

A large circular graphic composed of various white line-art icons on a teal background. The icons include a person with a headset, a cloud with circuit lines, a "net zero" icon with a leaf, a checkmark in a circle, a target, a microscope, a person at a presentation board, a hand holding a water drop, a globe with a thermometer, a hand with a downward arrow, a group of people with an upward arrow, a leaf, a person silhouette, a water drop with a scale, and a glass of water. The central text is overlaid on a white circle within this graphic.

APPENDIX
SES006
Enhancement
Case -
Water Quality
Enhancement

Contents

Appendix SES006: Water Quality Enhancement	3
UV Treatment at Cheam and Kenley Treatment Works	3
A. Introduction	3
B. Description of the proposed enhancement	6
C. Need for enhancement	7
D. Best option for customers	10
E. Cost efficiency	11
F. Customer protection	13
Customer Focussed Lead replacement programme	15
G. Introduction	15
H. Description of the proposed enhancement	21
I. Need for enhancement	24
J. Best option for customers	25
K. Cost efficiency	26
L. Customer protection	27

APPENDIX SES006: WATER QUALITY ENHANCEMENT

1. The Water Quality Enhancement Case covers two water quality enhancement schemes:
 - **Sections A-F:** UV Treatment at Cheam and Kenley Treatment Works
 - **Sections G-L:** Customer Focussed Lead Replacement Programme

UV TREATMENT AT CHEAM AND KENLEY TREATMENT WORKS

A. Introduction

This enhancement case sets out the requirement to install UV treatment at Cheam and Kenley Treatment Works.

A review of our raw water microbiological monitoring programmes, Disinfection Policy and Drinking Water Safety Plans has identified a potential risk of *Cryptosporidium* in raw water sources at Cheam and Kenley Treatment Works, evidenced by detection of faecal indicators in the raw water.

The Drinking Water Inspectorate (DWI) supports the need for these two schemes, for water quality reasons.

2. This enhancement case is structured in line with Ofwat's assessment criteria:
 - In Section A, we provide background and a summary of the key information relating to the proposed enhancement to install UV treatment at Cheam and Kenley treatment works.
 - In Section B, we provide a detailed description of the proposed enhancement
 - In Section C, we explain the need for the installation of UV at Cheam and Kenley treatment works
 - In Section D, we demonstrate that the option we are putting forwards is the best option for customers
 - In Section E, we explain how we have gone about confirming that the costs are efficient
 - In Section F, we set out the associated Customer Protection



- The DWI supports the need to install UV treatment at Cheam and Kenley Treatment Works for water quality reasons, see their letters of support¹ in which they summarise:

“Based on the information submitted by the company, the Inspectorate supports the need for this scheme, for water quality reasons, and the supported scheme shall be included by the company in its Final Business Plan, subject to the caveats listed in the attachment”.

The caveats listed by the DWI in supporting the schemes are “*ongoing catchment management and enhanced raw water Cryptosporidium monitoring*”. These are activities that are already carried out by the Company.

Background

- In November 2022, the Drinking Water Inspectorate (DWI) shared their Drinking Water Price Review 2024 Process with the Industry².
- As part of the DWI PR24 process, we submitted our Long-Term Planning for the Quality of Drinking Water to the DWI in January 2023³.
- We met the DWI on 9 January 2023 to present a brief overview of our achievements during AMP7 and discuss our long-term plan. This included an overview of our ambition for AMP8. The meeting provided an opportunity for discussion of the Company’s PR24 plan for catchments, raw water, treatment, and distribution networks and included the need for UV treatment for *Cryptosporidium* at Cheam and Kenley treatment works.
- Cryptosporidium* is a protozoan parasite that can infect humans. Infection can result in a diarrhoeal disease called Cryptosporidiosis. *Cryptosporidium* poses a challenge to water treatment, because of its small size and resistance to chlorine. Water companies must assess the risk of *Cryptosporidium* in its water sources, and design and continuously operate a water treatment process to remove the parasite or render it inactive. This is a regulatory requirement, and failure to comply is an offence⁴. UV treatment is an effective control for *Cryptosporidium*.
- The DWI required us to provide an indication of whether it was looking to submit to the DWI any specific water quality proposals to be considered for PR24 support. It was during this meeting where we stated that we would be requesting support from the DWI for UV treatment at Cheam and Kenley Treatment Works.
- In March 2023 we provided evidence to the DWI of the need for UV treatment at Cheam and Kenley Treatment Works, to fully mitigate against the potential risk of *Cryptosporidium* in treated water⁵.
- The interim risk mitigation solution that is currently adopted includes source blending at Cheam Treatment Works and source blending and filtration at Kenley Treatment Works with continuous monitoring for *Cryptosporidium* at both sites. This provides some protection but is a reactive process and not considered an effective solution to manage an emerging risk of *Cryptosporidium*, and relatively high faecal indicator organisms more generally. There is evidence that climate change may influence water levels and the propensity of sewers to flood, and hence the risks to source water quality will increase. Our ability to manage sources through rotation diminishes at periods of high demand.

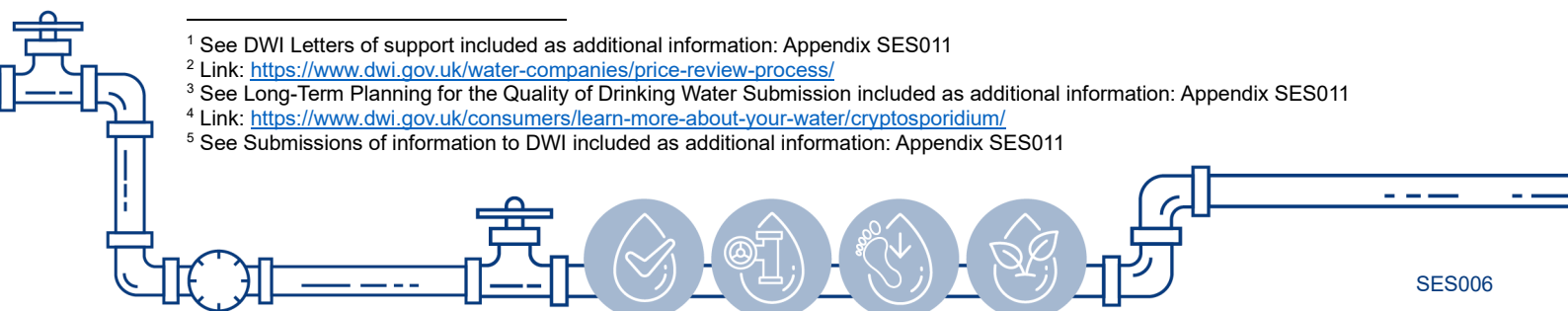
¹ See DWI Letters of support included as additional information: Appendix SES011

² Link: <https://www.dwi.gov.uk/water-companies/price-review-process/>

³ See Long-Term Planning for the Quality of Drinking Water Submission included as additional information: Appendix SES011

⁴ Link: <https://www.dwi.gov.uk/consumers/learn-more-about-your-water/cryptosporidium/>

⁵ See Submissions of information to DWI included as additional information: Appendix SES011



Summary of the enhancement case

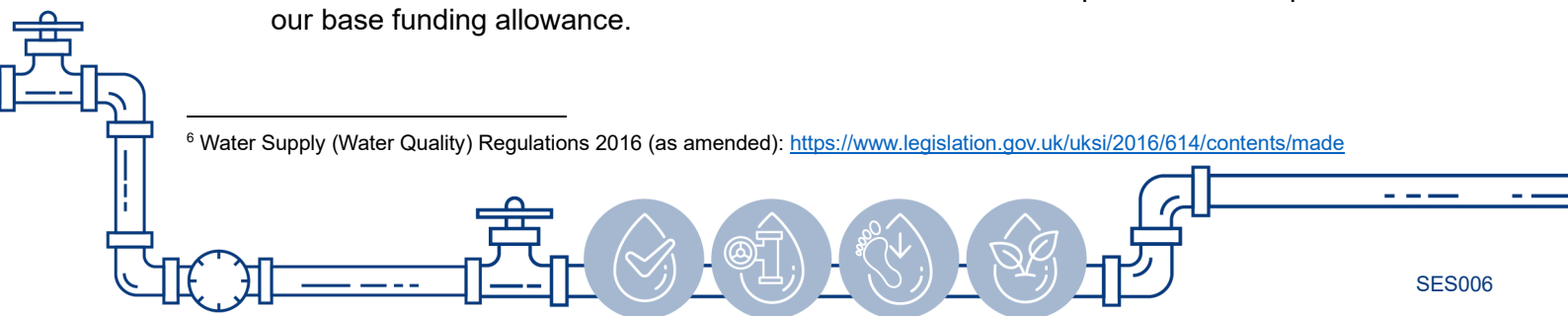
11. Our engagement with customers and stakeholders has told us that high water quality is essential and keeping our natural water supplies free from contaminants is a priority.
12. A review of raw water microbiological monitoring programmes, the Disinfection Policy and our Drinking Water Safety Plans has identified a potential risk of *Cryptosporidium* in the raw water sources at Cheam and Kenley Treatment Works (evidenced by detection of faecal indicators). Whilst there has been no recent detection of *Cryptosporidium* in continuous monitoring of raw water, there have been historical occasional positive detections at both sites.
13. Current treatment processes installed at Cheam and Kenley would not guarantee the delivery of wholesome treated water if challenged by *Cryptosporidium* in the raw water. We therefore plan to install UV treatment to mitigate the risk of *Cryptosporidium* at these two sites during AMP8. The DWI have supported the need for these two schemes.
14. The DWI have supported the need for the additional UV treatment to be installed during AMP8. The DWI will now serve two legal instruments, Regulation 28(4) Notices, on the Company requiring completion of the specified works within an agreed timeframe during AMP8.
15. The actions proposed within this enhancement case will either deliver direct and tangible improvements, or indirect improvements to the following performance commitments:
 - Compliance Risk Index
 - Water Quality Contacts
16. Our activities will help mitigate water quality risk which will also lead to improvements for the following other water quality metrics:
 - Event Risk Index (ERI)
 - Unplanned Outage (treatment works)
17. The cost of UV Installation is estimated at £5.21m, all of which has been assessed as enhancement expenditure, and is split as follows:
 - Cheam Treatment Works: £2.55m (Totex)
 - Kenley Treatment Works: £2.66m (Totex)
 - We expect the installation of the UV at Cheam Treatment Works to be delivered by 2027 and at Kenley Treatment Works to be delivered by 2028. Full commissioning, validation and use of the UV treatment at both Cheam and Kenley Treatment Works will be in place and operational by the end of AMP8.



