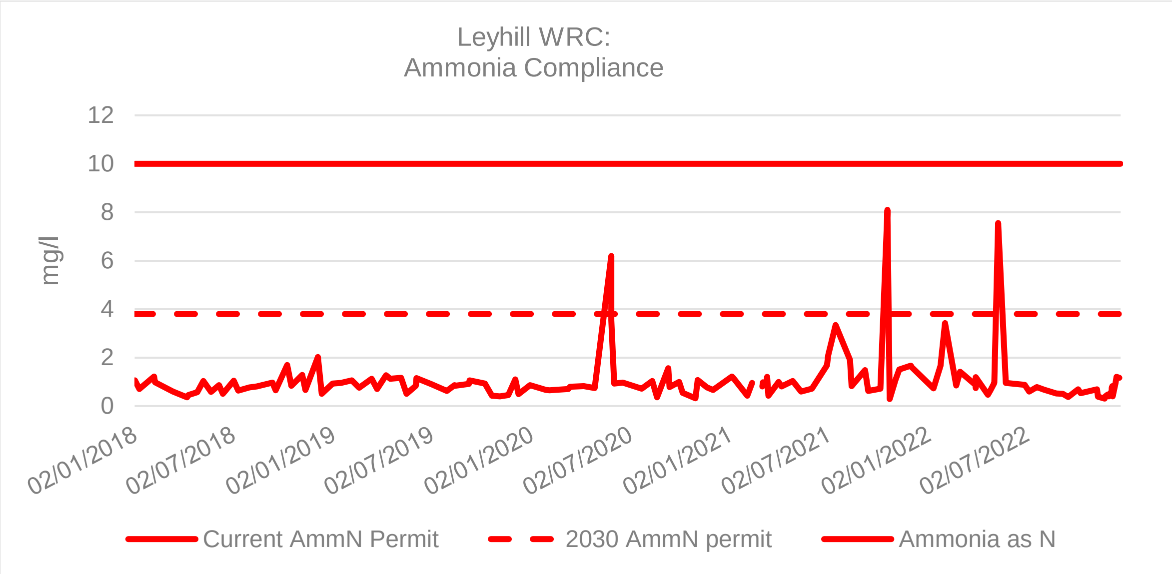
A3-3.6. Leyhill WRC

Leyhill WRC is a conventional trickling filter works with single point chemical dosing for Phosphorus removal, serving a population of 1,326.

Compliance with future permit limits

Compliance with current ammonia permit limit is very good however it would struggle to consistently meet the future ammonia permit limit as evidenced by the figure below.

Figure 34 - Leyhill WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 10 - Leyhill WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Biofilters are generally unsuitable for ammonia permits <5mg/. Tertiary nitrification may be required.
Tertiary solids removal – Build	Additional solids will be produced by the required tertiary nitrification process this may require additional tertiary solids removal.

A3-3.7. North Petherton WRC

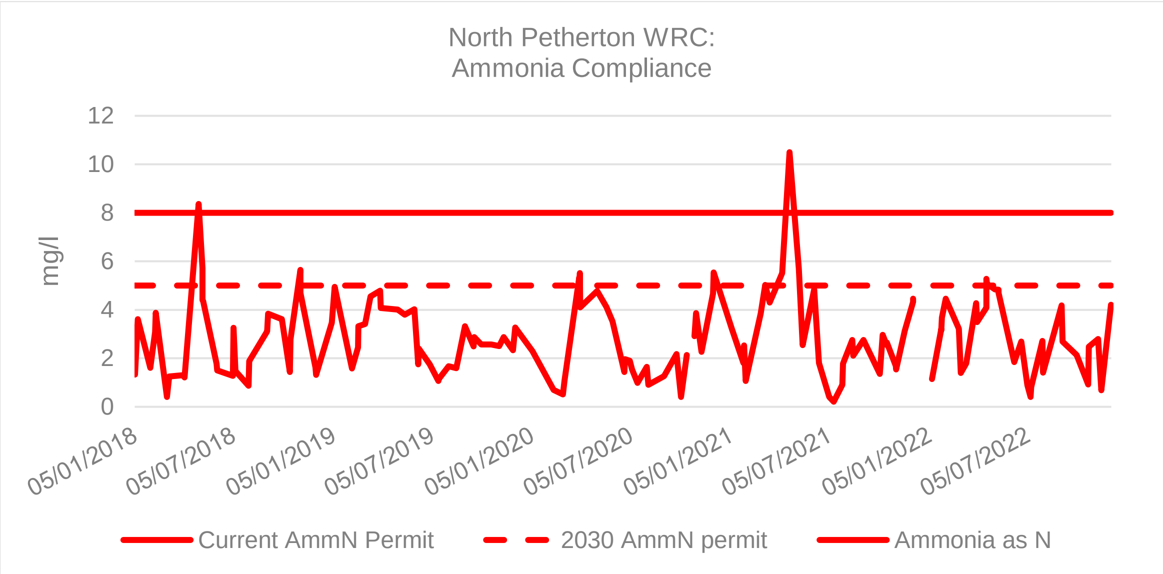
North Petherton WRC is a conventional trickling works serving a population of 4,252.

The WRC is also anticipated to require phosphorus removal through the Water Framework Directive and Environment Act.

Compliance with future permit limits

Compliance with current ammonia permit limit is very good however it would struggle to consistently meet the future ammonia permit limit as evidenced by the figure below.

Figure 35 - North Petherton WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 11 - North Petherton WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Biofilter performance to be optimised. Additional Secondary biological treatment and/or Tertiary nitrification may be required.

A3-3.8. Potterne WRC

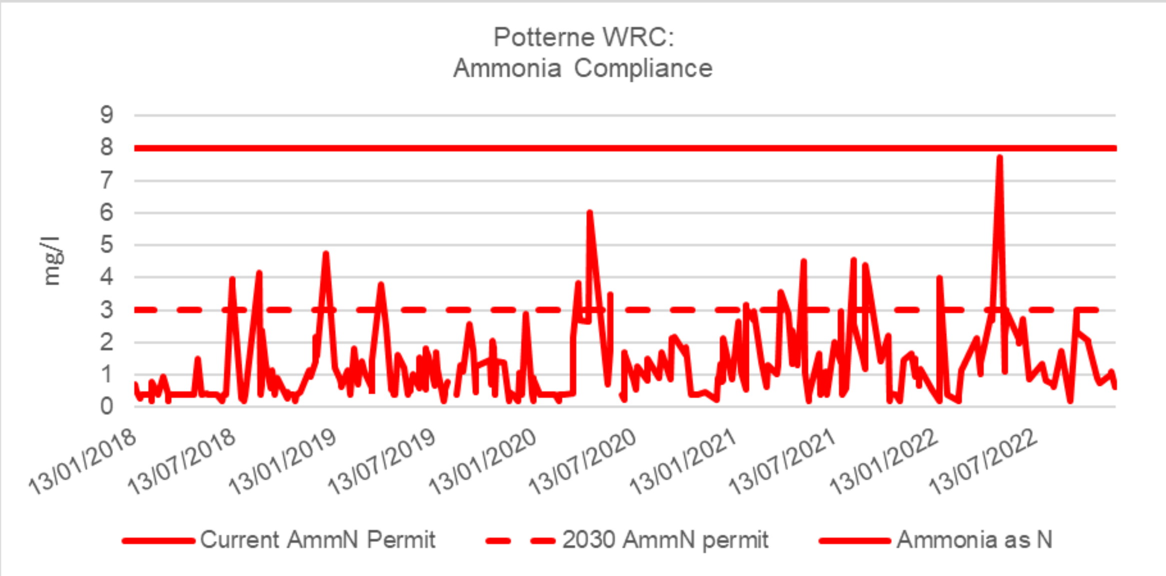
Potterne WRC has two Activated Sludge plants with single point chemical dosing for Phosphorus removal serving a population of 13,366.

The WRC is also anticipated to require a tightening of its phosphorus permit through the Water Framework Directive and Environment Act.

Compliance with future permit limits

Compliance with current ammonia permit limit is very good however it would struggle to consistently meet the future ammonia permit limit as evidenced by the figure below.

Figure 36 - Potterne WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 12 - Potterne WRC: Scope to meet new permit

Assets	Reason
Biological treatment - optimise and build	Optimisation of existing aeration Additional activated sludge plant to allow biomass to be increased to improve nitrification
Secondary Settlement - Build	Additional settlement and sludge handling may be required to accommodate the additional biomass required to improve nitrification

A3-3.9. Ringwood WRC

Ringwood WRC consists of two conventional trickling filter streams with front end dosing for Phosphorus removal serving a population equivalent of 18,640.

The WRC is also anticipated to require a tightening of its phosphorus permit through the Levelling Up and Regeneration Bill and Environment Act.

Compliance with future permit limits

Whilst the site has very good compliance with the current limits it would struggle to meet the new sanitary parameter limits as evidenced by the figures below.

Figure 37 - Ringwood WRC: Ammonia compliance

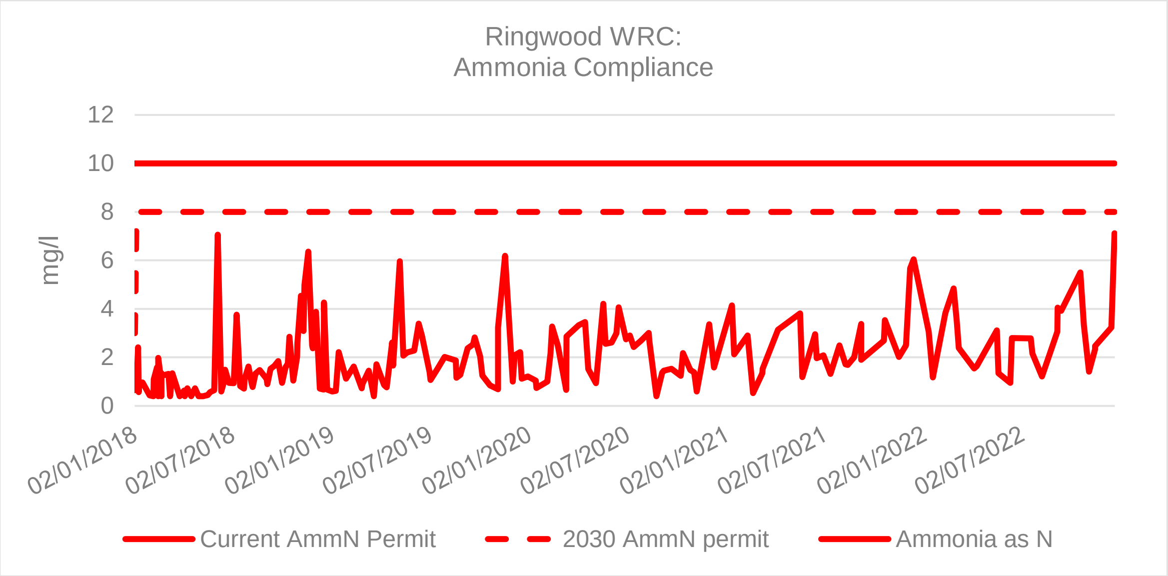
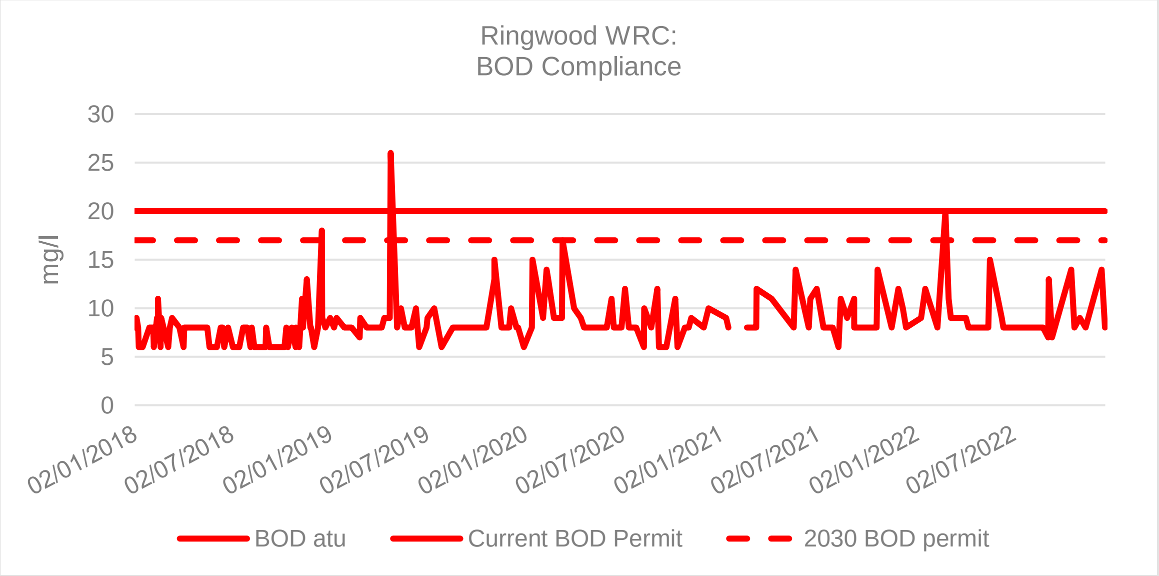


Figure 38 - Ringwood WRC: BOD compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Figure 39 - Ringwood WRC: Proposed treatment upgrades

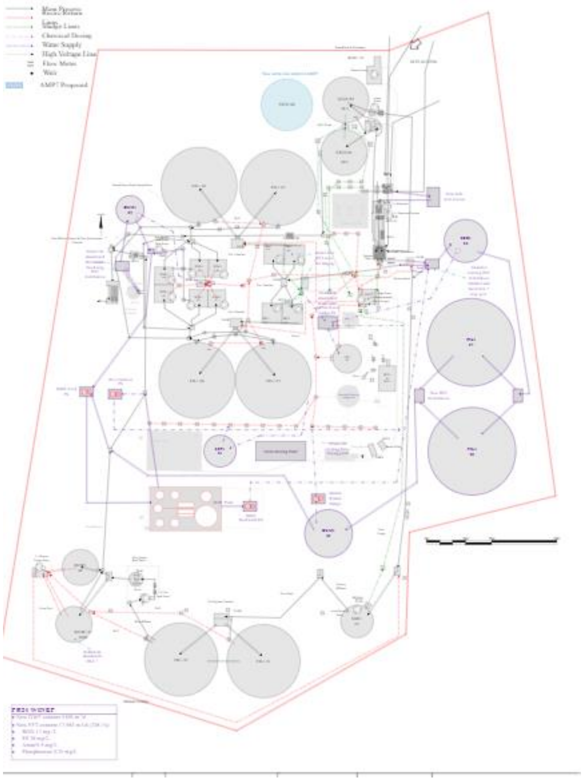


Table 13 – Ringwood WRC: Scope items to meet new permit

Assets	Reason
Primary settlement tanks – optimise and build	Stream 1 has upward flow square tanks which are known to be less effective and more difficult to maintain. Reduce flow to this stream and build new radial flow tank on stream 2
Biological treatment - optimise and build	Reducing flows to stream 1 enables it to be complaint enabling additional capacity only required for stream 2.
Secondary settlement - optimise and refurbish/build	Stream 1 has upward flow square tanks which are known to be less effective and more difficult to maintain. Reduce flow to this stream. Build new or refurbish abandoned settlement tank to accommodate increases flow to stream 2

A3-3.10. Royal Wootton Bassett WRC

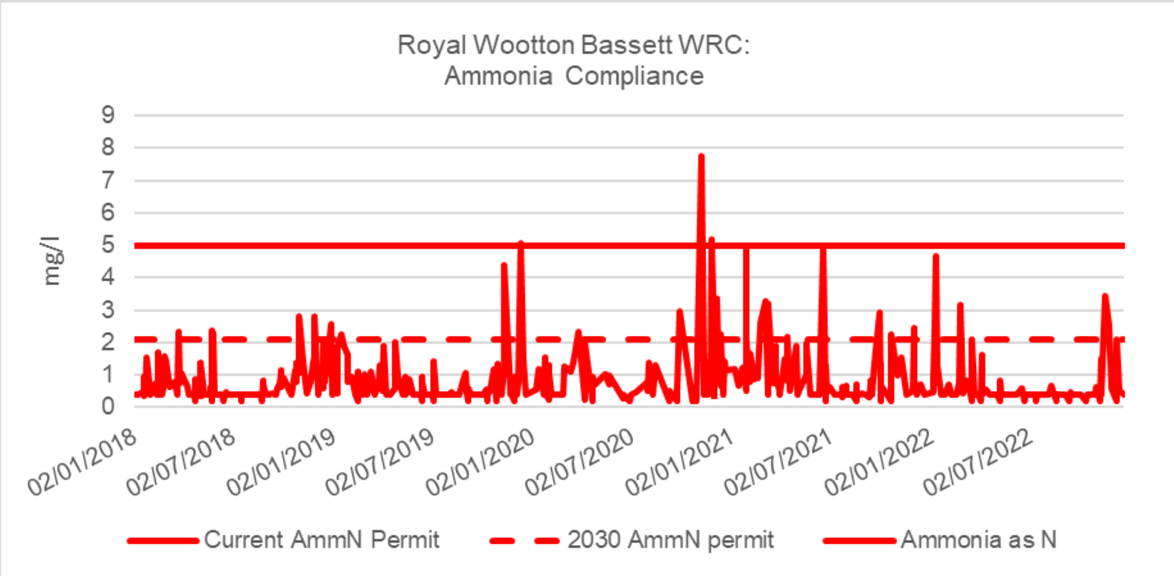
Royal Wootton Bassett WRC consists a conventional trickling filter stream, Tertiary Aerated Sand Filters and two point chemical dosing for Phosphorus removal, serving a population equivalent of 14,531.

The WRC is also anticipated to require a tightening of its phosphorus permit through the Water Framework Directive and Environment Act. It is also anticipated to require chemical permits for Cypermethrin (by 2030)

Compliance with future permit limits

Compliance with current ammonia permit limit is very good however it would struggle to consistently meet the future ammonia permit limit as evidenced by the figure below.

Figure 40 - Royal Wootton Bassett WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 14 – Royal Wootton Bassett WRC: Scope items to meet new permit.

Assets	Reason
Biological treatment – optimise and build	Optimisation of existing Tertiary aerated sand filters Additional Tertiary aerated sand filters or Tertiary Moving Bed Biofilm Reactor to improve nitrification.

A3-3.11. South Perrott WRC

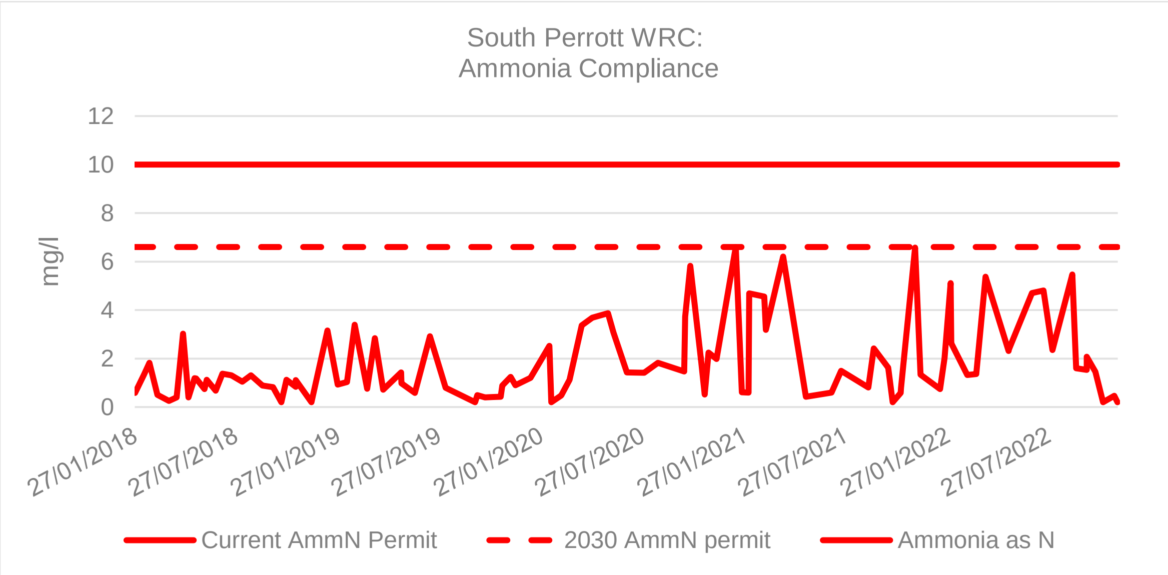
South Perrott WRC is a conventional trickling works serving a population of 853.

The WRC could also be required to have phosphorus removal through the Environment Act.

Compliance with future permit limits

Compliance with current ammonia permit limit is very good however it would struggle to consistently meet the future ammonia permit limit as evidenced by the figure below.

Figure 41 - South Perrott WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 15 – South Perrott WRC: Scope items to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Optimisation of existing biofilters to improve nitrification. Additional biological treatment may be required if this is insufficient to meet new permit.

A3-3.12. South Petherton WRC

South Petherton WRC is a conventional trickling works with single point chemical dosing for Phosphorus removal serving a population of 6,390.

The WRC is also anticipated to require a tightening of its phosphorus permit through the Levelling Up and Regeneration Bill and Environment Act.

Compliance with future permit limits

Compliance with current permit limits is very good however it would struggle to consistently meet the future permit as evidenced by the figures below.

Figure 42 - South Petherton WRC Ammonia compliance

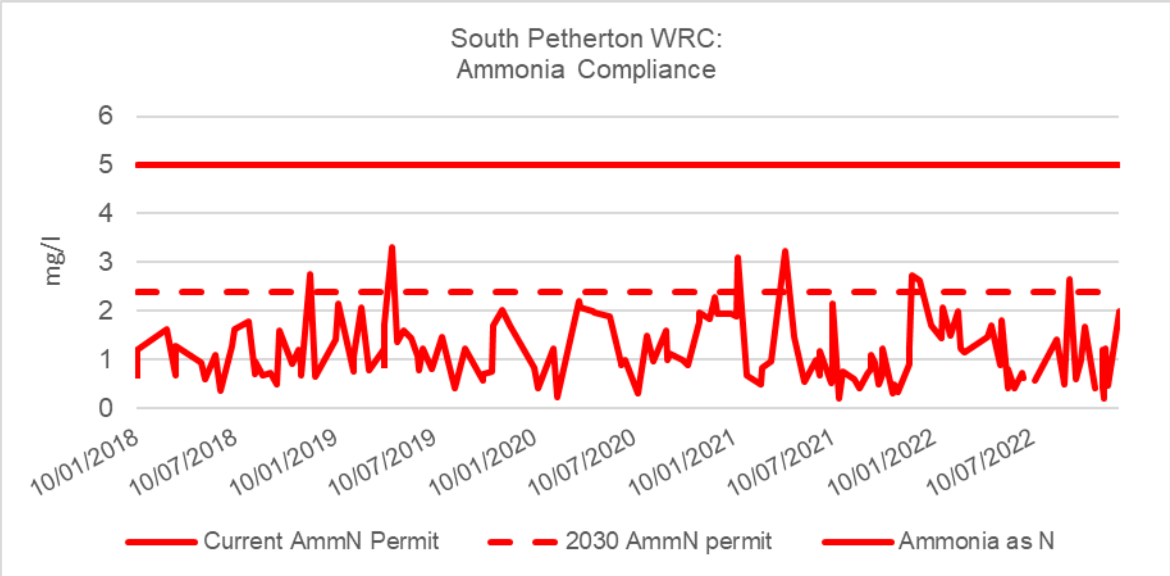
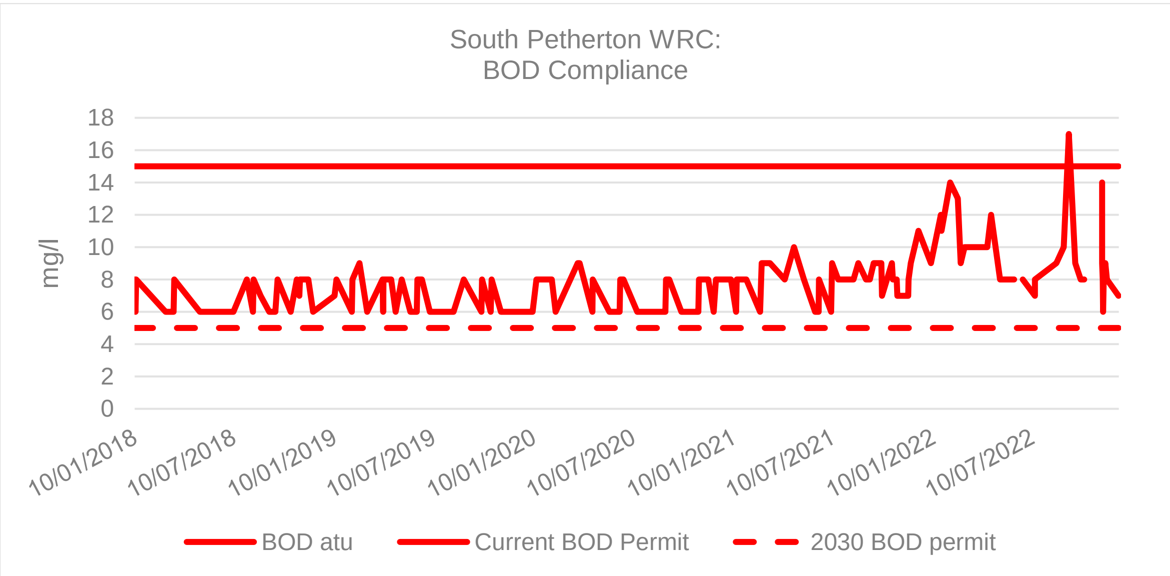


Figure 43 - South Petherton WRC BOD compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 16- South Petherton WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Biofilters are generally unsuitable for ammonia permits <5mg/l. Tertiary nitrification may be required.
Tertiary solids removal – Build	Tertiary solids removal will be required to achieve the tighter BOD permit limit.

A3-3.13. Sparkford WRC

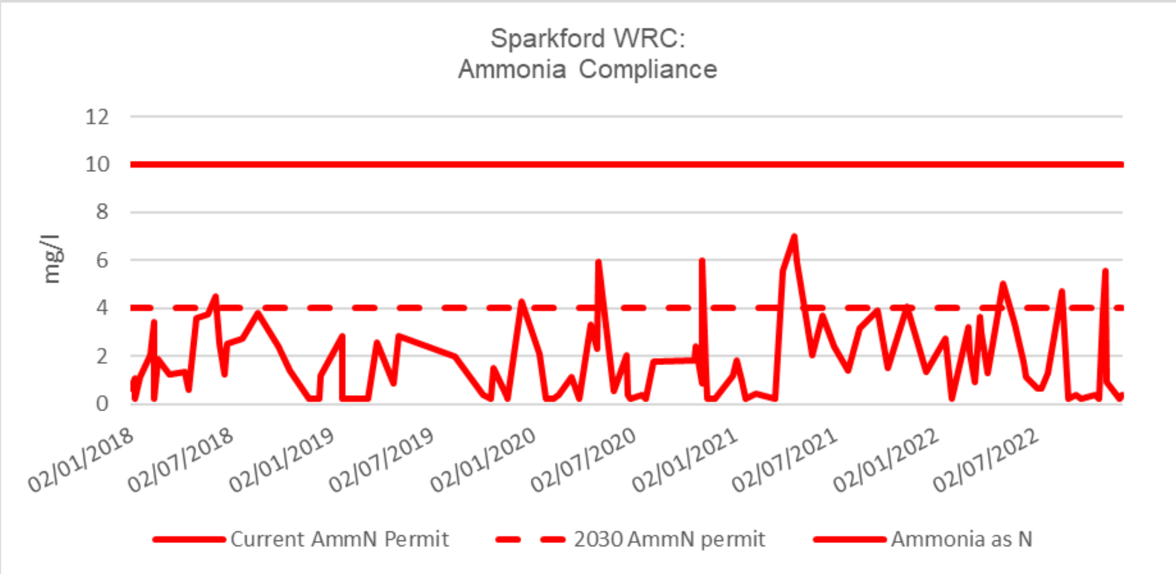
Sparkford WRC is a conventional trickling works with single point chemical dosing for Phosphorus removal, serving a population of 1,938.

Having been upgraded for phosphorus removal in AMP6, with tightening again in AMP7 and a stretch target in AMP8, the WRC is just below the population threshold requiring further improvements through the Levelling Up and Regeneration Bill, potentially requiring further phosphorus removal in AMP9.

Compliance with future permit limits

Compliance with current ammonia permit is very good however it would struggle to consistently meet the future ammonia permit as evidenced by the figure below.

Figure 44 - Sparkford WRC Ammonia compliance



Potential solutions

It should be noted that full scope has not been reviewed for this site, however, based on historical process loading calculation and other sites, the high-level scope for enhanced treatment capacity is likely to be:

Table 17 - Sparkford WRC: Scope to meet new permit.

Assets	Reason
Biological treatment - optimise and build	Biofilters are generally unsuitable for ammonia permits <5mg/l. Tertiary nitrification may be required.
Tertiary solids removal – Build	Additional solids will be produced by the required tertiary nitrification process this may require additional tertiary solids removal.

A3-4. Septic Tanks

A3-4.1. Ashwicke (Oakford Lane) WRC

Ashwicke (Oakford Lane) WRC is a septic tank located in the Bristol Avon catchment. This septic tank serves a population equivalent of 7 and currently there is no secondary treatment at the site. Under the U_IMP7 driver all septic tanks that discharge directly to surface water must be replaced/upgraded in order to treat the effluent before it is discharged.

Transfer

The most viable transfer option is to the Saltford catchment, around 1.5km south of Ashwicke WRC. Saltford WRC serves a population equivalent of around 125,000 so the addition of the flows from Ashwicke would require no upgrade at Saltford WRC. The elevation profile between the two is favourable as the majority of the route would be downhill, however due to the distance between the two and the minimal amount of flow at Ashwicke, septicity would be an issue.

Treatment Option (Green)

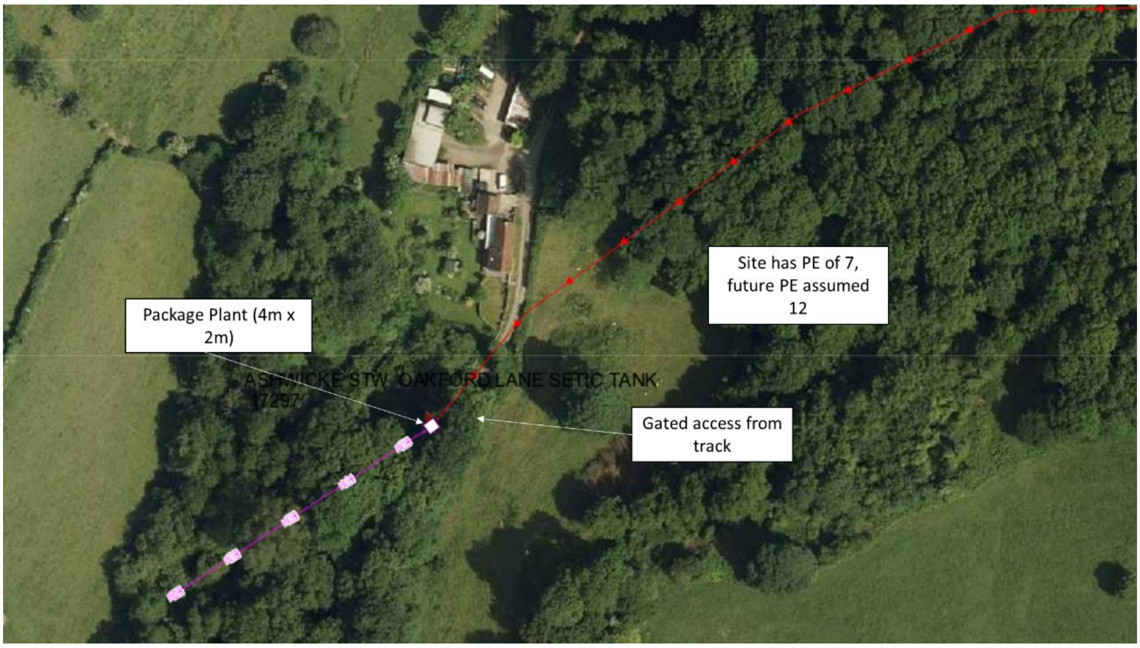
A reed bed was considered as a green treatment option for Ashwicke WRC, however this option was discounted due to the land profile. The figure below shows the sharpness of the gradient either side of the track, and any reed bed would require a lot of groundwork and upgrading of the access track the site is located on.

Figure 45 - Land profile at Ashwicke WRC

Treatment Option (Grey)

For the grey asset solution, a package plant was reviewed due to the small scale of the works. A future design horizon (20 year) of 12 PE was used to allow for future growth in the catchment. The figure below shows the proposed new layout of the site - the current septic tank would be replaced with a package plant. A size of 4m by 2m was selected in line with the size of flow at this site. The building of a package plant would require land purchase.

Figure 46 - Proposed Ashwicke (Oakford Lane) WRC site layout

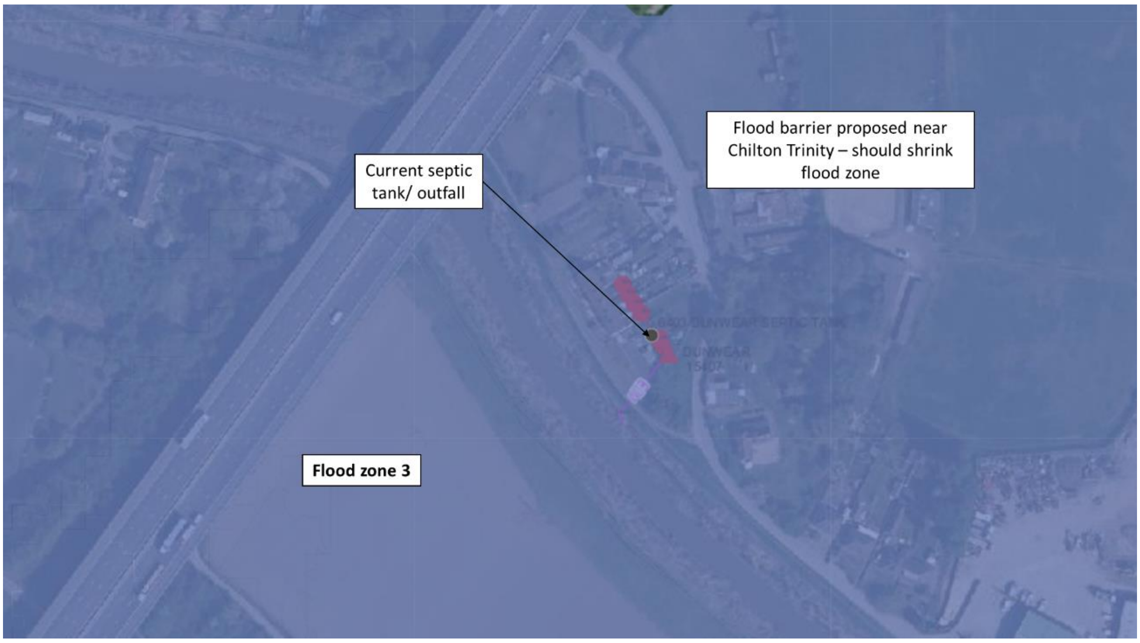


A3-4.2. Dunwear WRC

Dunwear WRC is a septic tank located in the Parrett catchment. This septic tank serves a population equivalent of 14 and currently there is no secondary treatment at the site. Under the U_IMP7 driver all septic tanks that discharge directly to surface water must be replaced/upgraded in order to treat the effluent before it is discharged.

Dunwear WRC is currently located within a flood zone 3 which may hinder construction slightly. However, a flood barrier is to be built on the river Parrett upstream, reducing the size of the flood zone with work reportedly commencing in early 2023.

Figure 47 - Bridgwater flood zone



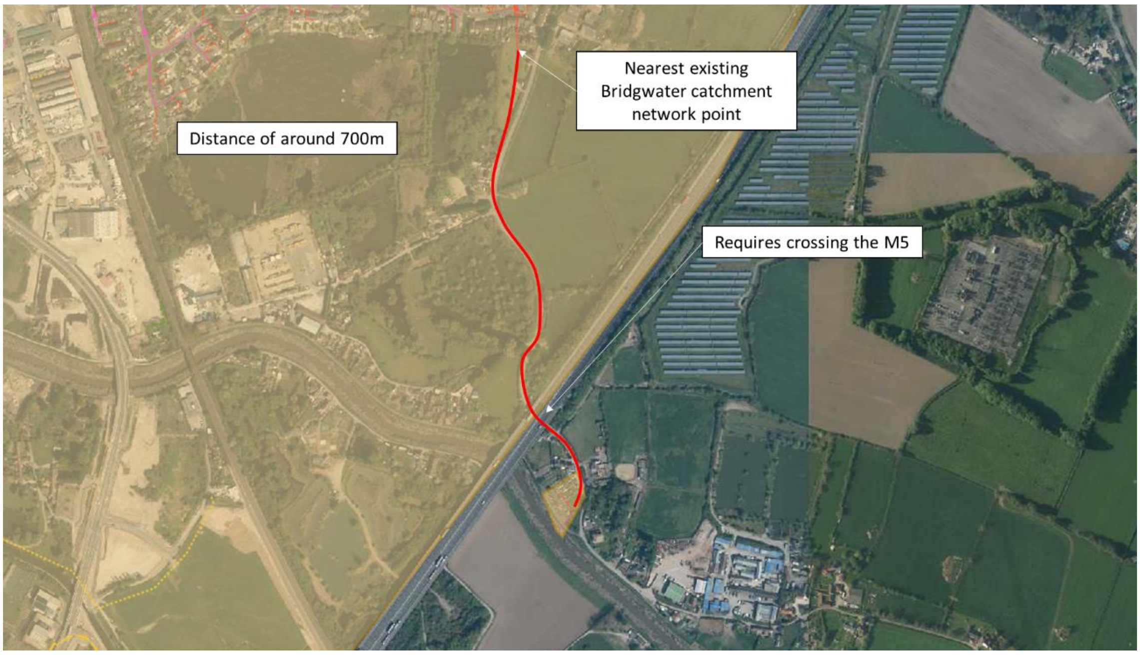
Environment Agency Flood Zones:

- Zone 3 – High Probability – Land having a 1 in 100 or greater annual probability of flooding
- Zone 2 – Medium Probability – Land having between a 1 in 100 and 1 in 1,000 annual probabilities of flooding

Transfer

The nearest catchment is Bridgwater (population equivalent of around 86,000), and the nearest network in this catchment is 700m away. The figure below shows the proposed route to this catchment.

Figure 48 - Transfer route to Bridgwater catchment



The route requires bypassing the M5, and this would significantly increase the cost associated with the transfer. In addition to this there are several overhead cables that will further add to the cost.

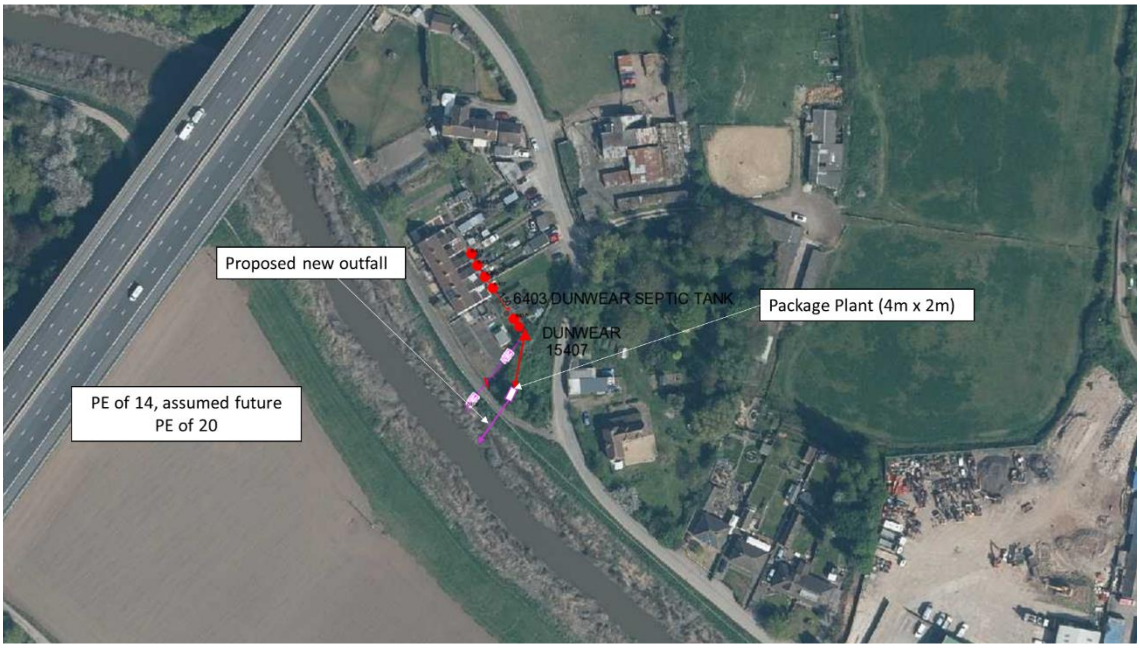
Treatment Option (Green)

A reed bed was considered as a green treatment option, however due to the lack of available land to build on nearby it was deemed unfeasible as a method of treatment. Internal Wessex Water design standards state for a population equivalent of 14, a 75m^2 reed bed is required.

Treatment Option (Grey)

For the grey asset solution, a package plant was selected for review due to the small scale of the works. A future design horizon (20 year) of 20 PE was used to allow for future growth in the catchment. The following figure shows the proposed new layout of the site – a size of 4m by 2m was selected in line with the size of flow at this site when factoring in the future 20-year design horizon. In order to build here, the land would need to be purchased.

Figure 49 - Proposed layout for Dunwear WRC



A3-4.3. Lottisham (Fir Cottages) WRC

Lottisham (Fir Cottages) WRC is a septic tank located in the Brue Axe catchment. This septic tank serves a population equivalent of 10 and currently there is no secondary treatment at the site. Under the U_IMP7 driver all septic tanks that discharge directly to surface water must be replaced/upgraded in order to treat the effluent before it is discharged.

