SES WATER

# APPENDIX SES003

# FUTURE SCENARIOS DETIALED REPORT

# Contents

# APPENDIX SES003: FUTURE SCENARIOS DETAILED REPORT

## A. Introduction

This appendix sets out further detail on SES Water's common reference scenarios ("CRSs") and its bespoke LTDS scenarios. In particular, it provides more commentary on what each scenario would mean for SES Water in both qualitative and quantitative terms. This includes consideration of the key features of each scenario, and the types of parameters that characterise them, together with a commentary on the values of these parameters in each scenario, and how they have been derived.

1. The appendix is structured as follow:
    - Section B provides detail on the baseline parameters for the scenarios (these are "median positions" for SES Water that are used to test the plausible extremes against)
    - Section C provides detail on the LTDS CRSs related to climate change, as they apply to SES Water
    - Section D provides detail on the LTDS CRSs related to technology, as they apply to SES Water
    - Section E provides detail on the LTDS CRSs related to demand, as they apply to SES Water
    - Section F provides detail on the LTDS CRSs related to abstraction reduction, as they apply to SES Water
    - Section G provides detail on the SES Water's bespoke LTDS scenarios.

# B. Baseline parameters for the scenarios for SES Water

## Introduction

The relevant parameters for the adverse and benign LTDS scenarios are specified in the document: "PR24 and beyond: Final guidance on long-term delivery strategies". In order to test these parameters without combining scenarios, it is necessary to create a full scenario for each of the "plausible extremes," that includes a "median position" for the parameters that are not to be set at the "plausible extreme" position. For example, the scenarios that test high and low abstraction reductions need to make assumptions regarding climate change, demand and the technology that is available. This section sets out the parameters for these "median positions" for SES Water that are used to test the plausible extremes against, and the rationale for selecting them.

2. For ease of reference, we have brigaded these parameters into the following areas:
   - Climate change parameters;
   - Technology parameters;
   - Demand levels;
   - Abstraction reductions; and
   - Other parameters.

## Baseline climate change parameters

3. To model scenarios that do not include plausible extremes for climate change, median positions for climate change parameters are required. SES Water is not particularly impacted by sea level or coastal parameters, however the frequency of extreme weather events, temperature, rainfall, and water quality are all important. To be fully consistent with Ofwat's guidance we have included a median RCP scenario. The key baseline parameters with respect to climate change are, therefore:
   - RCP scenario
   - Frequency of extreme weather events
   - Average temperatures
   - Average rainfalls
   - Water quality
4. Together with WRSE companies, water resources system modelling was undertaken to determine a deployable output impact for 28 climate change scenarios using UKCP18. These included 12 regional projections, three global projections from the Hadley Model, and 13 global projections from the CMIP5 ensemble. The baseline 'median' parameters were generated by averaging the climate change conditions for these scenarios, to calculate the median.
5. The 25th and 75th percentile of impact on deployable output was considered as the low and high scenarios for water resource planning. The Ofwat common reference scenarios

sit within this range and can be mapped to specific climate change scenarios used in the water resources modelling.

**Table 1: Mapping of the WRSE scenarios to the Ofwat scenarios**

| Component | Detail | WRSE climate change scenario designation |
|---|---|---|
| Default<br>(WRMP medium) | - | '0'<br>(Median of 28 climate change impact on Deployable Output) |
| Ofwat benign scenario | RCP 2.6 50th percentile | **Climate change scenario '20'** |
| Ofwat adverse scenario | RCP 8.5 50th percentile | **Climate change scenario '17'** |