B. Description of the proposed enhancement

18. Our business plan for 2020-2025 is focused on delivering five key pledges to our customers, supported by targets that were identified as those most important to the customers we serve. Our performance in the delivery of our pledge to ‘provide high quality water all day, every day’ is measured and reported annually to the Drinking Water Inspectorate (DWI) and judged against the performance commitments we agreed with Ofwat. The delivery of high-quality drinking water is specifically assessed by our performance in the Compliance Risk Index (CRI) and in the number of customers that contact us due to dissatisfaction with the taste, odour, or appearance of their water supply. We are also committed to ensuring that high quality water is consistently delivered by ensuring that we maintain and invest in our assets and our employees to reduce the likelihood of failure, as measured by our performance in respect of water quality events through the Event Risk Index (ERI), unplanned outage at treatment works and supply interruptions within the network.
19. As we plan for service delivery 2025-2030, and outline our ambition for 2050, we are building on our current commitments and have identified four key priorities based on feedback from our customers and stakeholders:
 1. to provide customers with high-quality water from sustainable sources
 2. to deliver a resilient water supply from source to tap and minimise wastage
 3. to help customers reduce their water footprint and charge a fair, affordable price for what they use, and
 4. to improve the environment and have a positive impact on our local area.
20. We aim to meet all statutory obligations in respect of drinking water quality, ensuring we protect the health of our customers and maintain consumer confidence in the water supply at all times. We are mindful of the potential cost impact of any additional measures that may be required in response to any deterioration of raw water quality, or to ensure treated or distributed water quality continues to meet any new or heightened quality standards. We will look to innovate to ensure we continue to meet all obligations at least cost to our customers.
21. This enhancement recognises that we will have to plan for the likely impacts of climate change and population growth, and contribute to improving the water environment, potentially having to adapt to new and varying quality of raw water sources.
22. Our existing raw water sources have all been risk assessed and tested to establish the required level of treatment to ensure the delivery of compliant treated water and any new sources developed would be rigorously assessed and tested prior to first use, in accordance with the requirements of the Water Supply (Water Quality) Regulations 2016 (as amended).⁶ Sources in use are regularly rotated (in the case of boreholes) and tested in accordance with a source specific monitoring programme to provide on-going verification of risk and to inform any necessary modifications to treatment.
23. The installation of UV treatment at Cheam and Kenley Treatment Works will ensure that we continue to provide customers with high-quality water from sustainable sources and deliver a resilient water supply from source to tap. Additional information is set out within the Appendix SES011.
24. The UV treatment will be new and is, therefore, enhancement spend and not implicit in our base funding allowance.

⁶ Water Supply (Water Quality) Regulations 2016 (as amended): <https://www.legislation.gov.uk/uksi/2016/614/contents/made>



C. Need for enhancement

25. The need for this enhancement is demonstrated by our ambition to provide customers with high-quality water from sustainable sources. We have an investment driver of continuing to provide drinking water that always reaches the highest quality standards and respond to any future changes to regulatory requirements.
26. The need is evidenced by the recent deteriorating raw water quality data, provided below.
27. Installing UV treatment during AMP8 at the two sites is a proactive action rather than an emergency reactive activity when *Cryptosporidium* is detected.
28. Therefore, customer support for this enhancement is strong. In addition, the DWI support the need for this enhancement.
29. In our long-term delivery strategy, we set out our 2050 ambition to “Provide customers with high-quality water from sustainable sources”. Installing UV treatment will ensure that our customers are protected from any sudden, rapid, or unusual deterioration of the quality of our water sources. This will help us cost-effectively maintain high-quality water supplies.

Investment driver: Continue to provide drinking water that always reaches the highest quality standards and respond to any future changes to regulatory requirements.

30. We have continuously delivered high quality water to our customers, despite pressures to water quality from other activities in the area we serve. We need to make sure that we continue to deliver high quality and resilient water supplies.
31. Over recent years there have been frequent detections of *E. coli*, coliforms, Enterococci and Clostridia in the raw water streams supplying Cheam and Kenley Treatment works. Due to this, despite previously there having been only occasional historic positive detection of *Cryptosporidium*, there remains a potential *Cryptosporidium* risk to the raw water at both sites that, without appropriate treatment, carries forward to the consumers being supplied by Cheam and Kenley Treatment Works.
32. Climate change will increase the risk of *Cryptosporidium* in raw water sources due to more extreme fluctuations in groundwater levels, propensity to sewer and surface water flooding. Higher peak demands may diminish our current ability to manage source quality through source rotation.
33. Faecal detections, and therefore a potential *Cryptosporidium* risk to the raw water, are believed to be due to both leaking and surcharging sewers that are outside our control. This was the conclusion from a specific WINEP investigation at the Secombe Centre source (SSEC) that was completed and signed-off by the Environment Agency in January 2022⁷ with future catchment activities to focus on further liaison with Thames Water.

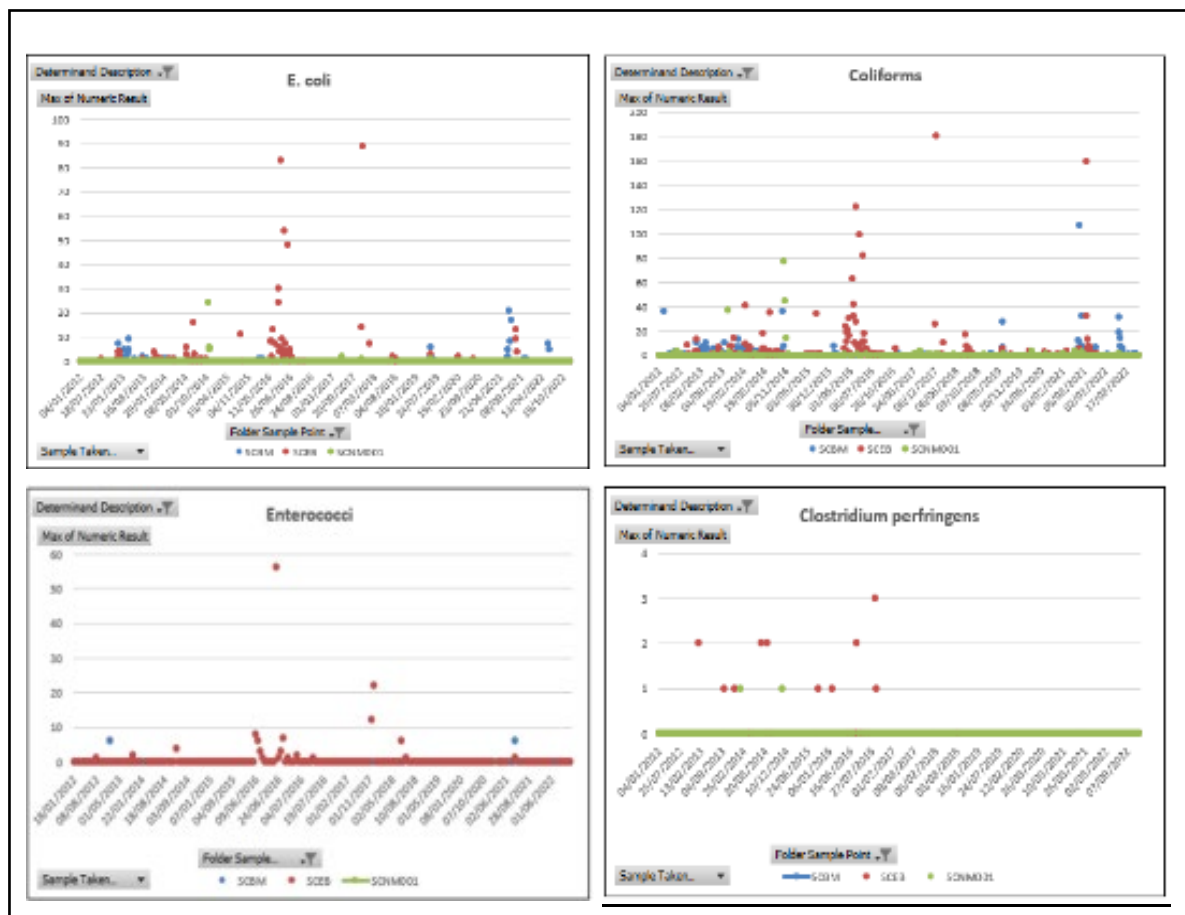
⁷ Source: SES Water: Secombe Centre Microbiology Investigation (Measure ID 7SU200021)



Water quality

- 34. A key driver for this enhancement expenditure is the increasing evidence of faecal detections in the raw water at Cheam and Kenley Treatment Works.
- 35. It can be seen in Figure 1 and Figure 2 that there are frequent detections of *E. coli*, Coliforms, Enterococci and *Clostridium perfringens* at both sites. Evidence of these organisms is an indicator that there is a *Cryptosporidium* risk within the raw water, and without appropriate treatment this risk carries forward to the consumers being supplied by Cheam and Kenley Treatment Works.