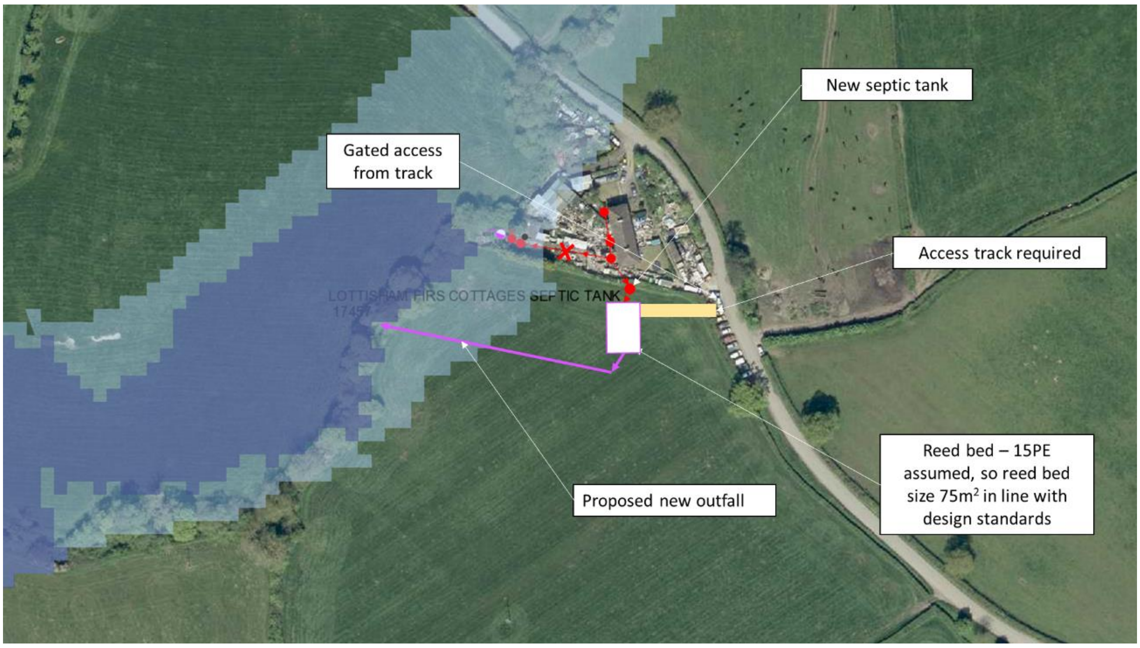
Transfer

The nearest catchment is Parbrook, which is 2.7km away. The distance between the two is too great to warrant a transfer option – septicity would be an issue.

Treatment Option (Green)

A reed bed was considered as a green treatment solution in place of the septic tank. A future design horizon (20 year) of 15 PE was used for design to account for future growth within the catchment and in line with design standards a size of 75m^2 is required. The figure below shows the proposed layout;

Figure 50 - Proposed layout at Lottisham WRC



Environment Agency Flood Zones:

Zone 3 – High Probability – Land having a 1 in 100 or greater annual probability of flooding

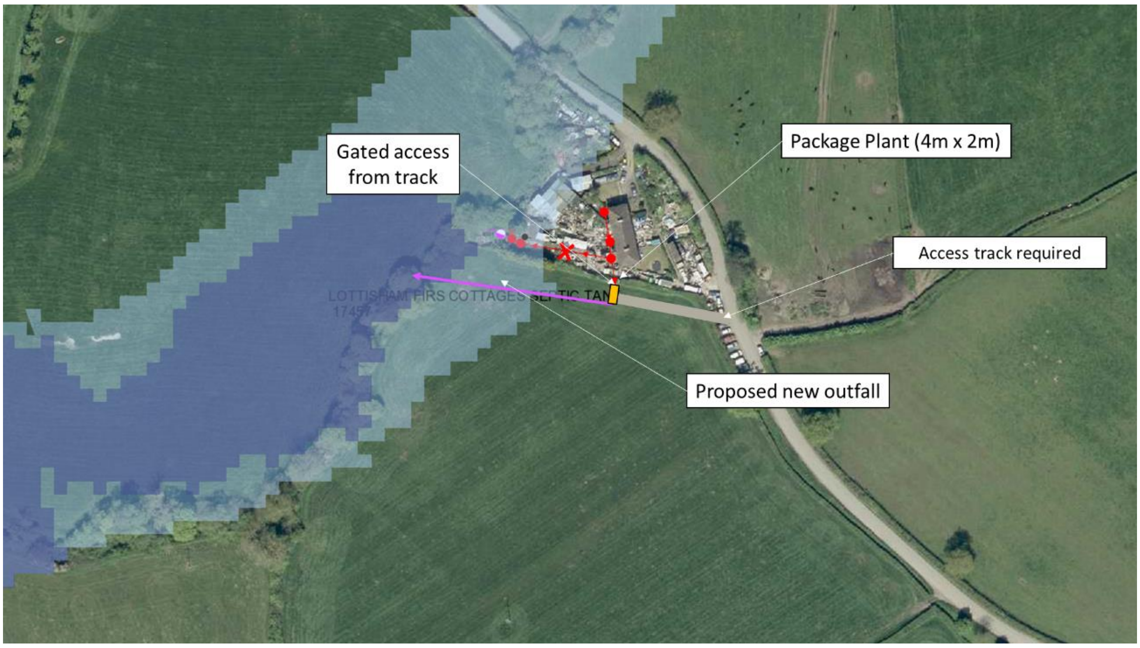
Zone 2 – Medium Probability – Land having between a 1 in 100 and 1 in 1,000 annual probability of flooding

Land purchase and an access track would be required. A new outfall pipe would also be needed.

<u>Grey</u>

For the grey asset solution, a package plant was selected for review due to the small scale of the works. A future design horizon of 15 PE was used to allow for future growth in the catchment. Similar to the green solution, an access track and land purchase would be required. The figure below shows the proposed layout.

Figure 51 - Proposed layout for grey solution at Lottisham WRC



Environment Agency Flood Zones:

- Zone 3 – High Probability – Land having a 1 in 100 or greater annual probability of flooding
- Zone 2 – Medium Probability – Land having between a 1 in 100 and 1 in 1,000 annual probability of flooding

A high-level costing review has shown that both the green and grey solution would be comparative in cost, however with sustainability at the forefront of the business's interests, the green option would be most favourable.

A3-5. Discharge Relocations

A3-5.1. Ratfyn WRC

Need for Investment

The Hampshire Avon is designated as a Special Area of Conservation (SAC). This high level of environment designation comes with stringent flow and quality standards, as defined by the Common Standards Monitoring Guidance. Regarding flow, abstraction cannot reduce flow by more than 10% of the natural flow at times of low flow.

Regulatory Drivers

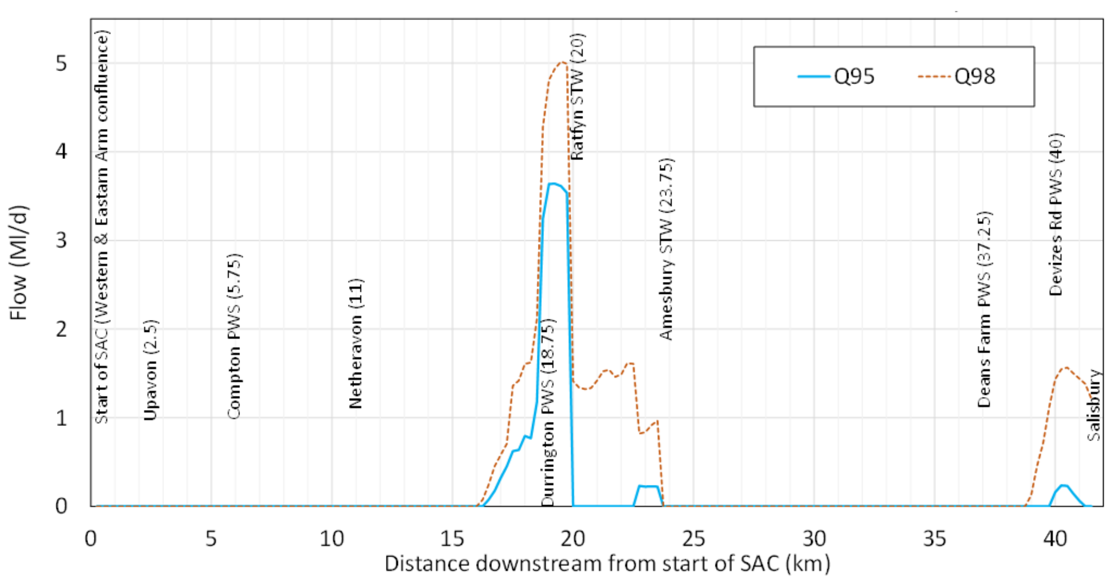
The WFD_IMP_WRFlow driver is a requirement for good ecological status within the waterbody. Abstraction at Durrington Water Treatment Centre (WTC) is currently causing flows to drop below the permitted 10% limit and therefore negatively affecting the ecological status between Durrington WTC and the continuous discharge from Ratfyn Water Recycling Centre (WRC).

In order to satisfy the requirements of the Water Framework Directive development is required to increase flows in order to maintain an acceptable ecological status.

Options Development - Augmenting Flows

In regard to flow, abstraction cannot reduce river flow by more than 10% at times of low flow (i.e Q98). Under full licence use the in-combination effect of all abstractions exceed the 10% limit at Q98. The greatest impact is downstream of Durrington WTC, where an extra 5.02 Ml/d of flow (at Q98) is required to ensure compliance.

Figure 52 - Extra flow needed to show compliance at full licence run 560



Whilst the major abstractor in the area, it should be noted that other abstractions contribute to the non-compliance within the wider Hampshire Avon, as follows:

- WW 3.73 Ml/d
- Veolia 0.82 Ml/d
- MOD 0.47 Ml/d

The degree of non-compliance is significantly reduced by the Ratfyn WRC final effluent discharge, and further reduced by the Amesbury WRC discharge to the Avon

To ensure flow compliance along the SSSI reach of the Avon (Western Arm) further upstream abstraction reductions are needed at Bishops Cannings and Bourton, these reductions add an extra 1.52 Ml/d of flow to the river at Q98. This effectively makes flow along the River Avon SAC reach compliance except between Durrington and Ratfyn, where 3.5 Ml/d of flow is required to ensure compliance.

The Ratfyn WRC effluent discharge is ~3.5Ml/d, as shown in Table 18the table below, thus relocating the discharge upstream of the Durrington abstraction would compensate for the Durrington impact.

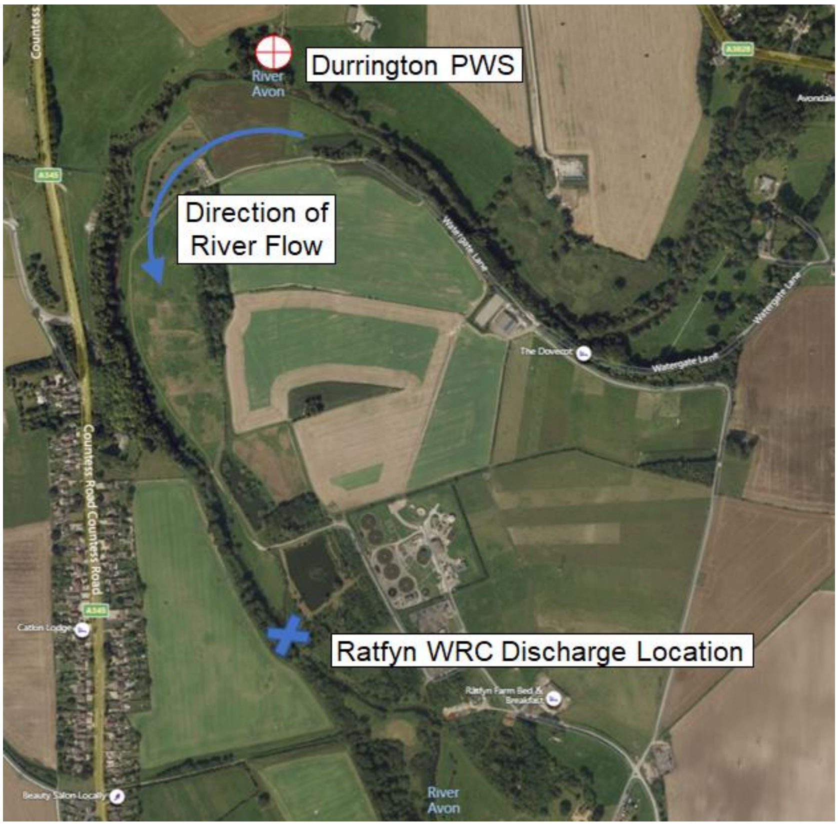
Table 18 - Ratfyn WRC's Average Daily Flows

	Average Daily Flows (m^3/d)				
		Summer Period (when low river flows)			
	Jan-Dec	Jun	July	Aug	Sept
2017	3,017	2,813	2,933	2,758	2,957
2018	3,466	3,117	2,963	2,857	3,174
2019	3,924	3,637	3,529	3,393	3,805
2020	4,469	3,981	3,887	3,837	3,990
2021	4,313	4,183	4,022	3,717	3,843
2017-2021	3,837	3,549	3,460	3,312	3,312

Solution (Discharge Relocation)

The comparative location between Durrington PWS and Ratfyn WRC is shown the figure below. The distance along the river between the sites is 1.2km.

Figure 53 - Location of Ratfyn WRC in relationship to Durrington PWS



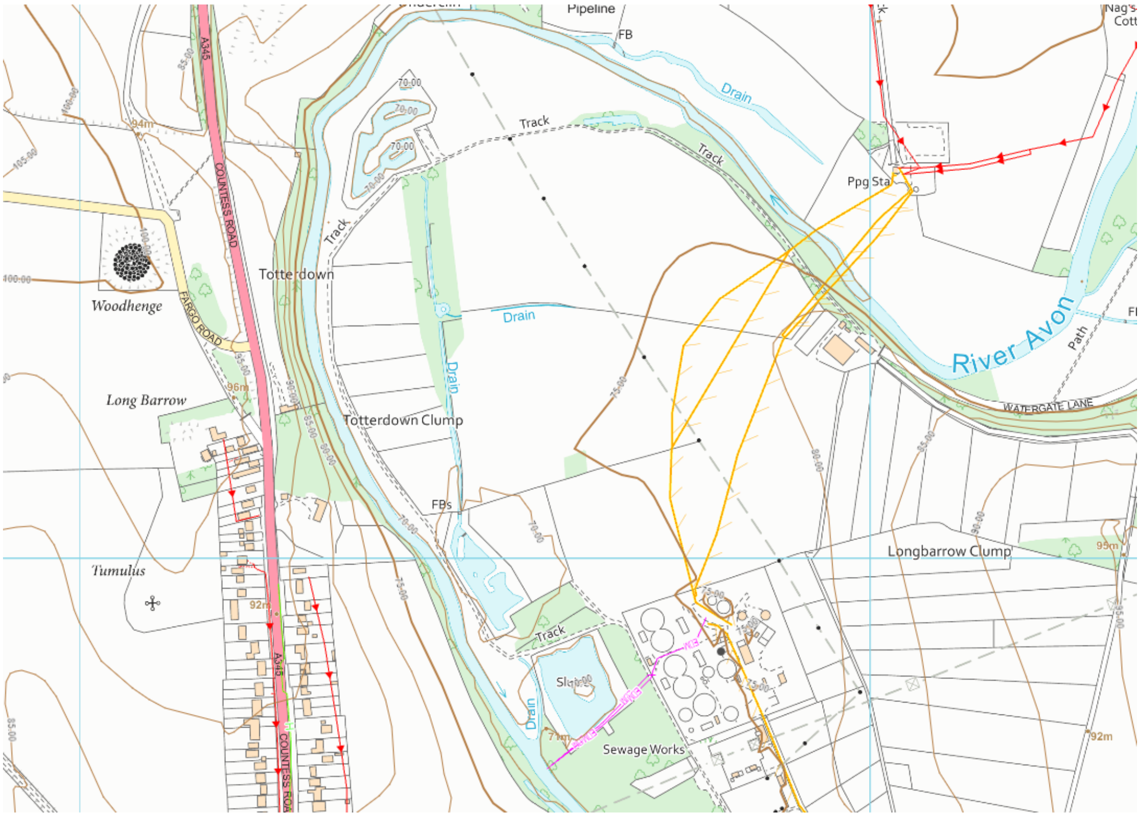
Consideration has been given to various points of discharge upstream of the Durrington WTC abstraction location.

We recently installed a new sewerage rising main to the site and, as such, are acutely aware of various ecological/environmental as well as third party issues that may arise when undertaking this project, including:

- Soil born virus in the fields to the north of the WRC
- Badger setts near the riverbank
- Established trees along portion of riverbank
- Nearby salmon fishing club, and also fishing in the main Avon
- Farmer who has a difficult relationship with Wessex Water

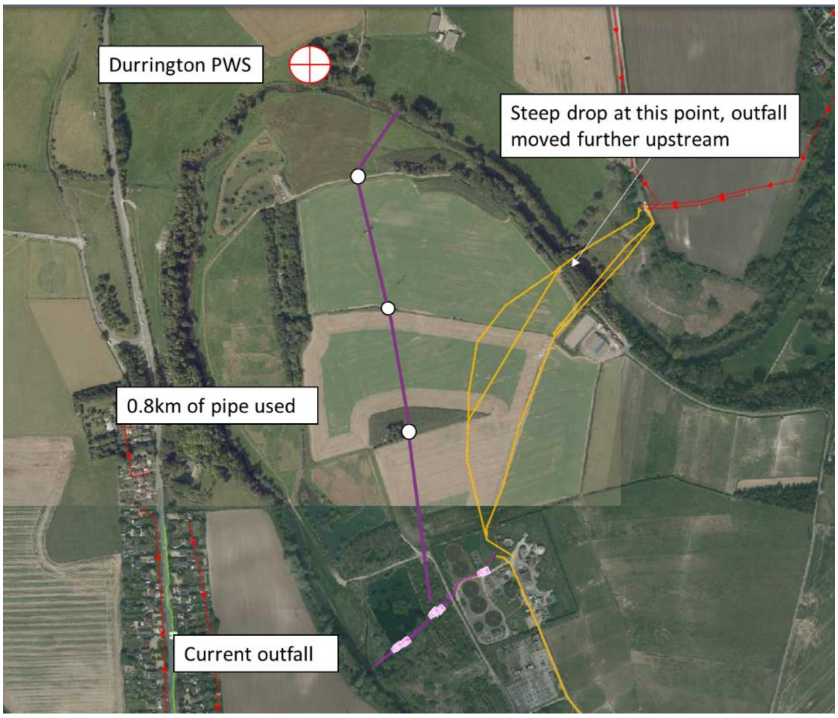
The following figure shows the contour at the site, and the elevation profile at the site. To try and maximise efficiency and minimise the need for pumping, the route has been picked to be mostly downhill.

Figure 54 - Contour profile at Ratfyn WRC



The following figure shows the proposed pipeline to keep disturbances at Ratfyn WRC to a minimum. Proposed discharge point has been located 0.15km upstream of the abstraction. 800m of pipeline would be required.

Figure 55 - Proposed Ratfyn discharge relocation



Conclusion

Abstraction at Durrington WTC is currently causing flows to drop below the permitted 10% limit and therefore negatively affecting the ecological status between Durrington WTC and the continuous discharge from Ratfyn WRC. Augmenting flows through the upstream relocation of the WRC discharge should mitigate the need for abstraction licence reductions.

The site has also been identified as requiring additional phosphorus removal under the Environment Act and Levelling Up and Regeneration Bill, and it is anticipated will be getting a 0.25mg/l permit through PR24. No other changes to permit limits have been considered as part of the discharge relocation.

A3-5.2. Shrewton WRC

Need for Investment

The discharge from Shrewton WRC is having a localised impact on the invertebrate communities of the River Till in its sensitive and valuable ephemeral reaches. The organic loadings from the discharge have caused a significant shift in the invertebrate community away from one that is able to support the notable winterbourne specialist species in the reach immediately below the works. This is either due to infiltration resulting in discharge of high levels of untreated effluent, or due to treated effluent being discharged into a dry river for much of the year therefore receiving no dilution and turning what should be an ephemeral reach into a perennial ponded reach made up of 100% effluent for long periods of time.

The Environment Agency have advised that a solution should be sought for Shrewton WRC that;

i) reduces or eliminates the frequency and magnitude of infiltration related discharges of untreated effluent from the works, and

ii) reduces or eliminates the discharge of secondary treated effluent to what should be an ephemeral (periodically dry) watercourse.

This would allow the reach immediately downstream of Shrewton WRC to return to a fully ephemeral watercourse and should eventually allow expansion of the important winterbourne communities seen upstream and downstream.

Regulatory Drivers

The WFD_IMP_MOD driver is where improvements are required to ensure no river, lake or estuary is in poor or bad ecological status due to the water industry. Following an investigation by the Environment Agency, the site has been deemed poor ecological quality and action is required. The report suggests that the poor ecological condition is being caused by the continuous discharge and not the quality of the effluent.

Options Development - Investigation

As discussed in the “ecological impact of Shrewton WRC discharge” document provided by the Environment Agency, the River Till was visited on the 13th of April 2022 in order to investigate the impact of the Shrewton Water Recycling Centre (WRC) discharge on the invertebrate communities. Groundwater infiltration causes the WRC to discharge from its storm overflow for prolonged periods during the winter. The aim of this investigation was to establish if this is impacting the ecology of the River Till at the point of discharge and further downstream.

The River Till is an important example of an ephemeral winterbourne stream and forms part of the Hampshire Avon Special Area of Conservation (SAC). It is included in the SAC designation because of its ephemeral nature and the conservation value of the plant and animal communities it supports. The section into which Shrewton WRC discharges is ephemeral and should remain wetted for only a few months of the year. This annual temporary flowing and drying cycle forms a key part of the habitat which is critical to the completion of the lifecycles of several aquatic invertebrates. In that way winterbournes provide a specialised and increasingly uncommon habitat supporting rare and locally specialised aquatic invertebrate communities.

Four sites were visited, and a sample of the macroinvertebrate fauna taken using the three-minute kick / sweep sampling methodology;

Table 19 - Sampling locations for EA ecological survey

Site no.	Site name	NGR	Location
1	U/S Shrewton WRC	SU0735242850	Upstream control ~ 150m u/s WRC discharge. ephemeral

2	D/S Shrewton WRC	SU0778942603	1st downstream impact site ~ 200m D/S WRC discharge. ephemeral
3	1.5KM US Winterbourne Stoke @ Footbridge	SU0797642288	2nd D/S impact site~ 800 metres D/S WRC discharge. ephemeral
4	@ Winterbourne Stoke	SU0782141163	D/S limit of ephemeral but only just above perennial head

Observations and Results

- **Site 1**, U/S Shrewton WRC - Limited gravel to sample, substrate mostly exposed clay with overlaying silt. High levels of organic detritus in marginal area and extensive in channel macrophyte growth typical of winterbourne reaches. Bankside inspection revealed a range of invertebrate taxa including 10 scoring sensitive Leptophlebia and 7 scoring Nemouridae and Limnephilidae. Small Chrionomids present and abundant.

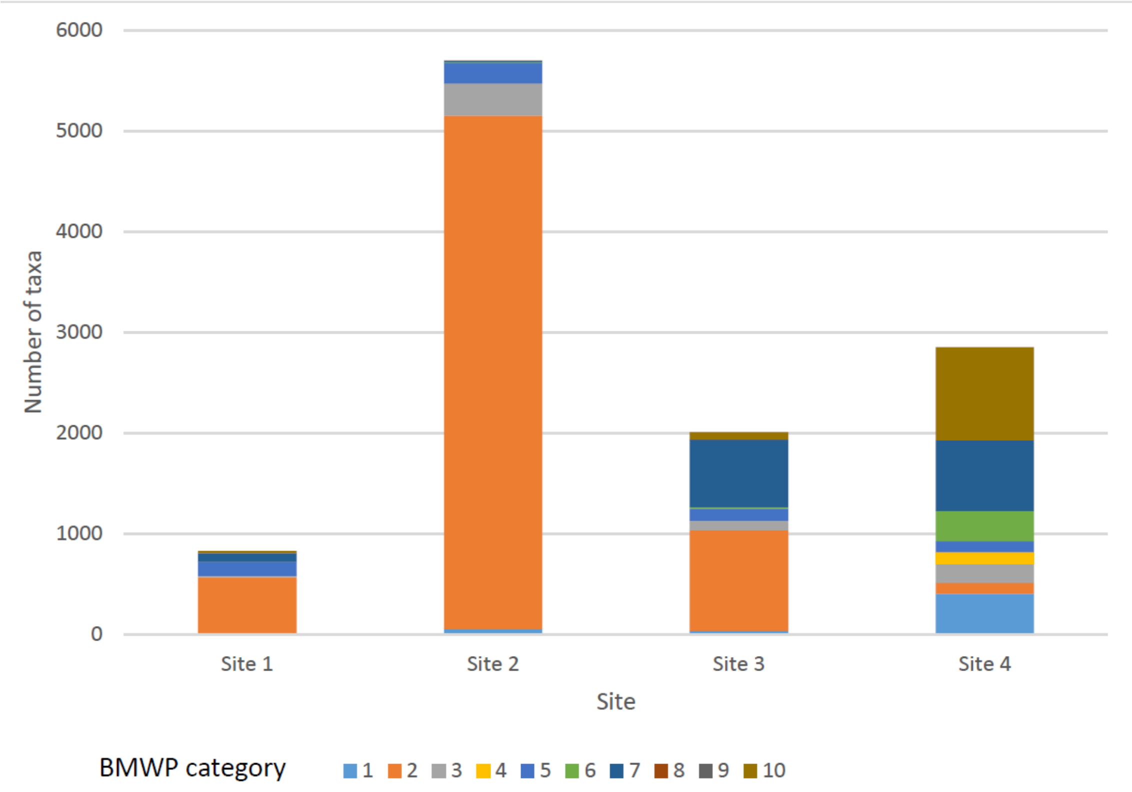
- **Site 2**, D/ S Shrewton WRC - Small section of silt free gravel to sample. Extensive marginal organic detritus. In channel macrophytes largely absent except for marginal riparian grasses. Sample material almost entirely composed of chironomid tubes even though what appeared to be visibly clear gravel substrate was sampled. Bankside sample inspection revealed sample comprised almost exclusively of chironomids with occasional *Asellus*. No evidence of higher scoring sensitive taxa.

- **Site 3**, 1.5km US winterbourne Stoke @FootbridgeB - Very small area of clear gravel. Channel choked with typical ephemeral stream vegetation and organic detritus. Bankside inspection revealed abundant invertebrates. Nemouridae stoneflies most notably abundant taxa along with chironomids. 10 scoring Leptophlebidae also readily evident. No chironomid tubes visible in sample.

- **Site 4**, @ Winterbourne stoke. - River channel entirely clear gravel. Limited organic detritus. Marginal vegetation only. Bankside evaluation of sample showed there to be extensive abundant and diverse invertebrate populations dominated by large numbers of Ephemerellidae mayfly, Gammarus and Limnephilidae caddis.

The number of chironomids found in the sample taken at Site 2 (200m downstream of the WRC discharge) was exceptionally high and made up nearly 90% of the overall invertebrate abundance (see the below figure). This indicates that the invertebrate community in this reach is extremely out of balance, being dominated by one taxonomic group which is very tolerant of organic enrichment. Whilst sensitive taxa were present in the sample (resulting in an ASPT score of nearly 5), these taxa were present at very low abundance.

Figure 56 - The distribution of numbers of invertebrate taxa occurring in each BMWP scoring class in the 4 sites monitored on the River Till



Although chironomid numbers in winterbourne environments can be naturally high due to the transient nature of the habitat, the high amounts of naturally occurring organic materials, the short multivoltine life cycles of chironomids and the lack of competition from other invertebrates (due to the specialist nature of the invertebrate communities able to inhabit these environments), what is seen downstream of the WRC discharge is an extreme shift in the community away from the balanced diverse mix of invertebrate taxa found at the upstream control site (Site 1) and further downstream towards Winterbourne Stoke (Site 4). In addition to the shift in overall invertebrate community structure, the chironomid community in the reach below the discharge has been acutely affected, showing a complete taxonomic change when compared to Site 1 (the upstream control site) and Site 3.

The presence of very large numbers of chironomid tubes in the substrate suggests that the community change observed at Site 2 is a chronic impact that has been ongoing for some time. It is not clear however if this impact is due to (i) infiltration overwhelming the sewerage system resulting in excessive levels of untreated effluent being discharged (the presence of sewage fungus on the outfall structure would support this) or (ii) the continuous discharge of secondary treated effluent into an ephemeral watercourse. The spatial impact of the discharge does seem to be largely confined to the reach immediately below the discharge as the invertebrate community at Site 3 shows a return to a near normal community structure expected for a river of this type.

The winterbourne specialists Nemoura lacustris (a stonefly) and Paraleptophlebia (a mayfly) were recorded at sites both upstream and downstream of the WRC discharge. These species have high conservation value. The absence of Paraleptophlebia from Site 2 suggests that the WRC discharge is impacting the conservation status of the ephemeral reach of the River Till.

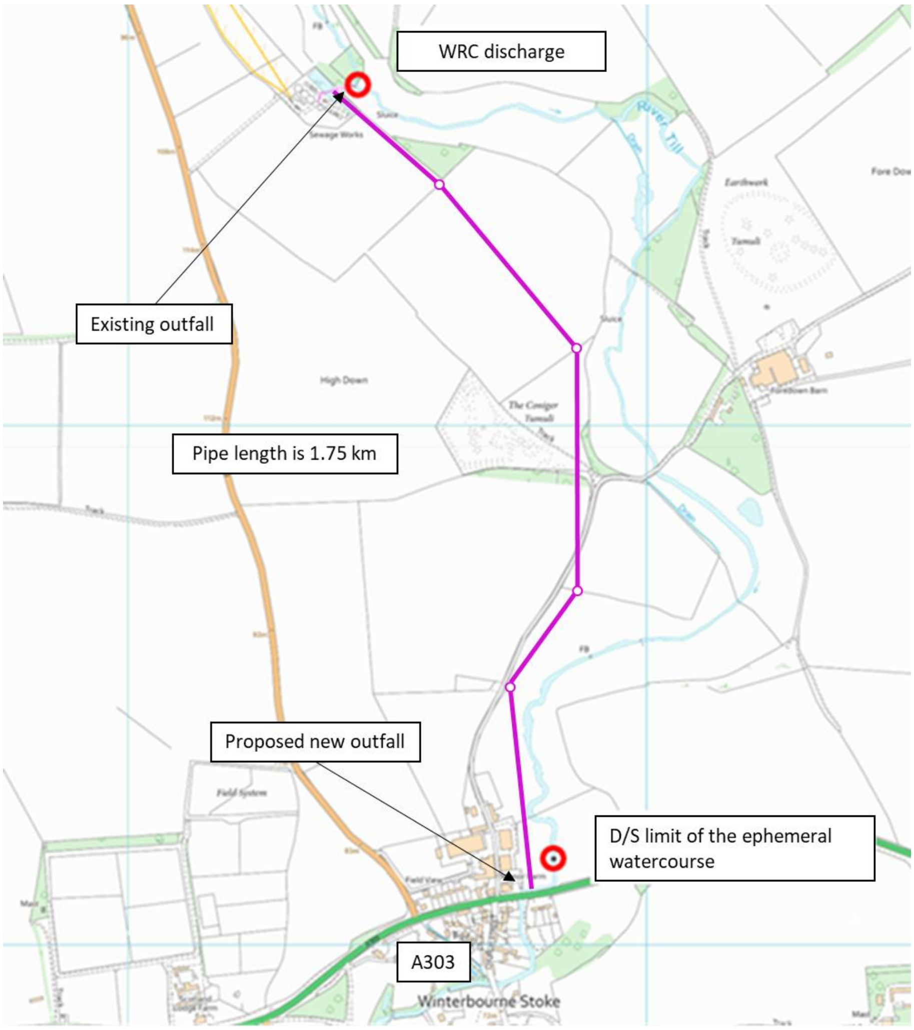
Solution (Discharge Relocation)

1) Winterbourne Stoke

The findings of the report show that the Shrewton WRC discharge is having a significant negative impact upon the invertebrate communities of the River Till and an engineering solution is required to address this. The report concludes that the change in ecological community is due to the permanent wetting of the watercourse rather than it being due to the storm overflow. Based on the report, the d/s limit of the ephemeral watercourse is in Winterbourne Stoke, thus the recommended solution is redirecting the outfall further downstream to this point.

The figure below shows the proposed layout for the pipeline, with the new discharge being located at the ephemeral point. To try and maximise efficiency and minimise the need for pumping, the route has been picked to be mostly downhill.

Figure 57 - Proposed location of new discharge in Winterbourne Stoke

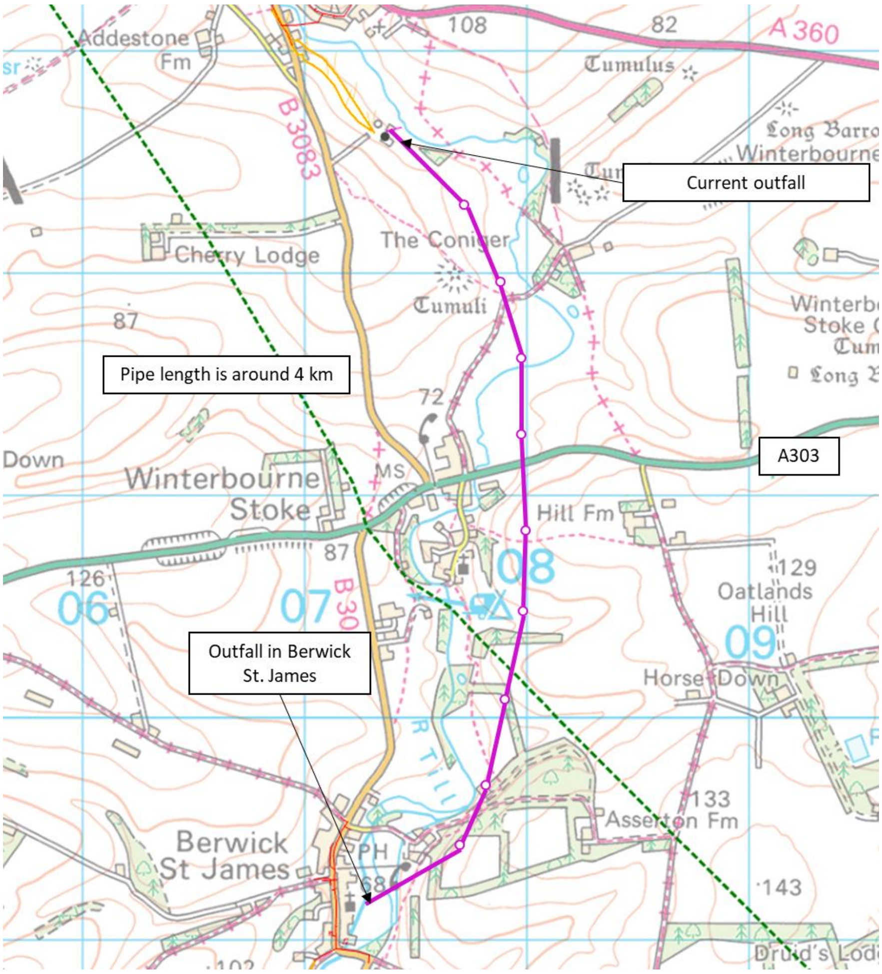


2) Berwick St James

There is a possibility that the proposed point of discharge does also run dry in especially dry summers. However, the extension to a point where we would be firmly past the perennial head to a point that doesn't run dry would require a pipeline down to Berwick St James – almost 4km as the crow flies. This would greatly increase the cost associated with the solution.

This option would require crossing the A303, bypassing the town of Winterbourne Stoke and potentially crossing the River Till – these factors would significantly add to the cost of the pipeline. Additionally, the cost of pumping the flow over this distance would be a lot greater in comparison to pumping to Winterbourne Stoke as the pipeline is double that of the one to Winterbourne Stoke.

Figure 58 - Proposed location of new discharge in Berwick St. James



Conclusion

Following the results of an Environment Agency investigation, an engineering solution is required in order to rectify the poor ecological status of the River Till downstream of Shrewton WRC. The proposed option is to move the outfall downstream to allow the upstream part of the river to become ephemeral again. Two discharge locations have been considered – Winterbourne Stoke and Berwick St James.

To summarise, to transfer to Berwick St James would significantly increase costs (estimated to be around 3x) when compared to transferring to Winterbourne Stoke. The only issue with transferring to Winterbourne Stoke is that we may be slightly upstream of the perennial head, however due to the costs associated with transferring to Berwick St James, it is still the best value option.

The site has also been identified as requiring additional phosphorus removal under the Environment Act and Levelling Up and Regeneration Bill, and it is anticipated will be getting a 0.25mg/l permit through PR24. No other changes to permit limits have been considered as part of the discharge relocation.

A4 Advanced/Alternative WINEP

As described in WSX16, we have extensively engaged with Defra, EA and Ofwat in the development of the WINEP. We have regularly emphasised the sheer scale of improvements being identified for PR24, and our concerns regarding affordability, financeability and deliverability, including when considered alongside our whole PR24 Business Plan.

The following pages cover two reports we produced following correspondence with the EA

- Advanced/Alternative WINEP
- WINEP Profiling

Also included is a letter from Natural England, in relation to our alternative WINEP proposals for nutrient reductions that could impact on Habitats sites and SSSIs.

- Natural England view on Nutrient Reduction

A4-1.1. Advanced/Alternative WINEP

Following a quadripartite meeting between Defra/EA/Ofwat/WW in June 2023, we proposed a revised Advanced/Alternative WINEP proposal for phosphorus removal in the Bristol Avon. This is to achieve the equivalent WFD load reduction at sub-catchment scale in AMP8 (i.e. the Cam Midford sub-catchment for Radstock), and then any remaining EnvAct rural/urban load targets in AMP9. It was recognised at the meeting that this proposal will not achieve (our 'fair share' of) WFD objectives at waterbody scale, as required by the WFD, but will bring an increased benefit to the whole environment, and at a lower overall cost.

Our report as submitted to the EA is included on the following pages.

Technical Note

Advanced WINEP Submission: Enhanced Catchment Permitting in the Bristol Avon

1. Introduction

This proposal outlines a cost-efficient approach to achieving Wessex Water's phosphorus reduction targets at catchment scale via innovative permitting to achieve Water Framework Directive (WFD) targets.

This proposal builds on the existing catchment permitting regime and Operating Techniques Agreement (OTA) for the Bristol Avon catchment, delivering nutrient reductions and holistic environmental benefits at scale.

This is an outcomes based approach, fully aligned with the integrated approach expected by Government in the recently published Plan for Water:

Our Plan for Water is designed to take us further and faster, based on taking a systematic, local, catchment-based approach, in a coordinated and collaborative way, using both nature-based solutions and investment in infrastructure involving communities, water companies, and businesses.

Box 1: Defra, Plan for Water, April 2023

Enhanced Catchment Permitting builds on the innovative approach demonstrated by Wessex Water and the Environment Agency when first developed for Bristol Avon in 2015. Aggregating water recycling assets at sub-catchment scale enables the delivery of WFD targets using the most efficient approaches with respect to financial and carbon costs, whilst maximising opportunities for wider environmental benefits. The current permitting approach to achieve WFD and Environment Act phosphorus reduction targets precludes opportunities for efficient delivery in terms of cost, carbon and wider environmental benefits.

The Bristol Avon catchment has been selected as an opportunity to maximise a Catchment Permitting approach by extending the existing Operations Techniques Agreement, providing environmental protection and regulatory confidence. The catchment is not subject to the requirements of either the Habitats Regulations or Levelling-up and Regeneration Bill (LURB), allowing for more flexibility in treatment solutions.

Wessex Water is in the unique position of having trialled Catchment Permitting over the last 8 years and as well as having recently implemented an integrated constructed wetland at Cromhall. Therefore, this proposal is based on the empirical performance data of these trials demonstrating:

- Actual water quality and wider environmental benefits
- Delivery against WFD targets
- Costs: financial and carbon
- Permitting regime and enforcement requirements

This paper details the water quality and wider environmental benefits achieved through the current catchment permitting approach, capital and carbon costs. It then goes on to identify the individual asset improvements, phosphorus load reductions, financial and carbon costs for the Bristol Avon catchment.

It should be noted that these proposals provide the equivalent phosphorus load reductions at sub-catchment or catchment scale to those required in the specific legislation (WFD, Env Act) but not necessarily at waterbody scale. The permits proposed differ from those identified by EA modelling to date.

Our original A-WINEP recommended an Outcomes Based Environmental Regulation (OBER) approach which would require changes to the Environment Act to deliver a combined nutrient reduction target at catchment level and an alteration to the amendment on the LURB – combining wastewater and agricultural reductions. We anticipated that this would deliver a £250m capital cost reduction. This option is no longer available so this revised submission, focussing on asset based catchment permitting, yields lower cost savings and reduced environmental benefits.

2. Bristol Avon Catchment Permitting

Wessex Water pioneered the Catchment Permitting approach, with the Environment Agency, in AMP6 to deliver WFD phosphorus reductions at scale in the Bristol Avon catchment. At that time EA guidance indicated that asset based improvements in the catchment would be disproportionately costly, not satisfying the PR14 cost-benefit assessment and therefore would be excluded from PR19. Rather than not deliver any phosphorus reductions at water recycling centres (WRC), Wessex Water proposed an approach to aggregate the WFD modelled load reduction at catchment scale and deliver via a mix of asset optimisation and limited new treatment installation.

The Catchment Permitting approach was designed to achieve the modelled WFD catchment phosphorus load reduction target of 46tpa by 2020. The approach was linked to a 'length of river improved' performance commitment to encourage improvements at assets throughout the catchment, rather than focussing on larger WRCs in the lower river reaches.

2.1 Catchment Permitting to date

WRC have previously been permitted on the concentration of phosphorus in final effluent at individual sites, rather than the overall load of phosphorus entering a watercourse. With the Environment Agency's agreement, Wessex Water devised the alternative catchment-wide permitting approach in PR19. For the trial, 23 WRCs (Table 2-1) in the Bristol Avon catchment were included in a catchment-wide permit. Each WRC was assigned a target load reduction for phosphorus expressed in tonnes per annum (tpa) with an annual reduction target of 46.2 tonnes for the whole catchment (this is in addition to load reductions delivered by existing permits).

The approach was formalised via an Operating Techniques Agreement (OTA) developed with the National Permitting Team at the EA and local Area staff. An OTA is the overarching permit document to cover all WRCs in the catchment and formalises the performance targets for phosphorus removal, including a description of how the targets are assessed and sampling and reporting requirements.

A copy of the current OTA is available in Appendix A. This enabled compliance monitoring and annual performance reporting.

2.1.1 OTA development

The target phosphorus removal for the catchment for the first year was achieved by optimising phosphorus removal processes at 13 WRCs. In subsequent years the target phosphorus removal was achieved by installing new phosphorus removal treatment processes at a further 10 WRCs (five of these had not previously had P removal).

Table 2-1 below shows the individual permits limits for the sites included in the trial. This illustrates the existing permitted concentration in 2015, the stretch target to be aimed for during the trial and then whether this will be achieved via an opex (optimization) or capex (new investment) approach.