*Source: WRSE data*

## Baseline technology parameters

6. Ofwat's guidance for the fasts/slower technology scenarios is relatively detailed and relatively specific targets are identifiable and measurable from Ofwat's guidance. The selection of baseline parameters for forecasting the modelling scenarios mirrors Ofwat's LTDS guidance. The key baseline parameters with respect to technology relate to:
   - Carbon-free baseload electricity
   - Low emissions HGVs and fleet
   - Low carbon construction materials
   - Access to datasets across water companies and other third parties
   - SES Water specific technology initiatives
7. It is important to note that the technology scenario does not only relate to IT, it covers the whole spectrum of technology. For example, in water resources terms it relates to potential shifts in ways to tackle both reducing demand, for example through smart metering, and ways to increase supply, such as advanced treatment to reduce the cost of using effluent. The modelling undertaken by WRSE has, therefore, explored the impact of technology advancements on the options selected.
8. The table below sets out the baseline outcomes in comparison to the faster and slower outcomes set out by Ofwat's guidance.
9. The median smart metering levels are assumed to be 2030; SES Water is a market leader in this regard, and it is expected that it will be able to install smart meters ahead of Ofwat's "faster" scenario.

**Table 2: Baseline technology Scenario outcomes**

| Variable | Median date |
| --- | --- |
| Carbon-free baseload electricity | 2035 |
| Low emissions HGVs and fleet | 2030 |
| Low carbon construction materials | 2035 |
| Access to datasets across water companies and other SES Water's technology initiatives | 2035 |

*Source: SES Water*

## Baseline demand parameters

10. The LTDS guidance in respect of demand uses population growth and housing growth as the relevant benchmarks. The guidance states it is necessary to consider government interventions to reduce water usage. These include known schemes, smart metering, and other potential future schemes. The key baseline parameters with respect to demand are, therefore:
    - Housing growth
    - Population growth
    - Government intervention to reduce usage
    - Smart Metering
    - Other consumption reduction initiatives
11. The table below sets out SES Water's baseline outcomes in relation to the parameters for demand
12. The table below sets out three signpost years being: (i) the base date of forecasts (2019-2020), (ii) the first year of the PR24 plan (2025-2026), and (iii) the last year of the PR24 plan (2049-2050). The demand forecasts for the baseline scenario moves linearly between these three signpost years.
13. Note that WRSE use the housing plan scenario as their baseline – therefore this table is the same as the "high scenario" below

### Table 3: Baseline Demand Scenario outcomes

| Variable | Units | 2019-20 | 2025-26 | 2049-50 |
|---|---|---|---|---|
| Housing Growth | Properties 000's | 291.68 | 312.45 | 372.59 |
| Population Growth | Population 000's | 734.50 | 756.87 | 863.57 |
| Government Intervention Level | Average household PCC (l/h/d) | - | 146.6 | 104.3 |
| Smart Metering | Smart meters 000's | 0.00 | 35.75 | 315.38 |
| Demand | Distribution input, Ml/d | 164.85 | 156.74 | 123.92 |

*Source: SES Water and WRSE data*

## Baseline abstraction reductions

14. The low and high CRSs are based on currently known legal requirements and the EA's 'enhanced' scenario, respectively. SES Water has, therefore, selected baseline parameters part way between these two extremes which reflects a default or "business as usual +" position. The baseline abstraction reductions have, therefore, been determined by consideration of:

- Issuance/extension of new licences for extraction sites
- Predicted abstraction to meet demand
- Abstraction reduction limits in the adverse ("1/500") scenario
- This has allowed SES Water to determine a median position with respect to the proportion of existing abstraction levels that would be permitted at each site.

### Baseline Abstraction Reduction/default Scenario – 'Business-as-usual +'

15. The most recent guidance from Ofwat states:[1]

*"When testing each of the common reference scenarios, companies will need to determine the default position for other parameters. Companies should not combine the extremes of the common reference scenarios for testing - whether adverse and benign. Using a combination of extremes risks producing a very low probability scenario. Instead, companies should use a parameter that lies between the 'plausible extremes' described by the benign and adverse common reference scenarios for its default position."*

16. Climate change is expected to bring greater variability in rainfall and an increased frequency of extended periods of drought. Further, combined with higher temperatures leading to less groundwater recharge, river flow levels are expected to be impacted significantly. Climate change is likely to force water companies into abstraction reduction in order to avoid environmental destruction and maintain the constant flow of supply. With no further government regulation, abstraction reduction is likely to increase as a result of

[1] Email from Ofwat, 29 March 2023

Climate change. Moreover, climate change consequences are likely to act as a catalyst for increased government regulation in relation to abstraction reduction.