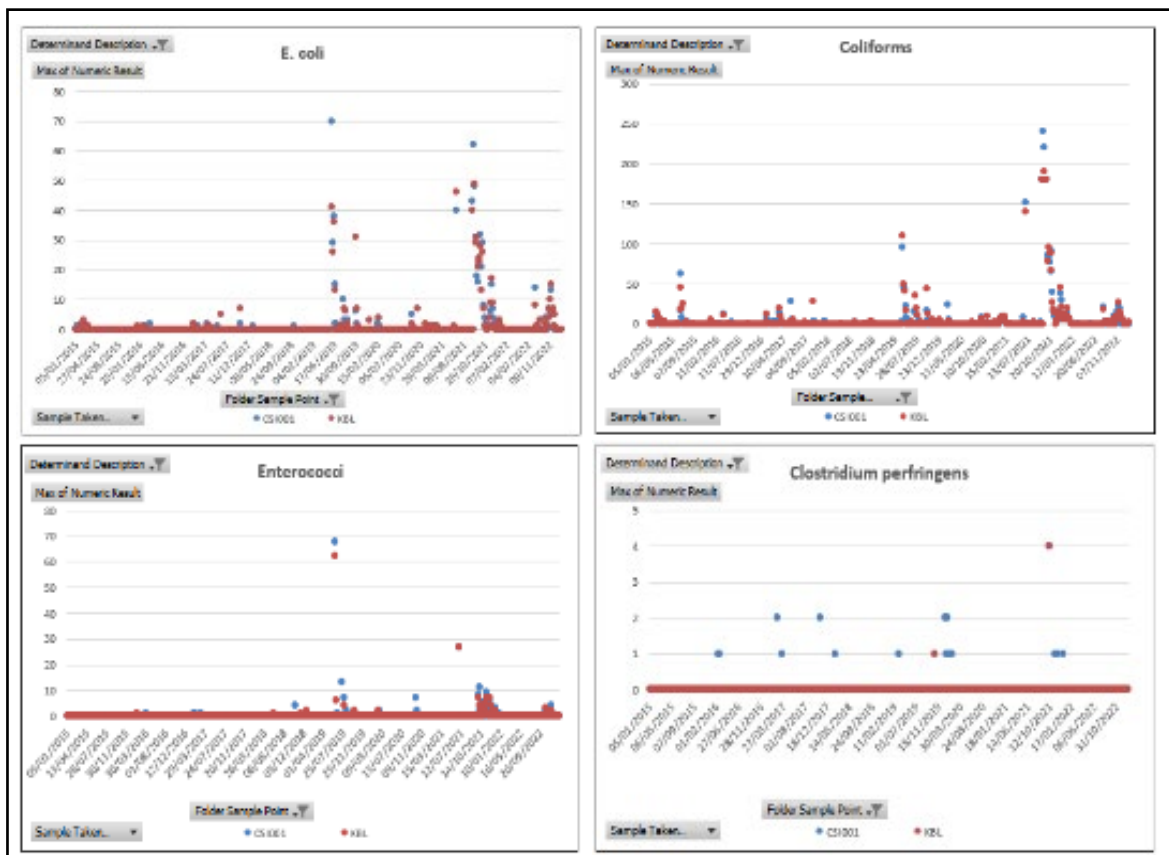
Figure 1: Evidence of E. coli, Coliform, Enterococci and Clostridium perfringens at Cheam Works



Source: SES Water Laboratory Data



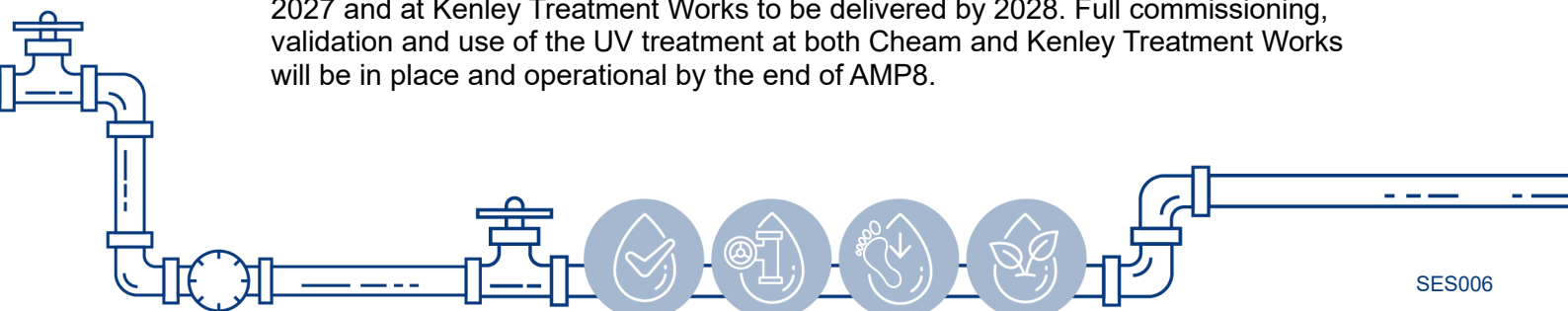
Figure 2: Evidence of E. coli, Coliform, Enterococci and Clostridium perfringens at Kenley Works



Source: SES Water Laboratory Data

Why action is needed now: adaptive planning and justifying the scale and timing of the proposed enhancement

- 36. Regular general microbiological testing and continuous sampling for *Cryptosporidium* has been adequate to date to ensure that that we are monitoring and reacting to the potential *Cryptosporidium* risk, however any response to a positive *Cryptosporidium* oocyst being detected would be reactive and action would likely involve considerable customer impact, such as widespread boil water notices over a prolonged period.
- 37. The trends we observe mean that proactive action is required to protect customers of deteriorating raw water quality in the short to medium term. It is for this reason that we applied to DWI for support towards a treatment scheme within AMP8.
- 38. The DWI have supported the need for the additional UV treatment to be installed during AMP8. The DWI will now serve two legal instruments, Regulation 28(4) Notices, on the Company requiring completion of the specified works within an agreed timeframe during AMP8.
- 39. We expect the installation of the UV at Cheam Treatment Works to be delivered by 2027 and at Kenley Treatment Works to be delivered by 2028. Full commissioning, validation and use of the UV treatment at both Cheam and Kenley Treatment Works will be in place and operational by the end of AMP8.



Customer support

40. Our ongoing engagement with customers and stakeholders continues to reinforce that high water quality is essential – keeping our water supplies free from pollutants and chemicals is always a priority. We assess that this proposed enhancement expenditure has, therefore, strong support from our customers.
41. As previously stated, support has also been received by the DWI, as water quality stakeholder. Support by the DWI highlights the importance and essential nature of this works. Following their support, and subsequent issuing of a Regulation 28(4) Notice, this work becomes a statutory requirement to deliver during AMP8.

D. Best option for customers

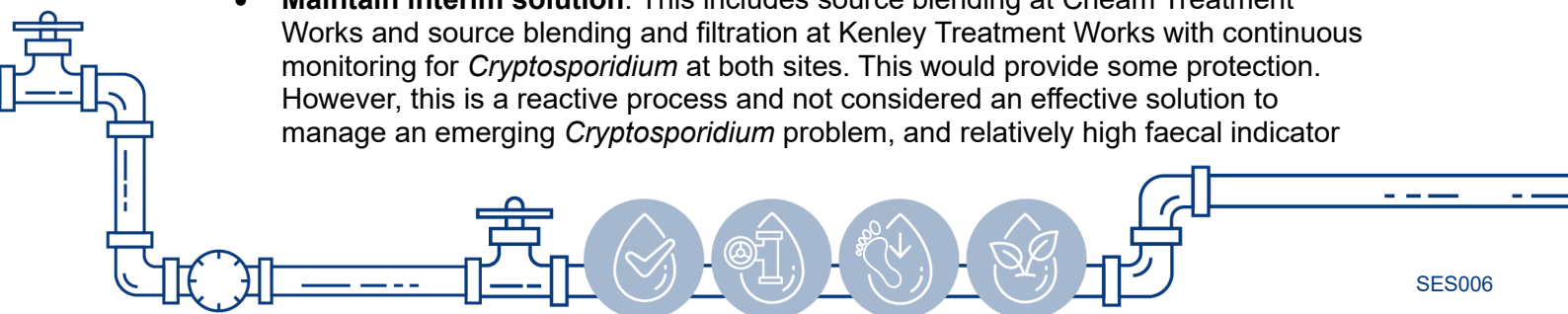
42. The AAT research that has been carried out reports 66% of household customers and 79% of non-household customers thought the plan was acceptable or completely acceptable. The 'installation of UV treatment to protect water quality from contamination' for an additional £1.73 a year for HHS (0.87%) NHHs) was reported as being the most important by 24% of HH customers and 31% of non-households. (Appendix SES015 - Customer insight synthesis and triangulation).
43. A range of options has been considered and was presented to the DWI in submissions of information provided to the DWI in March 2023. Based on the options presented and the risks highlighted, the DWI supported the need for this investment during AMP8.

Options considered

44. The options considered were:
 - **Catchment management:** Catchment management activities include farmer liaison, identification of properties with septic tanks, engagement with sewerage providers, source protection & selection and natural attenuation within catchment
 - **Maintain interim solution:** This includes continuous raw water monitoring, management of raw water blends including removing boreholes from supply on receipt of poor sample results and provision for disposal of water in contact and/or treated water tank (once dechlorinated) to sewer
 - **Installation of UV treatment:** a proactive solution of installation of UV treatment at both Cheam and Kenley Treatment Works is the only way to fully mitigate the immediate risk of deteriorating raw water quality

Assessment of options

45. The assessment of the options highlight:
 - **Catchment management:** Hazardous activities in the catchment are not considered to be within our control, and therefore potential raw water quality improvements are unquantified (as per outcome of WINEP investigation at one Cheam source that reported to the EA in 2022 referenced above).
 - **Maintain interim solution:** This includes source blending at Cheam Treatment Works and source blending and filtration at Kenley Treatment Works with continuous monitoring for *Cryptosporidium* at both sites. This would provide some protection. However, this is a reactive process and not considered an effective solution to manage an emerging *Cryptosporidium* problem, and relatively high faecal indicator



organisms more generally. There is evidence that climate change may influence water levels, propensity to sewer flooding etc. and hence the risks to source water quality will increase. Our ability to manage sources through rotation will diminish at periods of high demand.

- **Installation of UV treatment:** Under the future treatment risk mitigation measures, the need was identified to specifically address the potential risk of *Cryptosporidium* at these Cheam and Kenley works during AMP8. UV treatment would provide effective inactivation of *Cryptosporidium* and would add a multi-barrier approach to disinfection in general. A benefit would be to enable a review of chlorine disinfection dose with the potential reduction with associated chemical cost savings.
46. There is no treatment currently in place at both Cheam and Kenley treatment works that is considered fully effective for the removal or inactivation of *Cryptosporidium* oocysts. Although source blending at Cheam Treatment Works and source blending and filtration at Kenley Treatment Works would provide some protection.
 47. Therefore, the preferred solution, and one supported by the DWI, is the installation of UV Treatment (UV-irradiation at 40 mJ/cm²).
 48. We have selected our preferred option based on an assessment of the relative merits of the different options we have considered. Installation of UV treatment at both Cheam and Kenley Treatment Works is the only way to fully mitigate the immediate risk of deteriorating raw water quality and guarantee the delivery of wholesome drinking water.