Table 2-1 Phosphorus permitting in the Bristol Avon during or prior to AMP6, stretch targets and date the targets applied

Site ID	WRC	Permitted prior to or during AMP5 & AMP6 (mgP/l)	AMP6 Stretch Target (mgP/l)	Capex/ opex solution	Stretch target date
13028	Bowerhill WRC	2.00	0.50	Opex	01/01/2017

13031	Bradford on Avon WRC	2.00	1.40	Opex	01/01/2017
13058	Chew Stoke WRC	2.00	1.00	Opex	01/01/2017
13064	Chippenham WRC	2.00	0.60	Opex	01/01/2017
13090	Devizes WRC	2.00	1.30	Opex	01/01/2017
13131	Frome WRC	2.00	1.30	Opex	01/01/2017
13165	Keynsham WRC	2.00	1.30	Opex	01/01/2017
13204	Melksham WRC	2.00	1.20	Opex	01/01/2017
13235	Paulton WRC	2.00	1.00	Opex	01/01/2017
13244	Potterne WRC	2.00	1.10	Opex	01/01/2017
13252	Radstock WRC	2.00	1.00	Opex	01/01/2017
13016	Saltford WRC	1.00	0.80	Opex	01/01/2017
13308	Thingley WRC	2.00	1.20	Opex	01/01/2017
13044	Calne WRC	2.00	0.50	Capex	01/04/2018
13193	Malmesbury WRC	2.00	1.00	Capex	01/04/2018
13522	RAF Lyneham WRC**	(2.00)	1.00	Capex	01/04/2018
13360	Royal Wootton Bassett WRC	2.00	0.50	Capex	01/04/2018
13262	Seend WRC**	(2.00)	1.10	Capex	01/01/2019
13298	Sutton Benger WRC**	(3.00)	2.00	Capex	01/01/2019
13061	Chilcompton WRC**	(1.50)	0.80	Capex	01/01/2019
13116	Erlestoke WRC**	(1.50)	0.80	Capex	01/01/2019
13307	Tetbury WRC	2.00	0.50	Capex	01/01/2019
13318	Trowbridge WRC	2.00	0.80	Capex	01/01/2019
13338	Westbury WRC	2.00	2.00	***	-

*Permits in brackets denote AMP6 'backstop' EPR permits.
** No previous P removal, new capital schemes
*** No stretch target, just an existing conventional permit

Table 2-2 identifies the overall catchment load reduction targets to be achieved, in addition to the site based concentration targets identified in Table 2-1 above. These are the aggregated load reductions required each year through AMP6.

Table 2-2 Target annual phosphorus load reduction

Year ending	P load contribution from WRC (tpa)	Target catchment annual P load reduction (tpa)	Measured annual P load reduction (tpa) stretch target sites	Total measured annual P load reduction (tpa) all sites
Baseline	138.10	N/A	N/A	N/A
31-Dec-17	112.90	25.20	37.39	46.87
31-Dec-18	106.70	31.40	42.43	49.45
31-Dec-19	94.00	44.10	56.19	63.97
31-Dec-20	92.00	46.20	50.32	60.00

The second and third columns show the phosphorus load discharged and target load reduction from WRCs in the catchment for each year of the trial. The fourth column shows the load reduction achieved for each year for all sites with a stretch target, which increased from 37.4 tpa in 2017 to 50.3 tpa in 2020. The fifth column shows the measured load reduction from all sites including those with no stretch target but with an average flow greater than 1 Ml/d, this varies from 46.9 tpa in 2017 to 64 tpa in 2019. Wessex Water were fully compliant with the permit for the full duration of the trial and achieved the catchment load reduction target each year.

This approach was further extended in AMP7 to incorporate some asset upgrades. These upgrades focussed at larger WRCs (Trowbridge and Radstock) to centralise improvements rather than at the very small sites originally identified for improvement (Freshford, Winsley and Shoscombe). These swaps provide an equivalent or better water quality improvement than that identified in PR19 WINEP1, with fewer technical issues and for a lower totex. This demonstrated the EA's confidence in the catchment permitting approach recognising the economic and environmental value of optimising existing upstream assets rather than constructing first time phosphorus removal at very small WRCs.

The OTA was updated in AMP7 to capture these changes, as well as including site-specific permits (without stretch targets) at Rode and Rowde WRCs.

2.1.2 Outcomes delivered

An AMP7 investigation has reviewed the performance of the Bristol Avon catchment permit between 2020 and 2022, once all phosphorus reduction interventions had been completed. The investigation focussed on the performance of the WRCs, river water quality and WFD classification attributed to the innovative permitting approach.

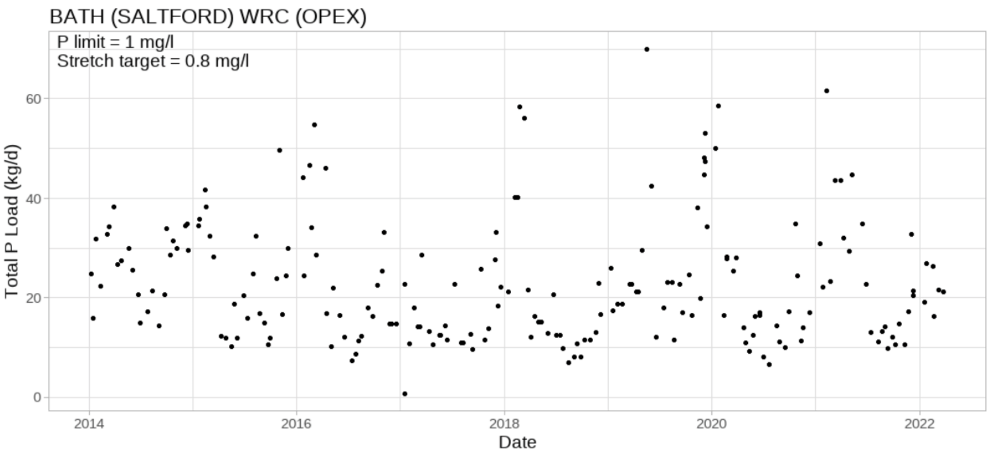
Water Recycling Centres

Of the 23 WRCs with stretch targets, 10 have had capital investment in AMP6 or AMP7 to achieve the stretch targets, five of these sites did not have P removal prior to these improvements (Chilcompton, Erlestoke, RAF Lyneham, Seend, Sutton Benger). The other five sites already had P removal treatment but required further investment to achieve stretch targets (Calne, Malmesbury, Royal Wootton Basset, Tetbury and Trowbridge). The remaining 13 WRCs had the opex solution applied with existing P removal processes optimised to achieve stretch targets from 01/01/2017.

The sites that had not previously had P permits saw the highest load reductions; Chilcompton 86%, Erlestoke 86%, RAF Lyneham 78%, Seend 85% and Sutton Benger 42%. The opex sites saw a load reduction between 10 and 36% with the exception of Chippenham that had a load reduction of 48%.

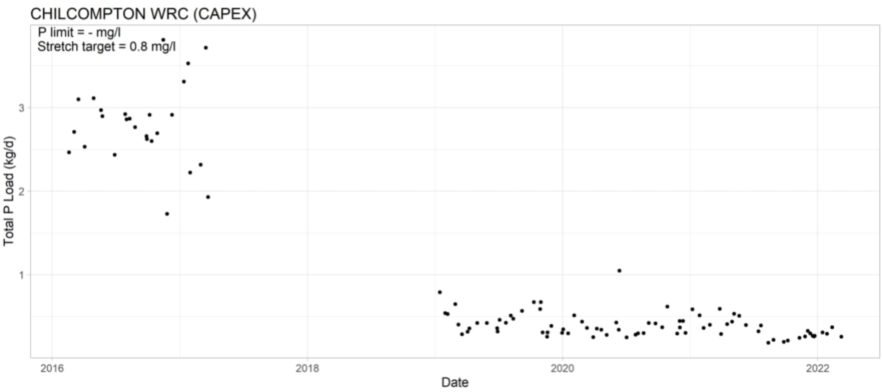
These trends are illustrated in Figures 2-1 and 2-2 below, using box and whisker graphs to illustrate the performance of Saltford WRC (optimising existing phosphorus removal) and Chilcompton WRC, where phosphorus removal was newly constructed:

Figure 2-1: Saltford WRC Phosphorus (P) Load discharged over time



The load discharged from Bath (Saltford) WRC is shown in Figure 2-1. The back stop P permit is 1mg/l total P and the stretch target is 0.8 mg/l which came into effect 01/01/2017. Average P load discharged pre stretch target was 24.52 kg/d and 22.07 kg/d post stretch target. The average concentration discharged pre stretch target was 0.73 mg/l, post stretch target the average concentration was 0.65 mg/l.

Figure 2-2: Chilcompton WRC Phosphorus (P) Load discharged over time



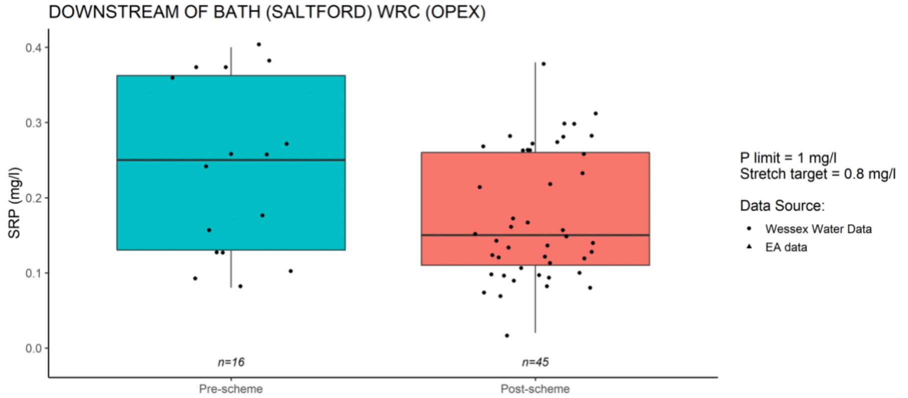
Chilcompton did not have a P permit prior to the installation of P removal treatment in the capital scheme. The new P permit applied from 01/01/2019 and saw the P load discharged reduced from 2.84 kg/d to 0.4 kg/d (Figure 2-2) a reduction in load of 86% with a reduction in total P concentration discharged from 6.22 mg/l to 0.82 mg/l, an 87% reduction.

River Water Quality

Water quality monitoring was undertaken for up to three years upstream and downstream of the WRCs included in the catchment permitting trial. These data were collected between April 2019 and April 2022. Wessex Water monitoring data is supplemented by sampling undertaken by the EA at relevant water quality sampling points.

The following graphs indicated the reduction in soluble reactive phosphorus (SRP) concentration in the receiving watercourses pre- and post-catchment permitting. Typically, there is a greater reduction in concentration in the watercourse at those locations where phosphorus reduction has been newly installed, compared to those sites where existing treatment has been optimised. This is demonstrated in the box plots below for Saltford and Chilcompton WRCs.

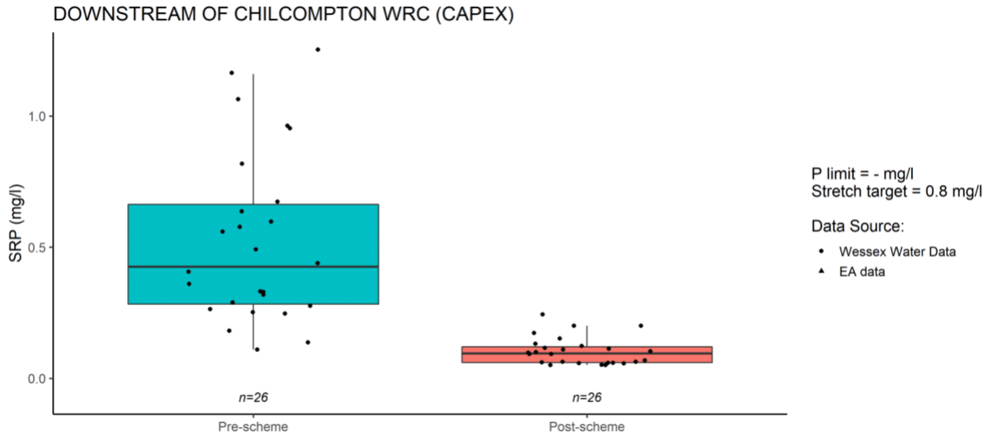
Figure 2-3 SRP concentrations downstream of Bath WRC boxplot



Opex targets were applied at Bath (Saltford) WRC from 01/01/2017. The boxplot (Figure 2-3) shows that the median SRP concentration downstream of Bath WRC has reduced from 0.25 mg/l to 0.15 mg/l since the stretch target was applied. It is worth noting that Saltford is close to the bottom of the catchment and the SRP concentration will have been reduced further up the catchment where stretch targets were applied.

Chilcompton WRC has had a new P removal scheme, there had previously been no P permit at the site. The total P concentration discharged has dropped from 7.5 mg/l pre scheme to 0.8 mg/l stretch target post scheme. This can be seen in the downstream SRP results, the boxplot (Figure 2-4) shows that the downstream river SRP median concentration has dropped from 0.43 mg/l to 0.1 mg/l post scheme and the data is less variable than before the stretch target was applied.

Figure 2-4 SRP concentrations downstream of Chilcompton WRC boxplot



In summary, an improvement in downstream SRP median values is seen for all sites. The most significant improvements in SRP median concentrations are seen downstream of the new capex schemes where there were no previous P permits.

WFD Classification

Most stretches of river saw a reduction of SRP downstream of the WRC except Devizes and Tetbury.

Table 2-4 presents the upstream river water quality SRP median data pre and post P stretch targets in relation to WFD classification for each of the WRC that had stretch targets applied and gives the median SRP concentration downstream of the WRC discharge. The colour coding indicates the WFD classification. The fourth column, 'classification boundary concentration' gives the SRP value for the lower boundary of the existing classification e.g. downstream of Bowerhill the average SRP concentration dropped from 0.465 to 0.316 mg/l, a 32% reduction from pre to post stretch target however the classification did not change as the lower boundary to move from poor to moderate is 0.214, whereas the average SRP in the river was 0.316 mg/l post stretch target, 0.1 mg/l above the boundary for moderate classification.

Table 2-3: WFD classification pre and post stretch target applied at WRC, average SRP concentrations are shown. Green – good, Yellow – moderate, Orange -– poor

WRC Name	Pre stretch target average SRP mg/l	Post stretch target average SRP mg/l	Classification boundary concentration mg/l	Difference in SRP to change classification mg/l
Bowerhill	0.465	0.316	0.214	-0.102
Bradford-on-Avon*	0.295	0.150	0.201	0.051
Calne	0.199	0.15	0.084	0.066
Chew Stoke*	0.380	0.195	0.203	0.008
Chilcompton*	0.425	0.095	0.179	0.084
Devizes	0.080	0.090	0.086	-0.004
Erlestoke*	0.390	0.150	0.203	0.053
Frome*	0.220	0.125	0.180	0.055
Keynsham*	0.310	0.140	0.223	0.083
Malmesbury	0.075	0.070	0.044	-0.026
Melksham	0.075	0.060	0.050	-0.010
Paulton	0.190	0.145	0.079	-0.066
Potterne*	0.361	0.345	0.203	-0.142
Radstock	0.385	0.200	0.197	-0.003
RAF Lyneham	2.925	0.220	0.188	-0.032
Royal Wootton Bassett*	0.450	0.080	0.183	0.103
Saltford*	0.250	0.150	0.225	0.075
Seend	0.370	0.300	0.208	0.208
Sutton Benger*	0.160	0.080	0.085	0.005
Tetbury	0.073	0.079	0.039	-0.040
Thingley	0.640	0.350	0.200	-0.150
Trowbridge*	0.270	0.195	0.215	0.020

Sites with * showed improvement in WFD classification

The most significant reductions were seen downstream of the sites that did not previously have P removal. Downstream of RAF Lyneham saw a reduction in SRP from 2.92 to 0.22 mg/l, a 92% reduction in average SRP. However, the classification has not changed from poor to moderate as the classification boundary is 0.188 mg/l, so a further reduction of 0.032 mg/l would be required to improve the classification.

Downstream of Royal Wootton Bassett, Chilcompton, Erlestoke and Sutton Benger WRC all saw SRP reductions of greater than 50% post WRC improvement. Keynsham is the site furthest downstream in the catchment. Although this is an opex site, it had the fifth highest SRP reduction of all the sites, which may reflect the benefits of SRP concentration reductions arising from WRC improvements in the upstream catchment.

In summary, there was an improvement in WFD classification at all sites with * in Table 2-3; 10 out of the 23 saw an improvement in classification. Nine moved from poor to moderate and one from moderate to good. Two sites saw a deterioration in SRP concentration with one of those sites seeing a deterioration in WFD classification from good to moderate. The remaining 11 sites saw an improvement in SRP concentration post schemes but no change in WFD classification.

2.1.3 Costs

As part of the environmental assessment of Catchment Permitting, we have reviewed the carbon and financial costs of this approach when compared to the more traditional individual asset based approach. These are summarised below.

Carbon Costs

The delivery of carbon savings was not the primary purpose of adopting the catchment permitting approach; however, they are a good additional outcome. Assessing the carbon benefits of this approach was not included in detail and therefore a full assessment has not been undertaken.

The overall concept of catchment permitting is to deliver phosphorus reductions with minimal capital investment, making as much use as possible of existing assets and infrastructure. This in itself will result in a carbon saving compared to the conventional approach of applying fixed permits to individual sites, requiring capital investment (and associated embodied carbon) to achieve them. It will also result in an operational carbon savings through economies of scale; power, transport of materials and chemicals, and asset maintenance are focussed on a smaller number of WRCs than through the conventional approach.

The below table illustrates the difference in annual operational carbon emissions to achieve differing levels of phosphorus in the effluent, for a WRC with a population equivalent (p.e.) of 12,000 (comparable to Malmesbury WRC). There is a significant step change in capital and carbon cost when targeting permits below 1mg/l, this is associated with the need for tertiary solids removal stages. For the 0.5mg/l permit it is assumed that a dedicated tertiary solids removal stage is required, whereas for the stretch target of 0.8mg/l it is assumed this is not required.

Table 2-5 shows that for a site with a 1mg/l permit the overall carbon cost is 97.3 tonnes CO_2e/year, this increases to 102.7 tonnes CO_2e/year to achieve a stretch target of 0.8 mg/l, the carbon saving will be in the avoided embodied carbon to meet a conventional permit of less than 1mg/l. The operational carbon cost for a site with a permit of 0.5 mg/l increases by approximately 25% to 125.1 tonnes CO_2e/year.

Table 2-5 Operational carbon cost for site with p.e 12,000

Tonnes CO_2e/year	1mg/l Permit	0.5mg/l Permit	0.8mg/l Stretch Target	Notes
Scope 1 emissions	22.2	29.1	23.5	Scope 1 covers direct emissions from owned/controlled sources (e.g. sludge logistics and treatment).
Scope 2 emissions	17.3	23.6	17.7	Scope 2 covers indirect emissions from the generation of purchased electricity.
Scope 3 emissions	57.8	72.3	61.5	Scope 3 includes all other indirect emissions that occur in a company's supply chain (e.g. ferric).
Total	97.3	125.1	102.7	

Financial Costs

Investment under this trial had been predicted to be £24m lower than the conventional approach (capital investment at all sites) and the opex costs were predicted to be £800k per year (additional to existing opex costs).

The sludge transportation budget was increased by an average of 26%, the chemical dosing budget was increased by an average of 34% and an allowance was made for the extra costs associated with running the chemical dosing plant at higher dose rates and for the increased production of sludge (power, maintenance, labour).

On average the actual chemical usage has been 70% of the predicted. Therefore, the increased operational expenditure associated with chemicals has been on average 30% less than was anticipated.

In summary the trial realised the financial benefit of reduced capital expenditure and the operational costs were broadly in line with predicted figures.

2.1.4 Summary

Wessex Water has pioneered an innovative Catchment Permitting approach in the Bristol Avon, with support from the EA. The successes of this trial since 2015 have been reported in two separate WINEP investigations:

- 6Wx006352 Bristol Avon Catchment Permitting Trial assessment and reporting of the phosphate reduction achieved published in March 2021
- 7WW300290 Bristol Avon Catchment Permitting Environmental Assessment published in December 2022

Overall, the Catchment Permitting approach has:

- Exceeded the regulatory phosphorus load reduction target of 46tpa, typically achieving 50tpa reduction since 2019
- Improved the WFD phosphorus status of 10 waterbodies, where nine moved from Poor to Moderate and one moved from Moderate to Good
- Improved phosphorus concentrations within existing WFD classification in a further 11 waterbodies
- Reduced the embedded carbon costs by reducing the level of construction required compared to a traditional individual asset approach
- Reduced capital investment in assets by £24m

The success of the Bristol Avon catchment permitting trial has informed further Catchment Permitting trials in the Parrett and Dorset Stour catchments, based upon our AMP7 solutions currently in development. These trials are also supplemented through comparable Catchment Nutrient Balancing operating techniques agreements, providing a holistic and cost-effective solution to phosphorus removal in these catchments.

Section 4 of this proposal describes how this Catchment Permitting Approach would be applied further in the Bristol Avon catchment to achieve the statutory load reductions targets from the relevant over-arching legislation in PR24.

3. A-WINEP Option Selection

This Advanced WINEP (A-WINEP) proposal to enhance the existing catchment permit within the Bristol Avon catchment continues to focus on asset improvements, through optimisation and new treatment solutions, including a small number of nature based solutions. This proposal goes beyond the existing water quality improvements to deliver the WFD phosphorus targets at sub-catchment, rather than waterbody, scale.

As a result, there will be new investment required at targeted sites to achieve total phosphorus concentrations of 0.25mg/l, the Technically Achievable Limit (TAL), whilst other sites will be optimised, and a small number of WRCs will benefit from nature based solutions (NBS) to improve their discharge.

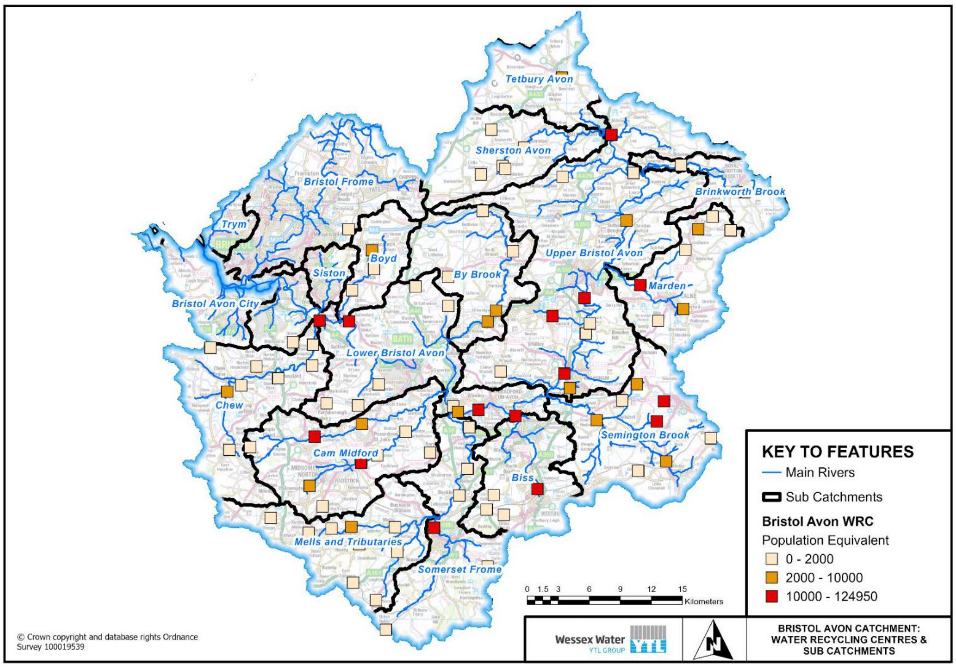
Solutions in the Bristol Avon have been selected to achieve the water quality requirements at sub-catchment level using the most efficient options from a cost and carbon perspective. The approach will deliver the greatest overall environmental benefits rather than just modelled phosphorus reductions. This approach is strongly aligned with the aspirations of Defra's Plan for Water, maximising a more integrated asset approach to deliver holistic, catchment scale benefit.

This proposal will use a Catchment Permitting approach, maximising existing assets and constructing new treatment processes, to deliver the phosphorus load reduction targets required by the WFD at sub-catchment scale and Environment Act at catchment scale.

Figure 3-1 shows the Bristol Avon catchment and sub-catchments included within this proposal and WRCs colour coded to reflect the population served. The relevant 18 sub-catchments are:

Tetbury Avon
Brinkworth Brook
Marden
Biss
Mells and tributaries
Lower Bristol Avon
Bristol Avon City
Trym
Boyd
Sherston Avon
Upper Bristol Avon
Semington Brook
Somerset Frome
Cam Midford
Chew
Siston
Bristol Frome
By Brook

Figure 3-1: Bristol Avon catchment and associated sub-catchments



The Environment Act phosphorus load reduction target is detailed in Table 4-1 below. Within the Management catchment of the Bristol Avon, there are two Operational catchment – Bristol Avon Urban and Bristol Avon Rural – each with specific load reduction targets.

Table 3-1 highlights the Environment Act reductions required both as percentages and as a total tonnage. The Environment Act 80% reduction is a national target.

Table 3-1: Phosphorus load reduction targets in the Bristol Avon

Catchment	Reduction Targets (tpa)				
	EnvAct	EnvAct	LURB	NN within EnvAct area	Total Reduction Target
Bristol Avon - Urban - Rural	18% 64%	51.1	-	-	51.1

Table 3-2 lists the range of unconstrained options initially considered when a WRC has been identified as requiring improvements.

Table 3-2: Unconstrained Options

Option	Description
Modify consents/permits	Review/revise permits with the Environment Agency.
River catchment / dynamic permitting	Work with the EA to spread loading across the catchment, or seasonal/flexible permitting.
Tolerate	Site already achieving new permit requirements.
Optimise/Operate	Increase the efficient use of the existing capacity with the existing assets.
Treat/pre-treat in network	Reduce load transferred to the WRC, e.g., network chemical dosing.
Rationalisation/centralisation	Close smaller treatment works and transfer flows to a larger one.
De-centralisation	Remove flows from a treatment works and create localised treatment works.
Catchment management initiatives	Source Control – Treating either diffuse or point-source non-domestic elements of wastewater before they enter the sewer system
	Catchment Nutrient Balancing – Treating and controlling the other contributors to the environment.
Discharge Relocation	Relocate effluent discharge to remove/reduce the need for other enhancement.
Increase treatment capacity	Green – Nature based solutions, such as integrated constructed wetlands.
	Grey – Invest in new assets to provide additional capacity.

Not all of the options listed in Table 4-2 are available to support this A-WINEP Catchment Permitting proposal, particularly those focussed on catchment management initiatives, given the Environment Act restrictions on water companies to only allow improvements to point-source discharges only. The following options have been considered as part of this submission to deliver the Catchment Permitting approach:

- Optimise/Operate
- Rationalisation/centralisation
- Increase treatment capacity – green and grey solutions

3.1 Optimise/Operate

In some cases, WRCs may already be regularly or occasionally achieving some or all of the future permit requirements. Targeted interventions to optimise existing asset performance could lead to more reliably achieving the new permit without substantial capital investment in the creation of new assets.

In many cases, however, this approach does increase the risk held by Wessex Water. Many sites do not have redundant process units and, with an ageing asset base, condition and performance would reasonably be expected to deteriorate more quickly as more reliance is placed on these units.

A number of WRCs may also have other enhancement drivers such as nitrogen or sanitary parameters. As such, P drivers cannot be considered in isolation.

We have undertaken a coarse screening exercise to assess whether new PR24 P permits could reliably be achieved through tolerating or through certain aspects of the site being optimised or operating in a different manner (e.g., re-purposing assets).

Figure 3-2: Coarse screening assessment template for Tolerate / Operate / Optimise

TOCOB	Ref	Criteria	Value	Validity agreed withSteering Group	Query agreed with SG	Data source
No build/Tolerate	1	Adequate TP performance		<=80% permit	*24 months P data required, w/95%ile <= 80% of permit*	Qlikview/Science Systems
	2	Adequate chemical dosing storage - condition and capacity			*Is there an existing ferric or PAC chemical dosing plant?*	Qlikview/Science Systems
	3			<4	*Is the condition of the chemical storage listed below condition grade of 4 on WAM*	WAM or Investment Engineer spreadsheet
	5			10 yrs at 2025	*Does the chemical storage unit have 10 years remaining of asset life?*	WAM or Investment Engineer spreadsheet
	6	Tertiary treatment stage		Tertiary treatment required?	*Is tertiary treatment required to meet the permit*	Qlikview/Science Systems
	7			10 yrs at 2025	*Does the tertiary treatment stage have 10 years remaining of asset life?*	WAM or Investment Engineer spreadsheet
	8			<4	*Is the condition of the tertiary treatment listed below condition grade of 4 WAM*	WAM
	15	Adequate sludge storage - Condition and capacity		>10 days	*Does the site have sufficient sludge storage capacity for future needs?*	Qlikview
	16			10 years at 2025	*Does the sludge storage unit have 10 years remaining of asset life?*	Qlikview
	17			<4	*Is the condition of the sludge storage listed below condition grade of 4 on WAM*	WAM or Investment Engineer spreadsheet

3.2 Rationalisation/Centralisation

This option acknowledges that improvement and operational costs are generally disproportionately expensive at smaller WRCs and considers merging or relocating smaller WRCs to a larger common WRC to allow for economies of scale.

In screening to ascertain the feasibility of transferring flows to nearby WRCs, either directly to the WRC or indirectly by connecting somewhere in the sewerage catchment, consideration needs to be given to several factors, including:

- whether the destination WRC has capacity to accommodate the additional flows without requiring further improvement itself.
- whether removal/relocation of the WRC discharge could cause a deterioration to the local ecology of the local watercourse, as in some cases our continuous treated discharge comprises a significant proportion of the receiving river flows.

Figure 3-3: Coarse screening assessment template for WRC transfers

Pump aways	1	Population Equivalent		<5000PE	*Maximum population equivalent for site flows to be transferred fr*	Popndata
	2	Distance		<10km	*Are the treatment works within 10km of each other?*	SAGIS
	3	Watercourse sensitivity		<30%	*If WRC contributes <30% of base flow to a watercourse, then assume it can't be transferred*	SAGIS
	4	Hydraulic headroom			*Are the flows being transferred + the receiving WRC DWF permit > the receiving site DWF * 150%?*	SWIMS
	5	DWF Headroom		>90%	*Does the receiving WRC have <90% DWF headroom? or that there is a planned upgrade scheme?*	SWIMS
	6	Land requirements			*Does the receiving treatment works have land available for future expansion/growth?*	GIS

3.3 Enhanced treatment capacity

This option considers providing increased/enhanced treatment capacity at the WRC. We have considered traditional 'grey' solutions as well as more novel 'green' nature-based solutions, with the latter particularly acting as a tertiary 'polishing' treatment stage.

The below table shows the typical phosphorus load reduction for different sizes of WRCs if discharging at different permits. In the absence of a dedicated phosphorus removal process a typical final effluent concentration is assumed to be 5mg/l.

Table 3-2: Phosphorus load removal across a range of WRC sizes for different permit levels

		Phosphorus Load Removed (kg/yr)			
WRC Size	**New Permit:**	**2mg/l**	**1mg/l**	**0.5mg/l**	**0.25mg/l**
250 p.e.		53	70	79	83
1,000 p.e.		211	281	316	334
2,000 p.e.		422	632	632	667
5,000 p.e.		1,054	1,405	1,581	1,669

3.3.1 Green Solutions

Wessex Water delivered the water industry's first phosphorus removal integrated constructed wetland (ICW) at Cromhall WRC in AMP6. The wetland was designed by the Wildfowl and Wetland Trust consultancy and constructed between 2018 and 2020, with the discharge permit coming into effect in April 2020. The wetland is illustrated in Figure 3-4 below.

Figure 3-4: Cromhall integrated constructed wetland and WRC (to the right)

Cromhall Water Recycling Centre (WRC) is a small, rural works located in South Gloucestershire. The WRC has a population equivalent of 2,055 and a mean daily discharge of 1.4 million litres per day and until recently treatment comprised mechanical screening, a single oxidation ditch and a humus/settlement tank, with effluent discharged to the Tortworth Brook.

Under the Water Framework Directive (WFD) Tortworth Brook is at moderate ecological status, with phosphate from diffuse (agricultural and rural land management) and point sources (water industry) the reasons for not achieving good status. Water quality modelling showed that a 3.0 mg/l total phosphorus permit would be required for WFD compliance, requiring significant tertiary treatment investment (e.g. ferric dosing). Since 2010 Wessex Water have been in discussions with a local landowner (Tortworth Estate) and the Environment Agency (EA) to explore whether an Integrated Constructed Wetland (ICW) could be trialled as a more sustainable approach to reduce nutrient discharges from Cromhall WRC. The EA agreed to an AMP6 WINEP output to construct an ICW rather than tradition phosphorus removal treatment using chemical dosing.

The ICW was completed in March 2020 and operational from April 2020. It is 0.8 ha in area and arranged in a modular design with a total of 12 cells combining open water, surface flow marsh and wet grassland habitat types, designed to perform ecological and bio-chemical functions. The ICW was designed to accept a maximum hydraulic loading rate of 32 l/s (2800 m^3/d) with hydraulic residence time of 0.4 to 3.2 days depending on flow rate.

Wetland performance monitoring data have been collected since the wetland became operational however, intensive monitoring commenced in November 2020. Performance for total phosphorus, suspended solids and ammonia is shown in Table 3-3.

Table 3-3: Mean concentrations of suspended solids, ammonia and total phosphorus (wetland inlet and outlet)

Site	Total phosphorus (mgP/l)	Suspended solids (mg/l)	Ammonia (mgN/l)
Wetland Inlet	2.15	7.07	0.72
Wetland Outlet	1.56	5.72	0.27
Removal	0.59	1.35	0.45
% Removal	27.50	19.09	62.49

For total phosphorus the wetland appears most effective in summer when receiving lower flows (longer residence time), warmer temperatures, more daylight and significant macrophyte growth. During summer months, concentrations into the wetland of ~3 mg/l are common with discharges between ~2-2.5 mg/l (16-30% reduction in concentration). Removal percentages over the winter months are minimal where concentrations both in and out of the wetland are broadly similar but low (~1 mgP/l). Ammonia and suspended solids are also effectively removed by the wetland with average reduction rates of 62% and 19% respectively.

Emerging findings for the PhD research show that influent concentrations of pharmaceutical and personal care product (PPCP) vary seasonally and daily, with up to 90 compounds identified at a quantifiable level from 140 investigated. The ICW appears to remove some compounds from the aqueous phase (>70% removal), however others show negligible removal or an increase in concentration through the wetland system. Early findings show that the ICW can effectively limit the export of AMR bacteria into the environment (95-99.9%), with removal rates above 95% achieved even during winter conditions, and that Cromhall ICW can effectively remove microplastics (>95%). The PhD research so far shows reductions in both nitrogen and phosphorus. Nitrogen reduction is more sustained with rates of over 60%, whereas phosphorus removal is more variable.

Assessment using Biodiversity Metric 3.0 shows that Cromhall ICW has delivered a 111% and 42% increase in habitat and hedgerow biodiversity units, respectively. This is due to the limited biodiversity value of the preconstruction habitat (arable land) and the creation of the wetland and an area of surrounding neutral grassland (priority habitat). As the neutral and wetland grassland quality improves with maturity and management the number of biodiversity units delivered will increase further. This is in direct contrast to what would be expected if a 'traditional' approach to phosphorus removal (such as chemical dosing) had been adopted, which would typically involve the loss of a small area of undeveloped land within the footprint of the WRC.

Comparisons show that since construction, the WFD water quality status of the furthest downstream sampling point on the Tortworth Brook has improved from indicative Bad to Poor. Orthophosphate 90th percentile concentrations have approximately halved and ammonia levels have also reduced from an indicative standard of Moderate to High.

Wetlands can achieve lower concentrations through the addition of upfront chemical dosing, but reliably achieving lower than 2mg/l would require excessive land area and cell redundancy to allow for maintenance.

Alternative 'green' solutions include reed beds. We have a number of small to medium size WRCs were there is a tertiary reed bed after the secondary settlement stage. None of these sites achieve <2mg/l in the absence of chemical dosing. Whilst we have examples of some sites regularly achieving less than 1mg/l with upfront chemical dosing, this is generally due to lower influent concentrations (i.e., more dilute). This is the case of Cromhall WRC, as can be seen by the low phosphorus concentrations leaving from the main WRC and ahead of entering the wetlands.

Whilst we promote the use of nature-based solutions such as wetlands, there can be significant secondary costs associated with complying with other regulations, in particular waste management (e.g. handling and disposal of spoil arisings) and flood alleviation requirements (e.g. providing additional flood compensation storage volume for any loss through the creation of the wetlands, inc. surrounding bunds if excess spoil is retained on site). There is often the requirement for an impermeable clay/membrane liner. We are also seeing an increase in land purchase costs, as landowners and their agents are becoming aware of nutrient and biodiversity credit value.

3.3.2 Grey solutions

Chemical dosing for phosphorus removal works by bonding the phosphorus with the chemical ion, with the compound then removed as sludge. We generally use ferric sulphate for chemical dosing. The flocculation is most effective when the chemical is dosed upstream of a primary settlement process, as this is where most of the solids removal in a WRC occurs.

A number of suppliers have been approached and a technology selection matrix has been developed to assist with which process we would be confident in proposing for PR24 to reliably achieve the TAL of 0.25mg/l. The Table 3-4 below provides a summary of some technologies and our level of confidence in their performance.

Table 3-4: Assessment of currently available grey solutions to deliver phosphorus reduction

Technology	Description
Pile Cloth Filters	The technology relies on upstream chemical dosing to turn reactive soluble phosphorus into particulate phosphorus. The filters are a rotating pile cloth arranged in discs, which traps particulates as flows passes through. The cloths are backwashed using high pressure water and air spray bars to periodically remove particulates, and the dirty backwash water is returned to the inlet of the site. We are confident that this technology can achieve down to a **0.5mg/l P permit**
Disc Filters	The technology relies on upstream chemical dosing (coagulant plus polymer) to turn reactive soluble phosphorus into particulate phosphorus. The filters are a rotating mesh disc, which traps particulates as flows passes through. The mesh is backwashed using high pressure spray bars to periodically remove particulates, and the dirty backwash water is returned to the inlet of the site. We are confident that this technology can achieve down to a **0.5mg/l P permit** and we are currently trialling the technology for a 0.25mg/l permit.
Multi Media Filters	The technology relies on upstream chemical dosing to turn reactive soluble phosphorus into particulate phosphorus. Flow is driven through four layers of different sized media, which trap particulates. The media is air scoured and backwashed regularly to remove particulates, and the dirty backwash water is returned to the inlet of the site. We are confident that this technology can achieve down to a **0.25mg/l P permit.**
CoMag & Actiflow (Ballasted Media)	The two technologies use different ballast agents. These are added to the flow with a coagulant and flocculant (polymer), which facilitates the enhanced settlement of particulates within a clarification tank. The sludge is then removed and recycled, allowing the reuse of the ballast agent (micro sand for Actiflo and magnetite for CoMag) and the remaining sludge is returned to the inlet of the site. Actiflo is the only technology with reference sites for a 0.1mg/L TP and we are unclear on consistency of results. Southern Water have the only full-scale plants in the UK and are achieving 0.1 mg/l. We are confident that this technology can achieve down to a **0.25mg/l P permit.**
Tertiary Continuously Backwashed Upflow (CoUF) Sand Filters	The technology relies on upstream chemical dosing to turn reactive soluble phosphorus into particulate phosphorus. Flow is driven through sand, which traps particulate phosphorus. The sand is backwashed continuously to remove particulate phosphorus, the dirty backwash water is returned to the inlet of the site. We are confident that this technology can achieve down to a **0.5mg/l P permit** (provided it is not an aerated sand filter).
Biological Nutrient Removal	This technology can be introduced to an existing activated sludge plant but requires significant physical changes and additional stages added, or there are suppliers of package plants for new sites. The technology requires a significant carbon load, and as such relies on both methanol dosing and coagulant dosing to achieve low levels of phosphorus & nitrogen. The technology is an activated sludge plant using returned activated sludge & creating waste sludge. We are confident that this technology can achieve down to a **1 mg/l P permit**. To reliably achieve less than 1mg/l an additional TSR (Actiflo/CoMag) and coagulant dosing are required downstream of the ASP.

4. A-WINEP proposal

4.1 Bristol Avon Catchment

There are 98 WRCs within the Bristol Avon catchment, of which 74 are within the Bristol Avon Rural catchment and 8 are within the Urban catchment. 16 WRCs are within the overall Bristol Avon catchment but do not discharge to water bodies under the remit of the Environment Act, generally due to being coastal discharges or groundwater discharges.

The WFD requires each water body to be classified in terms of its ecological status as high, good, moderate, poor, or bad. This is determined by combining assessments results for biological (biomass/abundance of plants/algae) and physiochemical quality elements (nutrients, dissolved oxygen). Under the WFD, environmental objectives have been set for all water bodies in England. Once published in the river basin management plans (RBMP) these objectives are legally binding.

The EA adopt a ‘fair share’ approach for determining target reductions for given sectors/contributors, on a polluter pays principle. The PR24 WFD for phosphorus improvements are:

- WFD_IMP – Implementation of actions to improve water quality in terms of relevant WFD status objectives. A subsequent suffix indicates what target the measure is aimed at achieving (i.e., g = Good status for the element).
- WFD_IMP_MOD – Actions to ensure no river, lake or estuary is in poor or bad ecological status due to the water industry.

After AMP7 improvements are taken into consideration, three waterbodies remain on the RBMP Cycle 3 spreadsheet as classified as 'poor' or 'bad' ecological status for phosphorus, linked with WRC discharges (see Table 4-1).

Table 4-1: Poor or Bad Ecological Status Waterbodies in the Bristol Avon (for phosphates), with failure attributed to continuous discharges from WRCs

Waterbody ID	Waterbody Name	Upstream WRCs
GB109053021760	Tributary - source to conf Biss Bk	Dilton Marsh (1,841pe) Rudge (5pe)
GB109053027400	Doncombe Bk - source to conf By Bk	Marshfield (1,750pe)
GB109053022210	Worton Str - source to conf Semington Bk	Urchfont (1,274pe)

The current Catchment Permitting approach in the Bristol Avon meets the WFD good ecological status objective target at the end of the catchment, rather than at sub-catchment or waterbody scale. This is particularly the case in the headwaters, given the focus on improving larger works – which generally discharge to the main river and lower down the catchment – for more efficient £/P removed unit costs.

4.2 WINEP and A-WINEP Proposals

Our current WINEP meets water quality objectives at waterbody and catchment scale, as appropriate for the respective drivers.

Our Advanced WINEP (A-WINEP) proposal is for catchment permitting for WFD objectives at sub-catchment scale, with specific/localised improvements linked with waterbodies in Poor/Bad WFD status due to our discharges and alongside catchment permitting for EnvAct objectives at catchment scale (as already allowed).

It should be noted that our A-WINEP proposal will not achieve WFD objectives at waterbody scale, as required by the WFD, but will bring an increased benefit to the whole environment, and at a lower overall cost.

Although it should also be noted that the WFD (and EnvAct) overall objectives will only be met if all sectors do their fair share reduction requirements, and not just Wessex Water.

The table on the following pages provides the WINEP and A-WINEP scenarios in the Bristol Avon, with all WRCs listed that will have a phosphorus permit by the end of PR29 (either existing, tightened or new). No P permits are proposed at unlisted WRCs within the catchment – these are generally smaller sites (typically <250pe) offering minimal load reduction potential, groundwater discharges or within the catchment but coastal discharges.

Those sites identified with WFD driver requires improvements in PR24 by 2030, including in some cases AMP6 stretch targets being re-defined as permits. For any site with just an EnvAct driver we propose to deliver in PR29 by 2035, ahead of the regulatory date in 2038.