17. A 'Business-as-usual +' (BAU+) scenario considers that abstraction levels will be impacted by climate change. This scenario is distinct, because it does not necessarily require further government intervention to induce further reductions in abstraction.
18. Data from SES Water indicates that in an extreme event (1 in 500), water available for use under the BAU+ scenario would reduce from 175.68 megalitres per day to 152.20 megalitres per day, a 13% decrease.
19. The table below provides a summary of SES Waters BAU+ which is the baseline scenario in comparison to the benign and adverse scenarios for abstraction reductions.

**Table 4: Abstraction Reduction parameters**

| Scenario | Water available for use[2] on full implementation of abstraction reduction (Ml/d) | % difference to benign scenario |
|---|---|---|
| Benign (Legal minimum requirement) | 175.68 | 0% |
| Default (BAU+ modelling) | 152.20 | 13.4% |
| Adverse (Enhance modelling) | 146.39 | 16.6% |

*Source: SES Water and WRSE data]*

[2] Calculated for this purpose as deployable output with any climate change factors and the relevant reduced abstraction levels.

# C. The impact of the LTDS climate change scenarios on SES Water

## Introduction

Ofwat places climate change as one of the material drivers of uncertainty around future enhancement spending. It has, defined two LTDS common reference scenarios for climate change, "High climate change scenario" and "Low climate change scenario." This section sets out how these scenarios apply to SES Water Ltd.

20. These high and low climate change scenarios are defined by Ofwat as follows:

**High climate change scenario**

**Land:** UKCP18 probabilistic projections, RCP8.5, 50th percentile probability level

**Sea level:** UKCP18 marine projections, RCP8.5, 50th percentile probability level

**Low climate change scenario**

**Land:** UKCP18 probabilistic projections, RCP2.6, 50th percentile probability level

**Sea level:** UKCP18 marine projections, RCP2.6, 50th percentile probability level

*Source: "PR24 and beyond: Final guidance on long-term delivery strategies", Ofwat, April 2022, page 37.*

21. We have adopted a multi-step approach to modelling these scenarios: considering at a high level, what actions, options and schemes would be technically feasible and legally compliant in each scenario and modelling optimal combinations of those to meet the specific parameters of each scenario. We have, specified both the high-level considerations taken into account when designing solutions, as well as the specific scenario parameters that would apply to us in these scenarios.

22. This section is structured as follows:
    - We outline the effect of climate change in the UK
    - We assess the economic effect of climate change in the UK
    - We set out the key factors and key parameters we considered in its modelling

## Climate change in the UK

23. Ofwat's description of the high and low climate change scenarios is brief in comparison to its guidance of other scenarios. Brief, as it makes use of the Representative Concentration Pathways ("RCP") a set of scenarios adopted by the Intergovernmental Panel on Climate Change ("IPCC"). Ofwat observes that the "RCP8.5" scenario generally aligns with an increase in global temperatures of 4ºC by 2100.

24. The RCP8.5 scenario is alternatively described as the "business as usual" scenario, whereby human production of greenhouse gases continues largely unconstrained. It is deemed an unlikely, nonetheless possible scenario. "8.5" refers to the level of radiative forcing expected in 2100[3].
25. The general global expectations of climate change are well known. Anticipated primary effects are an average increase in global temperatures and an increase in both the frequency and severity of extreme weather events such as storms and droughts.
26. In the UK, the primary effects, as described by the Met Office, will be (i) hotter and drier summers, (ii) warmer and wetter winters, and (iii) more frequent and intense weather extremes[4].
27. The Met Office provides climate change projections for the UK, including forecasts of rainfall and temperature in the south-east of England. These show that, by the end of the century, in addition to an approximately 4ºC increase in average temperatures, summer precipitation is likely to decrease and winter precipitation will increase[5].
28. Ofwat suggests that the LTDS high climate change scenario impact will include a 20% reduction in summer rainfall and a 20% increase in winter rainfall by 2050[6].
29. Dry summers result in increased periods of drought and an increased risk in wildfires.
30. Wet winters and extreme weather events put flood plains at greater risk. The UK government provides guidance on areas that are at greater risk of flooding, which includes some of the tributaries of the River Thames[7].