E. Cost efficiency

49. For the proposal submitted to the DWI in March 2023, initial estimated costs were used as it was difficult to provide accurate capex costs for each of the proposed UV installations due to not having a detailed design. Based on the capex costs for the UV installation at one of our other sites, Bough Beech Treatment Works, and having spoken to other water companies who have installed UV more recently, we would expect the capex costs for each project to be in the region of £1.7m - £3m. We instructed our framework contractor to provide us with designs and more detailed costs.
50. For Cheam treatment works, additional opex across the AMP period, included within the original proposal submitted to the DWI in March 2023, was initially calculated at £226,500.
51. For Kenley treatment works, additional opex across the AMP period, included within the original proposal submitted to the DWI in March 2023, was initially calculated at £113,250.

Overview of proposed costs

52. As shown in Table 1, the optimised cost between 2025 and 2030 is £5.21m and we anticipate continuing with a risk-based approach across the 25-year period in our core adaptive pathway.
53. **Spend apportionment:** The spend proposed within this submission relates to enhancement spend expected within AMP8.
54. Once installed, future ongoing opex and capex would be expected to form part of base expenditure.

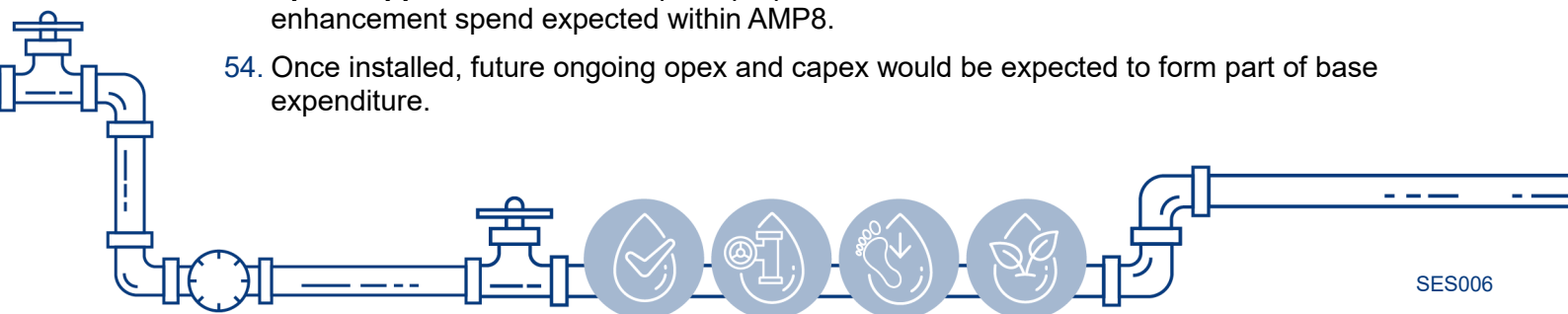


Table 1: Overview of proposed costs for UV Treatment Schemes

Cost	UV Installation at Cheam Treatment Works	
		AMP8
	Capex	£2.40m
	Opex	£0.15m
	Total	£2.55m
	UV Installation at Kenley Treatment Works	
		AMP8
	Capex	£2.60m
	Opex	£0.06m
	Total	£2.66m
	Total cost of UV Installations at Cheam and Kenley Treatment Works	
		AMP8
	Capex	£5.00m
	Opex	£0.21m
	Total	£5.21m

Source: SES Water Data

Cost efficiency assessment

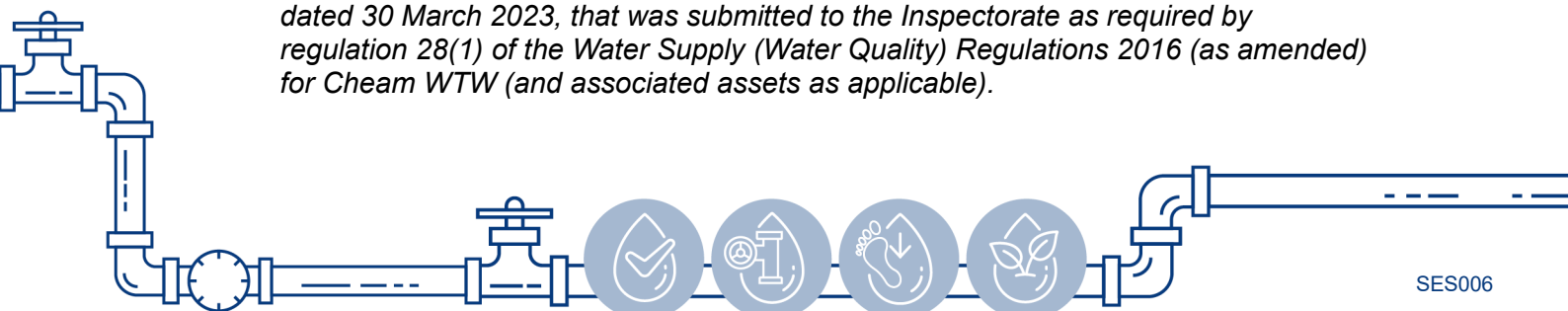
- 55. Consultants Atkins, as a third-party industry expert, have scrutinised the projects and the costs to provide assurance on the costs for these two schemes.
- 56. We are also applying a 1.0% target for ongoing (frontier shift) cost efficiency over AMP8, aligned with the level of per annum scope for frontier shift that the Competition and Markets Authority (CMA) adopted in its PR19 water company appeals decision.

Third-party assurance

- 57. The DWI have reviewed these schemes and supported the need for them. They state:

“The Inspectorate has completed its detailed assessment of the scheme proposed by SES Water to install UV treatment to secure or facilitate compliance with the wholesomeness standard for drinking water quality reasons at Cheam WTW (and associated assets as applicable) ...

The detailed assessment considered the outcome of the risk assessment report(s) dated 30 March 2023, that was submitted to the Inspectorate as required by regulation 28(1) of the Water Supply (Water Quality) Regulations 2016 (as amended) for Cheam WTW (and associated assets as applicable).



Based on the information submitted by the company, the Inspectorate supports the need for this scheme, for water quality reasons, and the supported scheme shall be included by the company in its Final Business Plan...⁸

58. In their support of the two schemes, when commenting on the costs the DWI state:

“The Inspectorate has no role in determining proportional allocation of expenditure. Where technical support from the Inspectorate is given, this should not be taken by the company to imply that the scheme will be partially or wholly funded as a Quality item.”⁹

59. Consultants Atkins, as a third-party industry expert, have scrutinised the projects and the costs to provide assurance on the costs for these two schemes.

F. Customer protection

60. Our engagement with customers and stakeholders has told us that high water quality is essential – keeping our natural water supplies free from pollutants and chemicals is always a priority. This enhancement has, therefore, strong support from our customers.

61. As previously stated, support has also been received by the DWI, as water quality stakeholder. Support by the DWI highlights the importance and essential nature of this works. Following their support, and subsequent issuing of a Regulation 28(4) Notice, this work becomes a statutory requirement to do during AMP8.

62. We have assessed the degree of customer protection that is afforded by the various mechanisms in place across the regulatory frameworks applying to this scope of works and conclude the following as providing requisite customer protection required for these programmes of works.

63. We are confident that our investment will help us to deliver our targets in water quality and water quality contacts. Should we not deliver on our promises to our customers we will be penalised through the ODI mechanism. Our enhancement investment requirements have been calculated alongside the ODI rates proposed, to ensure that they are proportionate and hold us to account for failure to perform where specific enhancement funding has been granted.

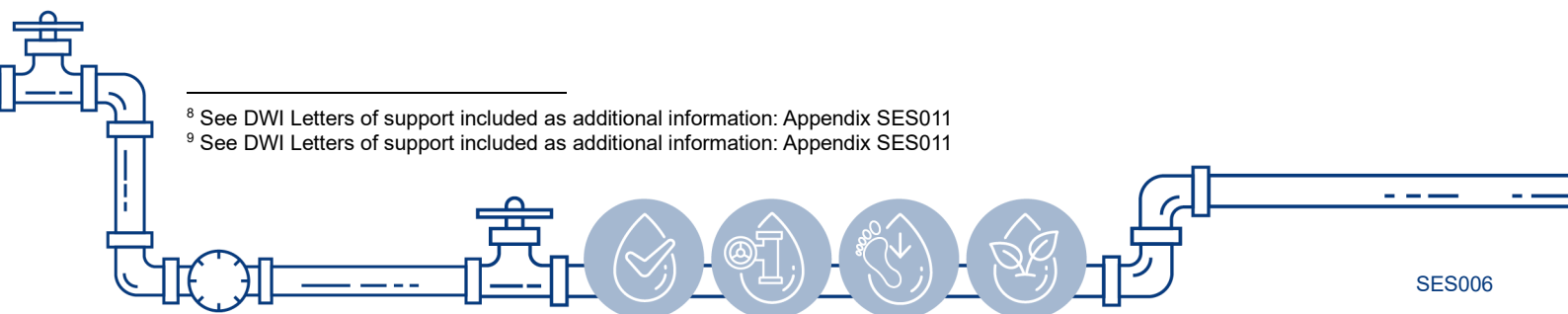
64. We recognise the importance of incentivisation and so we have also set our ODI rates at levels which allow us to aspire and aim for outperformance. Outperformance will be achieved in the event of us being able to make best use of our enhancement funding

65. We have not proposed a bespoke PC for these enhancement works as we believe the aspects of the programme are adequately addressed via the two common PCs and associated ODI mechanisms attached to them.

66. We have not proposed a Price Control Deliverable (PCD) for these works for the reasons set out in Appendix SES063. Whilst meeting the materiality threshold for a PCD, as stated above, we believe the common PCs and associated ODI mechanism and the expectation of enforcement action being taken by the DWI in the event of us not delivering this programme of works provides adequate protection for our customers.

⁸ See DWI Letters of support included as additional information: Appendix SES011

⁹ See DWI Letters of support included as additional information: Appendix SES011



- 67. By virtue of the nature of this work, third-party funding options are not deemed suitable or realistic. We assess there to be no third-party funding risks.
- 68. We believe that the above arrangements provide adequate protection for our customers in the event of late or non-delivery of these schemes.