Table 4-2: Bristol Avon phosphorus permits

		Current P Permit (Stretch Target)		WINEP		A-WINEP		
WRC	PE	(mg/l)	WINEP WFD Driver	PR24 P Permit (mg/l)	Additional Load removed (tpa)	PR24 P Permit (mg/l)	PR29 P Permit (mg/l)	Additional Load removed* (tpa)
Bristol Avon Urban								
Bath (Saltford)	125,617	1 (0.8)		0.5	3.59			
Trowbridge	66,217	2 (0.5)			0			
Keynsham	23,659	2 (1.3)			0	1		0.59
Bradford-On-Avon	12,203	2 (1.4)			0	1		0.61
Winsley	2,110	-			0		0.25	0.94
Freshford	1,583	-			0		0.2	1.6
Bristol Avon Rural								
Chippenham	43,630	2 (1.3)	WFD_IMPg	0.25	2.15			
Frome	36,453	2 (0.7)	WFD_IMPm	0.25	4.97	0.25		4.75
Radstock	27,965	2	WFD_IMPg	0.25	1.63			
Westbury	25,310	2 (1.3)	WFD_IMPm	0.25	5.88	0.25		5.88
Calne	21,924	2 (0.5)	WFD_IMPg	0.4	0.26			
Thingley	20,747	2 (1.2)	WFD_IMPg	0.5	1.55	1		0.44
Melksham	20,193	2 (1.2)	WFD_IMPg	0.8	1.08	0.25		2.56
Devizes	14,965	2 (1.3)	WFD_IMPm	0.25	1.21	1		0.33
Wootton Bassett	14,379	2 (0.5)			0			
Potterne	13,512	2 (1.1)	WFD_IMPm	0.25	1.31	1		0.15
Malmesbury	12,908	2 (1)	WFD_IMPg	0.4	1.11	0.25		1.24
Paulton	12,429	2 (1)	WFD_IMPg	0.5	0.68	0.25		1.02
Bowerhill	10,123	2 (0.5)	WFD_IMPm	0.25	0.37	0.2		0.37
Sutton Benger	8,810	-2	WFD_IMPg	0.5	1.61	1		1.07
Cam Valley	8,300	-	WFD_IMPg	0.7	4.46	0.25		4.92
Tetbury	8,042	2 (0.5)			0			
Chew Stoke	7,859	2 (1)	WFD_IMPg	0.3	1.1			
Lyneham	5,793	-1	WFD_IMPg	0.25	0.59	0.25		0.55
Compton Bassett	5,140	-	WFD_IMPg	1	1.51	0.25		1.8
Lavington (Woodbridge)	4,492	-		1	2.16	0.25		2.57
Keevil	3,815	-		1	1.84			
Pucklechurch	3,348	-		1	1.21			
Rowde	3,065	0.5			0			
Colerne	2,551	-		1	1.18			
Box	2,499	-			0		0.25	1.68
Coleford	2,282	-	WFD_IMPg	1	1.34	0.25		1.6
Chilcompton	2,083	-0.8	WFD_IMPg	0.8	0			
Shoscombe	1,981	-	WFD_IMPg	1	1.17	0.2		1.41
Wick	1,852	-			0	0.2		1.12
Dilton Marsh	1,841	-	WFD_IMP_MOD	1	1.01	0.25		1.2
Edford	1,840	-	WFD_IMPg	1.5	0.99	0.2		1.35
Marshfield	1,750	-	WFD_IMP_MOD	0.3	0.67	0.25		0.68
Oakhill	1,488	-	WFD_IMPg	1.5	0.64			
Norton St Philip	1,371	-	WFD_IMPg	0.6	0.89	0.25		0.96
Hullavington	1,366	-			0	0.25		0.77
Sherston	1,315	-	WFD_IMPg	4	0.12			
Nunney	1,274	-	WFD_IMPg	1.4	0.79	0.25		1.05
Urchfont	1,274	-	WFD_IMP_MOD	0.4	0.69	0.25		0.71
Stanton Drew	1,245	-			0	0.25		0.92
Farmborough	1,216	-			0		0.25	0.96
Beckington	1,201	-	WFD_IMPg	1.5	0.44			
Rode	1,201	2			0	1		0.14
Stratton-on-the-Fosse	1,146	-	WFD_IMPg	0.3	0.96	0.2		0.98
Westwood	1,127	-			0	0.25		0.6
Great Somerford	1,102	-			0	0.25		0.53
Seend	1,075	2 (1.1)	WFD_IMPm	1.1	0			
Erlestoke	928	0.8	WFD_IMPg	0.8	0			
Lacock		-			0	0.25		0.55
Didmarton	643	-			0	0.2		0.5
Hilmarton	582	-	WFD_IMPg	2.5	0.19	0.2		0.37
Compton Dando	479	-			0	0.2		0.47
Wellow	444	-			0	0.2		0.41
Doynton	263	-			0		0.8	0.38
South Wraxall	217	-			0	0.2		0.22
Hinton Blewett	165	-			0	0.2		0.1

In Bristol Avon catchment but not contributing to EnvAct load target								
East Harptree	428	-	WFD_IMPg	3	0.09	3		0.09

*The EA acknowledge that water companies typically outperform against their phosphorus permits. Thus for those sites needing to achieve the 'Technically Achievable Limit' of 0.25mg/l the EA are accepting that in some circumstances these can be modelled as if at 0.2mg/l, allowing for companies to benefit from any assumed outperformance in achieving load-based targets.

For our Bristol Avon A-WINEP we propose that for all sites <1mg/l the limits stated are stretch targets with a 1mg/l backstop permit limit, with sub-catchment load reduction targets. The table below provides the cost and carbon comparison between our WINEP and A-WINEP proposals. This shows a financial saving and lower carbon footprint for the A-WINEP proposal.

Table 4-3: Bristol Avon WINEP and A-WINEP comparison

	P Load Removed (T/yr)	Capex (£m)	Opex (£m/yr)	Embodied Carbon (TCO_2e)	Operational Carbon (TCO_2e/yr)
WINEP	51.6	260	6.7	20,400	1,700
A-WINEP	51.3	230	6.4	19,200	1,500

5. Summary

This paper details an alternative approach to achieving equivalent levels of phosphorus reduction in the Bristol Avon catchment, as the current regulatory requirements at lower cost and environmental impact.

This alternative approach delivers an equivalent level of phosphorus reduction as required by the WFD in PR24. However, this is achieved at a sub-catchment rather than waterbody level as required by current WINEP guidance. Our proposal delivers 51.3tpa phosphorus load reduction at a reduced capital and carbon cost, £30m and 1,000TCO_{2e}, respectively. In addition, this approach enables the use of nature based solutions at a limited number of sites providing further environmental benefits including increased biodiversity, and greater reductions of nitrogen, emerging contaminants and bacterial than traditional phosphorus removal technologies.

This proposal is rooted in the empirical evidence gained through the ongoing Bristol Avon catchment permit which has been operational for 8 years. We have demonstrated the environmental benefits achieved through this approach and the permitting system. The permitting system enables enforcement action for under delivery, providing the environment and customers with robust protection should we fail to deliver.

These alternative approach does not require changes to primary legislation, only current EA or Defra guidance with respect to achieving WFD targets at sub-catchment rather than waterbody level. It is intended that the improvements required are captured in an updated OTA for the Bristol Avon, as has been the case in previous AMP rounds.

We feel that this alternative approach achieves the water quality reductions required at a lower carbon and environmental cost, and fulfils the intentions set out by Government in the Plan for Water.

Document control

Wessex Water reference number: TBC

Document revisions

No	Details	Lead contact	Date
1	Final version submitted to EA (Anne Dacey)	Matt Greenfield	31/07/2023
2			
3			

Appendix A. Bristol Avon OTA

Please note: this is the current version of the OTA, and incorporates changes agreed with the EA, such as the inclusion of AMP7 permits.
This operating techniques agreement is referenced and enforced through conditions 2.3.1 and 2.3.2 in each of the permits listed in Table 2.

Official

Bristol Avon Catchment Permitting for Phosphorus Operating Techniques Agreement Document

Operating techniques agreement document reference number

BA OTA1

Revision log

Revision Number	Details	Date
Version 1	Original document	11/02/2016
Version 2	Update to baseload calculations, amendments to sites and modification to text	16/05/2018
Version 3	Update to load reduction calculations, updated to 2 significant figures, amendments to sites and modifications to text	14/09/2022

Sign off

Name	Role	Organisation	Signature	Date
Emma Baker	Deputy Director	Environment Agency	Emma J. Baker.	14/09/2022
Matt Wheeldon	Director of Asset Strategy and Compliance	Wessex Water Services Limited	M Wheeldon	01/09/2022

Technical Note

Official

Background

The Environment Agency and Wessex Water (the Operator) have worked together to develop a catchment permitting approach to the regulation of phosphorus (P) in sewage discharges to the Bristol Avon river catchment. The aim of this scheme is to achieve a target catchment annual P load reduction in the Operator's discharges to the river in a way that passes Water Framework Directive (WFD) cost benefit assessment. The overall aim is to achieve more improvements in water quality compared to the conventional permitting approach which was shown to fail WFD cost benefit assessment.

Normally tighter permit limits require investment in improved treatment at each Water Recycling Centre (WRC) to ensure that permit limits are achieved and to reduce the risk of non-compliance. However, in this approach the compliance risk will be spread across a number of WRCs. Whilst investment in improved treatment will be required at some WRCs, by utilising over performance, tighter 'targets for annual total phosphorus (TP) load reduction can be applied to and achieved at other WRCs without the need for additional capital investment. In this way the Operator aims to achieve an overall increased annual TP load reduction in the Bristol Avon river catchment.

These operating techniques are implemented through conditions 2.3.1 and 2.3.2 in each of the permits listed in Table 2.

25 WRCs are required to collectively achieve a target annual TP load reduction. This is shown in Table 1. Each WRC has been set a target TP load reduction as a proportion of this total. These are shown in Table 2 (Highlighted in ***Bold Italics***). 2 of the WRCs require a tightening of existing stretch targets by 22/12/2021 (Radstock WRC) and 31/03/2022 (Trowbridge WRC). Permit limits will also be applied to Rowde WRC and Rode WRC from 31/03/2022. Therefore, a phased approach to target catchment annual TP load reductions has been set out in Table 1.

Table 2 also includes 42 other WRCs that contribute TP load to the catchment which will not be operated to achieve a target annual TP load reduction but are expected to maintain their respective baseline annual TP loads as specified in Table 2.

This operating techniques document is divided into the following sections:

1: Calculation of the baseline TP load from the Operator's WRC in the Bristol Avon river catchment
2: The target discharge TP load reduction in the Bristol Avon river catchment
3: Apportionment of load to the individual WRC in the Bristol Avon river catchment
4: Monitoring of discharge TP and discharge flow in the Bristol Avon river catchment
5: Calculation of annual TP load from WRC for the Bristol Avon river catchment
6: Compliance assessment and reporting of WRC in the Bristol Avon river catchment
7: Discharge flow increases and decreases in the Bristol Avon river catchment

Technical Note

Official

1: Calculation of the baseline TP load from the Operator's WRC in the Bristol Avon river catchment

A baseline TP load of 133.49 tonnes per annum was calculated to be contributing to the Bristol Avon catchment from WRCs as follows:

Baseline load A = permit dry weather flow * 1.25 (default) * permit P concentration

Where there is no permit P limit:

Baseline load B = permit dry weather flow * 1.25 * 2016 measured annual average P concentration.

Total Baseline Load = Baseline Load A + Baseline Load B

2: The target discharge TP load reduction in the Bristol Avon river catchment

The target load reduction shall be phased to account for WRCs which have planned improvements. This is set out in Table 1 below.

Table 1

Compliance Year	TP load contribution from WRC (tonnes/year)	Target catchment annual TP load reduction (tonnes/year)
Baseline	133.49	N/A
2022	87.80	45.66
2023 onwards	86.68	46.77

Figures in this table may not add up exactly due to rounding to 2 decimal places.

Official

3: Apportionment of load to the individual WRC in the Bristol Avon river catchment

Table 2 below, shows the apportionment of the catchment load to individual WRC in the Bristol Avon river catchment and should be used for compliance assessment.

Table 2

			Baseline 2016		Targets				
Permit Number	**WRC Site Name**	**Permit DWF x 1.25 (Ml/d)**	**Permit TP concentration or measured concentration (mg/l)**	**Baseline annual TP load (tonnes/year)**	**Target annual TP load (tonnes/year)**	**Target annual TP load reduction (tonnes/year)**	**Stretch target TP concentration (mg/l)**	**Permit TP concentration limit (mg/l)**	**Compliance Year**
102272	***BATH (SALTFORD)***	33.75	1.00	12.32	9.86	2.46	0.8		
011987	BECKINGTON	0.43	5.04	0.79	0.79	0.00			
102735	***BOWERHILL***	2.73	2.00	1.99	0.50	1.49	0.5		
010528	BOX	0.73	4.27	1.13	1.13	0.00			
102190	***BRADFORD ON AVON***	3.77	2.00	2.75	1.92	0.82	1.4		
012129	BRINKWORTH	0.28	4.83	0.50	0.50	0.00			
103731	***CALNE***	5.85	2.00	4.27	1.07	3.20	0.5		
102712	CAM VALLEY	2.19	6.00	4.79	4.79	0.00			
102937	***CHEW STOKE***	4.00	2.00	2.92	1.46	1.46	1		
102218	***CHILCOMPTON***	0.53	1.50	0.29	0.15	0.14	0.8		
101637	***CHIPPENHAM***	12.50	2.00	9.13	2.74	6.39	0.6		
010265	COLEFORD	0.66	4.52	1.08	1.08	0.00			
102713	COLERNE	0.83	6.83	2.06	2.06	0.00			
102943	COMPTON BASSETT	0.75	4.34	1.19	1.19	0.00			
010024	COMPTON DANDO	0.11	5.10	0.21	0.21	0.00			
102219	CRANMORE STW	0.12	3.91	0.17	0.17	0.00			
102172	***DEVIZES***	2.75	2.00	2.01	1.30	0.70	1.3		
010031	DIDMARTON	0.18	6.11	0.39	0.39	0.00			

Official

			Baseline 2016		Targets				
Permit Number	WRC Site Name	Permit DWF x 1.25 (Ml/d)	Permit TP concentration or measured concentration (mg/l)	Baseline annual TP load (tonnes/year)	Target annual TP load (tonnes/year)	Target annual TP load reduction (tonnes/year)	Stretch target TP concentration (mg/l)	Permit TP concentration limit (mg/l)	Compliance Year
102816	DOYNTON	0.11	4.11	0.16	0.16	0.00			
011348	EAST HARPTREE	0.08	6.88	0.20	0.20	0.00			
010034	EDFORD	0.46	4.84	0.81	0.81	0.00			
103629	***ERLESTOKE***	0.22	1.50	0.12	0.06	0.05	0.8		
102858	FARMBOROUGH	0.36	5.43	0.71	0.71	0.00			
010037	FRESHFORD	0.58	7.04	1.48	1.48	0.00			
102222	***FROME***	10.31	2.00	7.53	4.89	2.63	1.3		
010039	GREAT BADMINTON	0.18	4.29	0.27	0.27	0.00			
102840	GREAT SOMERFORD	0.22	4.09	0.33	0.33	0.00			
102344	HILMARTON	0.15	5.56	0.30	0.30	0.00			
101441	HULLAVINGTON	0.31	4.80	0.55	0.55	0.00			
010047	KEEVIL	0.99	5.53	2.01	2.01	0.00			
102362	***KEYNSHAM***	4.00	2.00	2.92	1.90	1.02	1.3		
011342	LACOCK	0.21	4.79	0.37	0.37	0.00			
101440	LAVINGTON (WOODBRIDGE)	1.52	4.95	2.74	2.74	0.00			
010053	LEIGH ON MENDIP	0.11	7.95	0.31	0.31	0.00			
010054	LONG DEAN	0.26	5.09	0.49	0.49	0.00			
102361	***MALMESBURY***	3.96	2.00	2.89	1.45	1.45	1		
102728	MARSHFIELD	0.37	7.08	0.94	0.94	0.00			
101886	***MELKSHAM***	6.25	1.70	3.88	2.74	1.14	1.2		
010059	MELLS	0.11	6.61	0.26	0.26	0.00			
103269	NORTON ST PHILIP	0.39	5.05	0.73	0.73	0.00			
103453	NUNNEY	0.42	4.41	0.67	0.67	0.00			

Technical Note

Official

			Baseline 2016		Targets				
Permit Number	WRC Site Name	Permit DWF x 1.25 (Ml/d)	Permit TP concentration or measured concentration (mg/l)	Baseline annual TP load (tonnes/year)	Target annual TP load (tonnes/year)	Target annual TP load reduction (tonnes/year)	Stretch target TP concentration (mg/l)	Permit TP concentration limit (mg/l)	Compliance Year
011557	OAKHILL	0.38	8.29	1.13	1.13	0.00			
102988	***PAULTON***	2.82	2.00	2.05	1.03	1.03	1		
102629	***POTTERNE***	3.76	2.00	2.75	1.51	1.24	1.1		
010071	PUCKLECHURCH	0.69	5.44	1.37	1.37	0.00			
102630	***RADSTOCK***	7.48	2.00	5.46	1.91	3.55	0.7		
100854	***RAF LYNEHAM***	1.70	2.00	1.24	0.62	0.62	1		
011560	***RODE***	0.29	6.27	0.66	0.32	0.34		2	2022
					0.21	0.45			2023 (onwards)
101462	***ROWDE***	1.51	4.46	2.45	0.81	1.65		0.5	2022
					0.27	2.18			2023 (onwards)
102715	***SEEND***	0.26	2.00	0.19	0.10	0.08	1.1		
011559	SHERSTON	0.28	2.56	0.26	0.26	0.00			
010080	SHOSCOMBE	0.63	8.31	1.91	1.91	0.00			
102755	SOUTH WRAXALL	0.09	4.10	0.13	0.13	0.00			
012549	STANTON DREW	0.38	7.69	1.08	1.08	0.00			
011558	STRATTON ON FOSSE	0.40	7.36	1.08	1.08	0.00			
010083	***SUTTON BENGER***	2.46	3.00	2.69	1.79	0.90	2		
102818	***TETBURY***	1.50	2.00	1.10	0.27	0.82	0.5		
102328	***THINGLEY***	4.69	2.00	3.42	2.05	1.37	1.2		
102153	***TROWBRIDGE***	17.50	2.00	12.78	3.66	9.11	0.8		2022
					3.19	9.58	0.5		2023 (onwards)

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Technical Note

Official

			Baseline 2016		Targets				
Permit Number	WRC Site Name	Permit DWF x 1.25 (Ml/d)	Permit TP concentration or measured concentration (mg/l)	Baseline annual TP load (tonnes/year)	Target annual TP load (tonnes/year)	Target annual TP load reduction (tonnes/year)	Stretch target TP concentration (mg/l)	Permit TP concentration limit (mg/l)	Compliance Year
101668	URCHFONT	0.37	6.80	0.92	0.92	0.00			
010092	WELLOW	0.17	6.63	0.41	0.41	0.00			
101652	WESTBURY	8.59	2.00	6.27	6.27	0.00			
011563	WICK	0.46	6.88	1.15	1.15	0.00			
102718	WINSLEY	0.54	8.53	1.67	1.67	0.00			
100673	***WOOTTON BASSETT***	3.65	2.00	2.66	0.67	2.00	0.5		
		Total 2022		**133.49**	**87.80**	**45.66**			
		Total 2023 (onwards)		**133.49**	**86.68**	**46.77**			

Sites listed in ***BOLD ITALICS*** are relevant to section 5 below calculation of annual P load for the Bristol Avon river catchment
WRC with a population equivalent (PE) less than 250 have been excluded from this OTA.

Figures in this table may not add up exactly due to rounding to 2 decimal places.

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Official

4: Monitoring of discharge TP and discharge flow in the Bristol Avon river catchment

Discharge flow monitoring
The Operator shall monitor discharge flow for the WRCs listed in Table 2 above in accordance with their permit conditions.

Discharge P concentration monitoring
The Operator shall monitor discharge TP concentrations as daily (24 hour) composite samples according to the sampling frequencies set out in Table 3 below.

The number of samples required in each calendar year, as set out in Table 3 below must be taken within each calendar year.

The Operator shall provide an annual pre-scheduled sampling programme for each WRC set out in Table 3 below, before the end of November each year. Samples must be pre-programmed and collected at regular and randomised intervals throughout the year. Regular and randomised means approximately equal intervals during the year and includes samples from different days of the week. Sample events that end on Saturday or Sunday are counted as weekend samples and must account for 10% of the overall sampling programme.

Samples shall be treated and analysed in accordance with Condition 3.3.3 in each of the permits listed in Table 3 below. The Operator shall record the date and time of each sample.

The Operator shall ensure that monitoring shall be ongoing and sample frequency shall be unchanged at sites with target annual TP load reductions and sites with a permitted DWF*1.25 greater than 1Ml/d.

Table 3

Permit number	Site name	Sampling frequency (annual)
102272	BATH (SALTFORD) WRC	24
102735	BOWERHILL WRC	12
102190	BRADFORD ON AVON WRC	12
103731	CALNE WRC	12
102712	CAM VALLEY WRC*	12
102937	CHEW STOKE WRC	12
102218	CHILCOMPTON WRC	12
101637	CHIPPENHAM WRC	24
102172	DEVIZES WRC	12
103629	ERLESTOKE WRC	12
102222	FROME WRC	24
010047	KEEVIL WRC*	12
102362	KEYNSHAM WRC	12
101440	LAVINGTON (WOODBRIDGE) WRC*	12
102361	MALMESBURY WRC	12
101886	MELKSHAM WRC	12
102988	PAULTON WRC	12
102629	POTTERNE WRC	12
102630	RADSTOCK WRC	24
100854	RAF LYNEHAM WRC	12
011560	RODE WRC	12
101462	ROWDE WRC	12

Permit number	Site name	Sampling frequency (annual)
102715	SEEND WRC	12
010083	SUTTON BENGER WRC	12
102818	TETBURY WRC	12
102328	THINGLEY WRC	12
102153	TROWBRIDGE WRC	24
101652	WESTBURY WRC*	12
100673	ROYAL WOOTTON BASSETT WRC	12

WRC's marked with a * are included within the monitoring plan as these WRC's have a permitted DWF*1.25 greater than 1Ml/d. They are not included within compliance assessment but monitored in accordance with this section for audit purposes.

All sites are required to have 12 compliance samples per year, this is increased to 24 per year for sites with a population equivalent greater than 25, 000.

Monitoring reporting

The Operator shall provide the TP concentration from the 24 hour composite sample and total daily volume [1] discharged for each sampling occasion, within 28 days of sampling to the Environment Agency.

5: <u>Calculation of annual TP load from WRC for the Bristol Avon river catchment</u>

The Operator shall calculate the annual TP load discharged for the Bristol Avon river catchment. This shall be calculated as follows:

For each WRC marked in *ITALICS* in Table 2 above:

1. Multiply the TP concentration from the 24 hour composite sample by the total daily volume discharged over the same 24 hour period to obtain the daily load for the sampling day.

2. Calculate the sum of the daily loads for the calendar year and divide by the number of sampling days to obtain the mean daily load for the WRC.

3. Multiply the mean daily load by 365 to obtain the mean annual load (kg/year).

4. Divide the mean annual load by 1000 to achieve mean annual load (tonnes/year).

For the catchment load:

1. Calculate the sum of the mean loads derived in step 4 above.

2. Add the baseline load data from the non bold italic sites listed in Table 2 above.

[1] Total daily volume shall be calculated from the average of the available 15-minute flow readings taken from midnight to midnight where:
Total daily volume (m3) = (sum of readings (l/s) / number of readings) x (86,400 (s) / 1000)

6: Compliance assessment and reporting of WRC in the Bristol Avon river catchment

TP and flow limits set out in Schedule 3 Table S3.1 of each of the permits must be complied with and any failure of these shall be subject to normal enforcement procedures.

These operating techniques agreement is referenced and enforced through conditions 2.3.1 and 2.3.2 in each of the permits listed in Table 2 above.

Target Catchment Annual TP Load Reduction Compliance

At the end of each calendar year the target catchment annual TP load reduction shall be calculated by subtracting the catchment load calculated in section 5 from the baseline load shown in Table 1 above, for the appropriate calendar year.

The Operator shall be compliant with these operating techniques if the calculated catchment annual TP load reduction equals or exceeds the target catchment annual TP load reduction shown in Table 1 above, for the appropriate calendar year.

The Environment Agency shall assess and verify the Operator's reported calculations and explanations; to confirm if compliance has been achieved.

Where the Operator is compliant with the target catchment annual TP load reduction shown in Table 1 above for the appropriate calendar year, all of the WRC listed in Table 2 above shall be considered as compliant with their individual 'Target annual TP load reduction (tonnes/year)' as set out in Table 2 above.

In the event that the catchment annual TP load reduction as calculated above is less than the 'Target catchment annual TP load reduction (tonnes/year)' shown in Table 1 above, in a given year, each WRC not achieving their individual 'Target annual TP load reduction (tonnes/year)' shown in Table 2 above, in that year, shall be reported as non-compliant with this operating techniques agreement.

Reporting compliance

For each calendar year the Operator shall report compliance against the target catchment annual TP load reduction (tonnes/year) shown in Table 1 above, within 28 days of the end of the calendar year.

In the event of non-compliance with the target catchment annual TP load reduction shown in Table 1 above, the Operator shall investigate the reasons that individual WRCs did not achieve their 'Target annual TP load reduction' shown in Table 2 above, and report these to the Environment Agency within 28 days of notification of non-compliance with the catchment load target.

Failure to report compliance assessment within 28 days of the end of the calendar year shall be reported as a non-compliance with the operating techniques agreement.

Monitoring Compliance

The Operator shall be non-compliant with this operating techniques agreement if the annual sampling programme is not in accordance with the requirements set out in section 4 above.

If the result for a sample cannot be reported, the operator shall record the details and reschedule the sample within the same calendar year. A full explanation shall be provided by the operator, within 28 days of the end of the calendar year, if it is not possible to reschedule the sample. If the Environment Agency is satisfied with the explanation, then compliance assessment shall be based on the available samples. If the Environment Agency is not satisfied with the explanation, then the WRC shall be non-compliant with its monitoring requirements, as set out in section 4 above, and compliance assessment shall be based on the available samples.

7: Discharge flow increases and decreases in the Bristol Avon river catchment

In the event of a permit change for effluent dry weather flow increase in the catchment, proportional tightening of the backstop limit set out in Table S3.1 of each of the permits shall be applied to maintain a standstill load. A proportional tightening of the target annual TP load reduction would also be required. The required reduction could be applied entirely to the WRCs with the flow increase, across the catchment or a combination of these.

In the event of a permit change for effluent dry weather flow decrease in the catchment, normal permitting procedures should be applied to review the backstop limit set out in Table S3.1 of each of the permits. A proportional relaxation of the target annual TP load reduction would be considered.

A4-1.2. WINEP Profiling

In recognition of concerns regarding deliverability, financeability, and affordability of PR24 business plans, the EA wrote to companies in July 2023 – with direction from the Secretary of State – with an opportunity for companies to undertake a WINEP and Water Resources Management Plan (WRMP) phasing exercise, and particularly to identify whether any elements in each company's WINEP or WRMP could be phased from PR24 into future price review periods.

Our report as submitted to the EA is included on the following pages.

WINEP and WRMP phasing exercise

1. Introduction

In recognition of concerns regarding deliverability, financeability, and affordability of PR24 business plans, the Environment Agency (EA) wrote to companies on 5 July 2023 with an opportunity for companies to undertake a WINEP and WRMP Phasing Exercise, and particularly to identify whether any elements in each company's WINEP or WRMP could be phased from PR24 into future price review periods.

We believe that our PR24 WINEP and WRMP plans are ambitious and affordable. The programme is incredibly large – our WINEP alone is 50% bigger than our entire capital programme in any previous price review period. This is before any work to reduce leakage, roll out smart metering, build capacity for population growth, or capital maintenance. Whilst this will lead to significant bill increases, we will ensure bills are affordable to all by expanding our industry-leading affordability schemes to ensure no customers are in water poverty.

There are, however, significant risks around deliverability, particularly in the context of our wider PR24 business plan and associated UK-wide supply chain risks.

1.1 PR24 Environment Programme

Defra's Strategic Policy Statement (SPS) [published March 2022] to Ofwat set out the UK government's priorities, including environmental priorities, for Ofwat's regulation of the water sector in England. The water industry is developing business plans to inform Ofwat's price review for 2024 (PR24), for 2025-30 (and beyond).

The Water Industry Strategic Environmental Requirements (WISER) [published May 2022] was issued jointly by the Environment Agency and Natural England. It describes the environmental, resilience and flood risk obligations that water companies must take into account when developing their business plans. The WISER particularly has a focus on considering enhancements that go beyond the statutory minimum where there is customer support and wherever possible identify opportunities for working in partnership in order to achieve wider benefits.

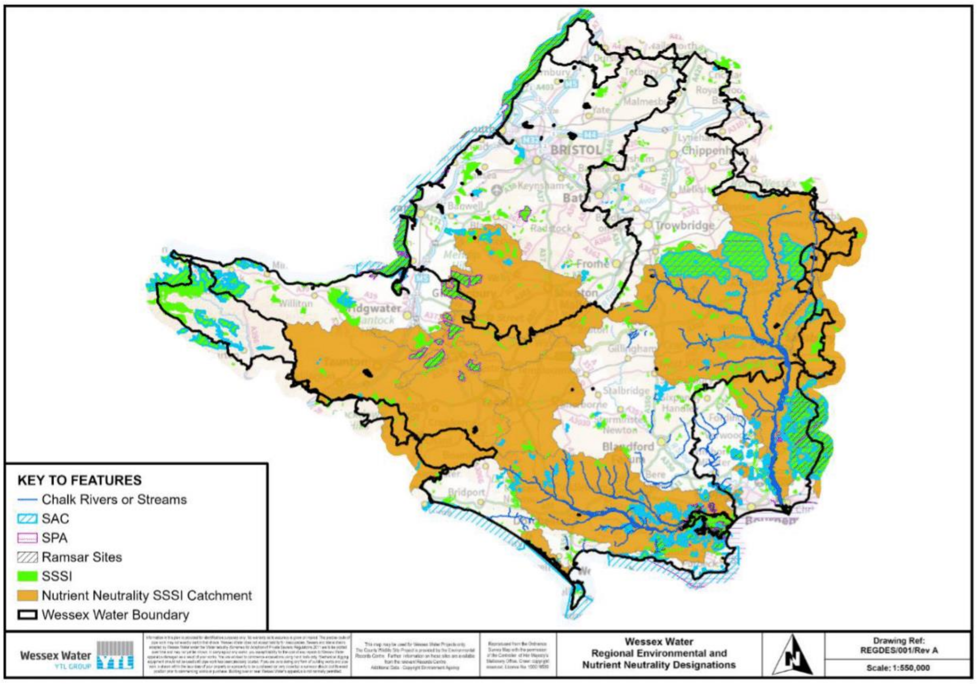
The Water Industry National Environment Programme (WINEP) is developed collaboratively between water companies and regulators, to identify specific environmental measures that water companies need to take to meet their environmental legislative requirements and related government priorities (as set out in SPS and WISER). These measures may be investigations, monitoring, options appraisals, or schemes to improve and protect the environment.

The WISER categorises environmental expectations of water companies as:

- Statutory obligations (S) – While it is important to understand the costs and benefits of measures needed, these statutory obligations must still be achieved.
- Statutory plus obligations (S+) – In cases where action is considered disproportionately expensive to meet statutory plus obligations, alternative objectives, or timescales to meet them may be set.
- Non-statutory requirements (NS) – Water companies should demonstrate that there is an environmental requirement and customer support and that such investments provide best value for customers over the long term.

We are proud that over 50% of our region has some form of environmental designation, as shown in Figure 1-1. Indeed, 43% of our region – proportionally more than any other English water company – falls within a nutrient neutrality catchment. Watercourses and land holdings in these areas are required to meet higher environmental standards, and we continue to be ambitious in seeking the best way to achieve this.

Figure 1-1: Environmental designations within the Wessex Water region



These environmental designations do, however, mean that a significant proportion of our WINEP is subject to Statutory (or Statutory+) drivers and, whilst we welcome the opportunity to consider phasing, a significant majority are unable to be phased beyond PR24, based on current legislation, regulations and guidance.

2. WINEP Phasing Exercise

Our 3 July 2023 snapshot of WINEP has a total of 824 action lines, comprising a total of 1,396 components.

Whilst the majority of action lines have a single component, a number have multiple that combined will satisfy the requirements of the action, in particular:

- 08WW101000 - EnvAct_INV4 – 370 components
  Investigations to reduce storm overflow spills to protect the environment so that they have no local adverse ecological impact.
- 08WW101001 – EnvAct_IMP3 – 23 components
  Improvements to reduce storm overflows that spill to designated bathing waters to protect public health.
- 08WW101002 – EnvAct_IMP2 and EnvAct_IMP4 – 125 components
  Improvements to reduce storm overflow spills so that they do not discharge above an average of 10 rainfall events per year by 2050.

The following sections contain elements within the WINEP where we believe that there is an opportunity for phasing into PR24 – either partially or fully – within the constraints as stipulated in the letter. The appropriate extract is included at beginning of every section.

We have also included sections on Storm Overflows and Continuous Water Quality Monitoring. Whilst not included within the letter, subsequent discussions with Defra have confirmed that the only fixed requirements are statutory targets within the Environment Act or Storm Overflow Discharge Reduction Plan (SODRP), with any interim targets considered non-statutory. Deferral in these areas provides some but not full mitigation to deliverability risk.

2.1 Abstraction licence changes

Water companies should meet their legal requirements on abstraction and consider phasing additional activity to future price reviews. For example, where there is uncertainty about abstraction changes needed for environmental improvements or avoiding deterioration, water companies should gather the evidence required to assess what abstraction changes are needed to improve the environment and what are the effective solutions for this.

Summary

We do not foresee a deliverability risk for WINEP actions in this area, and support delivery of all these schemes in AMP8.

Need for Investment

The hydrological regime drivers relate to actions to protect and improve the hydrological regime of water bodies to meet objectives as set out in accordance with Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The hydrological regime is a supporting element for a water body to achieve good ecological status. The impact of abstraction pressures on the hydrological regime can mean that the flow in a water body is not sufficient to be supporting good ecological status. The hydrological regime in surface waters is an essential factor determining the creation, function and health of habitats and the protection of the ecology they support.

WINEP lines for potential phasing

Our PR24 WINEP contains 18 actions (with 27 components) covering a range of WRFlow investigations or improvements.

We do not support deferring any investigations. We have the following No Deterioration or Improvement actions, for completion by 31/03/2030:

- 08WW100043 Sherston Avon flow adaptations (WFD_IMP_WRFlow)
  - Amend river augmentation regime (Stanbridge Stream support)
- 08WW100086 Dunkerton Springs daily licence reduction (WFD_ND_WRFlow)
  - Implement outcome of AMP6 investigation: reduce daily licence
- 08WW100089 Otterhead licence reduction (WFD_ND_WRFlow)
  - Reduction in daily abstraction licence at Otterhead.
- 08WW100051 Cannington Brook flow adaptations (WFD_IMP_WRFlow)
  - Implement outcome of AMP6 investigation and following AMP7 trial – site flow adaptations to improve hydrological connectivity.
- 08WW100094 Middle Bristol Avon WFD ND implementation (WFD_IMP_WRFlow)
  - Implement the recommendations of the AMP7 investigations.

We support delivery of all these schemes in AMP8.

2.2 Monitoring emergency overflows at pumping stations

Government is clear that it is essential that companies prioritise investment in reducing overflow discharges directly. Water companies should target monitor installation at high-risk sites during PR24 and phase other installations over future price reviews.

Summary

We propose deferral of 75% of the installations, and the prioritisation of the 25% in AMP8 to be at high-risk sites. This will improve deliverability risk, as well as improved scope/cost certainty for those being delivered in AMP9.

Need for Investment

The U_MON6 driver to monitor the duration and frequency of emergency overflow operation to MCERTS standards aligns with Environment Act 2021 requirements to monitor and report on the operation of storm overflows. Given the importance and potential impact of discharges of crude sewage from emergency overflows during dry weather, monitoring to MCERTS standard is required to improve the accuracy of the reported data. This will improve understanding of emergency overflow operation and improve transparency and public confidence in the data. At pumping stations that have emergency overflows and storm overflows, there is also a requirement to monitor the pass forward flow to MCERT standard.

WINEP lines for potential phasing

Our PR24 WINEP contains 5 action lines for the U_MON6 driver, 4 covering different possible solution types and one for a small number of permit only sites. The supporting spreadsheet ‘WSW EOs MCERTS EDM Site List’ details the individual sites and their respective solution.

Table 2-1: WINEP action lines included for U_MON6

Action ID	U_MON6 SubGroup	No. of Overflows	Assumed Solution Type
08WW101010	U_MON6a MCERTS EDM only	193	116
08WW101011	U_MON6b MCERTS EDM and civils		77
08WW101012	U_MON6c MCERTS EDM and MCERTS pass forward flow monitor	391	59
08WW101013	U_MON6d MCERTS EDM and MCERTS pass forward flow monitor and civils		332
08WW101014	U_MON6e Permit change only	23	23

It should, however, be noted that this driver was only added to the WINEP list of drivers in October 2022, with a request to include in our January 2023 WINEP submission proposals. In the absence of individual site surveys (which has not been possible given the timeframe) we cannot establish whether Civils are required at individual sites. In the spreadsheet we include the worst case of all requiring Civils, but we are assuming a split based on our experience of installing EDM and PFF monitors, as follows:

- 60% of EDM installations likely to be EDM only (no civils)
- 40% of EDM installations likely to need civils
- 15% of pass forward flow monitor (PFF) installations likely to have no civils
- 85% of pass forward flow monitor (PFF) installations likely to need civils

Our phasing proposal is to deliver 25% in the 4 main installation categories in AMP8. All remaining sites would be surveyed in AMP8 ahead of installation in AMP9.

Potential deferral from AMP8: £21m.

2.3 Environment Act Phosphorus Target

Water companies should meet the Environment Act target to reduce nutrient pollution in water by reducing phosphorus loading from treated wastewater by 80% by 2038 and interim Environment Improvement Plan target for 50% by 2028. However, water companies should phase additional schemes, which are not required to meet targets.

<u>Summary</u>

We propose deferral of a single scheme in this area (with a potential saving in AMP8 of £1.8m), which will have almost no impact on deliverability risk. We still have significant concerns regarding deliverability of the whole phosphorus reduction programme as a result of the LURB.

<u>Need for Investment</u>

Increased concentrations of nutrients, including phosphorus and nitrogen, can lead to eutrophication, which causes excessive algae growth and damages the ecology of our rivers. Nutrients can enter our surface and groundwaters rivers from multiple sources, including Water Recycling Centres (WRCs) and storm overflows, animal urine and faeces in farm slurries, agricultural fertiliser, sewer misconnections, septic tanks, and private discharges.

There are many regulatory drivers for phosphorus reduction in PR24, the principal ones being:

- Water Framework Directive – Action taken by 2030 so that no river lake or estuary should be in poor or bad ecological status due to water company activities. All water bodies to achieve their water quality standards (typically 'Good Ecological Status') by 2027, where there is evidence of eutrophication and linked to water company activity, and unless already upgraded / being upgraded in AMP7 under a WFD_IMP driver. Any improvements to follow 'fair share' polluter pays principle.
- Habitats Directive – Designated sites to be in 'Favourable' condition by 2030.
- Environment Act – To reduce P from by 80% load reduction at WRCs by 2037, with an interim target of 50% load reduction by 2028.
- Levelling-up and Regeneration Bill – New statutory duty to upgrade WRCs ≥2,000pe to 'technically achievable limits' by 2030 in nutrient neutrality areas.

WINEP lines for potential phasing

As described earlier, a significant proportion of region has some form of environmental designation. Our WINEP contains 144 action lines for delivery in PR24 associated with phosphorus removal, however only one of these has a primary driver of EnvAct_IMP1 (08WW102117 Tockington WRC - Phosphorus Removal). All others are other primary drivers necessitating improvements in AMP8.

Other WINEP actions with a sole EnvAct_IMP1 driver for phosphorus have already been deferred to AMP9, and we propose similar for 08WW102117 Tockington WRC - Phosphorus Removal. This would offer a potential saving in AMP8 of £1.8m.

Our A-WINEP proposals submitted in January 2023 regarding phosphorus reduction were in recognition of the challenges and opportunities associated with timing and scope requirements particularly associated with the LURB. Despite our A-WINEP being rejected we have continued to explore alternative approaches. This includes most recently developing a sub-catchment permitted approach to meeting WFD targets in the Bristol Avon, and a catchment permitting approach to meet LURB targets in the Hampshire Avon, which could also see a phasing of delivery to meet actual housing demand.

We will, of course, look to deliver against this legislative requirement but the LURB target is excessively stretching and we have repeatedly suggested it is phased to meet actual housing demand, as well as being altered to allow for catchment and nature based solutions, which are currently prohibited. These actions would help to mitigate the overall delivery risk.

Potential deferral from AMP8: £1.8m.

2.4 Sludge management

Water companies should provide greater supply chain resilience through storage and de-watering solutions in PR24.

Summary

We do not foresee a deliverability risk for WINEP actions in this area, and support delivery of all these schemes in AMP8.

Need for Investment

The sewage sludge (biosolids) drivers (SUiAR) are aimed at delivering improvements in the resilience of the sludge management chain. This can be achieved by improved sludge management practices and the creation of suitably robust contingency measures.

Developing and utilising new and additional sludge treatment and management technologies and with better contingency plans to manage impacts of climate change and periods of supply chain disruption will better serve the continuous production of treated sludge (biosolids) that are beneficially supplied to farmers for spreading onto their agricultural land.

WINEP lines for potential phasing

We currently dispose 100% of our biosolids to agricultural land, and have a particularly high percentage of our catchment that is classed as environmentally sensitive. Multiple factors could all contribute to the reduction in available landbank. The only mitigation both to reduce the risk of supply chain resilience and allowable within the scope of the Statutory sludge driver is storage and/or de-watering. This aligns with our proposed solutions, and we are thus not proposing any sludge lines for phasing.

2.5 Septic tank investments

Water companies should schedule a number of their improvements into PR29.

Summary

Our septic tank improvement schemes provide minimal environmental benefit, and their deferral would improve deliverability risk in this area. There is a potential saving in AMP8 of £1m.

Need for Investment

The U_IMP7 driver requires that septic tanks that discharge to surface water are replaced or upgraded to secondary treated sewage effluent discharges to satisfy the requirements of Government Policy on small sewage discharges to surface waters and the Urban Wastewater Treatment Regulations (UWWTR). When the General Binding Rules and Rule 6 came into effect the ambition was for compliance to be achieved by 2020, however this did not align with the PR19 WINEP process, hence inclusion in the PR24 WINEP.

WINEP lines for potential phasing

Three septic tanks within the Wessex Water area discharge directly to surface water and satisfy the requirements for inclusion within the WINEP.

- 08WW100210 Ashwicke (Oakford Lane) WRC – Upgrade of septic tank
- 08WW100212 Dunwear WRC – Upgrade of septic tank
- 08WW100213 Lottisham (Fir Cottages) WRC – Upgrade of septic tank

These surface water discharge locations are located along watercourses and rivers, and this can lead to the water quality of this discharge environment being compromised.

Further details of these sites and options considered are contained with the following WINEP Options Development Report: *ODR – Septic Tanks*.

Each of these listed WRCs serve small populations, the largest being Dunwear serving a population equivalent of 14. Due to their small sizes none of the sites have flow measurement, however the following table summarises estimated flows for the WRCs and the receiving watercourses.