## Economic and social effects of Climate Change in the UK

In addition to the physical impacts of climate change, there are also likely to be economic and social impacts that may impact the schemes and solutions available to us in these scenarios, and/or impact the costs of the solutions available to us in these scenarios.

31. Significant flooding is likely to result in population displacement and/or migration from affected areas and potentially result in significant infrastructure damage. Extreme floods in 2015/16 were thought to have cost £1.6bn in damage[8]. As weather becomes more volatile and hence unpredictable, we may see the costs of damages rise.
32. The UK Parliament noted that "*there will be some locations where defences can no longer be sustained by government funding*"[9] due to rising sea levels. Hence unavoidable disruption is anticipated in coastal economies.
33. The combination of wet winters and dry summers has already started to affect food production in the UK. Globally, Climate Change poses a threat to food production, which could see an increased scarcity of foods, scarcity of water and inflation.

[3]Radiative forcing is a measure defined as how much a factor has on influencing the ingoing and outgoing balance of radiation with the Earth. Due to Earth's atmosphere, some of the radiation reflected at the Earth's surface is absorbed in atmosphere, commonly known as the "greenhouse effect". Radiative forcing measures the annual energy change per unit area in the atmosphere in watts per meter squared. Therefore RCP8.5 refers to radiative forcing of 8.5 W/m2 attributable to greenhouse gas concentration in the Earth's atmosphere
[4] https://www.metoffice.gov.uk/weather/climate-change/climate-change-in-the-uk
[5] https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/climate-change-projections-over-land
[6] Ofwat presentation 220422 RCG common reference scenarios.pptx, Slide 2
[7] https://flood-map-for-planning.service.gov.uk/ - Notable areas of risk are the areas surrounding the rivers Arun and Adur,
[8] https://www.gov.uk/government/news/counting-the-costs-of-flooding
[9] https://www.parliament.uk/globalassets/documents/post/postpn363-sea-level-rise.pdf

34. Lastly, an anticipated effect of extreme global warming would be mass migration of peoples from uninhabitable regions. our inland geographical location makes it relatively less susceptible to these impacts than costal companies.

## Key factors in consideration when assessing the impact of Ofwat's LTDS low climate change scenario on us

35. By definition, Ofwat's LTDS low climate change scenario does not entail all that much climate change, so projects and solutions that are suitable in today's climate are likely to remain appropriate in this scenario.

## Key factors in consideration when assessing the impact of Ofwat's LTDS high climate change scenario on us

36. The Met Office considers the UK should expect three outcomes from climate change: (i) hotter and drier summers; (ii) warmer and wetter winters; and (iii) more frequent and intense weather extremes. All of these would be present in Ofwat's LTDS high climate change scenario that SES has considered.

### Considerations relevant to assessing the impact of hotter and drier summers

37. A key impact of climate change is an increase to summer heat and drought conditions which will result in increased summer peak demand for water.

38. It is important to consider the systems' capacity to deal with extended and extreme periods of drought as well as increased water demand during these periods.

39. On the operational side, there is an increased risk of failures in production and supply due to overheating of assets in extreme heat conditions. Underground assets would be susceptible to damage from ground movement resulting from fluctuations in moisture levels. Overground assets are susceptible to extreme and extended bouts of heat, and may therefore, have a greater propensity to malfunction.

40. Lastly, there is an increased risk of decline of natural capital due to evapotranspiration and rising water temperatures due to a general rise in temperature. For example, decreased levels during the summer at key rivers such as Wandle and Hogsmill should be anticipated, and their limited capacity planned for.

### Considerations relevant to assessing the impact of warmer and wetter winters

41. High precipitation increases the risk of flooding of assets with potential operational implications, such as reduced water quality compliance, supply interruptions and further costs of repair.