CUSTOMER FOCUSSED LEAD REPLACEMENT PROGRAMME

G. Introduction

Our ambition is to replace the lead pipes that supply water to customers who are at most risk from lead exposure. This enhancement expenditure will involve the replacement of lead pipes – communication and supply pipes – at high-risk premises including schools, colleges, and nurseries to eliminate lead exposure at these premises by 2030.

This investment goes beyond our statutory duty to replace lead pipework when greater than 10 ug/l lead is detected in drinking water samples at customers' homes and is supported by our customers.

69. This enhancement case is structured in line with Ofwat's assessment criteria:

- In Section G, we provide a summary of the key information relating to the proposed enhancement of replacement of lead pipes – communication and supply pipes – at high-risk premises including schools, colleges, and nurseries
- In Section H, we provide a detailed description of the proposed enhancement
- In Section I, we explain the need for these enhancements
- In Section J, we demonstrate that the option we are putting forwards is the best option for customers
- In Section K, we explain how we have gone about confirming that the costs are efficient
- In Section L, we set out the associated Customer Protection

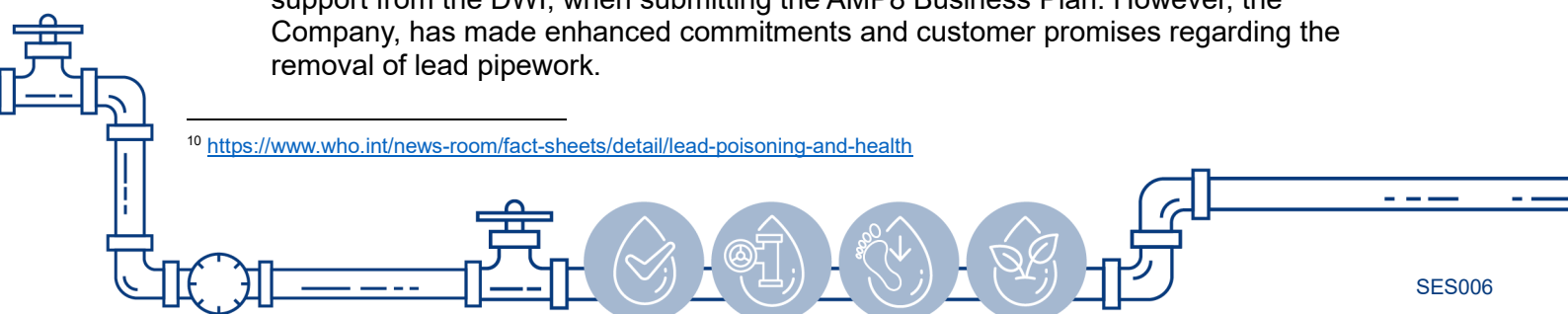
Background

70. “There is no level of exposure to lead that is known to be without harmful effects” and “Lead exposure can have serious consequences for the health of children” WHO, 2023¹⁰.

71. The Company had a DWI Undertaking for lead up to 2015. This Undertaking was completed in March 2015. The DWI were satisfied that the Company had met its obligations under the Undertaking and there was no requirement for a further Undertaking for 2015-20 and beyond. The DWI stated in their Undertaking closure letter that they expect the Company to “continue to maintain the quality of drinking water supplied to the consumers in respect of lead as per your current lead strategy”.

72. Due to the low numbers of lead exceedances experienced by the Company in the last ten years, the Company has chosen not to apply for a new Undertaking, or request support from the DWI, when submitting the AMP8 Business Plan. However, the Company, has made enhanced commitments and customer promises regarding the removal of lead pipework.

¹⁰ <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>



- 73. We have a lead strategy, that was required to be shared with the Drinking Water Inspectorate (DWI) by 31 March 2023. A summary of our proposed Lead strategy for AMP8, and beyond, is provided below in Figure 3 and Figure 4.
- 74. We received confirmation on 5 September 2023 that the *“the Inspectorate is still assessing company Lead and PFAS strategies and will send decision letters as soon as possible. Lead and PFAS strategies should feature in company Business Plans regardless and should include the appropriate costings”*¹¹.

Figure 3: Summary of SES Water Lead Strategy (page 1)

<u>SES Water</u>	<u>AMP 8 Lead Strategy - Summary</u>
<p>Summary</p> <p>This document outlines the delivery of the SES Water's Lead Strategy for AMP8 and beyond. The AMP8 delivery plan will be confirmed on receipt of the Final Determination from Ofwat when funding levels are known.</p> <p>Our proposed lead strategy is currently being tested through stakeholder engagement and customer surveys.</p> <p>The Company has been actively involved in the Water UK Lead Steering Group to help guide and develop strategies for the removal of lead in Drinking Water across the industry.</p> <p>The Company will continue in all the activities considered "routine"; including, enhanced monitoring of both lead and nickel, keeping records of the number of customers requesting lead checks, regularly reviewing treatment effectiveness, promoting the lead pipe replacement scheme, continuing the proactive replacement of lead pipes, monitoring the number of replacements carried out and keeping our customers informed and educated on the risks of lead in drinking water.</p> <p>The actions we will continue to deliver to deliver as both base and enhanced levels of service include:</p> <ol style="list-style-type: none"> 1. Maintain an enhanced monitoring strategy 2. Maintain the offering of free lead checks 3. Maintain analysis of 'hot spots' 4. Maintain review of treatment effectiveness 5. Continue the reactive replacement of all lead communication pipes where lead is detected in any sample which is greater than 5 µg/l, which is half of the regulatory Standard 6. Where the lead detected in any sample is greater than 10 µg/l, which is the regulatory Standard, in addition to the communication pipe, we will continue to offer to replace the customer owned supply pipe 7. Continue to replace all lead communication pipes during mains replacements 8. Continue to replace lead communication pipes when customers replace their part of the lead service pipe 9. Continue to replace all lead communication pipes due to non-quality service failures, including leakage and flow & pressure 10. Continue with investigations on the most pragmatic and efficient way to replace the service pipework on shared common services which are lead 11. Continue to provide customer education and information on the risks of lead in drinking water, available through the website and in correspondence with customers 12. Continue to monitor for Nickel on all random daytime samples <p>In addition to the above actions, for AMP8 there will be a further enhancement of:</p> <ol style="list-style-type: none"> 13. Investigate and sample the drinking water supply for the highest risk group of consumers at schools, nurseries and childminders (starting with infant schools). Where lead is detected, the Company will provide a lead-free drinking water supply, and a 'hydration station', which would become the new point of compliance. 	
<p style="font-size: small; margin: 0;">ses_leadstrategy_amp8_sept2023_summary_revised Page 1 of 2</p>	

¹¹ Email from DWI Price Review Team to SES Water, 5 September 2023

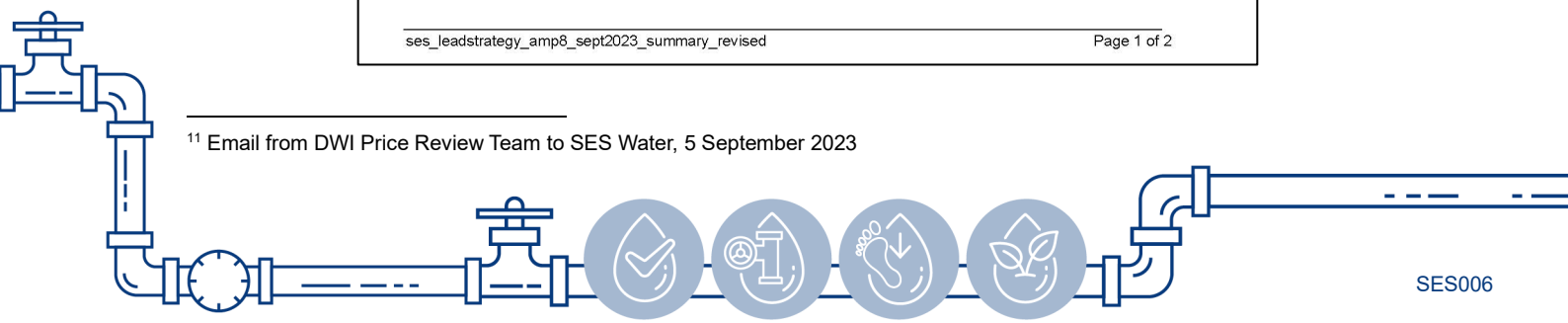
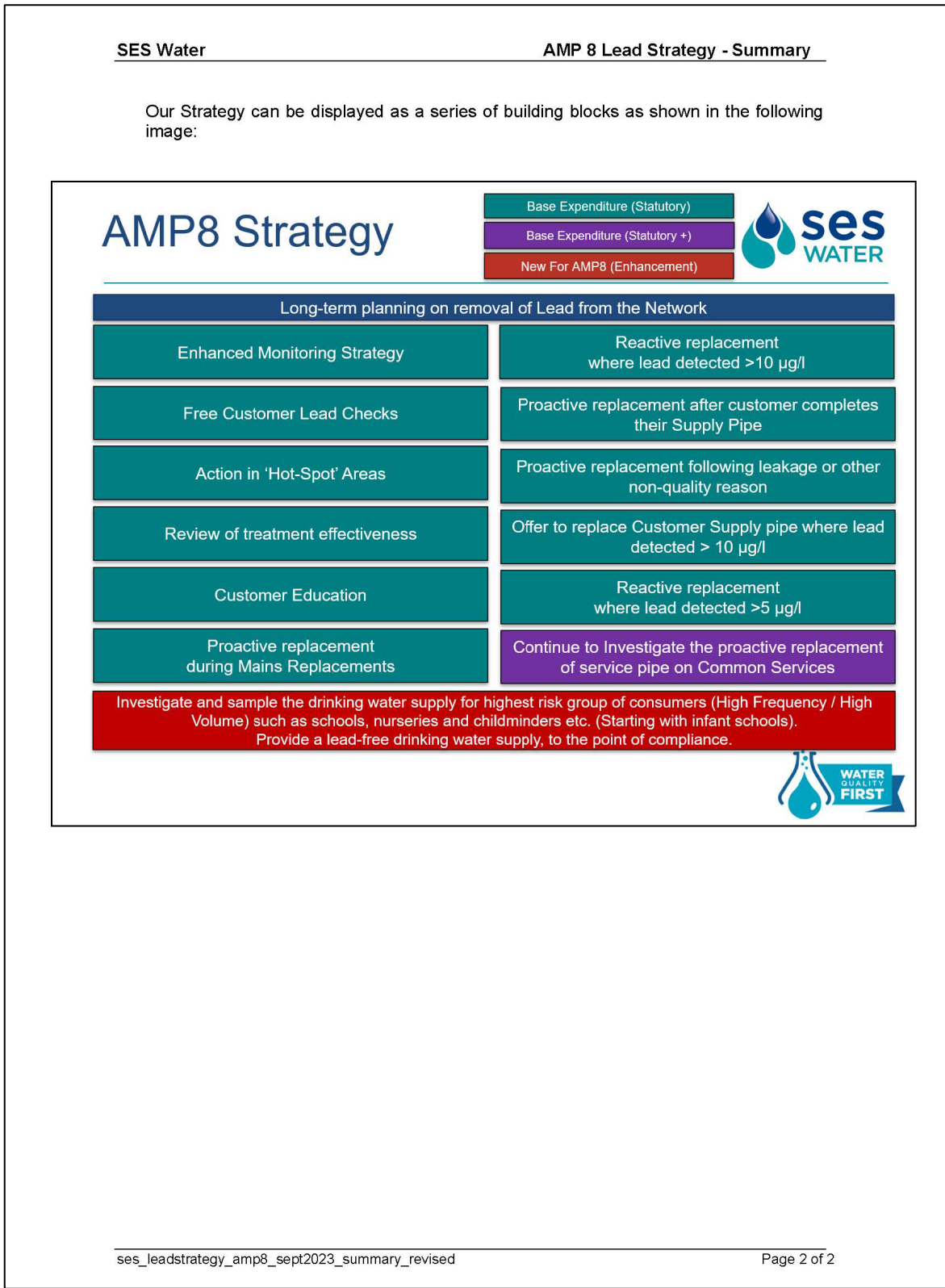