Table 2-2: Septic tank flow comparison

	WRC Flows (m³/d)		River Flows (m³/d)	
WRC	**Mean**	**Q90**	**Mean**	**Q95**
Ashwicke	1.4	1.1	26	7
Dunwear	2.7	2.2	809,000	162,000
Lottisham	1.9	1.5	111	21

*Dunwear discharges into the tidal Parrett. The flows provided is the sum of the Tone and Parrett.

In all cases, the WRC flows are very diluted by river flows. Any improvement at the WRCs will thus have negligible benefits on the quality of the receiving watercourses, and we thus we propose their deferral.

Potential deferral from AMP8: £1m.

2.6 Designated Bathing Waters

Refer to Section 2.10 for Storm Overflow improvements related to bathing waters.

Water companies should focus on improving those that are classified as 'poor' and 'sufficient' for PR24.

Summary
We do not foresee a deliverability risk for WINEP actions in this area (BW_ drivers), and support delivery of all these schemes in AMP8.

Need for Investment
The bathing water directive and regulations provide the framework for the management of the bathing waters in England. Bathing waters and the seaside economy are valuable economically, socially, and environmentally to this country.

WINEP lines for potential phasing
We have a single action in the WINEP with a bathing water driver:

- 08WW100014 Realtime water quality monitoring of amenity waters (BW_INV5)
    - Interest in bathing and recreational use of rivers is increasing throughout the region. Wessex Water (currently) have no designated inland bathing waters and none forecast for addition during PR24. This investigation will gather real time water quality data and make this available to recreational water users and other stakeholders to aid their decision making. The associated monitoring programme will be used to inform and prioritise potential improvements, particularly in the event of applications for new bathing water designations.

2.7 Drinking Water Protected Areas

Water companies should phase enhancement schemes on drinking water quality.

Summary
We do not foresee a deliverability risk for WINEP actions in this area, and support delivery of all these schemes in AMP8.

Need for Investment

The Drinking Water Protected Areas (DrWPA) driver seeks to prevent deterioration and/or improve water quality in surface water and/or groundwater sources, to mitigate against increases in the level of water purification treatment. Actions should address substances with the potential to impact drinking water treatment including wholesomeness. Schedule 1 of the Water Supply (Water Quality) Regulations 2016 lists the parameters, and the concentration of those parameters, which would constitute a potential danger to human health.

WINEP lines for potential phasing

12 actions lines in our WINEP have DrWPA_IMP (Statutory+) drivers, for delivery by 31/03/2030.

10 of these are for actions to reduce agricultural nitrogen loss (diffuse and point source), for high risk nitrate sites where nitrate modelling has shown trends are high and rising. Existing catchment measures are insufficient to reduce the trend, and we propose deeper and wider farmer engagement driven by renewed engagement by the EA. Previous levels of catchment management suggest that an enhanced approach may be more effective, and mitigate the risk of requiring additional water purification treatment.

1 action line (with 3 components) was related to Domestic Oil Storage Customer Campaigns in some of our surface water reservoir catchments, to reduce risk of drinking water source hydrocarbon contamination by domestic oil spills.

1 action was to reduce nitrogen levels in the final effluent from Collingbourne Ducis WRC, following an AMP7 investigation. This also has a WFDGW_IMP (Statutory+) driver.

We are thus not proposing any Drinking Water Protected Areas lines for phasing.

2.8 25 Year Environment Plan

Water companies should phase all non-statutory activities from PR24 into future price review periods.

Summary

We do not foresee a deliverability risk for WINEP actions in this area, and support delivery of all these schemes in AMP8.

Need for Investment

The 25YEP driver supports investigations and actions contributing to the government's 25 Year Environment Plan goals. The driver will help achieve the government's 25YEP ambition to leave the environment in a better condition for future generations as set out in the WISER.

WINEP lines for potential phasing

We have 6 actions/schemes with a 25YEP_IMP or 25YEP_INV driver for delivery by 31/03/2030, that we have included following consultation from a number of stakeholders and customer support. Two of these also have HD_IMP and SSSI_IMP drivers, and so have not been considered for any phasing. Listed below are the remaining 4 actions. We do not foresee a deliverability risk and support delivery of all these schemes in AMP8.

- 08WW100009 Wessex Water peatland management investigation (25YEP_INV)
  - The Wessex Water peat landholding is not well understood. This investigation involves undertaking a desktop survey of our landholdings and assess their management impacts on peat, to inform PR29.
- 08WW100012 Benefits of wetlands investigation (25YEP_INV)
  - The aim of this investigation is to quantify the benefit of wetlands created in PR19 through Wessex Water activity and provide a recommendation of an appropriate long-term monitoring programme to give an ongoing understanding of the performance of wetlands. The investigation will assess performance in terms of water quality, biodiversity net gain, ecosystem service change and carbon accounting.
- 08WW100036 Cam and Wellow Brook Partnership Project (25YEP_IMP)
  - This is a co-design and co-deliver Catchment Partnership Project led by Wessex Water and working with Local Authorities, academics and others to deliver WFD outcomes. The aim is to provide robust data and evidence into the current water quality and ecological status of the catchment and then, through a partnership approach, deliver actions to improve WFD status, improve river water quality and terrestrial habitats to meet 25YEP requirements, and extend the Chemical Investigation Programme (CIP) Innovative Pathway Control (IPC) work undertaken to date.
- 08MU100853 Stour Chalk Streams & Clay Vales (25YEP_IMP)
  - This is a co-design and co-deliver Catchment Partnership Project led by third party with Wessex Water support (financial and in-kind) and working with South West Water and others to deliver Drinking Water Protected Area improvements & WFD outcomes. The aim is to address known environmental pressures including sediment, pesticide and nutrient concentrations influencing abstraction water quality; winter high surface flows in the clay catchments causing flooding and summer low fluvial flows in the chalk catchments reducing climate resilience and potential for future water resources issues.

Further details of both the Cam and Wellow and Stour Chalk Streams and Clay Vales partnership projects are contained with the following WINEP Options Development Report: *ODR – Catchment Partnership Projects*.

2.9 Biodiversity

Water companies to phase general biodiversity driver actions or activities where the general duty in the Water Industry Act for biodiversity outcomes will be achieved through the Environment Act and Levelling-up and Regeneration Bill drivers.

Summary

We do not foresee a deliverability risk for WINEP actions in this area, and support delivery of all these schemes in AMP8. We are disappointed that government and regulatory ambition on biodiversity is being curtailed.

Need for Investment

Water companies have an existing duty to have regard to conserving biodiversity, which has been strengthened further as a result of the Environment Act 2021.

This driver can be used as a Statutory+ driver in the WINEP to deliver actions to respond to risks and issues for biodiversity related to water company operations, including to address their fair share of pressures that are impacting biodiversity.

WINEP lines for potential phasing

We have 12 actions/schemes with a NERC_IMP or NERC_INV driver.

Table 2-3: Action lines in the WINEP with a Biodiversity driver

Action_ID	Driver_Code_Primary	Action_Name
08WW100003	NERC_IMP	AMP8 Catchment Biodiversity Delivery Poole Harbour
08WW100062	NERC_IMP	AMP8 Catchment Biodiversity Delivery Shepherds Shore
08WW100063	NERC_IMP	AMP8 Catchment Biodiversity Delivery River Tone
08WW100064	NERC_IMP	AMP8 Catchment Biodiversity Delivery Divers Bridge
08WW100065	NERC_IMP	AMP8 Catchment Biodiversity Delivery Cherhill
08WW100066	NERC_IMP	AMP8 Catchment Biodiversity Delivery Goodshill
08WW100004	NERC_INV	Deans Farm Catchment Biodiversity Investigation
08WW100005	NERC_INV	Clatworthy Reservoir Feeder Streams Fish Investigation
08WW100069	NERC_IMP	Priority Habitats Restoration and Re-creation
08WW100070	NERC_IMP	Habitat improvements for swallows, swifts and martins
08WW100071	NERC_IMP	Sustainable Woodland Management
08WW100018	NERC_INV	Sustainable nutrient management to land investigation

6 of these (08WW100003, 08WW100062, 08WW100063, 08WW100064, 08WW100065 & 08WW100066) are to implement recommendations from AMP7 catchment biodiversity investigations

The other schemes are a mixture of investigations and improvements, as described below:

- 08WW100004 Deans Farm Catchment Biodiversity Investigation
  - Catchment biodiversity investigation of the S41 species and priority habitats of the Deans Farm source, near Salisbury, to inform PR29.
- 08WW100005 Clatworthy Reservoir Feeder Streams Fish Investigation and Options Appraisal
  - Walkover and electric fishing surveys to determine biodiversity, abundance and location of spawning reaches and nursery habitat in feeder streams and identify potential barriers to fish movement. Undertake options appraisal (where appropriate) to address barriers.
- 08WW100069 Priority Habitats Restoration and Re-creation
  - This project builds on the outcomes of the AMP6 baseline habitat mapping and opportunities assessment undertaken in AMP7 (7WW200707), by extending habitat restoration on lower grade land (non-priority habitats).
- 08WW100070 Habitat improvements for swallows, swifts and martins
  - Implementation of further sites from the AMP7 investigation (7WW200580) to improve bird habitat and nesting on more WRC land.
- 08WW100071 Sustainable Woodland Management
  - Implement a sustainable woodland management plan at a proportion of our woodland landholdings to improve biodiversity.
- 08WW100018 Sustainable nutrient management to land investigation
  - Review of land management practices of all landholdings (operational site or tenanted farms) to assess their impact on water quality.

We support delivery of all these schemes in AMP8.

2.10 Storm Overflows

Summary

We propose deferral of 48 of our storm overflow improvements, and 60% of the storm overflow investigations from AMP8 into AMP9.
We are proposing to defer 18 schemes at bathing waters of excellent or good water quality (as per the bathing water recommended deferrals in Section 2.6). The other 30 deferrals are either inland with low discharge counts, complex schemes that will be challenging to appraise, design and construct by 2030, and some low assumed impact sites. This will improve but not fully mitigate deliverability risk in this area.

The investigations deferrals are to allow us to focus on AMP8 urban pollution modelling appraisals first, before AMP9 investigations.

Need for Investment

Storm overflows are a fundamental part of our sewerage network. Their purpose is to prevent sewer flooding in properties by having these release mechanisms, to discharge excess sewage into the rivers or sea, rather than backing up into people's homes. We do, however, recognise and support the importance of reducing the frequency and volume of storm overflow discharges.

We have 1,300 storm overflows in the Wessex Water region. Approximately half will need improving by 2050.

The PR24 WINEP contains the action lines stated in Table 2-4.

Table 2-4: Action lines in the WINEP with an EnvAct Storm Overflow driver

Primary Driver	Description	Action ID	Number of Components (i.e. Sites) with Primary driver
EnvAct_INV4	Investigations to reduce storm overflow spills to protect the environment so that they have no local adverse ecological impact.	08WW101000	370
EnvAct_IMP2	Improvements to reduce storm overflow spills to protect the environment so that they have no local adverse ecological impact.	08WW101002	35
EnvAct_IMP3	Improvements to reduce storm overflows that spill to designated bathing waters to protect public health.	08WW101001	23
EnvAct_IMP4	Improvements to reduce storm overflows spills so that they do not discharge above an average of 10 rainfall events per year by 2050.	08WW101002	90
EnvAct_IMP5	Improvements to reduce storm overflow aesthetic impacts by installation of screens.	N/A	0 (secondary driver)

The installation of event duration monitors (EDMs) on the storm overflow network has provided a new evidence base that shows how often they operate, which can be used to make informed decisions regarding measures to reduce the frequency of storm overflow discharges.

The Environment Act storm overflow drivers have been developed to address new statutory requirements concerning storm overflow spill and impact reduction resulting from the Environment Act 2021 clauses on storm overflows and the Government's Storm Overflows Discharge Reduction Plan (SODRP).

The Environment Act 2021 clauses on storm overflows does not specify statutory reduction target dates for storm overflow improvements. We have, however, been verbally informed that the 2035 and 2050 targets should be considered as statutory although this has not been confirmed in writing.

The government's SODRP contains an "indicative trajectory of improvements" as shown in Table 2-5.

Table 2-5: Indicative trajectory of storm overflow improvements from SODRP

Year	2030	2035	2040	2045	2050
% of high priority site storm overflows improved	38%	75%	87%	100%	100%
% of total storm overflows improved	14%	28%	52%	76%	100%

WINEP lines for potential phasing

We have proposed to defer the following from AMP8 and phase into AMP9:

- 18 schemes at bathing waters that are classified good (2 No) or excellent (16 No) bathing water quality, as per guidance in the EA letter
- 10 schemes that are complex and will not be deliverable by 2030 if Urban Pollution Modelling (UPM) studies are required to determine no ecological harm
- 1 scheme at Lytchett Minster to align with the deferred Poole WRC upgrade
- 15 schemes that have low discharge counts or not expected to cause harm
- 4 non-high priority locations
- 222 investigations that currently have a 2027 target date, which are appraising potential AMP9 delivery schemes.

There are 23 storm overflow improvements at bathing water on the current WINEP. We are retaining on WINEP the 2 located at poor or satisfactory bathing waters. Of those discharging to good or excellent bathing waters, there are 3 storm overflows with a high discharge count, so we are also retaining AMP8 delivery (Chideock, Charmouth & Shore Road). We are proposing to defer the remaining 18 storm overflow improvements at good or excellent bathing water quality.

The WINEP currently contains 35 storm overflows that are groundwater induced, where we are proposing nature based solutions (wetlands) to treat these very dilute flows. We are keeping those on the WINEP24 to reduce the discharge hours we will be reporting on the EDM annual return once these are constructed. We do, however, await guidance from the EA that these will be permitted as continuous discharges before being able to make any firm commitment.

We are proposing to defer 30 inland storm overflow improvement schemes. 10 of these are large construction projects that have significant deliverability risk, especially if (as we should, to inform the design based on evidence of harm) we wait for the outcome of the investigations, which may not be available until 2027. The other schemes have low discharge counts (9), are not expected to cause harm (6 in Bristol), are located at non-high priority locations (4), and Lytchett Minster – to align with the deferred Poole WRC upgrade.

The 370 investigations currently on the WINEP, are a significant deliverability risk due to the requirements of Urban pollution modelling (UPM) investigations. Initially the Environment Agency indicated that 10% of overflows may need to have a UPM study. However, is now expected to be far higher due to new guidance and the large number of river reaches that are flat (eg. Somerset Levels and Moors) in the Wessex region.

We are proposing to defer the storm overflow investigations to align with the continuous water quality monitoring (CWQM), and prioritise the CWQM sites to align with the EnvAct_IMP2 requirements to assess no ecological harm.

Potential saving in AMP8: £254m.

2.11 Continuous Water Quality Monitoring

Summary

We are awaiting updated guidance from regulators about how continuous water quality monitoring (CWQM) should be implemented and note the briefing meeting on next steps arranged for 1st August. We are unclear how proposals we make are aligned with (or override) the forthcoming guidance.

We propose phasing of some AMP8 installations to AMP9, delivering a total of 25% of our sites in AMP8. This will improve but not fully mitigate deliverability risk, as well as improve scope/cost certainty for those being delivered in AMP9.

Need for Investment

Further to information garnered by the EDMs at storm overflows, gathering continuous water quality monitoring data will further improve the understanding of any impact from storm overflows and WRC discharges on the receiving environment, and help identify necessary improvement actions. Providing these data in near real time to the public will continue to improve the transparency of storm overflow operation.

The drivers have been developed to address new statutory requirements concerning storm overflow spill and impact reduction resulting from the Environment Act 2021 clauses on Storm Overflows and informed by the Defra "Consultation on the Government's Storm Overflows Discharge Reduction Plan – 31 March 2022"

WINEP lines for potential phasing

Due to the number of 'high priority' designations (Figure 1-1), under the current draft guidance Wessex Water will need to install 54% of monitors in AMP8, with the remainder in AMP9. We understand that Wessex Water has a high proportion of AMP8 installations when compared to other sewerage undertakers (as a proportion of asset base).

We have significant concerns about the deliverability of this programme of work due to the capacity of the supply chain to provide sensors, the land access requirements and ability of the relevant authorities to meet permitting requirements; factors that are largely out of our control.

We propose reducing the size of our programme significantly to improve deliverability. Capping at 25% of our assets in AMP8 will deliver approximately 50% reduction in totex compared to current guidance (Table 2-6). This will allow supply chain and permitting authorities to adapt across the industry (see below for further details). We are unable to comment on the capacity of the market to meet our proposal as this will be dependent on the demand for sensors from other sewerage undertakers (and more widely).

Table 2-6 Estimated reductions in AMP8 totex by reducing the CWQM programme.

Scenarios	Monitors (AMP8)	AMP8 Totex (£m)
As per guidance (54%)	1,400	£209
As per guidance capped at (40%)	1,041	£161
Capped at 25%	651	£101
Capped at 20%	520	£81

We have been active members of the Defra CWQM task group and have previously communicated concerns about affordability and deliverability of this programme, most recently via the consultation on draft guidance published in April 2023, upon which our PR24 plans are currently based.

The scenarios are based on a percentage of assets approach. We have previously made the following proposals about how the scale of this programme could be reduced:

- Re-profile by setting a lower cap on the minimum number of installations in AMP8 (draft guidance states 40%, although Wessex Water would need to install 54% due to the number of 'high priority' sites). This would:
    - Allow the sensor market to adapt to meet industry demand;
    - Lessen the immediate burden on supporting government sector services to approve installations (planning in local authorities, Environment Agency (flood risk permits etc), Natural England SSSI assent);
    - Lower the risk of installing 'redundant' or poorly placed assets installed through the programme. We would quickly understand which sites are likely to show an impact and more importantly those that will not, allowing a more informed programme to be rolled out in AMP9 and minimising the number of monitors installed that do not show an impact; and
    - Provide more time for the market to mature and to innovate, developing new technologies or approaches to monitoring and deliver a more efficient programme.
- Increase the number of exclusions in the guidance. For example by excluding permanently or at least delaying to AMP9:
    - Storm overflows that spill below a specified frequency. E.g., for storm overflows <10 or <5 spills per year and those that have never spilt.
    - Continuous discharges that have descriptive consents or those with population equivalents below a certain threshold (250 or 1000)

  Companies provided the above information to Defra at the end of 2022 although this appears to not have been included in the current guidance. Informed decisions could then be made on whether to install in AMP9 or change approach, based on performance of monitors installed in AMP8.
- Increase the distance between assets that can be considered a cluster and the cap on the number of assets included in a cluster.
    - Current guidance allows for two or more assets within 250metres of one another to be considered a cluster. This could be increased to 500 metres or 1000 metres.
    - The cap on the number of assets that can be considered to be within a cluster could be increased above the current 10.
- Removing the requirement to monitor at 15 minute frequency during storm overflow discharge event or event that effects the discharge from a water recycling

centre. This would reduce the operational costs of each unit, enabling more units to run off solar/non mains, and the frequency of sensor replacement and other consumables.

- Remove the requirement to install ammonium sensors in AMP8. This would decrease the capex (cost of the ammonium sensor) plus the opex (need to visit/calibrate every 4-6 weeks). Space could be left to accommodate sensor in the future (AMP9). In meantime, water companies could work with regulators to trial/develop proxy approach, using other parameters to infer ammonium. A lower number of ammonium sensors could be installed at a selection of representative or high-priority sites. This would also have the benefit of potentially opening the market to more providers.
- Alternative delivery approaches - moving away from the requirement to install pumped kiosks and their associated constraints (planning, land acquisition etc) e.g., using in-river and/or floating and tethered monitoring equipment.

Other aspects that could be considered but do not necessarily comply with the requirements of the Environment Act:

- Installing continuous water quality monitoring only at downstream locations. A decision on when (or if) to install upstream monitors could be made at a later date.
- Allowing installations to be temporary, establishing whether there is an impact and then either resolving via improvement action or demonstrating no improvement required. Equipment could then be redeployed elsewhere, reducing the amount of equipment deployed or in circulation at any one time.

We support the development and adoption of equipment standards across the industry and an accreditation scheme ahead of the programme-roll out. These are required to protect customers by ensuring that the installation of inadequate and substandard monitoring equipment is avoided.

Potential saving in AMP8: £108m.

3. WRMP Phasing Exercise

3.1 Summary

This document has been prepared in response to the Environment Agency's Information Letter: EA/17/2023 dated 5th July 2023 concerning Water Resources Management Plans (WRMP) and PR24 and whether there is any scope to delay investment in supply-side options in the first five years of our WRMP.

In summary, our plan is relatively insensitive to the three scenarios we have been asked to consider as our supply-demand balance deficit is primarily driven by the need to make significant licence changes in 2035 – the magnitude of which is much greater than the relative difference of the impact of the alternative planning assumptions considered in the scenario. The supply-side schemes that we are proposing to take forwards in AMP8 relate only to the design and development phases as part of our adaptive plan, to inform decision making in WRMP29 as to which schemes need to be taken forwards to construction and delivery in AMP9 to meet required licence changes. Further work in AMP8 on WINEP investigations will narrow down uncertainty in this need. If we don't take these schemes forwards to the design and development phase in AMP8 we risk not meeting the needs in the designated Hampshire Avon catchment, and therefore those of Wessex Water, as well as potentially the MoD and Veolia Water Services. There is however the potential to re-phase the demand management strategy proposed in our revised draft WRMP between AMP8 and AMP9, whilst still meeting licence change needs in 2035 and Defra DI targets in 2037-38.

The assessment presented below has been made using our revised draft WRMP data, and we have also liaised with South West Water and therefore the regional group in deriving these figures.

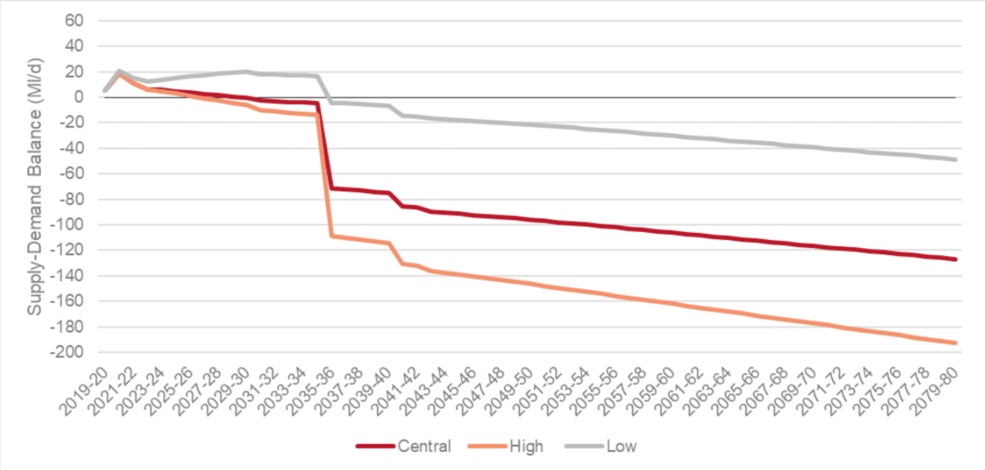
3.2 WRMP Supply-Demand Balance and Drivers

The baseline supply demand balance need is shown in Figure 1 for our Dry Year Critical Period (DYCP) planning scenario – the main driver for investment under the WRMP. We forecast a range of potential futures reflecting uncertainties in the drivers of investment and how they will evolve over time.

Under the core planning scenarios, our supply-demand balance declines gradually over time under all scenarios reflecting growing future demand associated with population growth. The main driver however affecting our supply demand balance is the reduction in available supplies due to statutory licence changes (WFD and HRA driven) that are required to protect the environment, which under our main scenarios come into effect from 2035-36, and leads to deficits of around 72 Ml/d and 108 Ml/d under our central and high scenarios, respectively.

The difference between these core scenarios primarily reflects the uncertainty in the actual volumes of licence changes that will need to be made to protect the environment, which depends on the outcomes of environmental investigations currently taking place, and those happening under the WINEP programme in AMP8.

Figure 1. Baseline supply demand balance for low, central and high scenarios



3.3 Preferred Adaptive Pathway to solving the supply demand balance (included in our revised draft WRMP)

A demand management strategy of smart metering and water efficiency for households and non-households as well as leakage reduction to meet the Defra DI reduction target by 2037/38 will meet the majority of our needs in 2035 under our central planning scenario, alongside additional supply-side schemes.

To be able to meet the needs under the high pathway, we will require more significant supply-side investment. The main uncertainty driving our planning needs in 2035 relates to uncertainty in the reductions needed to protect the environment, which depends on the outcomes of environmental investigations currently taking place, and those happening under the WINEP programme in AMP8. Given the short timescale to 2035 compared to the lead time of the supply side solutions, these supply side options need to be taken forwards in AMP8 for more detailed design and development such that by the time of our next WRMP in 2028, we can then make a decision within that plan as to which need to be progressed to delivery in AMP9 to meet needs in 2035.

3.3.1 Scenario 1– Alternative Climate Change Scenario

Our main central plan (see Figure 1) uses the RCP 8.5 50th percentile as the climate change scenario. Changing this to planning on the basis of the RCP 2.6 50th percentile would lead to an increase in the supply demand balance of 0.22Ml/d by 2030, 0.33Ml/d by 2050, and 0.5Ml/d by 2080.

This represents a very minor change to our overall supply demand balance, and in particular relative to the scale and magnitude of licence losses required to be met by 2035. Given the need to take supply side schemes forwards in AMP8 through design and development stage to meet these needs, no delay in investment required in the first five years of our plan (2025-2030) would be made as a result of adopting the alternative climate change scenario.

3.3.2 Scenario 2 – Alternative housing growth projections

In our central planning pathway, we have adopted the Office for National Statistics (ONS) principle forecast, with the Local Authority (LA) forecast used under the high scenario. We adopted this approach because the ONS forecast is more consistent with the historical housing growth we have experienced. However, our adaptive plan still ensures our plan could meet growth forecast by local authorities under the higher need scenario from 2025 as our final plan supply demand balance is in surplus under both scenarios.

Therefore, using ONS projections from 2030 and beyond would follow our central planning pathway, and so there would be no delay in investment required in supply-side options in the first five years of our plan as a result of adopting this as an alternative scenario, as we are already using this as our central planning scenario.

The main driver for supply options being taken forward in AMP8 to potentially meet the higher need scenario – which uses the LA forecasts – is abstraction licence reductions, which under the higher planning pathway is an additional 28 Ml/d versus the central planning scenario by 2035, compared to the difference in the demand as a result of LA forecast over ONS central forecast in 2035 of 8.5 Ml/d. Therefore, the LA forecast accounts for 23% of the additional need under the high scenario compared to the central scenario.

The options included in our plan to meet the 2035 need under the high scenario are being taken forwards to a design and development phase in AMP8, such that by WRMP29, once we have greater information on the magnitude of WINEP changes, we can then progress delivery of these schemes to construction and completion in AMP9.[1]

Of the schemes taken forwards to meet the need under the high scenario, two are being brought forward into AMP8 from the central pathway from delivery later in the planning period, and four are newer schemes required. The design and development costs of these schemes totals £7m and, as above, the majority of these are required to meet licence change needs. The main design and development costs related to a new scheme to import water from Bristol Water (15 Ml/d peak period, £3m AMP8 costs), as well as scheme development in the Hampshire Avon at Amesbury boreholes (4 Ml/d peak period benefit and £1.3m design and development costs). Given the scale of this cost relative to our overall business plan programme, there are no concerns about financing and delivery of these design and development phases.

We have also included in AMP8 other schemes taken forward for design and development from sensitivity analysis of our plan, should the proposed demand management savings not be achieved and also if some options to take forward to meet needs in the Hampshire Avon are not viable pending WINEP investigations in the next AMP on environmental feasibility.

Given the additional potential needs of Veolia Water Services and the Ministry of Defence in the region as well as our own, not taking the proposed schemes forwards in AMP8 through a design and development phase could jeopardise the delivery of licence reductions in the Hampshire Avon in 2035, if the needs in the catchment follow a higher need pathway.

An import in water from Bristol Water has been selected as part of a broader regional approach of Cheddar 2 being transferred to South West Water's supply area, and will improve interconnectivity in our region from areas of surplus in the Bristol Water area towards those areas in need in the designated Hampshire Avon catchments, which included Wessex Water's system as well as South West Water's Bournemouth WRZ. Therefore, given this need in the region, the option is a low regret activity.

[1] Any additional costs that may be required to meet these higher needs towards the end of AMP8 above the initial design and development cost we propose including as AMP9 transitional investment.

3.3.3 Scenario 3 – Supply-demand balance – delay meeting 1 in 500

Under our main planning scenarios shown in Figure 1, we meet 1 in 500 drought resilience from 2040-41 under all scenarios and meet 1 in 200 resilience from now until the change to 1 in 500 resilience in the plan.
The difference between the 1 in 200 and 1 in 500 drought resilience under the DYCP planning scenario is 6.51 Ml/d and 4.03 Ml/d under the Dry Year Annual Average (DYAA) forecast. This change in DO is relative to the main driver of our supply demand balance which is licence changes that will occur in 2035, ahead of the proposed 1 in 200 to 1 in 500 planning change.
The lead time of supply-side schemes selected in AMP8 is driven by the need to meet the 2035 licence changes. Therefore, there are no supply side schemes that would commence delivery in AMP8 that would be affected by a change in the timescales of meeting 1 in 500 drought resilience.

3.3.4 Demand management scenario

As identified above, the primary driver of supply-demand balance deficit is licence changes in 2034-35. Our revised draft WRMP proposes an approach to meeting this need with a demand management strategy comprising a sizeable smart metering roll out for households and non-households plus water efficiency for households and non-households as well as leakage reduction – in combination this strategy has been scaled to deliver the benefits as quickly as possible for the environment and to meet the Defra DI reduction target to 2037/28. The majority of the activity under this strategy occurs in AMP8 through installation of smart meters to 75% of properties, and delivery of targeted water efficiency and leakage activity, with a primary driver being to relieve pressure on existing sources within the Hampshire Avon catchment.

As an alternative approach, our demand management strategy could be phased differently over AMP8 and AMP9. We therefore propose to slow down the pace of smart metering roll out in AMP8, focussing primarily in the Hampshire Avon, but then ramp up roll out in AMP9 to achieve maximum penetration by 2035. We also propose to phase our leakage reduction strategy from AMP8 into AMP9. Phasing these two aspects of our demand management strategy differently would still ensure we meet the Defra DI target by 2037-38 and remain on track for the associated 2050 targets for leakage and per capita consumption, as well as meeting the needs for demand reductions by 2035 to be able to make licence changes. This approach will defer nearly £110m of investment and significantly mitigate deliverability risk in these specific areas.

This has the added benefits of reducing our carbon emissions, mitigating affordability concerns, and providing extra time for innovative developments in technology to support the remainder of our rollout.

4. Summary

We are proud that more than half of our region has some form of environmental designation. Watercourses and land holdings in these areas are required to meet higher environmental standards, and we continue to be ambitious in seeking the best way to achieve this. These environmental designations do, however, mean that a significant proportion of our WINEP is subject to Statutory (or Statutory+) drivers and, whilst we welcome the opportunity to consider phasing, a significant majority are unable to be phased beyond PR24, based on current legislation, regulations and guidance.

We believe that our PR24 WINEP plan is ambitious and affordable. The programme is incredibly large – our WINEP alone is 50% bigger than our entire capital programme in any previous price review period. This is before any work to reduce leakage, roll out smart metering, build capacity for population growth, or capital maintenance. Whilst this will lead to significant bill increases, we will ensure bills are affordable to all by expanding our industry-leading affordability schemes to ensure no customers are in water poverty.

There are, however, significant risks around deliverability, particularly in the context of our wider PR24 business plan and also not yet having sight of other companies WINEP or business plans and associated UK-wide supply chain risks.

We have reviewed a number of areas where we believe that there is an opportunity for phasing into PR24 – either partially or fully – that will go someway to mitigating our deliverability concerns for our PR24 WINEP. We support a wholesale review of the phosphorus removal programme, which we believe has great potential to improve deliverability, and at the same time bringing wider environmental benefits at reduced costs not least as set out in the LURB.

Table 4-1: Phasing Proposals

Area	Estimated Totex Reduction in AMP8 (2025-30)* (£m)
Monitoring Emergency Overflows	21
Phosphorus reduction	2
Septic Tanks improvements	1
Storm Overflow improvements	254
Continuous Water Quality Monitoring	108
Demand-side interventions (smart metering and leakage)	110
Total:	496

*All costs at 2020/21 price base.

Whilst our proposals assist with mitigating PR24 deliverability risk, significant concerns remain.

A4-1.3. Natural England view on Nutrient Reduction

We include a letter from Natural England, in relation to our alternative WINEP proposals for nutrient reductions that could impact on Habitats sites and SSSIs.

20th September 2023

Horizon House
Deanery Road
Bristol
BS1 5AH

Via email only

Dear Matt,

Wessex Water draft PR24 Business Plan: Nutrient Reduction for Habitats sites and SSSIs

We write at your request for Natural England's views on Wessex Water's draft PR24 Business Plan. This is with a view to assisting your Board in their role to assure that the plan is affordable and deliverable, and in line with the company's statutory obligations now and into the future.

Natural England is supportive of Wessex Water's ambition to enhance water quality and deliver a resilient and sustainable water supply. We are committed to helping Wessex Water find the best solutions and are keen to work with you on your ambitions to develop and implement catchment and nature-based approaches that deliver both for water and for nature.

We recognise the need for greater operational flexibility for you to be able to deliver the ambitious PR24 programme, while being mindful of the requirements of the Levelling Up and Regeneration Bill (LURB) and its amendments, alongside the existing legislation. It seems likely now that catchment permitting will have a role to play in this.

We are currently working with Defra and the Environment Agency in writing the guidance for Catchment Permitting and Nature Based Solutions which will be shared with water companies shortly. Once this guidance is available, we can discuss your plans in more detail. Workable solutions that adhere to environmental legislation, provide you with the operational flexibility you need and deliver the outcomes in the timescale we all want, will need to be well evidenced and evaluated.

As more clarity emerges on how catchment permitting, and an increased use of nature-based solutions are going to work in practice we can work with you to identify the areas where these approaches would be most effective.

Thank you for discussing this issue with Natural England we look forward to working together and delivering improvements across Wessex for nature and for people.

With kind regards,

Rachel Williams
Area Manager – Wessex Area Team
Natural England

www.gov.uk/natural-england

A5 M&G Enhancement

The following paragraphs cover Management and General (M&G) activities.

A5-1.1. Enhancing our data and analytics capabilities

With the growing interest in producing a 'data driven company' we need to ensure that we have skills to develop data led solutions. We need to prepare the technical capabilities to be able to efficiently develop and deploy these solutions along with being able to maintain them in the future.

A5-1.1.1. Highlighting the priorities

In the short term (1-3 years), we will invest in technologies that can deliver quick wins and immediate benefits, this includes data analytics platforms, asset management and machine learning capabilities. These technologies will help us reduce water losses, improve customer service, optimise network performance, and increase operational efficiency.

In the medium/long term (3-10 years), we will invest in technologies that can enable more integrated and adaptive management of water and waste systems, such as digital twins, artificial intelligence, and cloud computing. These technologies could create digital replicas of our physical assets, leverage advanced algorithms to automate decision making, enhance data security and transparency, and scale up our computing capabilities.

A5-1.1.2. Business application

One area that we are pursuing is digital twins. A digital twin is a virtual representation of a physical system that can simulate its behaviour and performance under different scenarios. A digital twin of a waste or supply network could support our operational and regulatory commitments by providing them with real-time data, insights and predictions that could help us to optimize processes, reduce costs, enhance customer service, and comply with environmental standards.

A digital twin of a waste or supply network could also enable us to test and evaluate various interventions and strategies before implementing them in the real world, thus minimizing risks and uncertainties. A digital twin of a waste or supply network can be a powerful tool for water and waste companies to improve their efficiency, sustainability, and resilience in the face of increasing challenges and demands.

A5-1.2. Supporting additional sampling and analytics due to legislative changes

Our Saltford analytical laboratory is adequately sized to meet the current business sampling needs for wastewater and water supply. With changes in legislation led by our regulators we will see a significant increase in the sampling requirements across the business.

To meet this enhanced sampling requirement and subject to suitable planning requirements we will need to expand our laboratories capacity; including the overall footprint of the building.

Figure 59 - Laboratory location wide

Figure 60 - Laboratory location close

A5-1.2.1. Highlighting the need – water supply

Per and Polyfluoroalkyl Substances (PFAS) are not currently a regulated parameter in the United Kingdom but have been the subject of numerous information letters issued by the DWI. The regulations do address these types of chemicals under Regulation 4 (wholesomeness) and the “catch all” aspect of the regulation.

In October of 2021 DWI information letter 05/2021 set out the requirements for companies to submit sample results and summary risk assessment information for 47 PFAS. This letter outlined requirements to regularly submit PFAS sample results through the routine monthly raw water data submissions and makes changes to the tier system reported in PFAS/PFOA Guidance in January 2021.

This was followed by information letter 03/2022 which set out the requirement for companies to have a risk assessment methodology for PFAS compounds and defined a tiered approach with a precautionary guideline value for concentrations of PFAS in water. Information letter 02/2023 clarified the DWI’s expectations regarding water companies AMP8 (2025-2030) strategies for investigating PFAS risk and the trigger levels and actions that will be implemented to mitigate PFAS risk from source to tap. This allowed us to calculate the impact of PFAS sampling at Wessex Water.

As a result of the changing requirements, we are expecting to carry out up to 2500 PFAS sample analyses per year, giving around 117,500 parameter results. Analytical capacity and resilience is currently low in the UK with a limited number of service providers and we have experienced delays in sample processing including a complete breakdown restricting all PFAS sampling. To operate in a resilient way we have to consider approaches to future PFAS sampling requirements. It has also been indicated that the number of parameters measured is likely to rise from 47 increasing the analytical load.

A5-1.2.2. Highlighting the need - wastewater

There are a number of increasing demands on the industry that require an uplift in the amount of sampling we undertake. The following areas are where increased sampling requirements are expected:

1. Continuous water quality monitoring

Development of the guidance and requirements is still underway for continuous water quality monitoring. Indications are that validation of the online water quality monitors will need to take place at least monthly. This will entail confirming accuracy of the online monitors by duplicating samples for at least three of the more complex parameters.

By the end of AMP8 we will have around 600 monitors installed in waterways across our region that could be sampled monthly; 7,200 samples per year and analysing up to 36,000 parameters. In AMP9 this will increase by around 2000 to a total of 2,600 with around 31,000 samples. The additional AMP8 sample analyses will reach around 36,000 per year, by the end of AMP9 this will increase to around 156,000.

2. New phosphorus and iron permits at Water Recycling Centres (WRC)

To support the development of new permits we need to provide additional sampling and analytical capability at sites to understand the speciation of phosphorus and the treatment approach required.

We have 50 sites that will be getting new phosphorus and iron permits. Each site will require daily sampling for a few weeks during the summer months. It is likely that this will lead to an additional 700 samples and 1400 parameter analyses per year over AMP8.

3. New chemical permits

Nine of our WRC will be getting new chemical permits where we will be required to monitor for dissolved zinc, dissolved copper and dissolved nickel. Like the water supply needs we will also have to test for perfluoro-octane sulfonate (PFOS) a PFAS chemical.

These chemical samples will need to be analysed monthly giving rise to around an additional 108 samples and at least 432 parameter analyses per year in AMP8.

4. New total nitrogen permits

Six of our WRC will be getting new nitrogen permits. These will require 612 additional samples and analyses per year.

5. Industrial Emissions Directive (IED)

The IED will likely result in additional samples at 5 sludge sites and around 12 sampling points. We are expecting in excess of 4,300 samples per year analysing around 61,900 parameters per year. Our current inorganic, metals and organics capacity is already restricted.

A5-1.2.3. Mitigating the risk

The increase in regulatory sampling and additional monitoring requirements has a consequential impact on supporting functions. In 2022 our laboratory analysed more than 165,000 samples providing results on more than 2,835,000 parameters. The step change in sampling requirement in AMP8 will result in around 12,900 additional samples per year providing analyses for around 100,000 parameters. This number will increase to around 36,700 samples with analysis of around 220,000 parameters by the end of AMP9.

To achieve the measurement of an additional 220,000 parameters the associated support systems need to be in place. Our lab is currently at capacity with limited available space to process additional sample needs. The current lab occupies around 1,072m^2 of the building with an additional 494m^2 allocated to admin, facilities and storage. There is very little redundancy capacity within the lab, if we have an analytical instrument or workstream failure or an operational need to take part of the lab offline we peak lop by using external labs. In discussion with these suppliers there is only the capacity to support a small amount our sample processing needs for limited time periods. We have reciprocal arrangements with other labs in the South-West & Wales for disaster recovery but again these have limited capacity for short periods of time.

There are very few labs capable of processing PFAS chemicals in England & Wales and therefore redundancy and resilience are low for the sector. PFAS sampling requires a dedicated and contamination free space. Even the most minor rogue particles can lead to spurious or incorrect sample readings. To mitigate the business risk for PFAS analytics we require a dedicated PFAS analysis capability, this will enable additional resilience and redundancy capacity for the industry.

To manage the new analysis requirements and meet the redundancy and resilience expected the labs require expansion. To account for this an additional 600m^2 of lab and storage space is proposed. The additional space will allow for the growth of sampling and associated analysis in the upcoming AMP and some further growth in AMP9 (related to the growth in WINEP schemes and continuous water quality monitoring). Due to the sensitivity of the PFAS samples the highest percentage of the new space will be taken by this capability.

To improve the operation and flow at the lab we are proposing to expand by a total of 1150m^2 but are only seeking enhancement funding for the area related to increasing regulatory sampling, 600m^2.

To support the new IED, sludge and wastewater analysis requirements there is a need to provide additional capacity in our general chemical and organics lab. To meet the new demand we will require more soil drying capacity and furnaces for analysis of soil organic matter. The Biological Oxygen Demand workstream has also reached its physical capacity with internal sampling programmes being reduced to align with the current limitations. New auto-sampling and analysis tools are also required.

A5-1.2.4. Delivery efficiency

We are proposing a wider lab refurbishment to coincide with the lab expansion. This approach will make the most of the space available and enable a resilient service during the lab upgrades by allowing rotation of sampling capability whilst the upgrades are ongoing. The assessment of the work required and expansion proposals have been developed by AECOM and Saunders Boston Architects.

A5-1.3. Resilience to changes in communication networks

The end of 2G and 3G networks in the UK will have a significant impact on Wessex Water, as we rely on these older technologies for data transmission and remote control. These devices include meters, leak detectors, pumps, valves, sensors and alarms. It will also impact our Lone Worker system which is critical to ensure the safety of our operators. Without a reliable network connection, these devices will not be able to function properly, leading to inefficiencies, service disruptions, increased costs, environmental and health and safety risks. To address this challenge, Wessex Water need to find alternative solutions that can ensure the continuity and quality of our services.

A5-1.3.1. Highlighting the need

All cellular communication companies have signed up to the Government target of switching off 2G and 3G by 2033 https://www.gov.uk/government/news/a-joint-statement-on-the-sunsetting-of-2g-and-3g-networks-and-public-ambition-for-open-ran-rollout-as-part-of-the-telecoms-supply-chain-diversificatio. This approach will see a phasing out of the infrastructure that supports the 2G and 3G networks over the next ten years. Wessex Water are expecting a reduction in service levels for the 2G and 3G network as the 2033 target gets closer suggesting that we cannot wait for this change to occur.