42. Warmer and wetter winters are also like to lead to an increased rate of riverbank erosion, which poses a threat to assets and the security of long-term supply of water.

43. As all factors adjust to much warmer winters, land use and environment behaviour may change, increasing risks of water pollution and supply levels.

### Considerations relevant to assessing the impact of extreme weather events

44. Whilst average winter temperatures will be higher, in the high climate change scenario we would expect more extreme and rapid changes in weather, so there is an increased likelihood of extreme cold snaps and snow events, with a potential impact on asset functionality and leakage levels.

45. The frequency and severity of summer storms is likely to increase due to climate change, and there is an increased risk of flooding as a result of extreme weather events, resulting in a higher risk of run-off and water pollution.

46. Future development should consider resilience to run-off to avoid water pollution. Consideration also ought to be given to the resilience any future projects have against extreme flooding events to avoid pollution and asset damage.

47. Extreme weather will lead to an increased risk of riverbank erosion and high river flows with a potential risk of damage to infrastructure and our assets. Exposure to riverbank erosion is, therefore, also a key consideration.

48. Weather extremes may also mean more prolonged dry periods during the winter occasionally, resulting in low groundwater and river levels. Future planning should consider that seasonal behaviour will become less predictable, and plans should be adaptable in the face of volatile seasonal climates.

## Key scenario parameters

49. Based on the analysis above we consider that the main parameter of the climate change scenario should be the RCP scenarios for climate change as this aligns with Ofwat's guidance and this scenario will give an indication as to the severity of the climate change impact. The discussion above reveals that specific consequences for us should be considered particularly in relation to the effects on water such as temperature, drought, rainfall, and pollution.

   **(a)** The overall climate change level or the RCP scenario

   **(b)** Frequency of extreme weather events in the UK including but not limited to:

      **(i)** Storms

      **(ii)** Adverse rainfall

      **(iii)** Drought

   **(c)** Average temperatures

   **(d)** Average rainfalls

   **(e)** Water quality as a result of:

      **(i)** Algal blooms

      **(ii)** Invasive species

      **(iii)** Saline intrusions

      **(iv)** Agricultural run-off

### Table 5: Sample climate change scenario parameters

| Variable | RCP 8.5 | RCP 2.6 |
|---|---|---|
| Rainfall events exceeding 20mm/hr | 4x as frequent by 2080 compared to the 1980s | |
| Global average temperature rise to 2100 (Degrees Celsius) | 4.3 | 1.6 |
| Winter precipitation change (%) from 1981-2000 to 2041-2060 (50th percentile) | 7% | 5% |
| Summer precipitation change (%) from 1981-2000 to 2041-2060 (50th percentile) | -15% | -11% |
| Water resource availability (million l/day) | 7.5 million litres less water will be available each day from existing sources | 3 to 4 million litres less water will be available each day from existing sources |

*Sources: Met office, WRSE, SES Water*

# D. The impact of the LTDS technology scenarios on SES Water

## Introduction

Ofwat places technology as one of the material drivers of uncertainty around future enhancement spending. It has therefore defined two LTDS common reference scenarios for technology, "faster technology scenario" and "slower technology scenario." It is important to note all aspects of technological development and are not simply limited to Information Technology. This section sets out how these scenarios apply to us.

50. The Faster and Slower LTDS Technology Scenarios are defined by Ofwat as follows:

### Faster technology scenario

1) Smart water supply network by **2035**:
   - automatic detection of potential leaks; and
   - robust real-time asset condition information – including telemetry, robotic and drone inspection – enabling a risk-based maintenance approach across the business.
2) Full smart meter penetration by **2035**.[46]
3) New wastewater approach by **2040**:
   - monitoring and advance forecasting of localised surface water rainfall and related pollution/wastewater stresses, including intelligent sewer technology, enabling rapid response and/or prior action; and
   - automatic monitoring and enhanced sampling of environmental water quality.
4) Low-emission HGVs and fleet by **2030** and carbon-free baseload electricity by **2035**.
5) Full open access to datasets across water companies and other utilities, through common data sharing protocols by **2035**.
6) The whole-life financial cost of low-carbon construction materials equals that of conventional building materials by **2035**.