Figure 4: Summary of SES Water Lead Strategy (page 2)



75. We will continue to manage plumbosolvency through the optimised dosing of orthophosphoric acid and look to eliminate Company owned lead communication pipes, promoting the removal of customer owned lead supply pipework. In AMP8 we will continue our AMP7 strategy that will see all lead communication pipes replaced where there is evidence that the lead is present in drinking water at any concentration greater than half the current lead standard. We will also continue to offer to replace the customer owned supply pipe where the lead detected in any sample is greater than the regulatory standard. Recognising that the risk from lead ingestion is greatest to children, there was a major initiative to replace lead communication pipes supplying establishments where they are educated or cared for during AMP5. As an enhancement for AMP8, we are revisiting the risk from lead ingestion being greatest to children. We plan to review, investigate, and sample the drinking water supply for the highest risk group of consumers at schools, nurseries and childminders and will provide a lead-free drinking water supply, to the point of compliance, which will include the replacement of the property's supply pipe, if made of lead, and the provision of a lead free "hydration station" on site.
76. Our ongoing strategy demonstrates the ongoing commitment of the Company to continue its obligations for the removal of lead pipework from Company owned assets and its promotion for the removal of customer owned lead pipework.
77. The current number of lead service pipe numbers in our supply area is decreasing with time; however there remain in excess of 100,000 lead communication pipes, and it is estimated that there are a similar number of supply pipes.
78. The measures detailed in the strategy are intended to continue the removal of leaded pipework so that the risk will ultimately be minimised. However, it is acknowledged that leaded service pipework will remain in existence for the foreseeable future; therefore, the control of lead will continue to be managed through both treatment chemicals. There will also be the continued stakeholder engagement with health professionals and the environmental health teams within local authorities. Through our strategy, the risks of the leaded pipes to the general population (and vulnerable groups) will be reduced and managed to an acceptable level.
79. Our strategy can be displayed as a series of building blocks as shown Figure 3 and Figure 4, above.
80. In AMP8, we will continue in all the activities considered "routine" and carried out during AMP7 as base expenditure; including, enhanced monitoring of both lead and nickel, keeping records of the number of customers requesting lead checks, regularly reviewing treatment effectiveness, promoting the lead pipe replacement scheme, continuing the proactive replacement of lead service pipes, monitoring the number of replacements carried out and keeping our customers informed and educated on the risks of lead in drinking water.
81. For 2025 to 2030, whilst there is not a current regulatory quality driver, we have proposed a continuation of our enhanced strategy to replace all company-owned lead communication pipes where the concentration detected in any sample taken (compliance, operational or check sampling) exceeds 5 µg/l, half of the regulatory standard, (rather than 10 µg/l). We shall continue offering to replace customers' supply pipes (in addition to the communication pipe) in the event of a lead sample exceeding 10 µg/l. We will also continue to investigate the proactive replacement of lead services pipes on Common Services Where this was enhancement expenditure in AMP7, this will become the norm and be considered as base expenditure.



Summary of the enhancement case

82. Recognising that the risk from lead ingestion is greatest to children, during AMP5 there was a major initiative to replace lead communication pipes supplying establishments where they are educated or cared for. As enhancement expenditure for AMP8, we are revisiting the risk from lead ingestion being greatest to children. Therefore, in AMP8, and beyond, we plan to review, investigate, and sample the drinking water supply for the highest risk group of consumers (High Frequency / High Volume) such as schools, nurseries, and childminders, starting with infant schools. We plan to provide a lead-free drinking water supply, to the point of compliance, which will include the replacement of the property's supply pipe if made of lead and the provision of a lead free "hydration station" on site.
83. Our Statutory + expenditure is the enhancement relating to work we aim to continue in understanding more about the complexities and costs associated with removing lead shared supplies. We will also continue to investigate the most pragmatic and efficient way to replace the service pipework on shared common services which are lead.
84. Our engagement with customers and stakeholders has told us lead replacement is an area that they expect us to invest in over the next 25 years. When presented with different options in our Bespoke 2 research, 70% of customers chose an option that involved targeting schools, nurseries and colleges, as young people are most at risk from lead exposure.
85. The actions proposed within this enhancement case will either deliver direct and tangible improvements, or indirect improvements to the following performance commitments:
- Compliance Risk Index
 - Water Quality Contacts
86. Our activities will also help to mitigate the risk of failing the following other water quality metrics:
- Event Risk Index (ERI)
 - Number of lead communication pipes replaced
 - Number of lead supply pipes replaced
 - Number of lead-free schools
87. The AMP8 cost for this enhancement case is £3.8m.
88. The full removal of lead pipework from communication pipes and supply pipes, will be a multi-AMP project. To achieve this in an economically viable manner, technological advancement is required to reduce the unit cost of pipe replacement, and it is likely that a change in law is required to facilitate ease of access to shared lead supply pipes located beneath homeowners' properties.
89. A summary of property numbers is provided in Table 2 and summary of communication pipe numbers is provided in Table 3.



Table 2: Estimated number of consumers by category

Category	Estimated No. of Property connections
Schools	450
Nurseries & Childminders	100
Hospitals and Maternity Units	20
Sports Clubs	300
Church Halls & Play Groups	200
Community Hubs	250
Other Commercial Businesses	12,300
Domestic Housing (including Social Housing)	284,000

Source: SES Water Data

Table 3: Lead communication pipe numbers

Year	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
No. of Properties	287,090	288,668	291,352	292,347	294,248	295,181	299,244	301,753
No. of Mains Connections	219,090	219,740	220,583	221,207	221,571	221,902	222,189	222,799
Lead Comm. pipes replaced	795	772	538	315	532	202	383	346
Other Comm. pipes replaced	837	1090	873	614	879	267	431	389
Lead	103,498	102,726	102,188	101,873	101,341	101,139	100,756	100,410
Copper & Iron	14,699	14,560	14,451	14,376	14,271	14,239	14,188	14,143
PE	100,893	102,454	103,944	104,958	105,959	106,524	107,245	108,246
% Lead	47.2%	46.8%	46.3%	46.1%	45.7%	45.6%	45.4%	45.1%

Source: SES Water Data

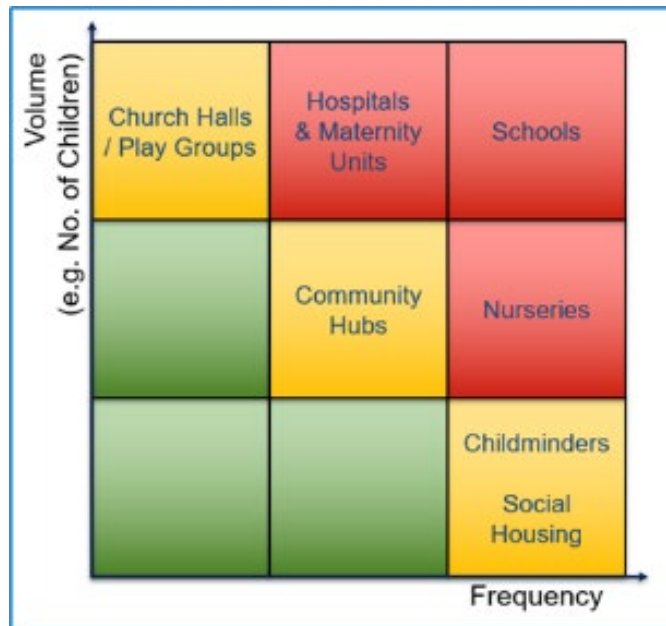


H. Description of the proposed enhancement

Highest Risk Premises – Lead Replacements

- 91. Our ambition is to replace the lead pipes that supply water to customers who are at most risk from lead exposure. This enhancement expenditure will involve the replacement of lead pipes – communication and supply pipes – at high-risk premises including schools, nurseries, and colleges to minimise lead exposure at these premises by providing a lead-free drinking water supply, the point of compliance, a point where water can be drawn for consumption.
- 92. For AMP8, by adopting a lead-free approach, we are focusing resources on higher risk and higher ‘volume’ sites – meaning that the cost per unit of risk reduction is lower than in other applications. The project is to investigate and sample the drinking water supply, starting with infant schools. Where lead is detected, the Company will provide a lead-free drinking water supply and a ‘hydration station’, which would become the new point of compliance. (See Figure 5)
- 93. We plan to deliver lead replacement at circa 170 educational premises between 2025 and 2030. We will continue to deliver the same type of lead replacement works, systematically addressing the higher risk premises first, over subsequent AMPs (See Figure 6).
- 94. The cost for each intervention, to provide the investigation, sampling, new pipework, and a hydration station, is estimated at £20k. If the work can be completed more efficiently, or less lead pipework is detected than expected, then we will be able to offer the scheme to more schools, nurseries and colleges and a faster rate and complete more than the planned c. 170 educational premises by 2030.