Many of our systems are reliant on the connectivity provided by these older networks which often remain available in rural locations where newer networks are not accessible, this is mostly due the reduced use of the 2G network increasing availability. Another impact is that modern construction techniques create a barrier to certain radio waves this is known as a Faraday cage. Cellular connectivity reduces inside buildings creating issues with connectivity to lone worker solutions, this presents a growing health and safety risk.

A5-1.3.2. Mitigating the risk

We propose to invest in technologies to minimise the risks at our sites. Solutions may include the following:

- Upgrading the devices to support newer network technologies, such as 4G or 5G
- Installing signal boosting capabilities at sites with limited access to cellular services
- Switching to other communication methods, such as satellite, radio or low-power wide-area networks
- Using hybrid solutions that combine multiple communication methods to optimise performance, reliability and cost-effectiveness

The choice of the best solution will depend on various factors, such as the type, location and function of the device, the availability and cost of the network service, the regulatory and contractual requirements and the future plans of the business. Therefore, a thorough assessment of the current and future needs and capabilities is essential to make an informed decision. Wessex Water will identify available technologies, their use cases and tailor them to where they are most effective. This is not merely to replace 2G & 3G but to enhance connectivity to allow further data acquisition and situational awareness.

We are proposing a programme of change to meet the 2033 deadline for the end of 2G services. We are expecting the current devices to fall back to 2G operation as the 3G network gets shut down. This enables investment to span AMP8 and AMP9.

The development and implementation of this solution is expected to cost £0.25m in AMP8 with a further £1m in AMP9.

A5-1.4. Managing the end of cellular services at private sewerage pumping stations

Following the private pumping stations for adoption in 2016, on adoption Wessex Water installed monitoring technology. The monitoring solutions available at the time used cellular technology that was only available with access to the 2G and 3G networks. These networks are being retired with the retirement of 3G already underway and 2G due in 2023. There is a need to update the technology to monitor Private Sewer Pumping Stations (PSPS) to supported communications technology.

A5-1.4.1. Highlighting the need

Our asset records show that we have around 430 devices that use 2G and 3G cellular networks monitoring PSPS. The devices track issues with pump operation and monitor levels to prevent sewage overflowing. The majority of these PSPS only have simplistic equipment and prior to 2016 often had no form of monitoring, other than potentially a red light indicating a pump failure or high level.

The technology installed from 2016 following the adoption of these stations is currently operating well and providing qualitative information on pumping station operation. The alerts from these sites are received in our control room and are used to raise maintenance work or highlight failures that could lead to a pollution.

Early in 2022 Vodafone announced the phasing out of the 3G network in the UK with the programme being completed by the end of 2033 https://www.vodafone.co.uk/newscentre/our-network/3g-retirement-in-2023/. EE followed suit suggesting that 3G will be switched off early in 2024 https://ee.co.uk/3g-switch-off. O2/Telefonica are yet to make a public announcement on the end of 3G.

All cellular communication companies have signed up to the Government target of switching off 2G and 3G by 2033 https://www.gov.uk/government/news/a-joint-statement-on-the-sunsetting-of-2g-and-3g-networks-and-public-ambition-for-open-ran-rollout-as-part-of-the-telecoms-supply-chain-diversificatio. This approach will see a phasing out of the infrastructure that supports the 2G and 3G networks over the next ten years. Wessex Water are expecting a reduction in service levels for the 2G and 3G network as the 2033 target gets closer suggesting that we cannot wait for this change to occur.

A5-1.4.2. Mitigating the risk

To manage the end of these cellular networks we will need to replace around 430 monitoring units at PSPS. These are all in one device incorporating the digital alarm function and the cellular router. We have sourced a replacement device through an open business tender in 2022 and where new PSPS are identified these are being installed. This will be the standard solution for the replacement devices at the c430 PSPS.

We are proposing a programme of change to meet the 2033 deadline for the end of 2G services. We are expecting the current devices to fall back to 2G operation as the 3G network gets shut down. This enables investment to span AMP8 and AMP9.

The cost to deliver this programme is £0.66m. Around 80% of this programme will be delivered in AMP8 and the remaining 20% in AMP9.

A6 Development

This is an annex to chapter WSX16 Section 5.4. This section does not repeat the narrative but contains detailed appendix supporting information as evidence.

A6-1.1. Development projections

Table 20 - Number of allocated new houses in Local Planning Authority areas

Adopted Local Plans - Strategic allocations: Number of allocated new houses			
Wiltshire		South Glos	
Amesbury	1,300	N Yate	3,000
Calne	120	Filton	6,000
Corsham	330	Emersons Green	2,500
Chippenham	3,400	Thornbury	500
Malmesbury	486		
Melksham	611	Mendip	
Salisbury	3,950	Frome	1,000
Trowbridge	3,950	Wells	500
Warminster	900		
		North Somerset	
Bath	7,000	Weston S Mare	2,500
		Ashton Vale	4,000
Bristol	30,000	Backwell/Nailsea	3,000
Sedgemoor		North Dorset	
Bridgwater	5,000	Gillingham	2,200
Burnham/Highbridge	230	Blandford	1,000
Taunton		West Dorset & Weymouth	

Monkton Heathfield	3,000	Bridport	760
Comeytrowe	2,000	Dorchester	1,200
		Chickerell	820
South Somerset		Weymouth Town	600
Yeovil	2,500	Crossways	500
Chard	1,220		
Crewkerne	525	Christchurch & East Dorset	
		North Wimborne	650
Purbeck		East Wimborne	350
Wool	1,000	Roeshot	950
Lytchett Minster	650	Corfe Mullen	250
		West Parley	320
Bournemouth	8,000		
		Poole	6,850

Table 21 - Number of household projections for the long term planning

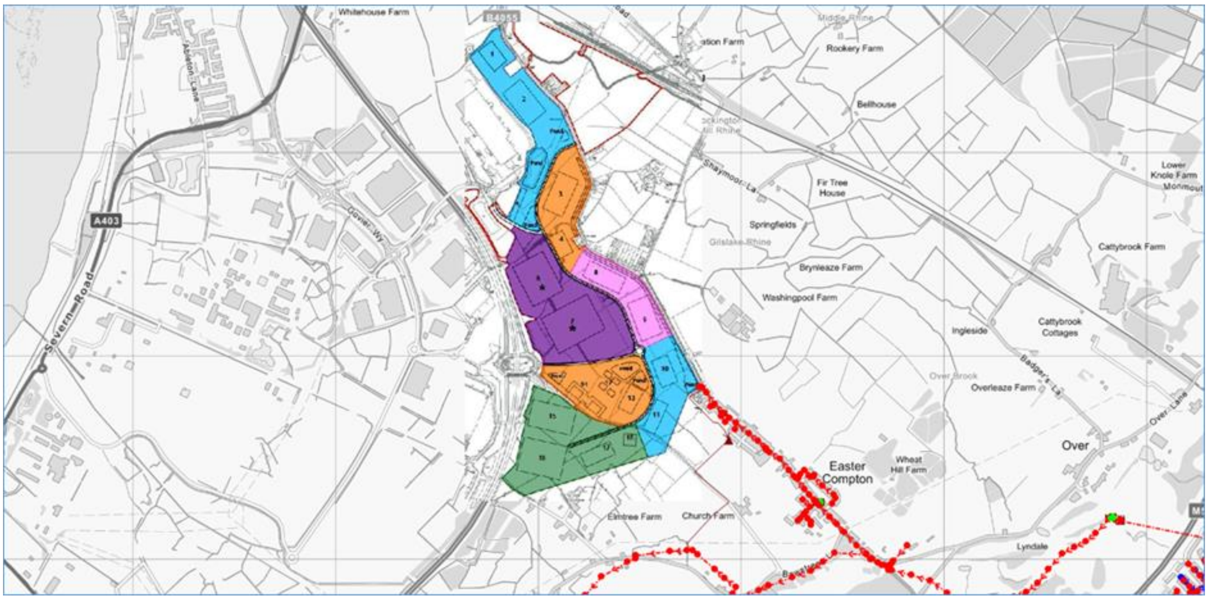
Household Projections(2018 base)							5Yr growth %	10Yr growth %	25yr growth %	Ave growth pa %
Area name	2020	2025	2030	2035	2040	2050	2025-2030	2025-2035	2018-2043	2025-2050
New Forest (Part @20%)	15,979	16,351	16,719	17,040	17,313	18,045	2.2%	4.2%	10.36%	0.41%
Bath and North East Somerset	79,362	82,554	85,856	88,862	91,504	98,571	4.0%	7.6%	19.40%	0.78%
Bournemouth	86,540	87,408	88,988	90,288	91,177	92,902	1.8%	3.3%	6.29%	0.25%
Bristol, City of	195,658	202,001	208,360	215,085	221,548	235,949	3.1%	6.5%	16.81%	0.67%
North Somerset	95,968	100,211	104,227	107,906	111,432	121,035	4.0%	7.7%	20.78%	0.83%
Poole	65,696	67,209	68,753	70,205	71,419	74,404	2.3%	4.5%	10.71%	0.43%
South Gloucestershire	119,024	125,669	131,887	137,947	144,013	159,824	4.9%	9.8%	27.18%	1.09%
Wiltshire	214,401	222,704	230,216	237,036	243,254	263,015	3.4%	6.4%	18.10%	0.72%
Christchurch	22,605	23,371	24,196	24,933	25,582	27,178	3.5%	6.7%	16.29%	0.65%
East Dorset	39,263	40,451	41,595	42,551	43,374	45,672	2.8%	5.2%	12.91%	0.52%
North Dorset	30,785	31,695	32,550	33,235	33,831	35,584	2.7%	4.9%	12.27%	0.49%
Purbeck	21,139	22,116	22,994	23,718	24,337	26,305	4.0%	7.2%	18.94%	0.76%
West Dorset	47,991	50,648	53,072	55,076	56,774	62,378	4.8%	8.7%	23.16%	0.93%
Weymouth and Portland	30,111	31,242	32,350	33,312	34,087	36,349	3.5%	6.6%	16.35%	0.65%
Cotswold (Part @10%)	4,037	4,345	4,629	4,870	5,079	5,782	6.5%	12.1%	33.09%	1.32%
Stroud (Part @ 10%)	5,148	5,386	5,613	5,820	6,008	6,522	4.2%	8.0%	21.09%	0.84%
Mendip	50,453	53,033	55,361	57,415	59,299	64,856	4.4%	8.3%	22.29%	0.89%
Sedgemoor	53,803	56,318	58,573	60,662	62,594	68,012	4.0%	7.7%	20.76%	0.83%
South Somerset	74,216	76,722	79,055	81,118	82,933	87,980	3.0%	5.7%	14.67%	0.59%
Taunton Deane	52,553	56,137	59,458	62,525	65,224	73,269	5.9%	11.4%	30.52%	1.22%
West Somerset (Part @ 50%)	16,279	17,122	17,968	18,725	19,414	21,189	4.9%	9.4%	23.75%	0.95%
	1,321,010	1,372,693	1,422,419	1,468,329	1,510,196	1,624,823				
	23,846	51,683	49,727	45,910	41,867	**303812**	Net New Dwellings over 25 Yr			
	11,923	10,337	9,945	9,182	8,373	**12152**	Ave Annual NND over 25 Yr 2025-2050			

A6-1.3. Network development reinforcement

The defined schemes are summarised in the boxes below:

Avonmouth

This former Imperial Chemicals site located north of Bristol in the Severnside area is zoned for economic development, and benefits from extant planning consent granted in the post war period. This land is at high risk of flooding from climate change and coastal flood defences have been improved to protect low level land at Severnside.

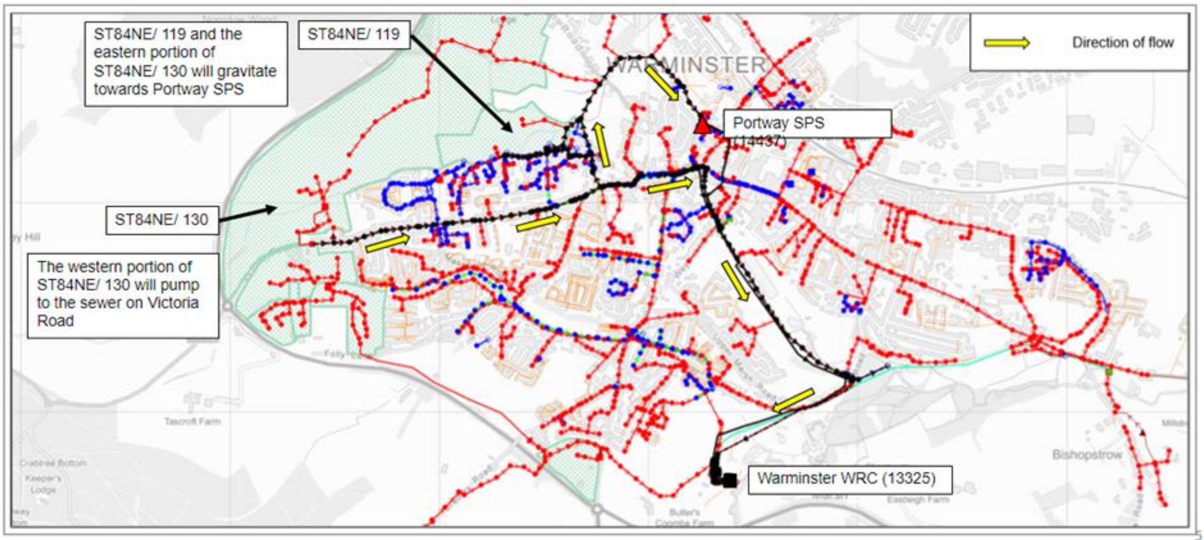


Existing public sewer networks service small domestic settlements scattered across the locality. Development as a site for light industry has commenced at the western approaches with connections to Redwick WRC at the north. Wessex has a long-term strategy to redirect flows to Bristol WRC at Avonmouth where capacity is available and provide relief from sewer flooding. Working in partnership with the site developer additional capacity will be provided to service future development.

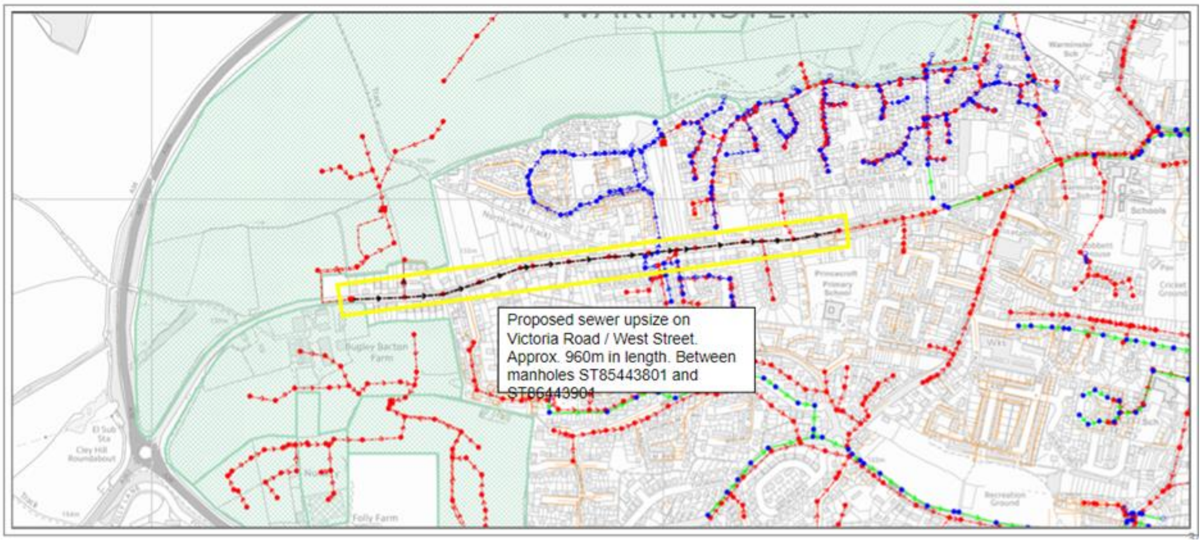
This scheme has been reduced in scope now that the North Bristol Relief Sewer strategy commissioned in 2023 is operational. The length of the required rising main has been reduced accordingly.

Warminster

The Wiltshire Local Plan provides a strategic allocation for 900 new homes on land between Warminster town and the western by-pass. Appraisal to confirm points of connection to local catchments with several options for network reinforcement has been completed. Local connections are available for the initial phases of development before a threshold is reached requiring additional sewer capacity.

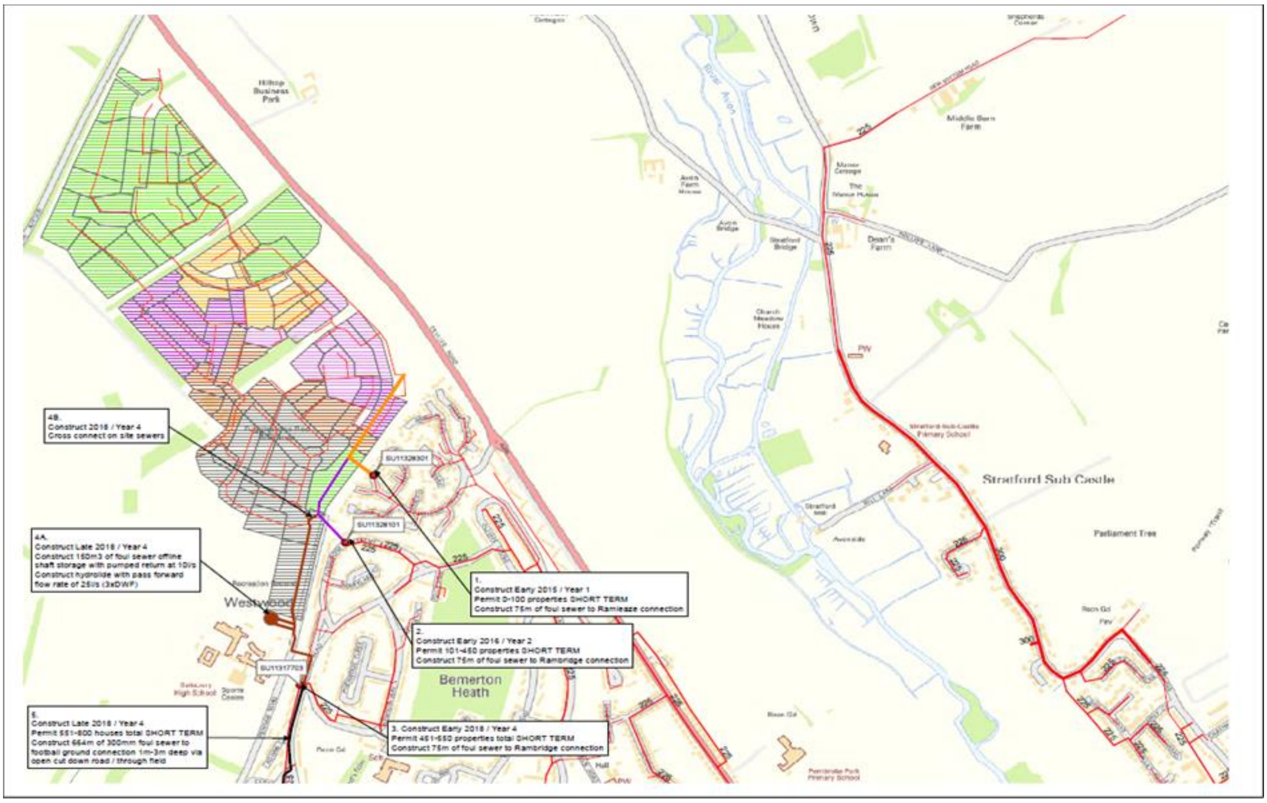


Network reinforcement will be required to both local sewers and the downstream catchment where flooding will occur. There are options for relief sewers, upsizing and a storage tank within the town to protect existing property. The developer is preparing to commence the first phase of the site and a scheme of works will be required between 2025 – 2030 to maintain standards of service.

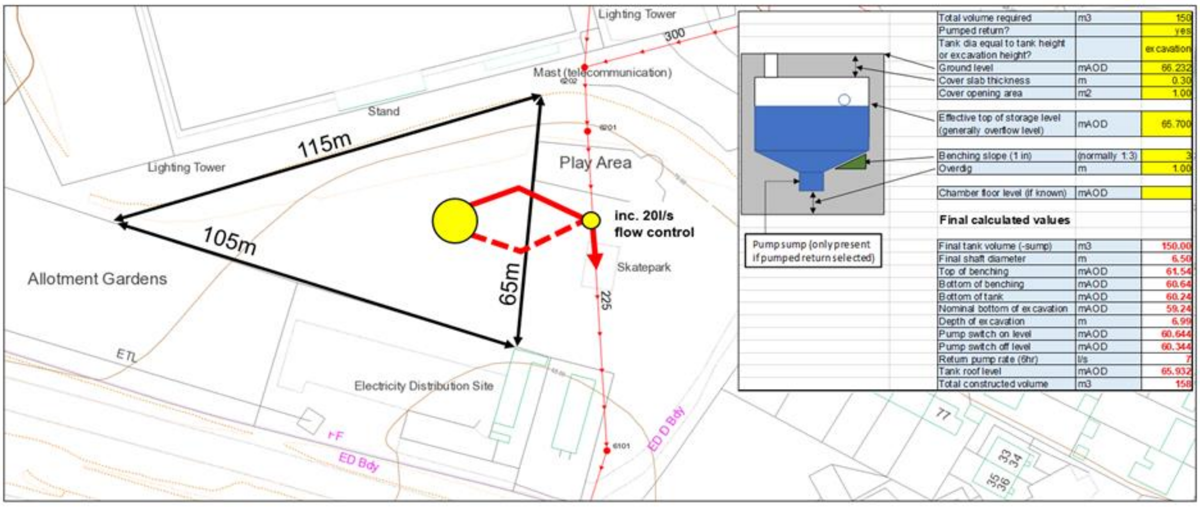


Salisbury, Fugglestone Red

Development commenced in 2015 on a major site allocation of mixed use with 1250 homes and employment land. A foul drainage strategy was agreed between the developer and Wessex Water to construct various capacity works as the site progressed through the planned phases. This involved both on-site and off-site mitigation measures and network reinforcement schemes.

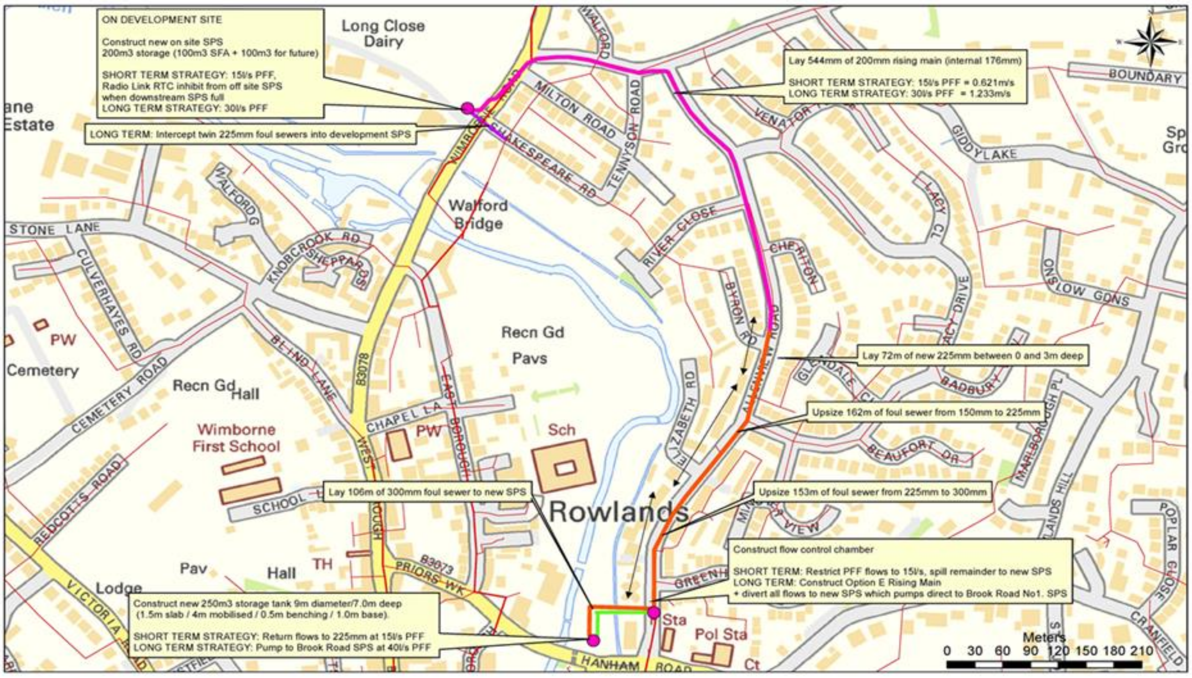


The latter stages of this development requires significant works off-site to prevent overloading the foul system. As we approach the point where the off-site network reinforcement scheme needs to be instructed, we have undertaken a review of proposals. This review considered in more detail the complexities of a railway crossing and known construction challenges for upsizing improvements in sensitive areas.

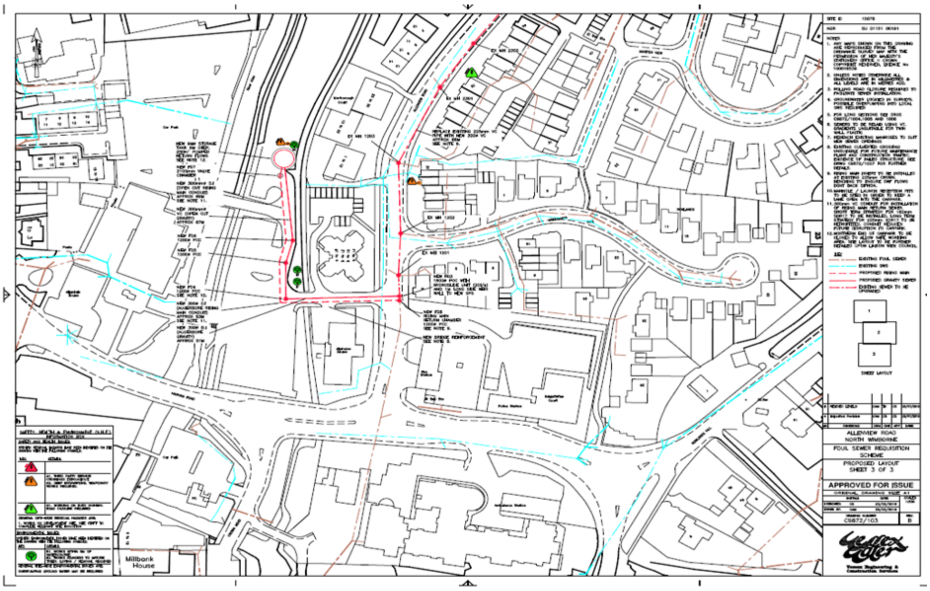


North Wimborne

Residential development at North Wimborne for 600 new dwellings is partially constructed and awaiting the remaining phases for completion. A foul connection was provided to service the site under S98 Requisition arrangements. A drainage strategy was agreed between Wessex Water and the developer for a pumped connection with an off-site rising main to the public sewer system.

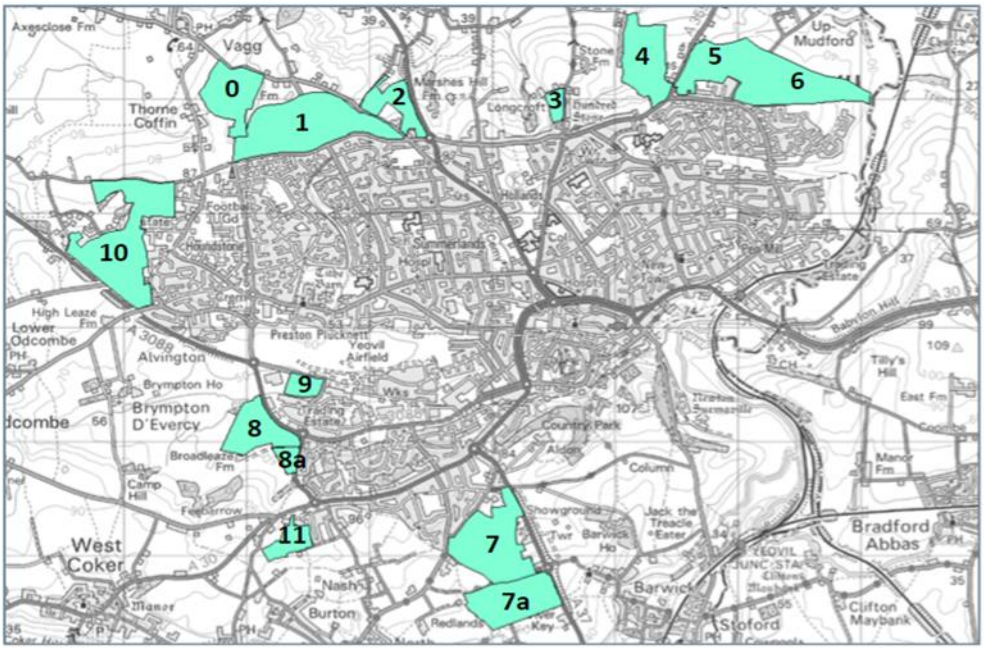


The second phase of the scheme requires a storage tank with pumped return to prevent downstream sewer flooding. There are few options within the town to locate and construct a large tank without significant disruption and restrictive working arrangements. A design scheme can be built within a local car park and will form part of a future strategy to direct flows away from the town centre.



Yeovil

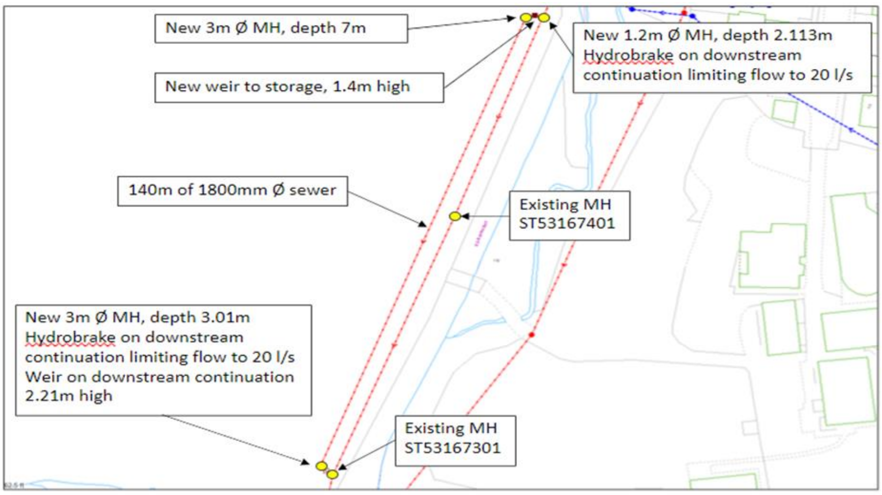
Yeovil is one of the strategic towns and cities within the southwest that has multiple allocations to satisfy demand for housebuilding. Most of these allocations are located on greenfield sites forming extensions to Yeovil town. Development pressures are building owing to the restrictive planning policy of nutrient neutrality and the Brimsmore site has advantage of outline consent once resolved.



The cumulative impact from these allocations has been appraised and a strategy has been developed to mitigate sewer flooding and improve capacity of critical sewers through the town. All public sewers flow to Pen Mill WRC located at the eastern boundary of the urban fringe.

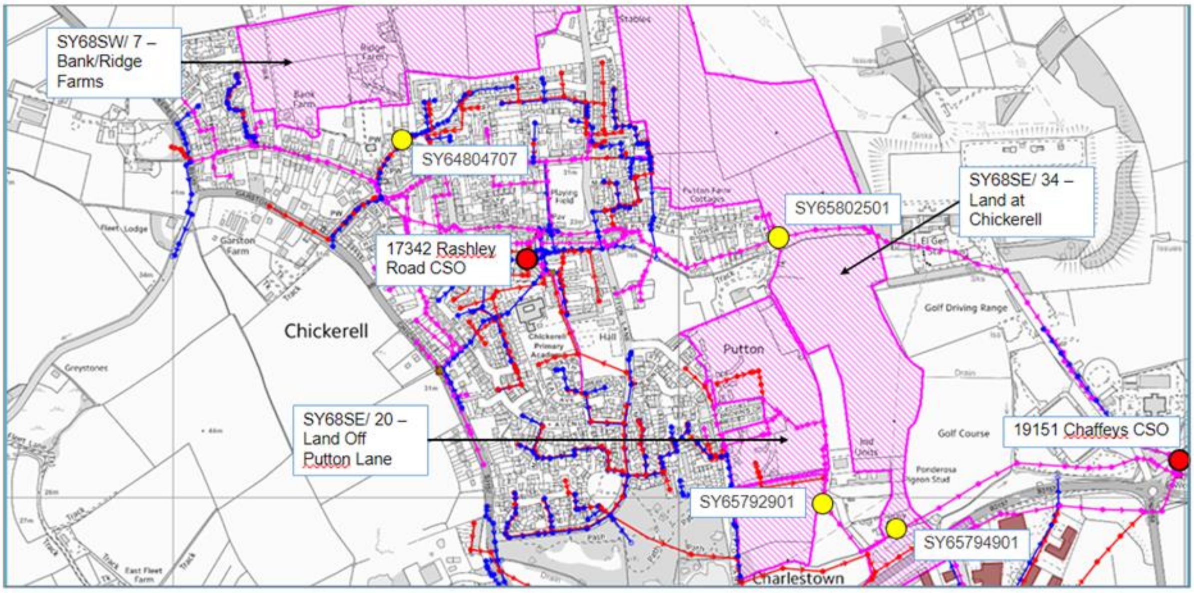
Brimsmore at the north is one of the largest of the allocations at Thorne Road in excess of 1500 new homes with the first phase recently completed.

Options for a 400m3 storage tank are proposed with offline tank sewer and hydraulic controls to attenuate flows. This scheme can be located downstream within space available on local playing fields and will protect property from sewer flooding.



Chickerell, Weymouth

Chickerell has an allocation of approximately 820 new homes in the Weymouth & Portland adopted plan, which remains valid under the new Dorset unitary authority. Development sites extend from the north of the settlement and wrap all around the eastern suburb. The northern site providing ~ 300 homes is nearing completion.



The eastern phases of development are due to commence in 2024 and are scheduled to complete by 2030. Appraisal works undertaken recommend the phased construction of 3 new storage tanks with hydraulic controls as network reinforcement to provide additional capacity. Works are planned to commence the first tank in AMP 7, with further schemes in AMP 8 to match the rate of development.

A7 Innovation

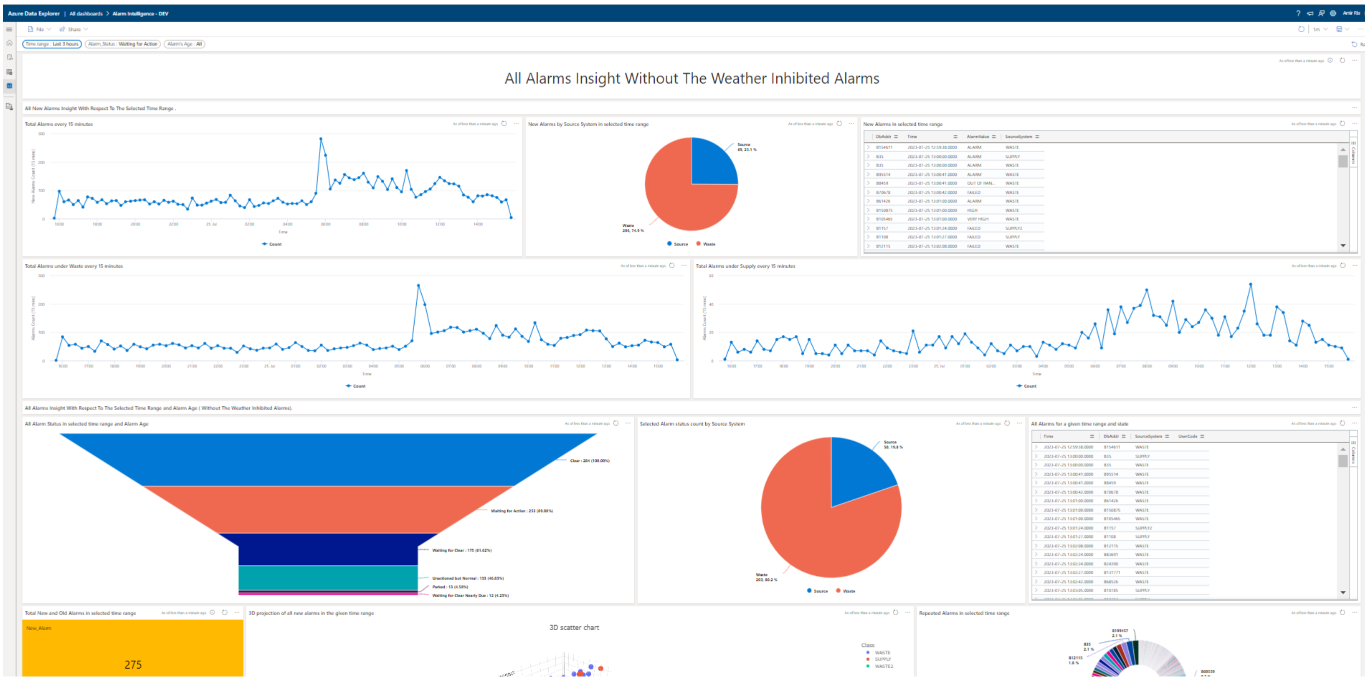
The following are examples of innovation, both recently and upcoming.

A7-1.1. Recent innovation

A7-1.1.1. Alarm Intelligence

WHY? What's the underlying issue or opportunity being addressed? Our control room is hit with a large number of alarms every day, many times beyond its capacity to handle. A new team for alarm rationalisation has been built in the control room as part of an effort to reduce the number of alarms and standardise them. This application goes hand in hand with this effort by providing the control room will real-time information on the load, status and distribution of alarms across Waste and Supply. This information shall assist the control room managers in their decision-making. For example, when it needs to call in standby for support. The next step would be to identify greater potential issues from incoming alarms and alert the control room on repeat offenders and motifs found in the incoming alarms flow.
What did we do previously? The control room currently uses an existing application within ScopeX which presents them with a list of active alarms and a report showing historical data.
What is the innovation? Using cloud technologies to provide real-time data and analytics to the incoming alarm stream
What were the expected benefits? e.g. financial, compliance, reliability Control room performance and reliability Compliance by assisting to point out alarms and predict issues before they materialise
Have we reached any conclusions? What impact has it had? We are currently implementing an initial proof-of-value of a dashboard presenting real-time data to the control room
Next – what do we propose for 2025-30? We propose a full implementation of the project, including investment in analytics and machine learning
Any challenges for going further? Cultural and process change in the control room A machine learning model to identify motifs and to predict alarms and issues with minimal false positive alerts.
Financial points e.g. spend on trials, indicative cost savings, IoT Lab PoV funding

Other comments



A7-1.1.2. Next Bristol Avon Catchment Partnership Fund

WHY? What's the underlying issue or opportunity being addressed? In 2015 the Bristol Avon Catchment Partnership (BACP) Steering Group identified there was a gap in resourcing initial investment into partnership projects. The lack of initial resource was having a big impact on the ability of external partners to take an evidenced-led approach and work in a collaborative way to develop and deliver high-impact projects that deliver multiple-benefit outcomes for the water environment.
What did we do previously? Previously partners would often lack the upfront investment to carry out the relevant scoping and feasibility work required to evidence applications to larger sources of funding. This had a knock-on impact as funding applications were less likely to be considered or successful without the required evidence base to support the projects. Partners also found it hard to secure other sources of match funding without an initial investment in a project to give wider funders more confidence in the delivery of the project.
What is the innovation? *What new technology or way of working? What scale e.g. early investigation; a trial?* To address this gap in funding, the BACP Steering Group established the Bristol Avon Catchment Partnership Fund, this takes a unique approach to pooling funding on an annual basis from six different partners. The BACP manages the CPF on behalf of the partnership and distributes the funds via a formalised application process to successful projects. This has encouraged the partners to adopt a catchment-based approach and recognise the need to support work outside of their administrative boundary that delivers a positive impact on the whole hydrological system. The CPF provides vital seed funding and small grants to allow partnership projects to carry out various work that is hard to resource from other funding sources. Such as, scoping and feasibility work (e.g. walk-over surveys), project development for strategic partnership programmes, test and trials/pilots, and community engagement-based work across the Bristol Avon Catchment. All of the projects that are funded demonstrate deliver against the aims and objectives identified in the Bristol Avon Catchment Plan. In 2022 the CPF developed a community grants allocation that provides an opportunity for community groups to apply for small grants specifically to fund work such as, kits for water quality testing or equipment to help with habitat management. This Community Fund enables the partnership to respond to the growing demand from local groups to enable and support community delivery at a local level while supporting and engaging communities to deliver more for their local rivers and water environment.
What were the expected benefits? e.g. financial, compliance, reliability The expected benefits of the Catchment Partnership Fund were to provide early-stage project finance to enable partners to develop partnership projects, enabling them to attract match funding, reliably deliver improvements to the water environment and become more self-sufficient by securing other larger sources of funding. Overall, the expected benefit was to provide more consistent delivery of improvements to the water environment in the Bristol Avon catchment. The expected benefits of the Community Fund were to enable local groups to make meaningful improvements whilst increasing their connection and understanding of the local water environment.
Have we reached any conclusions? What impact has it had? Between 2015-2023 the Catchment Partnership Fund has provided £249k in seed funding to 48 projects focused on improving the water environment. This initial investment has generated £357k in match funding, including in-kind contributions and volunteer time.

The CPF has been a successful mechanism that has allowed many projects to develop, attract, and secure larger funding, and become self-sustaining programmes delivering ongoing benefits for the water environment. Examples of projects that have developed can be seen in the Catchment Delivery Framework.

Before and after of historic pond restoration in Stoke Park Bristol-funded through the Community Catchment Partnership Fund. It is expected the pond will provide suitable habitat for Great Crested Newts, known to be in the local area, once refilled. Photo Credit: Stoke Park Community Group.

Next – what do we propose for 2025-30?

e.g. a trial; full implementation / rollout

The Catchment Partnership Fund is seeking further financial contributions from new public and private sources across the catchment. This will allow for the CPF to continue to run but will also allow for enhancement of seed funding for new projects which will allow for wider delivery of improvements to the water environment across the catchment.

The model is in the process of being adopted and rolled out by Dorset Catchment Partnerships following the success in the Bristol Avon.

Any challenges for going further?

As with all lines of business, the cost of delivery is increasing. Ensuring the CPF can continue to provide initial investment in line with increasing costs/inflation will be a challenge. Addressing this will require close collaboration with the current funding partners to assess ongoing contributions. It will also become more challenging to secure larger pots of investment without providing robust evidence-led bids in the future.

Financial points e.g. spend on trials, indicative cost savings,

The Catchment Partnership Fund receives financial input from the five local authorities in the catchment and Bristol Water, contributions from these partners total £28k per year as of 2023. In addition, each year the Catchment Partnership receives £15k from the Environment Agency’s Partnerships Host Fund which is fed directly into the CPF to allow us to maximise delivery through partnership projects. The BACP is co-hosted by Wessex Water and West of England Rural Network, the ongoing support from Wessex Water has enabled the management and communications of the CPF to be maintained and provided a consistent point of contact for wider partners over the past 8 years.