7) Increasing reliance on technology produces progressively higher risks of failure and threats from cybercrime, creating possible need for non-digital backups **throughout the period to 2050**.

**Slower technology scenario**

1) Smart water supply network by **2040**:
   - automatic detection of potential leaks; and
   - robust real-time asset condition information – including telemetry, robotic and drone inspection – enabling a risk-based maintenance approach across the business.
2) Full smart meter penetration by **2045**.
3) New wastewater approach by **2045**:
   - monitoring and advance forecasting of localised surface water rainfall and related pollution/wastewater stresses, including intelligent sewer technology, enabling rapid response and/or prior action; and
   - automatic monitoring and enhanced sampling of environmental water quality.
4) Low-emission HGVs and fleet by **2040** and carbon-free baseload electricity by **2035**.
5) Progress on open data across the sector is limited **throughout the period to 2050**, with only a handful of water companies opening up large numbers of their datasets, beyond those required for regulatory purposes.
6) The whole-life financial cost of low-carbon construction materials continues to fall, but conventional building materials remain cheaper **throughout the period to 2050**.
7) Cyber and digital protection stays ahead of cybercrime and digital networks remain resilient **throughout the period to 2050**.

*Source: "PR24 and beyond: Final guidance on long-term delivery strategies", Ofwat, April 2022, page 38-39.*

51. We note that there are a large number of separate relevant parameters related to technology in these scenarios, so we have structured this section as follows:
    - We outline the overall scenario description
    - We assess the likely effects of meeting the seven specific requirements
    - We set out the key factors that we have considered in respect of each requirement
    - We set out the key technology parameters we have considered when modelling these scenarios

## The LTDS Faster technology scenario

### Overall scenario description

52. The technology advancements described in the LTDS technology scenarios are well within our capabilities and we anticipate meeting the faster technology scenario requirements for many of the specific points as part of our current plan. At several points, the scenario definitions do, however, require usage of more advance technologies such as robotics and low emission vehicles that we must account for in our plans.

53. In the faster technology scenario, water companies are anticipated to adopt innovative technologies in a shorter time frame than in the slower technology scenario. In general, the scenarios' adverse and benign options are a question of timing. Ofwat expects the adoption of these technologies over the period 2025-2050, and the differences between scenarios are, therefore, a question of the speed of adoption.

54. Water companies are expected to leverage digital technologies to provide customers with more personalised and convenient services. There are several technologies that water companies will need to consider in both the faster and slower technology scenario to deliver better outcomes for customers and the environment. Below we outline the relevant technologies and how we can utilise them over the long term.

- Data analytics: The process of collecting, cleaning, and analysing data. A general advantage of analytics is that it provides information and insights previously unknown or hidden from the user. Real-time data analytics can be used to optimize operations and improve decision-making in a more responsive and timely manner by making use of sensors and internet of things devices to gather data on water quality, flow rates and pressure. The data collected can be applied to machine learning algorithms to predict and prevent equipment failures, identify leakages, and reduce water losses.
- Automation technologies: designed to replace manual tasks that streamline operations and reduce costs by improving speed and reducing errors due to human error in performance of the tasks. For example, automated valves and pumps could control the flow of water in the network, reducing the need for manual interventions. Automated meter reading technologies can collect data on water usage, eliminating the need for manual meter reading.
- Robotics: manually controlled machines often specialised to perform specific tasks while being controlled by a human operator. Water companies could use drones or robots to inspect and maintain their infrastructure. In particular drones/robots equipped with cameras would be able to inspect pipes and other assets in hard-to-reach areas. Drones/Robots could also be utilised in the performance of routine maintenance tasks, such as cleaning filters and screens, as well as tasks that carry a higher degree of risks, minimising healthy and safety risk and potential liabilities.
- Digital platforms: user interfaces accessible through multiple hardware technologies (mobile phones/tablets/computers) that provide user specific information and services. Water companies could use mobile apps to allow customers to report leaks or track their water usage. They could also use social media to communicate with customers and provide them with up-to-date information on service disruptions and water quality issues.