Figure 5: High Risk 'Vulnerable' Groups



Source: SES Water Data

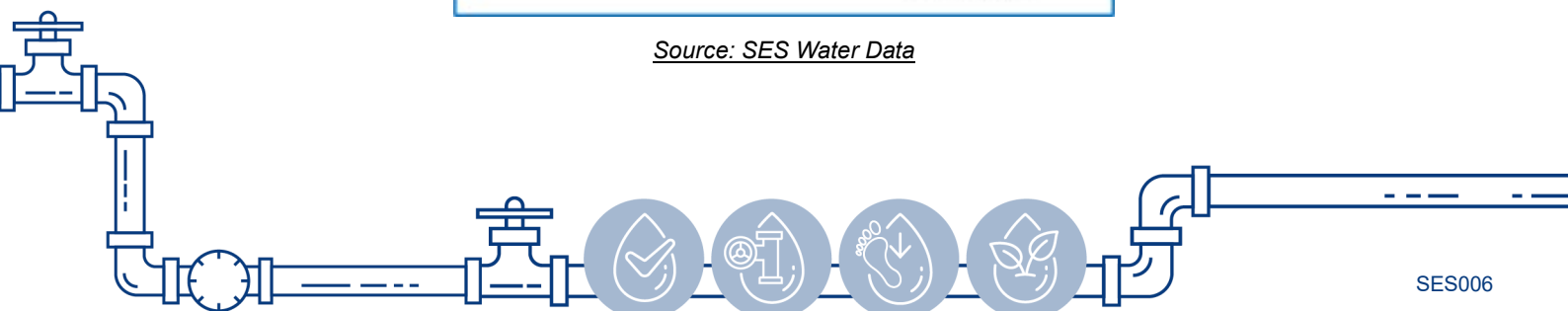
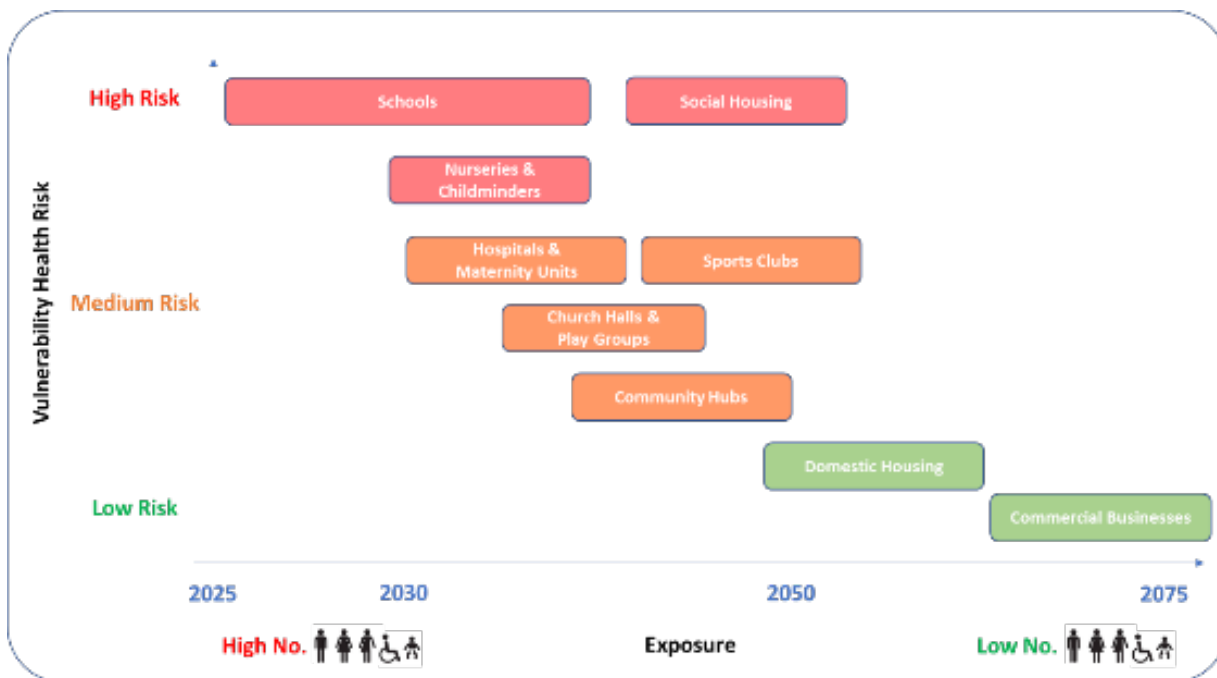


Figure 6: Strategy for addressing high vulnerability, high exposure risk groups



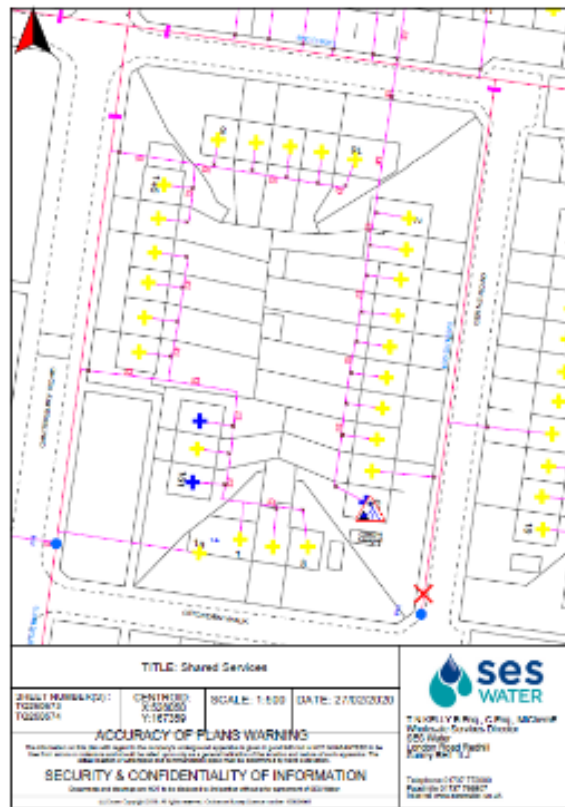
Source: SES Water Data

Shared Common Services

95. A proposal at PR19 was to commence an enhancement project to investigate and trial the separation of shared supplies for up to 100 properties per year, where these properties were supplied by lead mains. We are discovering that these large lead shared supplies are generally of poorer integrity – and therefore provide the potential to fail the lead standard as well as leak. By providing new, separate supplies, the lead risk would be greatly reduced, any customer-side leakage could be addressed, and meters can be fitted to each property.
96. Many of the properties served by shared common services are social housing or in areas of low income where consumers could be classified as a higher vulnerability health risk.

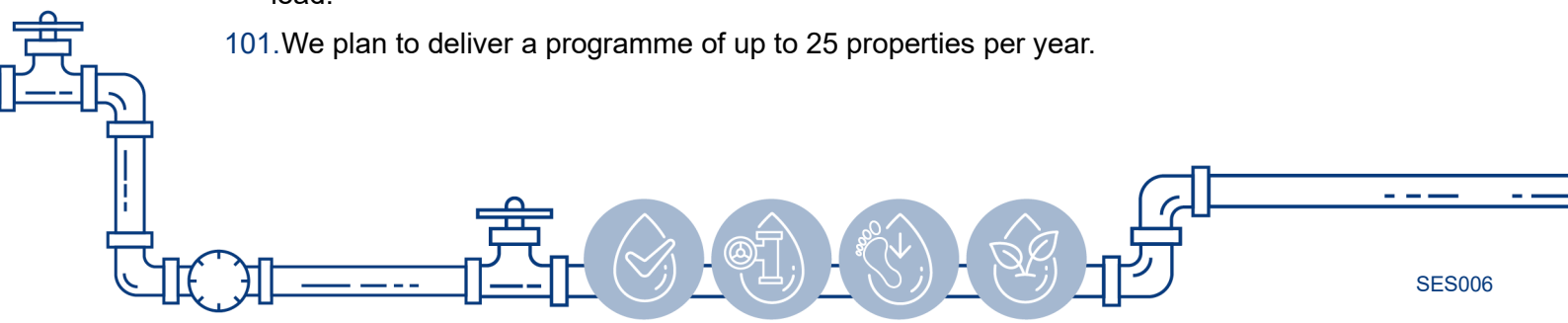


Figure 7: Shared Common Services - Pipework arrangements



Source: SES Water GIS Mapping System

- 97. As a trial for AMP7, we had plans to replace both the communication pipe and supply pipe for up to 100 properties per annum identified as being on shared common services. However, initially due to Covid, and then in the planning and logistics of this the work, with the pipework running in the rear of customer properties there have been operational difficulties in rolling this trial out so far in the current AMP. We plan to commence this work, which is predicted to require a high unit cost of delivery owing to its complexity and inherent challenges associated with land ownership and access. This may result in us adjusting our proposals for AMP8 at a later stage in the PR24 process.
- 98. This is a view shared across the industry, with us being an active participant within the Water UK Lead Steering Group. Common themes include the logistical difficulties of replacement, location of shared pipework being at the rear of properties in private land and ownership of pipework.
- 99. Through the Water UK Lead Steering Group, and the shared learning opportunities, it is planned to review how Severn Trent Water, and other water companies, have dealt with the complex issue of shared common services through their Green Recovery Scheme.
- 100. Therefore, for AMP8, we will continue with investigations on the most pragmatic and efficient way to replace the service pipework on shared common services which are lead.
- 101. We plan to deliver a programme of up to 25 properties per year.