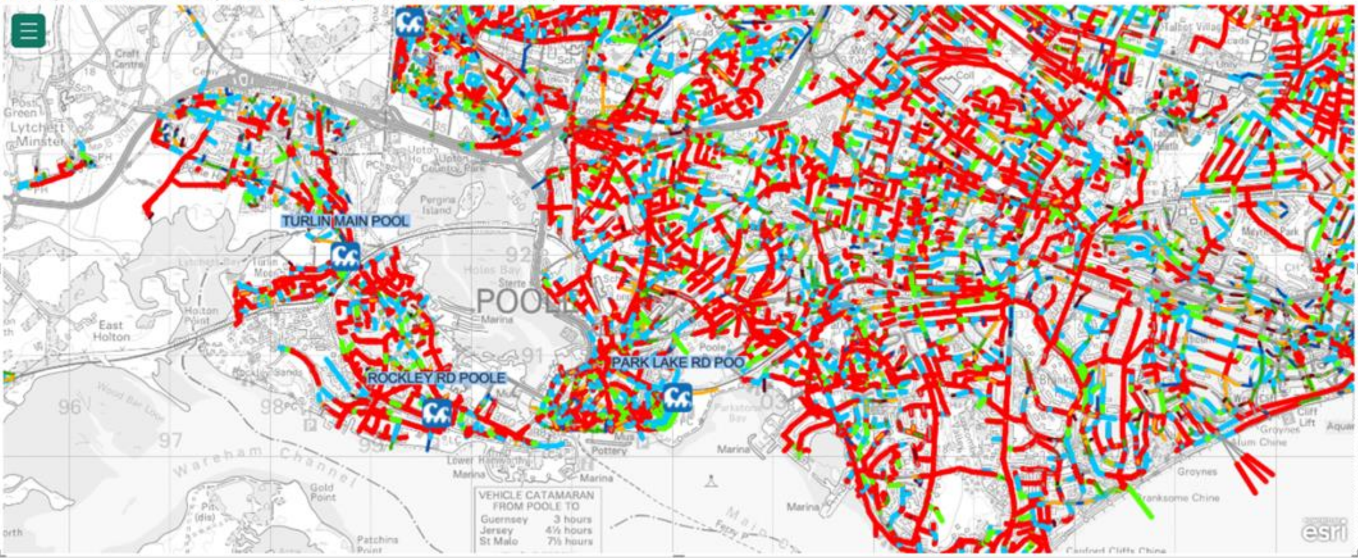
Other comments

External people / organisations: Bath and North East Somerset Council, Bristol City Council, South Gloucestershire Council, North Somerset Council, Wiltshire Council, Bristol Water, West of England Rural Network, Environment Agency, Natural England

A7-1.1.3. EDM Spills Classification

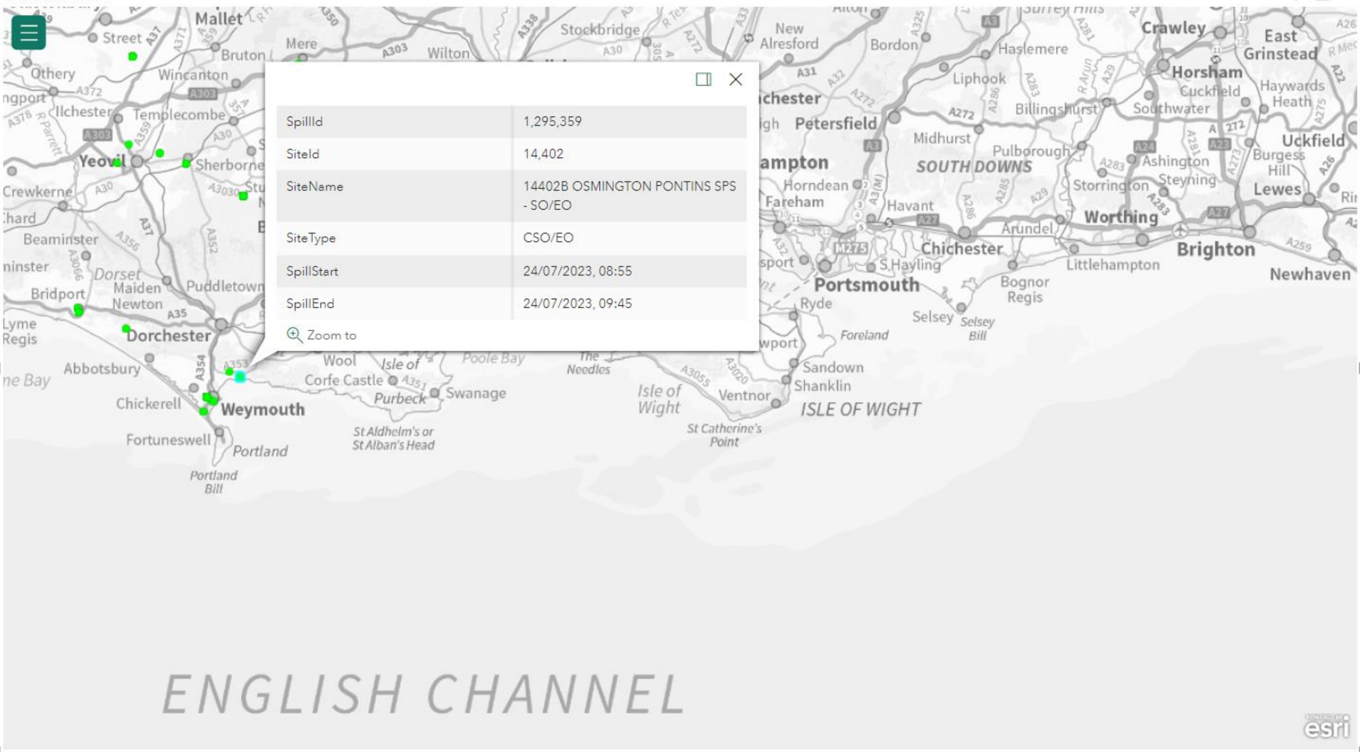
WHY? What's the underlying issue or opportunity being addressed? The objective of this project is to augment and replace the functionality of a legacy spreadsheet which the Modelling team is currently using to produce accurate 12-24 spill counts for CSOs across the region, in order to compare model performance to actual performance.
What did we do previously? A legacy MS-Excel spreadsheet which consumed many human hours to maintain and process, and lacked the 12/24 counting capability
What is the innovation? Augmenting the capabilities that existed in the spreadsheet by utilising modern big-data tools. We have now implemented the first 12/24 count solution, after several previous solutions failed.
What were the expected benefits? e.g. financial, compliance, reliability Compliance and financial
Have we reached any conclusions? What impact has it had? Our solution has already proven to be accurate and useful, it has also highlighted issues and errors in the legacy spreadsheet which now helps the business with reporting
Next – what do we propose for 2025-30? We propose a full implementation of the project and integrating it with additional digital initiatives that would give a top view of issues in the region
Any challenges for going further? Weather and Telemetry Data availability from the newly created Data Access Layer ('DAL')
Financial points e.g. spend on trials, indicative cost savings, The current solution was implemented as an IoT Lab PoV and now requires to be adopted as a live solution for the business.
Other comments

EDM Spill Postcode, EDM Spill Site, Signal, Spill Start Time and EDM Spill Postcode



Site Name	Spill Start Time	MaxReadingValue
TURLIN MAIN POOL	14/01/2023 03:15:00	72.83
ROCKLEY RD POOLE	16/01/2023 05:00:00	4.08
PARK LAKE RD POO	28/02/2023 06:30:00	3,616.21
COWSLIP RD POOLE	28/02/2023 14:20:00	1,095.75

SitePostcode



A7-1.1.4. Applying 'intelligent' analytics to enhance asset & monitoring & anomaly detection

WHY? What's the underlying issue or opportunity being addressed?

Wessex Water has over 1,500 storm overflow Event Duration Monitoring (EDM) devices. These monitors generate too many alarms for the control room to effectively manage and it is increasingly challenging to manually identify genuine alerts from expected operational behaviour during high alarm volume periods such as wet weather.

To differentiate expected EDM operation from the unexpected instances, it is necessary to manage the data differently. There is a need to provide control room decision support capability by developing a system that can monitor the data and only alert the unexpected instances. The correct resources can then be directed to site if necessary.

What did we do previously?

All EDM data is fed into our telemetry system and this generates alerts that are handled by the control room. These alerts do not differentiate between expected and unexpected behaviour or compliant and non-compliant behaviour. This then results in a high volume of alerts, most of which require no action.

Our alert capability is exclusively embedded within the telemetry system. This is largely based on simple fixed threshold alarms and this does not take into account weather or any seasonal factors such as groundwater infiltration nor does it detect small changes from normal expected behaviour. This system is a simplistic tool and currently only detects potential issues when they are likely already a problem or alerts issues that are actually expected behaviour (e.g. high levels during heavy rain).

The majority of EDM equipment uses ultrasonic level sensors. These provide Wessex Water with a lot of valuable continuous level data for their sites.

What is the innovation?

What new technology or way of working? What scale e.g. early investigation; a trial?

In 2020, Wessex Water completed a trial of three systems to apply intelligence to how the EDM (storm overflow) data from the sewer network sites are managed. The subsequent tender resulted in a three year contract with StormHarvester.

StormHarvester takes sewer level data from Wessex Water and learns what is normal/expected behaviour and accounts for the amount of rainfall within a catchment. It learns from historic data that Wessex Water provides it and creates an operating envelope: if the current sewer level remains inside the operating envelope then no alert is generated but if the sewer level goes outside the operating envelope, an alert is generated.

Wessex Water was the first water company to fully adopt StormHarvester.

What were the expected benefits? e.g. financial, compliance, reliability

StormHarvester is allowing Wessex Water to perform proactive maintenance on its assets as we can detect when sites are starting to fail rather than waiting for the telemetry alerts to tell us that the site has already failed.

There are four main types of failure that are being detected:

1) Partial blockages of chambers or sewers: where a small change in the level is detected, usually after rainfall, which indicates a partial blockage is forming or there is siltation. This can lead to a full blockage and a pollution.
2) Blockages/high levels during rainfall: these could otherwise go unnoticed in amongst other genuine alarms/high levels.

3) Loss of data or communications: if new data is not received, StormHarvester will detect this and generate an alert. This is useful to support asset management and equipment faults. 4) Sensor failures: if the sensors jump to very high, very low or zero readings, StormHarvester will detect these and the sites will need maintenance visits to repair them. These alerts are making it easier to monitor and maintain the EDM equipment. The easy identification of faults allows Wessex Water to maintain high levels of operability that then allows early intervention to prevent blockages before they can become pollutions.
Have we reached any conclusions? What impact has it had? The initial trial of StormHarvester used 89 EDM (storm overflow) sites in Bath. This has now been expanded to over 1200 signals from all the AMP5 & AMP6 EDM sites and the available AMP7 EDM sites are currently being added to StormHarvester. Ten Water Recycling Centre (WRC) sites have also been trialled with a view to roll out to all eligible sites, this is now awaiting a contract to proceed. The result will be 100% of the EDM sites being monitored by StormHarvester and the future further addition of more non-regulatory in-sewer monitoring devices is expected. We have seen a significant reduction in pollutions caused by blockages at and around EDM assets. This suggests that the monitored network with the analysis through StormHarvester provides a more effectively managed sewer system.
Next – what do we propose for 2025-30? e.g. a trial; full implementation / rollout Full roll-out to all the EDM signals is in progress and the intention is to host the future larger-scale deployment of network monitoring devices (monitoring levels in tanks, syphons, flow control chambers and pollution hot-spots). This will give better coverage to detect issues as well as implement more condition based maintenance across the sewerage network. The ongoing development with StormHarvester to look at WRC storm tank compliance and Sewerage Pumping Station (SPS) pump analysis. There are also plans for integration with telemetry system alongside more frequent alerting/reporting which could reduce alarm volume through the control room.
Any challenges for going further? Wider-scale implementation will require more staff to maintain the system for Wessex Water to identify and address technical issues.
Other comments External people / organisations: StormHarvester

A7-1.2. New or future innovation

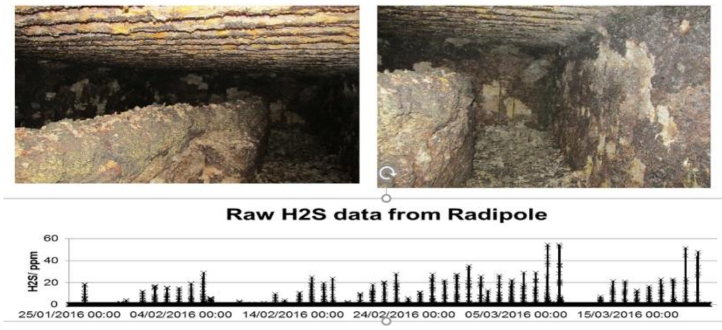
A7-1.2.1. Calcium Aluminate Cement Veneers for Biogenic Corrosion Resistance

WHY? What's the underlying issue or opportunity being addressed?

Biogenic corrosion of concrete due to hydrogen sulphide attack (H_2S) including sulphate resistant (SRPC) varieties, is ubiquitous across the waste sewerage network around the world. This occurs where sulphuric acid forms due to bacterial interaction, and corrodes the concrete surfaces above the water line. The cost of rehabilitation of structures can be excessive. However, with the advent of Calcium Aluminate Cement (CAC) in the form of thin overcoats or veneers, the problem can either be solved or at least the structure can be provided with up to ten times the longevity when compared to SRPC structures.

What have we done to date?

For the last three decades various repair coatings have been trialled across all W&Sc's worldwide, and in Wessex Water we have had disappointing outcomes. The USA EPA have stated through extensive trials that continuous level of H_2S > 5ppm, will initiate concrete corrosion such as that shown right. In this case the structure was constantly subjected to levels between 20 – 40 ppm, vastly reducing the lifespan of the structure, and in this case under a road, representing a third party safety liability. But elevated levels of corrosion are not limited to the sewers and tunnels, and also frequently occur in the WRC treatment plant's, or anywhere where semi turbulent flow initiates the bacteriological interaction.



What is the innovation we propose for 2025-30?

Wessex Water in collaboration with Sydney Water and Sydney University are now concluding the detailed examination of the biogenic resistance capabilities of CAC. This material substitutes bauxite (a form of aluminium ore) for the traditional limestone constituent.

This has the unique ability to constantly resist corrosion due to acid pH levels from 6 down to 3 on the pH scale. Beyond that from a pH of 3 down to 1, or below, CAC is subject to corrosion, but at a reduced rate of 10% that of comparative SRPC.

Sydney Water have shared their technical data exclusively with Wessex Water from their application of CAC to the Bondi Outfall and Northern outfall tunnels and conclude that the benefits include :

- Less surface preparation is needs of the surface to be coated;
- CAC bonds well to damp surfaces;
- Less expensive than traditional coatings;
- More productivity is experienced in application;
- Major cost savings are made when considering the whole life cost.

Photo above right, shotcreting a 40mm thk veneer of CAC at Shaft 13, Bournemouth CIS Tunnel, UK Photo below right, Sydney Water application of the same to the Bondi Tunnels , Australia

How advanced is it?

The productive use of CAC has come of age and the efficacy of such, especially the German derived supply of CAC developed bauxite, is now ready for implementation, especially across existing structures requiring rehabilitation, and as importantly, the specification of 25-40mm thk veneers of CAC at proposed WRC's structures in the planning stage as a preventative measure.

The three participants to the CAC research projected listed above, all agreed to evaluate CAC against existing and previously used repair coatings and methods such as epoxies in the formation of a 'corrosion cell', as can be seen right.

Sydney Water and University formed the first cell in Sydney to reflect an environment of high humidity and elevated temperature, and Wessex Water built their cell in Bournemouth UK, to replicate low humidity and temperature. The corrosion cell experiment has been on going since 2019 and the results will be available in 2024. Interestingly, a new material has been developed in competition to CAC, known as 'Geopolymers', these have been included in the cell from the beginning, to compare.

What are the expected benefits?

Considerable costs savings will be made over the whole life of the assets, in areas where H_2S > 5ppm is present, as corrosion will be eliminated in the majority of situations, hence reliability will be secured. Of course disruption experienced by customers will be mitigated when assets are in highway of public land. The whole life carbon footprint will also be reduced by prevention of constant unnecessary rehabilitation of poor performing and historic repair coatings.

Any anticipated challenges?

None evident.

Financial points

All costs already accounted in AMP7, costs of application of materials will be via constructional o and/or maintenance totex budgets.

Other comments

External people / organisations: Dr Ian Bateman of IBtech Pty, Sydney Water & Sydney University

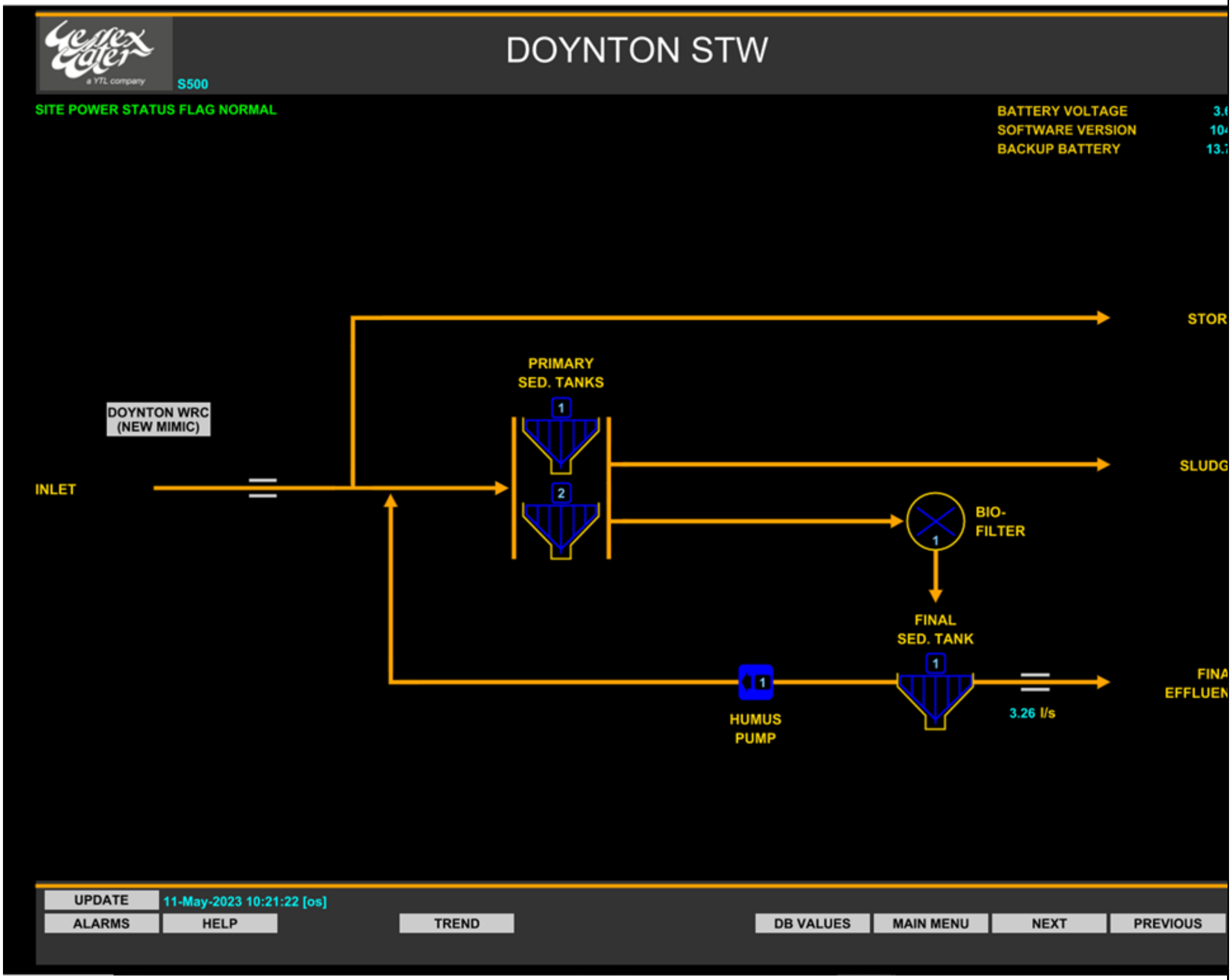
A7-1.2.2. Pollution reduction – Detection Dogs

WHY? What's the underlying issue or opportunity being addressed? Pollution reduction utilising Sewerage Detection Dogs
What have we done to date? Working methods, technologies etc Not explored previously. We have used CCTV and the misconnection/streamclean teams to identify.
What is the innovation we propose for 2025-30? What new technology or way of working? What scale e.g. early investigation; a trial; full implementation / rollout? Initial trial with 1 number detection dog, but then increase numbers to increase coverage.
How advanced is it? e.g. early concept; being trialled elsewhere; demonstrated but not yet readily available; all ready to implement Utilise Pollution detection dogs as used in Sydney Water which has resulted in $14m Australian Dollar saving in identifying misconnections from the sewerage network into surface water systems. Working with Nikki Glover who has successfully rolled out Newt Detection dogs in Wessex Water, her experience and research has shown that this has a very high chance of success in detecting pollutions and misconnections.
What are the expected benefits? e.g. financial, compliance, reliability Financial benefit in that detection dogs can cover large distances in a day which will be significantly quicker than current methods. Compliance benefit in that we should be able to detect issues sooner reducing the impact of pollutions. PR Benefit if managed properly.
Any anticipated challenges? None
Financial points e.g. anticipated spend on trials, indicative cost savings Cost of trial 1FTE, 1 Dog, Training, Insurance, Modified Ford Ranger for welfare = £70-80k but then £5k increments thereafter. Expect to reduce costs of associated fines and prosecution.
Other comments External people / organisations: Sydney Water Nikki Glover will be visiting Sydney Water in September to understand fully. Also keeping an eye on Irish Water who have started their own trial.

A7-1.2.3. Digital Twins (‘DT’)

WHY? What’s the underlying issue or opportunity being addressed? “Digital Twins” of built assets contain information about the “Physical Twin”, by periodically updating the information held about the physical the digital can be used to make predictions in various scenarios. During Apollo 13 NASA used what is considered the first digital twin to test scenarios before they were put into action. Similarly, Wessex have the opportunity to build twins that can observe telemetry to control, monitor and forecast network behaviour
What have we done to date? Our existing regional control and monitor system, ScopeX, has a basic digital twin capability known as ‘mimics’.
What is the innovation we propose for 2025-30? During design, construction and commissioning a significant investment is made in producing models containing both 3D geometry and associated data. Traditionally much of the value in this is lost after delivery which could be used in asset operation. Trials are in place by IoT Team to link geometry models with asset data and telemetry existing 2D schematic mimics. In addition, the new digital twins could support the integration of data from multiple sources, both internal and external. For example, Waste, Supply, and Weather, all on the same DT.
How advanced is it? This is new to Wessex Water, but already in use across many use cases in Industry 4.0
What are the expected benefits? e.g. financial, compliance, reliability In the short term mimics can be more readily understood and engaged with in terms of a 3D model giving a real-world view of assets position, geometry and current and predicted status. Integrated data presented on the DT will help operations in their day-to-day work.
Any anticipated challenges? Access to data Data integrity Cultural and process change
Financial points e.g. anticipated spend on trials, indicative cost savings Currently selected as an IoT Lab proof-of-value to present capabilities and potential costs
Any other points Would probably relate to ‘site of the future’ initiatives
Other **External people / organisations:** Unity, Microsoft Figure - existing Scopex 'mimic

Figure - existing Scopex 'mimic



A7-1.2.4. Hibernated Epoxy Resin Development for Infiltration Sealing

WHY? What's the issue or opportunity being addressed?

Wessex Water adopted epoxy resin saturated Cured in Place Pipelining (CIPP) materials used for infiltration sealing of sewers, in 2011 as they emerged. We worked with supplier Epros GmbH (later Trelleborg) of Germany, and framework lining contractor Onsite Ltd, to perfect manufacture of the wet uncured linings and their installation into sewers to prevent infiltration/exfiltration. The system and product has been very successful in preventing such, and is becoming more important as we line sewers to seal upstream of CSO's to prevent unnecessary premature spills to watercourses.

However, the epoxy resins are very volatile and prone to premature curing (spontaneous exotherm) in transit, meaning financial loss of product and abortive works labour costs baked into tender rates, and a limitation on diameter of sewers to be lined at 225mm and down.

What have we done to date?

Sealing sewers 300mm diameter and above has to be completed using polyester resin liners which shrink slightly meaning infiltration can move between the host pipe and the liner to emerge into the sewer at lateral connection to the dwelling etc, cut through the liner. These are difficult to seal and historically increases the cost beyond the system's ability to challenge the traditional option of open cut replacement, in which case we lose the benefits of a 95% decrease in CO_2 offered by CIPP lining in comparison to excavation solutions.

What is the innovation we propose for 2025-30? What new technology or way of working? What scale e.g. early investigation; a trial; full implementation / rollout?

We propose to develop our own hibernated cure epoxy resin, where once the components of the resin are mixed and vacuum impregnated into the felt liner, the 'reactive clock' leading to a cure known as the exothermic reaction, is frustrated by additional chemical "super-latency" agents that enable the reaction to be hibernated until it is heated to a critical temperature. Discussions between Wessex Water's Rehabilitation Manger and Dr Ian Bateman (Australia's leading CIPP resin material scientist) have proved the theory and mechanism of hibernation of epoxy resin.

How advanced is it? e.g. early concept; being trialled elsewhere; demonstrated but not yet readily available; all ready to implement

Late concept stage, now leading to resin batching pending funding approval. The resin will then undergo the necessary 10,000 hour long EL50 laboratory analysis in acid conditions required by ISO 11296 : Part 4. Once this is complete the resin if successful, will be ready for use and consideration of exploitation of commercial rollout, producing a stream of revenue for Wessex Water.

What are the expected benefits?

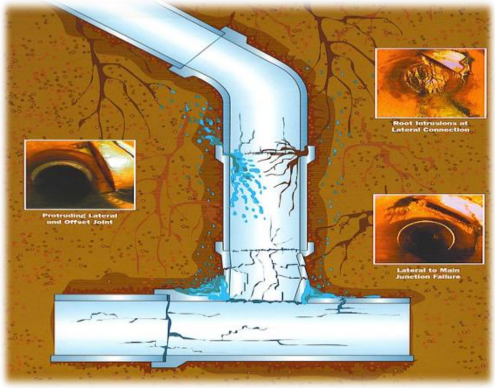
- We no longer suffer loss of saturated epoxy liners prior to construction due to premature spontaneous curing;
- We can line any sewer of any size, not restricted to sewers >225mm diameter;
- The epoxy can exploit the emerging CIPP Pressure lining market in the UK across multiple utilities handing fluids, generating a commercial stream of revenue
- The reduced likelihood of a premature spontaneous cure will greatly reduce the stress of such an occurrence, that might otherwise render the host asset as lost for future use.

Any anticipated challenges? The EL50 test will exploit any weakness' of the resin liner compilation which is usually recognised as a 'Creep Knee' deformation of the sample representing failure somewhere along the 10,000 hour timeline. But this is traditionally overcome by a set of 5 slightly different resin composition samples under simultaneous test to ensure the best resin eventually is recognised.
Financial points e.g. anticipated spend on trials, cost savings The estimated cost of the resin design and certification and worldwide accreditation would be some £80k
Other comments **External people / organisations:** Dr Ian Bateman Ibtech Pty Australia

A7-1.2.5. ‘Latseal’ Sewerage Junction 3D Repair

WHY? What’s the underlying issue or opportunity being addressed?

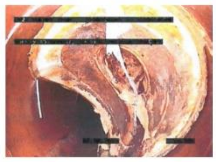
The ability to rehabilitation sewers without the need for excavation has been achievable since 1971 by using resin impregnated felt liners, cured in place by heat or light, known as ‘Cured in Place Pipelining’ (CIPP). Once installed in the sewer, small robotics open connections through the liner from 4the original house drains and other connections.



But, often the connection from the house or road gully etc, to the original sewer, can me badly fractured or displaced (see right) and there has never been a suitable ‘Tube on tube’ 3D connection facility that can be installed to repair that connection, without adequate adhesion to the adjacent CIPP liner and lateral connection, which does not wrinkle and cause the collection of organic matter over time , which can cause blockages.

In addition with the importance of CIPP lining of sewers to prevent infiltration/exfiltration which may cause downstream CSO’s to spill prematurely, the lack of a suitable 3D connection facility has meant the ground water has exploited these areas to infiltrate, along with tree roots.

What have we done to date?



Most of these inadequate or defective sewer connections have been excavated at huge cost and all of the associated disadvantages in socio ec flag onomic costs and disruptions to customers. This has also resulted in an unfortunate ongoing higher level of carbon footprint than necessary.

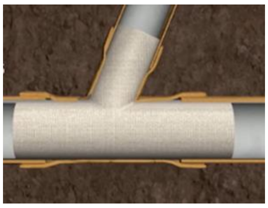
Some 15 years ago a connection collar known colloquially in the industry as a ‘Top Hat’ was introduced to the UK market. Having used a small number of these as a trial, we found them to secure insufficient adhesion to the CIPP liner, or host pipe and eventually fall out as shown right.

What is the innovation we propose for 2025-30?

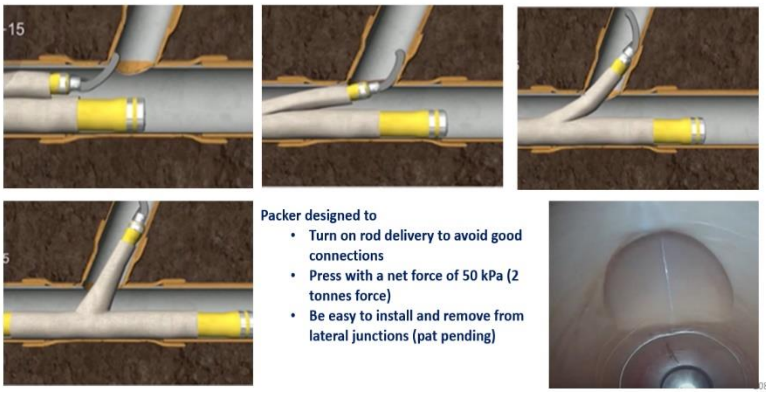
Wessex Water have rejected a number of similar systems over the years, not only for lack of constructional continuity, but for reasons of inadequate long term load bearing capabilities. All linings and repair systems such as these need to pass the most stringent of tests as detailed in ISO 11296 : Part 4: 2018, they also need to be capable of adhering to the American design standards for resin systems known as ASTM F1216.

We have chosen a superior connection system known as ‘Latseal’ as supplied from Australian designer Dr Ian Bateman. The system is used by Sydney Water and we seconded an engineer to southern Australia to undertake benchmarking and due diligence prior to purchase. Sydney had installed over 250,000 in the last decade with very few failures and we purchased the identical equipment but utilised a refined silica composite resin for ensured longevity, along with a new system of woven glass carrier tube with elevated flexural modulus, or strength.

The deliver packer system can be seen here ensuring the blow up packer locates properly and once expanded to the internal periphery of the sewer, the resin repair can be seen without any wrinkles bottom right.



The final repair product can be seen in the image to the left.



How advanced is it?

The system is now in use after a period of commissioning throughout the Wessex Water sewerage network.

What are the expected benefits?

The benefits are :

- A cost effective repair system that takes one hour to install from arrival on site by the team;
- Hence minimal disruption to traffic and our customers;
- A glass and silica construction of considerable strength compared to those that have gone before, capable of well over 50 years of insitu longevity;
- Low carbon foot print 95% less carbon generated than traditional open cut;
- Proven track record with few failures as experience by Sydney Water

Any anticipated challenges?

None expected

Financial points

All costs already accounted in AMP7, costs of application of materials will be via constructional and/or maintenance totex budgets.

Other comments

External people / organisations: Dr Ian Bateman of IBtech Pty

A7-1.2.6. PipeBots Gross Metal Loss

WHY? What's the issue or opportunity being addressed? Rising mains convey sewage under pressure up a gradient. Commonly made of cast iron or ductile iron, their pipe walls deteriorate gradually, eventually leading to bursts which can cause major pollution. Deterioration can be due to hydrogen sulphide attack, abrasion, and corrosion linked to ground conditions. These variables are hard to predict locally. We want to carry out preventative inspection and maintenance to stop bursts from happening, based on knowledge of a rising main's condition. Currently this is difficult and expensive because they're underground, difficult/expensive to shut off, and have uncertainty/risk regarding which sections need surveying.
What have we done to date? Wessex Water have joined a collaborative project to secure OFWAT funding and embark on development of an 'in-pipe' crawler robotic which can collect condition data from within a pressurised wastewater pipe. Development of a new vibro-acoustic sensing rig is at 'proof-of-concept' stage, with completion expected by October 2023.
What is the innovation we propose for 2025-30? Further development of the robotic and sensing rig to Stage 3 Development and Verification. This would include trials of the solution in a real-world environment and testing against operational requirements.
How advanced is it? The development and availability of 'in-pipe', live inspection tools do not exist and are desperately needed for rising main assets, which are unique to the water sector. Such tools would enable operators to gauge the condition of mains, to identify defects and plan rehabilitation works.
What are the expected benefits? This capability would subsequently reduce the risk of failure leading to pollution and the secondary impact of increased risk of flooding to customers and inconvenience to society during repair works.
Any anticipated challenges? Successful data collection inside a pressurised sewage pipe has many challenges, from waste 'ragging' affecting the sensors, unknown bends, and limited pipe wall contact, to the difficulty of inserting the robotic into the pipe under pressure.
Financial points Wessex Water have committed £11,600 of 'in-kind' funding to the current proof of concept project. Further funding contribution is likely to be required for Stage 3 Development and Verification.
Other comments **External people / organisations:** Thames Water, Welsh Water, Synthotech, University of Sheffield

A7-1.2.7. Telemetery (ScopeX) Health

WHY? What's the underlying issue or opportunity being addressed? Our regional control and monitoring system, ScopeX, lacks health monitoring capabilities. For example: 1. Configuration mistakes 2. Standards validation The target is to build an automated system that would monitor the internal configurations done in the system on a daily basis and issues report for issues found. Where possible, auto-correction could potentially be achieved.
What have we done to date? We currently rely of vigilance of people, when they happen to come across a mistake in configuration. For some issues, we are able to manually run reports to identify issues.
What is the innovation we propose for 2025-30? An automated way to enhance the health of potentially our most critical system used by the control room and operations, ScopeX. Once the infrastructure is in place, capabilities could be bolted on according to priority in the future.
How advanced is it? This is new to Wessex Water, we currently rely on manual work and local heroes
What are the expected benefits? e.g. financial, compliance, reliability Reliability and compliance
Any anticipated challenges? Access to relevant data Process and cultural change
Financial points e.g. anticipated spend on trials, indicative cost savings Trials to cost 70K
Any other points

A7-1.2.8. Superhydrophobic sewer coating for mobilisation of Fats, Oils and Grease

WHY? What's the underlying issue or opportunity being addressed?

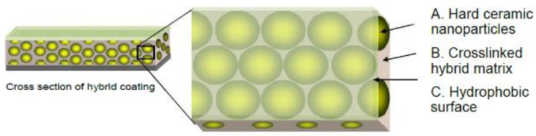
Fat oil and grease accumulations are causing impediment to flow throughout the world sewerage system. This can cause surcharge flooding, loss of storage capability within the asset with premature spilling of CSO's, customer complaints of odours and smells, and the cost of removal.

What have we done to date? Working methods, technologies etc

FOG accumulation can become sizeable if illegal discharges increase for various reasons including poor maintenance of grease traps etc. Often these can build up quicker than the expected maintenance round. Regularly these accumulations occur at the upstream of inverted syphons and in difficult reach locations. The normal removal methods include jetting and manual man entry removal. Historically, there has been an absence of low contact adhesion surface materials that can be employed.

What is the innovation we propose for 2025-30? What new technology or way of working? What scale e.g. early investigation; a trial; full implementation / rollout?

Wessex Water have made initial contact with a company Ultra Tech International Inc. who have recently invented the next generation beyond superhydrophobic coatings. This product is known as 'Gentoo' and is akin to a flexible ceramic, which has such low surface energy that it repels water and most oils and solvents, it can also withstand significant abrasion without sacrificing performance.



A. Hard ceramic inorganic nanoparticles provide high abrasion resistance
B. Highly crosslinked flexible polymeric resin binds particles with flexibility and high durability
C. Self assembled surface groups result in excellent watershedding and easy cleaning property

The proposal is very early concept, and it is envisaged that research may well identify other competitor products all of which would be tested to establish efficacy in preventing FOG adhesion to the sewer structure, allowing its mobilisation downstream to the WRC for treatment.

How advanced is it? e.g. early concept; being trialled elsewhere; demonstrated but not yet readily available; all ready to implement

Very early-stage concept, initial discussion with inventors.

What are the expected benefits? e.g. financial, compliance, reliability

The vision would be to apply the coating to any location where excessive build-up of FOG causes serious operational problems in sewers or in treatment locations. It is considered appropriate to apply the materials to pumps/impellors and wet wells to further aid the transit of FOG downstream.

If this is possible, then we can envisage that routine jetting and vactor maintenance would be substantially reduced in cost, and the CO2 generated by cleaning machines and labour costs.

Any anticipated challenges?

No major challenges in laboratory proof of concept, where testing would include adhesion pull off test of coating from the substrate in tile trials, Taber abrasion verification, delamination test etc, all within the remit of IKT laboratories. Once proven in theory, then thorough live trials would be undertaken.

Financial points e.g. anticipated spend on trials, indicative cost savings As yet unknown, but verification expected to be in the range £50 - 70k
Other comments **External people / organisations:** IKT Laboratories Gelsenkirchen Germany, and resin suppliers

A7-1.2.9. Vacuum Testing of Manholes for Infiltration

WHY? What's the issue or opportunity being addressed?
Groundwater often enters sewers and manholes (infiltration) which can cause pipes to fill up, leading to storm overflow spills from the sewerage network or from water recycling centres.

What have we done to date?
We seal sewers and manholes to prevent ground water infiltration and have extensively tested materials for sealing manholes, especially in locations with fast moving groundwater such as parts of Dorset with gravel geology. We have found a polymer modified cementitious grout (Pozament SPP6) with consistently superior sealing capabilities, reduced particle bleed and a short chemical hydration clock, reducing the amount of material that needs to be used.

However, we rarely manage to pinpoint infiltration or sewage leakage through routine CCTV or visual inspections. This can be due to low levels of ground water at the time of inspection, which means that water isn't being forced into the sewer or the manhole. This can lead to unnecessary amounts of grout sealer being used as a precaution.

What is the innovation we propose for 2025-30? What new technology or way of working? What scale e.g. early investigation; a trial; full implementation / rollout?

We propose using Lansas vacuum testing plates. When air is evacuated from the manhole, any ground water on the outside of the manhole will be sucked inside and stain the internal surface, allowing the entry points to be marked.

If the ground is dry, we will be able to saturate the ground around the manhole to create our own infiltration effect. If this is not possible (e.g. at manholes below roads), we plan to use a hydrophilic polyacrylate gel which can be sprayed on the internal surface of the manhole, which creates small 'volcano point' air intrusions where air is sucked inside.

How advanced is it? e.g. early concept; being trialled elsewhere; demonstrated but not yet readily available; all ready to implement
The vacuum testing plates are readily available.

What are the expected benefits?
This will be an holistic, least-cost way to deal with ground water infiltration and ensure a water-tight seal. A simple and elegant solution.

Any anticipated challenges? None

Financial points e.g. anticipated spend on trials, cost savings

Purchase of two sets of equipment and training some £40k from Lansas Inc , California , USA

Other comments
External people / organisations: Lansas

A7-1.2.10. Waste Smart System

WHY? What's the underlying issue or opportunity being addressed?

To utilise and improve the data and control that we have over our Waste assets to most effectively deal with the challenges that we face such as storm overflows, carbon, environmental performance etc.

We are creating a smart system that covers all of our waste assets and processes, from our customers properties to the receiving environment. By looking at our waste network and water recycling centres as one system, we can:

- Alert our teams earlier to faults or failures.
- Tune their controls so that they operate more effectively together.
- Remote control our assets allowing us to respond more quickly to an issue.
- Intervene earlier when we recognise that equipment is operating sub optimally, rather than waiting for it to fail.
- Predict change to the system and automate corrective actions.

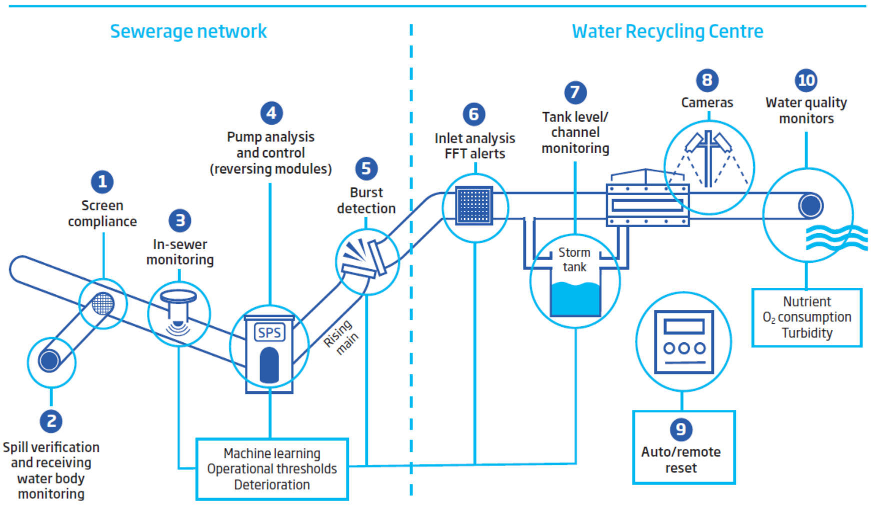
What have we done to date? Working methods, technologies etc

We have determined the capabilities that we want to develop and have started a project to create a trial smart system. We will be utilising the technology we have in smarter ways and complementing it with the latest innovations.

We have already seen a lot of success in this area such as storm harvester where we are using the AI to indicate when our sewerage system is operating abnormally and therefore predicting blockages before they result in pollutions.

What is the innovation we propose for 2025-30? What new technology or way of working? What scale e.g. early investigation; a trial; full implementation / rollout?

The intention is to, in a very agile way, roll out successful technologies and processes across the network. The Smart System will continue to be our test bed and we will develop and test more technologies through the AMP.



How advanced is it? e.g. early concept; being trialled elsewhere; demonstrated but not yet readily available; all ready to implement We are starting our live trial system
What are the expected benefits? e.g. financial, compliance, reliability We hope to see improvements in compliance, resilience, reliability and financial
Any anticipated challenges? N/A
Financial points e.g. anticipated spend on trials, indicative cost savings We are currently forecasting to spend £1m over the next two years on the trial
Any other points N/A

A7-1.2.11. World Sewer Operators (WSO)

WHY? What's the underlying issue or opportunity being addressed?

There is a common vision worldwide to create wastewater, urban drainage and water networks that are: efficient, resilient, sustainable, compliant and climate change adapted.

WSO's mission is to deliver this by enabling worldwide peer to peer networking, learning and development communities for executives and senior management of public and private network owners.

To deliver this requires creation of a safe peer to peer environment for the asset owners, without participation by the supply chain or other stakeholders, undertaken in a confidential manner and with the content member led. To provide certainty and confidence participation in WSO will be by invitation.
The WSO facilitation team will provide the catalyst and support for its members to address their pressing needs through peer-to-peer exchange of experience and information, through its programmes, all undertaken on an independent, not-for-profit basis.

What have we done to date? Comment by Iain Naismith IKT

Wessex Water's senior management, led by its CEO, has a reputation for looking externally for solutions around the world. For example, is widely regarded among the other UK WaSCs as the leader for bringing to the UK well-founded innovations to extend the life of its sewerage assets.

Since 2014, Wessex Water has founded and developed with IKT the Sewer Rehabilitation Contact Group, a peer-to-peer exchange between sewer rehabilitation management, which now comprises the 13 WaSCs of UK/Ireland, Network Rail, Transport for London, Manx Utilities and Govt. of Jersey.
Through this Group, Wessex Water is also a participant in the wider ComNet Wastewater an international peer to peer self-help group addressing ageing assets and climate change adaptation and comprising representatives of KomNetAbwasser (a community of 130 German municipal sewer owners), Rioned (the Dutch wastewater sector research association) and Vlario (which serves Belgian sewer network owners).

Wessex Water now has the opportunity to similarly be the founding member of World Sewer Owners, as a peer-to-peer community for the executives and senior management of the world's major sewer networks, working with IKT to devise and develop its programmes and guide the recruitment of participants.

What is the innovation we propose for 2025-30? What new technology or way of working?
What scale e.g. early investigation; a trial; full implementation / rollout?

WSO will be a new way of working for the executive and senior management, to address their pressing needs through peer-to-peer engagement with other sewer network owners worldwide. It will provide rapid answers, leading to identification and implementation of new approaches, new ways of working and new technologies that provide the solutions.

Roll out is planned for late 2023 through 2024, with full implementation in 2025 – 30.

How advanced is it? e.g. early concept; being trialled elsewhere; demonstrated but not yet readily available; all ready to implement

WSO will be ready to implement by late 2023.

The potential for Wessex Water's engagement with WSO has been demonstrated through the success of the Sewer Rehabilitation Contact Group and its involvement with ComNet Wastewater, whilst IKT has also developed and expanded the German KomNetAbwasser over the past decade.

These have demonstrated the capacity of the team to devise and deliver peer to peer engagement.

What are the expected benefits? e.g., financial, compliance, reliability WSO will provide financial, compliance and reliability benefits for Wessex Water and the other peer-to-peer participants, as its purpose is to enable them to address their pressing needs through: • Engaging with their peer group on pressing topics in private, confidential spaces that are free of commercial interest • Tapping into each other's knowledge, know-how and experience • Sharing and identify solutions that minimise risk, provide greater certainty and avoid reinventing the wheel. • Choosing to engage with the WSO programmes of most relevance to them. Facilitation of WSO by IKT is neutral, independent and not-for-profit.
Any anticipated challenges? The success of WSO will be dependent on: Devising services and delivery that meet actual need. To address this Wessex Water, as founding member, can ensure that its interests and requirements are included from the start, IKT will build on this when engaging with other participants. Recruitment of the calibre organisations and engagement of their executive and senior management – to address this, Wessex Water's own executive have the opportunity to assist IKT in recruitment of a core participation from network owners they most desire to engage with. Delivery of a service that meets the needs of Wessex Water and other participants is essential. To address this, IKT will build on its experience with its existing networks and engage with participants to deliver what they require.
Financial points e.g. anticipated spend on trials, indicative cost savings £40k to support IKT's external costs to initiate WSO, primarily for travel and attendance in recruiting participation. WSO will subsequently be financed by annual subscription from the membership, commensurate with the provision of its services on a not-for-profit basis. (staff time).
Other comments **External people / organisations:** WSO Facilitator: IKT – Institute for Underground Infrastructure gGmbH Roland Waniek and Iain Naismith (German organisation not for profit) Accompanying pictures show: Webpage from KomNetAbwasser the peer-to-peer association of 130 German Sewer Owners managed by IKT, the participation in the Sewer Rehabilitation Contact Group founded by Wessex Water and IKT, which includes all 13 UK/Irish WaSCs, and the IKT WSO development team.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Heavy rain precaution
working documents
Certified consultants
knowledgeable
videos
KomNetABWASSER
Kommunales Netzwerk der Abwasserbetriebe
Herausgeber
neutral
unabhängig
gemeinnützig
IKT
IKT - Institut für Unterirdische Infrastruktur
Service training
ICT courses on all aspects of sewer construction and operation
for municipal sewage companies
Online meeting: weekly sewage consultation
The KomNetAbwasser is:
A strong community of wastewater companies
that support each other
in terms of technology and operation
INTRODUCTIONS
SRC Group
Sewer Rehab Contact Group
WATER UK
UK Water and Sewerage Services
Scottish Water
Northern Ireland Water
Irish Water
Northumbrian Water
United Utilities
Yorkshire Water
Severn Trent Water
Anglian Water
Dŵr Cymru Welsh Water
Thames Water
Wessex Water
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Southern Water
Network Rail Routes and Regions
Foul I Surface I Combined
Slide 2

A8 WRC Screening Reports

We have undertaken options appraisal of all our WRCs identified as requiring potential improvements for environmental drivers and/or growth requirements. These are included below for reference, although may have been superseded by more detailed optioneering and/or emergent risks and issues from when these reports were produced.

Site ID: 13001 - ABBOTSBURY WRC

Population 2023: 1158

Current Permits

P	BOD	SS	AmmN
0.81	12	24	5

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13006 - ALMONDSBURY WRC

Population 2023: 2965

Current Permits

P	BOD	SS	AmmN
-	40	60	20

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	1	2	Flow upgrade required in future

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13008 - AMESBURY WRC

Population 2023: 12182

Current Permits

P	BOD	SS	AmmN
1	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	2	Flow upgrade required in future

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13004 - BISHOPS CANNINGS (ALL CANNINGS) WRC

Population 2023: 1281

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	25	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Potential to transfer flows to (reasonably) nearby Device WRC in place of grey asset solution at All Cannings WRC.
Least Cost	Same as Preferred Option
Justification	Whilst there are concerns about the deliverabilty and cost risk of the transfer option, it is substantially less than what would be a grey asset solution for a small site, as we are not confident that alternative solutions like an integrated constructed wetlands could reliably achieve the required permit. The distance between All Cannings and Devizes WRCs is very high, almost 5km. And the route goes past housing delveopments, police HQ and various tree groups. The elevation profile is also unfavourable, and may necessitate intersatge pumping

Site ID: 13021 - BISHOPS CAUNDLE WRC

Population 2023: 406

Current Permits

P	**BOD**	**SS**	**AmmN**
-	40	60	20

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13022 - BISHOPS LYDEARD WRC

Population 2023: 2346

Current Permits

P	**BOD**	**SS**	**AmmN**
1	35	45	12

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13024 - BLACKHEATH WRC

Population 2023: 6328

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	7

Phosphorus

Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, SSSI_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Site required to achieve 0.25mg/l due to LURB.
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Nitrogen

Needs: HD_IMP, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Grey	0	REF!	REF!
2	Green	0	REF!	REF!
3	Transfer	0	REF!	REF!

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit and 10mg/l nitrogen permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13027 - BOURTON WRC

Population 2023: 1753

Current Permits

P	**BOD**	**SS**	**AmmN**
1	40	50	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	DWF of site has a too large contribution to waterbody to remove.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13028 - BOWERHILL WRC

Population 2023: 10123

Current Permits

P	**BOD**	**SS**	**AmmN**
0.5	14	25	6

Phosphorus
Needs: EnvAct_IMP1, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Proposed permit is the same/higher than current permit
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13029 - BOX WRC

Population 2023: 2499

Current Permits

P	BOD	SS	AmmN
-	25	45	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13031 - BRADFORD-ON-AVON WRC

Population 2023: 12203

Current Permits

P	BOD	SS	AmmN
1.4	25	45	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13032 - BRADFORD-ON-TONE WRC

Population 2023: 1434

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
-	40	50	25

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	1	1	Flow upgrade may be required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13039 - BRUTON WRC

Population 2023: 3748

Current Permits

P	**BOD**	**SS**	**AmmN**
2	25	35	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Site required to achieve 0.25mg/l due to LURB.
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 19031 - BUCKLAND NEWTON WRC

Population 2023: 433

Current Permits

P	**BOD**	**SS**	**AmmN**
4	30	45	15

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13043 - BUTLEIGH WRC

Population 2023: 2888

<u>Current Permits</u>

P	BOD	SS	AmmN
-	40	60	20

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Site required to achieve 0.25mg/l due to LURB.
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13045 - CAM VALLEY WRC

Population 2023: 8300

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13047 - CANNINGTON WRC

Population 2023: 4340

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
-	40	60	10

Phosphorus
Needs: WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Enhance existing treatment capacity
Least Cost	Same as Preferred Option
Justification	Meeting new discharge permit requirements through enhancing existing treatment capacity is both least cost and best value option.

Site ID: 13048 - CASTLE CARY WRC

Population 2023: 4427

Current Permits

P	**BOD**	**SS**	**AmmN**
0.5	15	25	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Proposed permit is the same/higher than current permit
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Chemicals: copper (dissolved)

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Install ASP at Castle Cary for soluble copper removal Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	Not confident we can meet IMP permit without installed technology. EA guidance recommends end-of-pipe solution for soluble copper removal. See corresponding ODR for further detail. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13050 - CERNE ABBAS WRC

Population 2023: 1017

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	55	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 19156 - CHARD WRC

Population 2023: 20240

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
0.5	20	30	2.5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Proposed permit is the same/higher than current permit
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13055 - CHARLTON HORETHORNE WRC

Population 2023: 545

Current Permits

P	**BOD**	**SS**	**AmmN**
1.5	30	45	14

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13057 - CHEDDAR WRC

Population 2023: 10354

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
0.7	15	25	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13062 - CHILTHORNE DOMER 1 VAGG LN WRC

Population 2023: 334

Current Permits

P	**BOD**	**SS**	**AmmN**
-	30	40	15

Phosphorus
Needs: EnvAct_IMP1, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13066 - CHRISTCHURCH WRC

Population 2023: 61871

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	10

Phosphorus
Needs: HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13069 - COLEFORD WRC

Population 2023: 2282

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	2	Flow upgrade required in future

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13073 - COMBE ST NICHOLAS WRC

Population 2023: 1063

Current Permits

P	**BOD**	**SS**	**AmmN**
-	12	24	9

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13075 - COMPTON BASSETT WRC

Population 2023: 5140

Current Permits

P	BOD	SS	AmmN
-	25	40	30

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Enhance existing treatment capacity Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option Same as Preferred Option
Justification	Meeting new discharge permit requirements through enhancing existing treatment capacity is both least cost and best value option. As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13076 - COMPTON DANDO WRC

Population 2023: 479

Current Permits

P	BOD	SS	AmmN
-	25	60	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13077 - CORFE CASTLE WRC

Population 2023: 1662

Current Permits

P	**BOD**	**SS**	**AmmN**
1.3	26	40	13

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13078 - CORFE MULLEN WRC

Population 2023: 8736

Current Permits

P	BOD	SS	AmmN
-	35	60	20

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13082 - CRANBORNE WRC

Population 2023: 807

Current Permits

P	**BOD**	**SS**	**AmmN**
1	30	50	10

Phosphorus
Needs: EnvAct_IMP1, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13084 - CREWKERNE EAST WRC

Population 2023: 7910

Current Permits

P	BOD	SS	AmmN
1	13	26	4

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Chemicals: cypermethrin

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Flexible permitting: Maximising Benefits approach for IMP cypermethrin permit where AMP7 Phosphorus scheme installations (front end ferric dosing) can be used as best endeavours to remove cypermethrin as much as reasonably practicable. Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	Evidence from CIP2 and CIP3 treatment technology trials that Cypermethrin is removed from effluent via solids. AMP7 P scheme at Crewkerne WRC install front end ferric doing on site to improve solids removal. Scheme to be installed by December 2024. Very likely that due to the addition of ferric, increased solids removal and therefore cypermethrin will be observed. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13086 - CROMHALL WRC

Population 2023: 1945

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	40	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Optimising the performance of the integrated constructed wetlands within existing site constraints.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13087 - CROSCOMBE WRC

Population 2023: 620

Current Permits

P	**BOD**	**SS**	**AmmN**
-	40	60	20

Phosphorus
Needs: EnvAct_IMP1, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13090 - DEVIZES WRC

Population 2023: 14965

Current Permits

P	BOD	SS	AmmN
1.3	10	30	5

Phosphorus
Needs: EnvAct_IMP1, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Chemicals: cypermethrin, nickel (dissolved), zinc (dissolved)

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	08WW100022a (cypermethrin) flexible permitting: approach 2 99%ile permitting for NDLS 08WW100022b (soluble nickel) and 08WW100022c (soluble zinc): Install ASP or similar for AMP8. Flexible permitting approach 1: single catchment permit for soluble metals. Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	ASP for soluble metals - normal filtration treatment options do not work for soluble materials on its own. Adsorption onto bio-flocs worked well during CIP2 and CIP3 chemical removal trials. EA guidance recommends end-of-pipe solution for soluble metals removal (nickel and zinc). Cypermethrin - Devizes WRC receiving MMF installation at end of AMP7/early AMP8. likely that improved solids removal from the MMF will improve Cypermethrin removal as is removed via solids, therefore flexible permitting approach 2 chosen. As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13091 - DIDMARTON WRC

Population 2023: 643

Current Permits

P	BOD	SS	AmmN
-	20	30	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13092 - DILTON MARSH WRC

Population 2023: 1841

Current Permits

P	BOD	SS	AmmN
-	35	50	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13096 - DORCHESTER WRC

Population 2023: 35751

Current Permits

P	BOD	SS	AmmN
0.7	15	30	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Nitrogen
Needs: HD_IMP, U_IMP1, HDIMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Grey	0	REF!	REF!
2	Green	0	REF!	REF!
3	Transfer	0	REF!	REF!

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit and 10mg/l nitrogen permit. No option - Dorchester WRC will be targetting a more stringent nitrogen permit under different PR24 drivers.
Least Cost	Same as Preferred Option No option No option
Justification	The proposed solution uses land to the east of the site. No option - Dorchester WRC will be targetting a more stringent nitrogen permit under different PR24 drivers. No option - Dorchester WRC already has a phosphorus permit tighter than the UWWTR target.

Site ID: 13099 - DOWNTON WRC

Population 2023: 5577

Current Permits

P	**BOD**	**SS**	**AmmN**
1	30	40	15

Phosphorus
Needs: HD_IMP_NN, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13100 - DOYNTON WRC

Population 2023: 263

Current Permits

P	BOD	SS	AmmN
-	20	45	20

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13101 - DRAYCOTT WRC

Population 2023: 1379

Current Permits

P	BOD	SS	AmmN
-	20	40	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13104 - EAST CHINNOCK WRC

Population 2023: 464

Current Permits

P	**BOD**	**SS**	**AmmN**
1.5	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13105 - EAST COKER WRC

Population 2023: 3889

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Site required to achieve 0.25mg/l due to LURB.
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13106 - EAST HARPTREE WRC

Population 2023: 428

Current Permits

P	BOD	SS	AmmN
-	15	25	10

Phosphorus
Needs: WFD_IMPg, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Integrated constructed wetlands acting as a tertiary treatment stage in collaboration with Bristol Water.
Least Cost	Same as Preferred Option
Justification	Working with Bristol Water, we have identified a parcel of land adjacent to the WRC that could fit a small integrated constructed wetlands. It is proposed that the construction is undertaken by Wessex Water, with Bristol Water undertaking the river and lake water quality sampling and modelling.

Site ID: 13107 - EAST KNOYLE WRC

Population 2023: 709

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	35	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13113 - EDFORD WRC

Population 2023: 1840

Current Permits

P	BOD	SS	AmmN
-	30	60	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	DWF of site has a too large contribution to waterbody to remove.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13114 - EDMONDSHAM WRC

Population 2023: 59

Current Permits

P	BOD	SS	AmmN
-	40	60	25

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13118 - EVERCREECH WRC

Population 2023: 3368

Current Permits

P	**BOD**	**SS**	**AmmN**
1	8	15	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13121 - FARMBOROUGH WRC

Population 2023: 1216

Current Permits

P	BOD	SS	AmmN
-	50	60	25

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13125 - FIVEHEAD WRC

Population 2023: 1106

Current Permits

P	BOD	SS	AmmN
-	25	40	20

Phosphorus
Needs: WFD_IMPg, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13128 - FORDINGBRIDGE WRC

Population 2023: 10570

Current Permits

P	BOD	SS	AmmN
1	20	30	10

Phosphorus
Needs: HD_IMP_NN, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13130 - FRESHFORD WRC

Population 2023: 1583

Current Permits

P	BOD	SS	AmmN
-	30	45	20

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13131 - FROME WRC

Population 2023: 36453

Current Permits

P	**BOD**	**SS**	**AmmN**
1.3	20	40	9

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13132 - GILLINGHAM WRC

Population 2023: 15013

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	30	8

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target. Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC. As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13134 - GLASTONBURY WRC

Population 2023: 29348

Current Permits

P	**BOD**	**SS**	**AmmN**
0.8	25	50	4

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13137 - GREAT SOMERFORD WRC

Population 2023: 1102

Current Permits

P	BOD	SS	AmmN
-	30	40	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13353 - GREAT WISHFORD WRC

Population 2023: 2224

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	30	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Enhance existing treatment capacity Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option Same as Preferred Option
Justification	Meeting new discharge permit requirements through enhancing existing treatment capacity is both least cost and best value option. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13142 - HARDINGTON MANDEVILLE WRC

Population 2023: 498

Current Permits

P	**BOD**	**SS**	**AmmN**
1.5	20	30	5

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13144 - HASELBURY PLUCKNETT WRC

Population 2023: 935

Current Permits

P	BOD	SS	AmmN
-	15	35	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13146 - HAZELBURY BRYAN WRC

Population 2023: 914

Current Permits

P	**BOD**	**SS**	**AmmN**
1.5	45	50	20

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Phosphorus stretch target as part of catchment permitting approach.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13148 - HILMARTON WRC

Population 2023: 582

Current Permits

P	**BOD**	**SS**	**AmmN**
-	25	38	7

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13150 - HINTON BLEWETT WRC

Population 2023: 165

Current Permits

P	BOD	SS	AmmN
-	20	30	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13152 - HOLDENHURST WRC

Population 2023: 177543

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	25	5

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.7mg/L phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13156 - HORNSEY BRIDGE WRC

Population 2023: 1538

Current Permits

P	BOD	SS	AmmN
-	15	60	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13157 - HULLAVINGTON WRC

Population 2023: 1366

<u>Current Permits</u>

P	BOD	SS	AmmN
-	45	60	8

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13158 - HURDCOTT WRC

Population 2023: 3857

<u>Current Permits</u>

P	BOD	SS	AmmN
1	20	30	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Enhance existing treatment capacity Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option Same as Preferred Option
Justification	Meeting new discharge permit requirements through enhancing existing treatment capacity is both least cost and best value option. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13160 - ILCHESTER WRC

Population 2023: 2604

Current Permits

P	BOD	SS	AmmN
1	25	30	15

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13161 - ILMINSTER WRC

Population 2023: 8563

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
1	25	35	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13163 - IWERNE MINSTER WRC

Population 2023: 1486

Current Permits

P	**BOD**	**SS**	**AmmN**
1	17	30	5

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target. Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC. As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13165 - KEYNSHAM WRC

Population 2023: 23659

Current Permits

P	**BOD**	**SS**	**AmmN**
1.3	40	60	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13172 - KINSON WRC

Population 2023: 49080

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	40	10

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13173 - LACOCK WRC

Population 2023: 736

Current Permits

P	BOD	SS	AmmN
-	40	60	20

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13175 - LANGPORT WRC

Population 2023: 9954

Current Permits

P	**BOD**	**SS**	**AmmN**
1	30	50	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13177 - LAVINGTON (WOODBRIDGE) WRC

Population 2023: 4492

Current Permits

P	BOD	SS	AmmN
-	15	30	4

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 17968 - LEYHILL WRC

Population 2023: 2317

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	40	10

Phosphorus
Needs: WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	DWF of site has a too large contribution to waterbody to remove.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13181 - LONGBRIDGE WRC

Population 2023: 1347

Current Permits

P	**BOD**	**SS**	**AmmN**
-	13	26	4

Phosphorus
Needs: EnvAct_IMP1, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13522 - LYNEHAM - SITE B (MAIN) WRC

Population 2023: 5793

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	30	6

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13190 - LYTCHETT MINSTER WRC

Population 2023: 8758

Current Permits

P	**BOD**	**SS**	**AmmN**
-	30	40	50

Phosphorus
Needs: HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

Nitrogen
Needs: HD_IMP, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Grey	0	REF!	REF!
2	Green	0	REF!	REF!
3	Transfer	0	REF!	REF!

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Conversion of WRC to an SPS, to ultimately pump flows for treatment at Poole WRC.
Least Cost	Same as Preferred Option
Justification	Whilst not without its delivery and cost risks, the transfer option came out substantially more favourably than a grey solution upgrade. There is insufficient land near the site to achieve both the N and P permit requirements.

Site ID: 13192 - MAIDEN NEWTON WRC

Population 2023: 1726

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
1	20	30	20

Phosphorus
Needs: HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13193 - MALMESBURY WRC

Population 2023: 12908

<u>Current Permits</u>

P	BOD	SS	AmmN
1	30	50	9

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	
Least Cost	
Justification	

Site ID: 13196 - MARDEN WRC

Population 2023: 878

Current Permits

P	**BOD**	**SS**	**AmmN**
2	20	30	20

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13198 - MARNHULL WRC

Population 2023: 598

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	40	10

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	DWF of site has a too large contribution to waterbody to remove.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Phosphorus stretch target as part of catchment permitting approach.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13199 - MARNHULL COMMON WRC

Population 2023: 6765

Current Permits

P	**BOD**	**SS**	**AmmN**
1	30	45	15

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13200 - MARSHFIELD WRC

Population 2023: 1750

Current Permits

P	**BOD**	**SS**	**AmmN**
-	10	20	1.9

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13201 - MARTOCK WRC

Population 2023: 9644

Current Permits

P	**BOD**	**SS**	**AmmN**
1	40	50	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13204 - MELKSHAM WRC

Population 2023: 20193

Current Permits

P	**BOD**	**SS**	**AmmN**
1.2	20	35	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13207 - MERE WRC

Population 2023: 3628

Current Permits

P	BOD	SS	AmmN
1	37	40	6

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13208 - MERRIOTT WRC

Population 2023: 3928

Current Permits

P	**BOD**	**SS**	**AmmN**
1	18	27	4

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

Chemicals: cypermethrin

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Flexible permitting: Maximising Benefits approach for IMP Cypermethrin permit where AMP7 Phosphorus scheme installations (front end ferric dosing) can be used as best endeavours to remove cypermethrin as much as reasonably practicable. Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	Evidence from CIP2 and CIP3 treatment technology trials that Cypermethrin is removed from effluent via solids. AMP7 P scheme at Merriott WRC installing front end ferric doing on site to improve solids removal. Scheme to be installed by December 2024. Very likely that due to the addition of ferric, increased solids and therefore cypermethrin will be observed. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13209 - MICHAELWOOD WRC

Population 2023: 3158

<u>Current Permits</u>

P	BOD	SS	AmmN
-	20	30	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13211 - MILBORNE PORT WRC

Population 2023: 5648

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	46	12

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13212 - MILBORNE ST ANDREW WRC

Population 2023: 1810

Current Permits

P	BOD	SS	AmmN
-	15	25	10

Phosphorus
Needs: EnvAct_IMP1, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13214 - MILVERTON WRC

Population 2023: 1727

Current Permits

P	BOD	SS	AmmN
1	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13220 - NETHERAVON WRC

Population 2023: 2106

Current Permits

P	**BOD**	**SS**	**AmmN**
1	40	50	25

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13222 - NORTH NIBLEY WRC

Population 2023: 757

Current Permits

P	BOD	SS	AmmN
1	50	55	20

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13223 - NORTH PETHERTON WRC

Population 2023: 3916

Current Permits

P	BOD	SS	AmmN
-	27	40	8

Phosphorus
Needs: WFD_IMPg, HD_IMP_NN, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13226 - NORTON ST PHILIP WRC

Population 2023: 1371

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
-	14	30	7

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Integrated constructed wetlands acting as a tertiary treatment stage.
Least Cost	Grey asset solution at the WRC to achieve a 1mg/L phosphorus permit.
Justification	We are promoting the use of a nature based solution (integrated constructed wetlands) as best value, compared to the least cost more conventional 'grey' asset solution. We are, however, not proposing to achieve as tighter permit as we would with a grey asset based soltuion. This is due to uncertainty on removal efficiency, and that the required effective wetlands area gets exponentially large the more stringent the target, meaning it will no longer be best value when taking into consideration additional construction costs.

Site ID: 13227 - NUNNEY WRC

Population 2023: 1274

Current Permits

P	BOD	SS	AmmN
-	31	51	12

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Integrated constructed wetlands acting as a tertiary treatment stage.
Least Cost	Grey asset solution at the WRC to achieve a 1mg/L phosphorus permit.
Justification	We are promoting the use of a nature based solution (integrated constructed wetlands) as best value, compared to the least cost more convential 'grey' asset solution. We are, however, not proposing to achieve as tighter permit as we would with a grey asset based soltuion. This is due to uncertainty on removal efficiency, and that the required effective wetlands area gets exponentially large the more stringent the target, meaning it will no longer be best value when taking into consideration additional construction costs.

Site ID: 13232 - PALMERSFORD WRC

Population 2023: 46745

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
1	15	25	5

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13235 - PAULTON WRC

Population 2023: 12429

Current Permits

P	**BOD**	**SS**	**AmmN**
1	21	40	7

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13237 - PEWSEY WRC

Population 2023: 8366

Current Permits

P	**BOD**	**SS**	**AmmN**
1	17	30	8

Phosphorus
Needs: HD_IMP_NN, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13242 - POOLE WRC

Population 2023: 174139

Current Permits

P	BOD	SS	AmmN
-	20	30	10

Phosphorus
Needs: HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

Nitrogen
Needs: HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Grey	0	REF!	REF!
2	Green	0	REF!	REF!
3	Transfer	0	REF!	REF!

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Substantial upgrades at the WRC to achieve a 0.25mg/l phosphorus permit and 0.25mg/l nitrogen permit.
Least Cost	Same as Preferred Option
Justification	We undertook an AMP7 Options Appraisal to consider various options, including treating partial rather than full flow and also a long sea outfall, however substantive treatment upgrades at the WRC were the only solution to meet the need. A number of different types of treatment processes were considered. Land availability constrains restricted the number of solutions that were feasible. The scheme programme will need to take into consideration the potential effluent reuse scheme taking a proportion of flows to the Dorset Stour and storm overflow improvements at the WRC.

Site ID: 13244 - POTTERNE WRC

Population 2023: 13512

Current Permits

P	**BOD**	**SS**	**AmmN**
1.1	15	23	8

Phosphorus
Needs: EnvAct_IMP1, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13250 - PUNCKNOWLE WRC

Population 2023: 1381

Current Permits

P	**BOD**	**SS**	**AmmN**
2.5	20	30	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13253 - RATFYN WRC

Population 2023: 12630

Current Permits

P	**BOD**	**SS**	**AmmN**
1	17	34	6

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Relocation of the discharge upstream of the Durrington abstraction. Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	By relocating the flows of Ratfyn WRC further upstream, the flows that are abstracted at Durrington WTC will be compensated with the outfall of Ratfyn WRC - thus maintaining a satisfactory ecological status and preventing a reduction of 10% or more in river flow. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13255 - RINGWOOD WRC

Population 2023: 18467

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	30	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Enhance existing treatment capacity Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option Same as Preferred Option
Justification	Meeting new discharge permit requirements through enhancing existing treatment capacity is both least cost and best value option. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13256 - RODE WRC

Population 2023: 1201

Current Permits

P	**BOD**	**SS**	**AmmN**
2	20	40	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13258 - SALISBURY WRC

Population 2023: 69170

Current Permits

P	**BOD**	**SS**	**AmmN**
1	18	35	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13264 - SHAFTESBURY WRC

Population 2023: 18435

Current Permits

P	**BOD**	**SS**	**AmmN**
1	12	25	3

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13267 - SHEPTON MALLET WRC

Population 2023: 38471

Current Permits

P	BOD	SS	AmmN
0.35	18	36	6

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Proposed permit is the same/higher than current permit
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Chemicals: zinc (dissolved)

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Flexible permitting: Maximising Benefits approach for IMP zinc permit where AMP7 scheme installations (MBBR and MMF) can be used as best endeavours to remove Zinc as much as reasonable practicable from the effluent. Work with traders to reduce zinc at source Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	Catchment investigation in AMP7 showed that CIP2 monitoring was not representative of the current influent and effluent quality, therefore the permit originally provided in from CIP2 was not accurate (48ug/l). Sewer and river catchment investigation identified traders in the catchment which discharge high levels of Zinc to the WRC. We challenged the permit via the catchment investigation which increased the permit to 111ug/L for 2022 reg date. An Improvement permit increased to 84ug/l for AMP8. Approach for AMP8 to work with traders to reduce at source and use alternative methods for their business, and to use existing treatment methods from AMP7 installation to remove as much zinc as possible (MMF and MBBR) - maximising benefits. further detail of justification in corresponding ODR, and the catchment investigation report. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13268 - SHERBORNE WRC

Population 2023: 13788

Current Permits

P	**BOD**	**SS**	**AmmN**
0.5	20	30	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Proposed permit is the same/higher than current permit
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13271 - SHILLINGSTONE WRC

Population 2023: 3172

Current Permits

P	**BOD**	**SS**	**AmmN**
-	30	55	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13274 - SHOSCOMBE WRC

Population 2023: 1981

Current Permits

P	BOD	SS	AmmN
-	30	70	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13275 - SHREWTON WRC

Population 2023: 2052

Current Permits

P	**BOD**	**SS**	**AmmN**
1	45	55	15

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, SSSI_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Redirecting the outfall further downstream - This will allow the upstream part of the river to become ephemeral again. Redirecting the outfall further downstream - This will allow the upstream part of the river to become ephemeral again.
Least Cost	Same as Preferred Option
Justification	By relocating the flows of Shrewton WRC closer to the perennial head of the river, this will allow for the upstream section where Shrewton WRC currently discharges to return to ephemeral behaviour thus greatly benefiting the invertebrate community in the River Till. By relocating the flows of Shrewton WRC closer to the perennial head of the river, this will allow for the upstream section where Shrewton WRC currently discharges to return to ephemeral behaviour thus greatly benefiting the invertebrate community in the River Till. As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13276 - SHROTON WRC

Population 2023: 432

Current Permits

P	**BOD**	**SS**	**AmmN**
-	32	50	16

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13278 - SOMERTON WRC

Population 2023: 9105

Current Permits

P	BOD	SS	AmmN
0.5	20	30	5

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Proposed permit is the same/higher than current permit
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Chemicals: cypermethrin

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	NDLS - flexible permitting approach 2 99%ile look up table for Cypermethrin. IMP: approach 4 Maximising benefits approach for cypermethrin permit where AMP7 scheme installations (Front end ferric dosing and MMF) can be used as best endeavours to remove cypermethrin as much as reasonable practicable from the effluent. Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	Evidence from CIP2 and CIP3 treatment technology trials that Cypermethrin is removed from effluent via solids. AMP7 P scheme at Somerton WRC installing front end ferric and MMF on site to improve solids removal. Very likely that due to the addition of ferric and a tertiary solids filter, increased solids removal and therefore cypermethrin will be observed. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13280 - SOUTH PERROTT WRC

Population 2023: 860

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13281 - SOUTH PETHERTON WRC

Population 2023: 6363

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	30	5

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 19556 - SOUTH WRAXALL WRC

Population 2023: 217

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13282 - SPARKFORD WRC

Population 2023: 1845

Current Permits

P	BOD	SS	AmmN
1	20	30	10

Phosphorus
Needs: WFD_IMPg, HD_IMP, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

Chemicals: cypermethrin

	2025	2035	
Capacity Risk	0	2	Capacity upgrade required in future
Flow Risk	0	2	Flow upgrade required in future

Preferred Option (Best Value)	NDLS - flexible permitting approach 2: 99%ile look up table for Cypermethrin. Install MMF for AMP8. Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	Site undergoing AMP7 P scheme (front end ferric dosing) installed by Dec 2024. flexible permit approach chosen with 99%ile look up table, ferric dosing should improve solids removal and therefore cypermethrin. Installation of MMF in AMP8 will improve solids removal, twinned with ferric dosing should improve cypermethrin removal and meet permit. As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC. We have assessed in the order of 10 different solutions per site to give us a range of load reduction opportunities that can then be optimised alongside solutions at other WRCs in the sub-catchment or wider catchment as appropriate, with the applicability of solutions dependent on the specific drivers (e.g. those requiring point-source improvements).

Site ID: 13286 - STANTON DREW WRC

Population 2023: 1245

Current Permits

P	**BOD**	**SS**	**AmmN**
-	30	45	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13287 - STANTON ST BERNARD WRC

Population 2023: 165

Current Permits

P	BOD	SS	AmmN
-	-	-	-

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13288 - STOGURSEY WRC

Population 2023: 1078

Current Permits

P	**BOD**	**SS**	**AmmN**
2.1	12	24	6

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13292 - STOURTON CAUNDLE WRC

Population 2023: 331

Current Permits

P	**BOD**	**SS**	**AmmN**
1.5	13	26	6

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13293 - STRATTON-ON-THE-FOSSE WRC

Population 2023: 1146

Current Permits

P	BOD	SS	AmmN
-	20	40	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13297 - STURMINSTER NEWTON WRC

Population 2023: 10682

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13298 - SUTTON BENGER WRC

Population 2023: 8810

Current Permits

P	**BOD**	**SS**	**AmmN**
2	30	40	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13303 - SYDLING ST NICHOLAS WRC

Population 2023: 424

Current Permits

P	**BOD**	**SS**	**AmmN**
-	30	60	10

Phosphorus
Needs: HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13304 - TARRANT CRAWFORD WRC

Population 2023: 19598

Current Permits

P	**BOD**	**SS**	**AmmN**
1	18	36	14

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13305 - TAUNTON WRC

Population 2023: 96713

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	30	3

Phosphorus
Needs: HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC. We have assessed in the order of 10 different solutions per site to give us a range of load reduction opportunities that can then be optimised alongside solutions at other WRCs in the sub-catchment or wider catchment as appropriate, with the applicability of solutions dependent on the specific drivers (e.g. those requiring point-source improvements).

Site ID: 13306 - TEMPLECOMBE WRC

Population 2023: 1733

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	35	20

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13308 - THINGLEY WRC

Population 2023: 20747

Current Permits

P	**BOD**	**SS**	**AmmN**
1.2	22	33	3

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Chemicals: PFOS

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Sewer catchment investigation to identify sources of PFOS to the network - as per EA guidance. Grey asset solution at the WRC to achieve a 0.5mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	Catchment investigation under PFOS approach 2 from Environment Agency. Due to nature of PFOS no treatment options exist which can reliably remove PFOS to within permit. As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13310 - THORNFORD WRC

Population 2023: 4250

Current Permits

P	**BOD**	**SS**	**AmmN**
1.5	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Site required to achieve 0.25mg/l due to LURB.
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	A	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13312 - TINTINHULL ASH WRC

Population 2023: 1514

Current Permits

P	**BOD**	**SS**	**AmmN**
-	15	25	20

Phosphorus
Needs: EnvAct_IMP1, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13313 - TISBURY WRC

Population 2023: 4880

Current Permits

P	**BOD**	**SS**	**AmmN**
1	25	30	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13315 - TOCKINGTON WRC

Population 2023: 1737

Current Permits

P	BOD	SS	AmmN
-	30	40	10

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	DWF of site has a too large contribution to waterbody to remove.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13316 - TOLLER PORCORUM WRC

Population 2023: 286

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	30	10

Phosphorus
Needs: HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13317 - TRENT WRC

Population 2023: 688

Current Permits

P	BOD	SS	AmmN
-	20	40	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13322 - URCHFONT WRC

Population 2023: 1274

Current Permits

P	BOD	SS	AmmN
-	10	20	2

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Integrated constructed wetlands acting as a tertiary treatment stage.
Least Cost	Grey asset solution at the WRC to achieve a 1mg/L phosphorus permit.
Justification	We are promoting the use of a nature based solution (integrated constructed wetlands) as best value, compared to the least cost more convential 'grey' asset solution. We are, however, not proposing to achieve as tighter permit as we would with a grey asset based soltuion. This is due to uncertainty on removal efficiency, and that the required effective wetlands area gets exponentially large the more stringent the target, meaning it will no longer be best value when taking into consideration additional construction costs.

Site ID: 13324 - WAREHAM WRC

Population 2023: 12959

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
-	25	45	15

Phosphorus
Needs: HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Site required to achieve 0.25mg/l due to LURB.
2	Grey	1	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
3	Grey	0.8 (stretch)	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
4	Grey	0.5	R	Due to regulatory restrictions, options are limited to either a 0.25mg/l grey solution or transfer.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB	Band 1	G	Subject to load reduction requirements.
9	CNB	Band 2	G	Subject to load reduction requirements.
10	CNB	Band 3	G	Subject to load reduction requirements.
11	CNB	Band 4	G	Subject to load reduction requirements.

Nitrogen
Needs: HD_IMP, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Grey	0	REF!	REF!
2	Green	0	REF!	REF!
3	Transfer	0	REF!	REF!

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit, and optimising of recently installed sand filters to achieve the 10mg/l nitrogen permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13325 - WARMINSTER WRC

Population 2023: 26046

Current Permits

P	**BOD**	**SS**	**AmmN**
0.5	16	30	3

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Proposed permit is the same/higher than current permit
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13329 - WEDMORE WRC

Population 2023: 1796

Current Permits

P	BOD	SS	AmmN
-	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 1mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13330 - WELLINGTON WRC

Population 2023: 19457

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
1	30	50	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN, HD_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Enhance existing treatment capacity Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option Same as Preferred Option
Justification	Meeting new discharge permit requirements through enhancing existing treatment capacity is both least cost and best value option. The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13331 - WELLOW WRC

Population 2023: 444

Current Permits

P	BOD	SS	AmmN
-	25	40	10

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13332 - WELLS WRC

Population 2023: 18196

Current Permits

P	**BOD**	**SS**	**AmmN**
1	25	40	10

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13338 - WESTBURY WRC

Population 2023: 25310

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
2	13	20	2

Phosphorus
Needs: EnvAct_IMP1

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13341 - WESTWOOD WRC

Population 2023: 1127

Current Permits

P	**BOD**	**SS**	**AmmN**
-	25	35	20

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13345 - WICK WRC

Population 2023: 1852

Current Permits

P	BOD	SS	AmmN
-	30	45	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13349 - WIMBORNE WRC

Population 2023: 26195

Current Permits

P	**BOD**	**SS**	**AmmN**
1	30	40	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13350 - WINCANTON WRC

Population 2023: 8692

Current Permits

P	**BOD**	**SS**	**AmmN**
1	15	25	5

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13352 - WINSLEY WRC

Population 2023: 2110

Current Permits

P	BOD	SS	AmmN
-	40	80	30

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13354 - WIVELISCOMBE - HILLSMOOR WRC

Population 2023: 1944

Current Permits

P	**BOD**	**SS**	**AmmN**
1	18	36	5

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	DWF of site has a too large contribution to waterbody to remove.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13355 - WIVELISCOMBE - STYLES WRC

Population 2023: 1506

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	1	Flow upgrade may be required

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.

Site ID: 13358 - WOOKEY WRC

Population 2023: 1282

Current Permits

P	**BOD**	**SS**	**AmmN**
-	20	40	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, WFD_ND

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	G	Considered treatment option.
2	Grey	1	G	Considered treatment option.
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	2	2	Flow upgrade required

Preferred Option (Best Value)	Enhance existing treatment capacity
Least Cost	Same as Preferred Option
Justification	Meeting new discharge permit requirements through enhancing existing treatment capacity is both least cost and best value option.

Site ID: 13359 - WOOL WRC

Population 2023: 8224

Current Permits

P	**BOD**	**SS**	**AmmN**
1	25	40	20

Phosphorus
Needs: EnvAct_IMP1, HD_IMP_NN, HD_IMP, SSSI_IMP

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Site required to achieve 0.25mg/l due to LURB.
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

Nitrogen
Needs: HD_IMP, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Grey	0	REF!	REF!
2	Green	0	REF!	REF!
3	Transfer	0	REF!	REF!

	2025	2035	
Capacity Risk	0	0	No Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit and 10mg/l nitrogen permit. No option - Wool WRC already has a phosphorus permit tighter than the UWWTR target.
Least Cost	Same as Preferred Option No option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC. No option - Wool WRC already has a phosphorus permit tighter than the UWWTR target.

Site ID: 13364 - WRINGTON WRC

Population 2023: 2620

<u>Current Permits</u>

P	**BOD**	**SS**	**AmmN**
1	30	45	15

Phosphorus
Needs: N/A

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
N/A	N/A	N/A	N/A	No Phosphorus driver at site

	2025	2035	
Capacity Risk	2	2	Capacity upgrade required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	No relevant drivers at site, no options required
Least Cost	N/A
Justification	N/A

Site ID: 13366 - YEOVIL WRC

Population 2023: 62280

Current Permits

P	**BOD**	**SS**	**AmmN**
0.59	30	55	15

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg, HD_IMP_NN

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	R	Proposed permit is the same/higher than current permit
4	Grey	0.5	R	Site required to achieve 0.25mg/l due to LURB.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	R	No site within reasonable distance.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	0	1	Capacity upgrade may be required
Flow Risk	0	0	No flow upgrade required

Preferred Option (Best Value)	Grey asset solution at the WRC to achieve a 0.25mg/l phosphorus permit.
Least Cost	Same as Preferred Option
Justification	The regulatory driver requires improvements to point source discharges to TAL of 0.25mg/l.There are concerns on reliably achieving a target this through a nature based solution. Also, for a WRC of this size the land uptake would be cost-prohibitive, even if it were suitbale land were found to be available. We have and are considering alternative site-based improvements, however these will still be classified as a 'grey' solution.

Site ID: 13368 - YEOVIL WITHOUT WRC

Population 2023: 1839

Current Permits

P	**BOD**	**SS**	**AmmN**
1	20	30	10

Phosphorus
Needs: EnvAct_IMP1, WFD_IMPg

Solution No.	Solution	Permit	RAG	Reason for inclusion/exclusion
1	Green (Wetlands)	2	R	Proposed permit is the same/higher than current permit
2	Grey	1	R	Proposed permit is the same/higher than current permit
3	Grey	0.8 (stretch)	G	Considered treatment option.
4	Grey	0.5	G	Considered treatment option.
5	Grey	0.25	G	Considered treatment option.
6	Grey	0.2 (stretch)	G	Considered treatment option.
7	Transfer	0.25*	G	Transfer option considered.
8	CNB		R	Driver requires improvements to point source discharges.

	2025	2035	
Capacity Risk	1	2	Capacity upgrade required in future
Flow Risk	0	2	Flow upgrade required in future

Preferred Option (Best Value)	Grey asset improvements at the WRC to achieve a 0.8mg/L phosphorus stretch target.
Least Cost	Same as Preferred Option
Justification	As described in the Phosphorus ODR, we have taken a catchment-based approach in considering the best value / least cost options to achieve the required improvements. Cost and benefit models have been used to determine both best value and least cost options (if different) for a range of potential P load reductions at any given WRC.