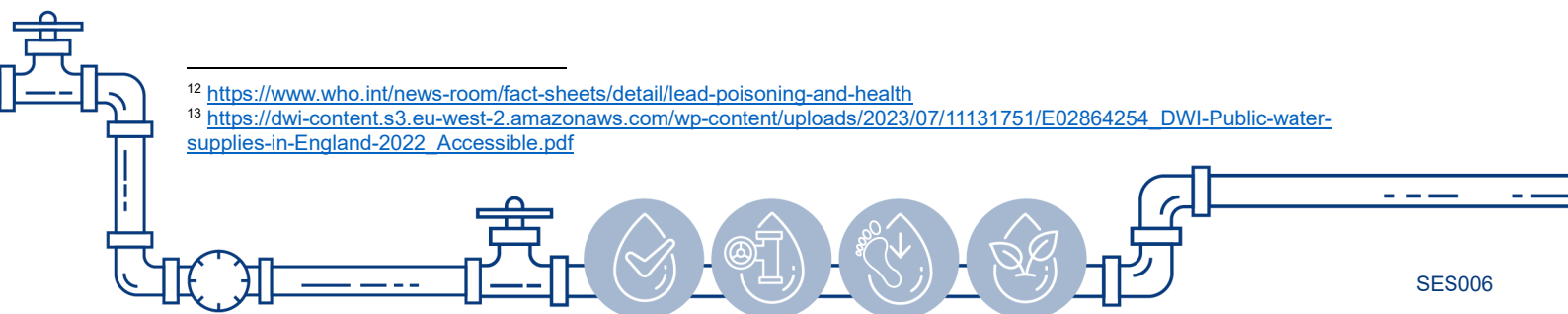
I. Need for enhancement

Ambition: To eliminate all the lead pipes in our supply network and our customers' homes as quickly as possible.

102. A third of our pipes that connect customers to our network and supply their homes and businesses are made of lead and we add a chemical called phosphate to make sure that the water is safe to drink at the customer tap.
103. In our long-term delivery strategy, we set out our 2050 ambition to replace the 100,000 lead pipes that connect our network to our customers and support customers to do the same to the pipes within their homes.
104. The eradication of lead from drinking water supplies is a core focus of the DWI. However, to achieve this in an economically viable manner, technological advancement is required to reduce the unit cost of pipe replacement, and it is likely that a change in law is required to facilitate ease of access to shared lead supply pipes located beneath homeowners' properties. Unless and until these changes arise, we are focusing our attention on the areas that present the highest risk to the public and where we have customer support for additional investment.
105. The World Health Organisation¹² shares the following facts on lead and health:
- *“Lead exposure can have serious consequences for the health of children. At high levels of exposure to lead the brain and central nervous system can be severely damaged causing coma, convulsions and even death. Children who survive severe lead poisoning may be left with permanent intellectual disability and behavioural disorders. At lower levels of exposure that cause no obvious symptoms, lead is now known to produce a spectrum of injury across multiple body systems. In particular, lead can affect children’s brain development, resulting in reduced intelligence quotient (IQ), behavioural changes such as reduced attention span and increased antisocial behaviour, and reduced educational attainment. Lead exposure also causes anaemia, hypertension, renal impairment, immunotoxicity and toxicity to the reproductive organs. The neurological and behavioural effects of lead are believed to be irreversible”.*
 - *“There is no level of exposure to lead that is known to be without harmful effects”.*
106. In the annual publication of Drinking Water 2022¹³, the Chief Inspector of the Drinking Water Inspectorate states:
- *“We must not forget the significant legacy issue of lead which remains prevalent in our homes. Scientific evidence unequivocally states that there is no safe level of lead in drinking water. Companies should be increasing their strategy, not reducing it, towards eliminating lead”.*
 - *“Whilst the replacement of every single lead pipe will be of benefit to public health, the target which most companies have set themselves of being lead free by 2050 feels currently out of reach without a colossal effort from AMP9 onwards”.*

¹² <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>

¹³ https://dwi-content.s3.eu-west-2.amazonaws.com/wp-content/uploads/2023/07/11131751/E02864254_DWI-Public-water-supplies-in-England-2022_Accessible.pdf



J. Best option for customers

107. We looked at a number of options focused on the progressive removal of lead as part of an enhancement programme of works. These were:

- A proposed removal of all customer lead communications pipes by 2050 – which was deemed both cost prohibitive and of limited benefit, since properties would continue to have lead supply pipes
- The removal of lead supply pipes as well as communication pipes – which was also deemed cost prohibitive and legally highly challenging owing to the issue of shared supply pipes running through multiple properties
- A targeted approach focussed on this highest risk and highest exposure volumes, ensuring a fully lead-free supply is provided.

108. By adopting a lead-free approach to schools, nurseries, and colleges, we are focusing resources on higher risk and higher 'volume' sites – meaning that the cost per unit of risk reduction is lower than in other applications.

109. We consider that there is compelling evidence that customers want us to invest in replacing lead pipes, taking a targeted approach so we eliminate lead exposure in buildings to be predominantly frequented by children and young people. This investment was included in our preferred plan which we tested with customers for affordability and acceptability. Appendix SES015 - Customer insight synthesis and triangulation (p31-32) provides detail on the customer research that supports this lead enhancement case.

110. Customers have told us lead replacement is an area that they expect us to invest in over the next 25 years and have shown a preference for us to take a risk-based approach by targeting schools, nurseries, and colleges first, as young people are most at risk from lead exposure. (See Chapter 5: Our customers and their priorities). This will be in addition to the continuance of the statutory+ programme. We undertook and completed work in AMP5 to remove all lead communications pipes from schools in our area. Now, we will replace any remaining communications and supply pipes, so we remove all lead from the pipes that supply any of these premises. Our long-term target is to eradicate lead from the main drinking water supply of all of these establishments over the next 15 years. Beyond this, we will look to address lead removal from other elevated risk premises such as community centres, sports clubs, and village halls.

111. Alongside this we will work with the industry, academia, and supply chain partners to identify an economically viable solution to the eradication of lead from all properties. This may take the form of a technological innovation that facilitates more cost-effective solutions to lead pipe replacement, the introduction of a government grant-based scheme or similar (akin to the Green Deal) that helps customers fund the costs of lead replacement, or a combination of both. Furthermore, a future change in law around the ownership of supply pipes (akin to that in the wastewater sector and the transfer of shared sewers) is also deemed essential to make such an approach viable. We have considered this as an uncertainty in our LTDS as there is currently no commitment from government to make such a change.



K. Cost efficiency

Overview of proposed costs

112. The cost for each intervention, to provide the investigation, sampling, new pipework, and a hydration station, is estimated at £20k. This figure is an estimate of the unit cost of these interventions on a school-by-school basis and have not been tested in delivery at this stage. However, if the work can be completed more efficiently, or less lead pipework is detected than expected, then we will be able to offer the scheme to more schools, nurseries and colleges and a faster rate and complete more than the planned c.170 educational premises by 2030.

113. The proposed number of lead replacements for the AMP8 programme are as follows:

Figure 8: proposed number of lead replacements for the AMP8 programme

		Base Level of Service							Base Totals	New for AMP8 Enhancement	
		Statutory						Statutory +			
		Mains Replacement	Customer Replacement	Company (Non-Quality)	Quality >10 µg/l	Quality >10 µg/l	Quality >5 µg/l	Investigation of Shared Services	Base Totals	Schools Programme	Totals
Year Plan	Comm Pipes	200	200	50	30	0	70	25	575	34	609
	Supply Pipes	0	0	0	0	30	0	25	55	34	89
AMP8 Plan	Comm Pipes	1000	1000	250	150	0	350	125	2875	170	3045
	Supply Pipes	0	0	0	0	150	0	125	275	170	445
Costs	Unit Cost (£)	-	£ 2,200	-	£ 3,200	£ 2,200	£ 3,200	-	-	£ 20,000	-
	Cost (£k)	-	£ 2,200	£ -	£ 480	£ 770	£ 400	£ 3,850	£ 3,850	£ 3,400	£ 7,250

Source: SES Water Data

114. Our Statutory and Statutory+ expenditure for lead removal in AMP8 is £3.8 million. £3.4m of this is base expenditure and relates to ongoing lead management activity (Statutory). The remaining element (Statutory+) is the enhancement expenditure relating to work we aim to continue in understanding more about the complexities and costs associated with removing lead shared supplies, as summarised above.

115. The optimised cost of our enhanced risk-based lead removal programme requires a further £3.4m of enhancement expenditure. We anticipate continuing with a risk-based approach across the 25-year period in our core adaptive pathway.



L. Customer protection

116. We have assessed the degree of customer protection that is afforded by the various mechanisms in place across the regulatory frameworks applying to this scope of works and conclude the following as providing requisite customer protection required for these programmes of works.
117. Customers are protected by virtue of the existing DWI requirement for us to continue to comply with the routine (base) activities that formed the basis of the Undertaking until 2015. Our proposed enhancement programme provides additional protection for the customers that are most at risk from exposure to lead and goes beyond current regulatory drivers to mitigate this risk.
118. We have not proposed a bespoke PC for these enhancement works as we do not deem this scope of works would meet the criteria for a bespoke PC.
119. We have proposed a Price Control Deliverable (PCD) for elements of these works as set out in more detail in Appendix SES063, totalling c.90% of the enhancement expenditure in this claim (£3.4m).
120. The PCD deliverables will be the number of schools expected to be covered in each year, profiled over the AMP. At this stage, we propose a unit cost rate for the PCD of £20k per school. We recognise that there is a range of potential unit costs - some will be higher, others lower – however we cannot accurately categorise schools in advance by likely unit cost and hence we do not consider that we would be incentivised by a single unit rate to tackle lower unit cost schools in preference to higher cost schools.
121. We propose that there should be annual assurance and reporting on progress and unit cost to Ofwat, but that the PCD is assessed and settled on the basis of performance by the end of the period. The effect will be to return the full amount of the enhancement claim to customers in the event of non-delivery (and pro-rata for partial delivery), taking account of cost-sharing. We do not consider that an annual performance or timing incentive is appropriate here as there is no statutory or regulatory requirement to deliver the proposed improvements at any specific point within the AMP.
122. The balance of the spend in this grouping relates to a number of other lead reduction enhancement activities related to ongoing activity to remove lead on shared supplies that are only £0.4m in aggregate and we propose that it is excluded from the PCD.
123. We believe that the above arrangements provide adequate protection for our customers in the event of late or non-delivery of these schemes.