## Smart water supply network by 2035

55. Ofwat describes the impact of having a smart water supply network as: "automatic detection of potential leaks and robust real-time asset condition information – including telemetry, robotic and drone inspection – enabling a risk-based maintenance approach across the business."

56. A smart water supply network by 2035 would have a significant impact on the way water is managed, distributed, and consumed. These include:

- Improved efficiency and reduced costs: Monitoring and controlling the flow of water in the network in real-time would reduce wastage, improve the efficiency of water distribution, and ultimately lower costs.
- Enhanced water quality: Monitoring water quality in real-time would increase detection before they reach consumers. This would reduce the risk of not meeting water quality standards.
- Increased sustainability: Active water supply management would enable a reduction of water wastage. Reducing water wastage is particularly prudent in the

conservation of water resources and reducing environmental effects of water uses.

- Greater resilience: A smart network improves the detection time and enables quicker responses to emergencies such as droughts and floods.

57. We have considered the capital expenditure required to launch a Smart water supply network and its capital outlay plan to achieve the rollout by 2035.
58. Consideration has also been made for the internal knowledge we have in respect of telemetry, robotics, or drones in order to enact the smart water supply network successfully.

### Full smart metering penetration by 2035

59. Ofwat notes that "'full' smart meter penetration does not need to refer to 100% penetration where this would involve prohibitive costs".
60. We are well advanced on smart meter roll outs and therefore likely to satisfy the faster technology requirement in this respect.
61. Full smart metering penetration for water customers by 2035 would have a significant impact on the way customers manage and use water. This includes:
    - Increased awareness and control: smart meters would enable customers to track their water usage in real-time and receive alerts when they exceed their normal consumption patterns. This would increase awareness of water usage and encourage customers to use water more efficiently.
    - Reduced bills: smart meters would enable water companies to bill customers based on their actual usage, rather than on estimated usage. This would reduce the likelihood of customers being overcharged or undercharged for their water consumption.
    - Improved customer service: smart meters would enable customers to report issues such as leaks and low pressure in real-time, allowing water companies to respond more quickly and efficiently. This would improve customer satisfaction and reduce the number of complaints.
    - Increased sustainability: smart meters would enable water companies to monitor and reduce water losses, which are a significant source of waste in the water industry. This would help to conserve water resources and reduce the carbon footprint of water supply.
    - Enhanced planning: smart meters would provide water companies with more accurate data on water usage, enabling them to plan and invest in infrastructure more effectively. This would ensure that water supply meets demand and reduce the likelihood of service disruptions.
62. Full smart metering penetration for water customers by 2035 could help water companies to achieve several Ofwat performance commitments, including:
    - C-MeX: smart meters would enable water companies to provide more personalized and timely services to customers. For example, customers would be able to track their water usage, report issues in real-time, and receive alerts on service disruptions and water quality issues. This would improve customer satisfaction and help water companies to meet Ofwat's customer service standards.

- Leakage reduction: smart meters would enable water companies to monitor and reduce water losses, which are a significant source of waste in the water industry. This would help water companies to achieve Ofwat's leakage reduction targets and ensure that water is used more efficiently.
- Affordability: smart meters would enable water companies to bill customers based on their actual usage, rather than on estimated usage. This would reduce the likelihood of customers being overcharged or undercharged for their water consumption and help water companies to meet Ofwat's affordability targets.
- Environmental performance: smart meters would help water companies to reduce their carbon footprint by conserving water resources and reducing the energy required to pump and treat water. This would help water companies to achieve Ofwat's environmental performance targets.
- Resilience: smart meters would enable water companies to respond quickly to emergencies such as droughts, floods, and earthquakes. This would improve the resilience of the water supply system and help water companies to meet Ofwat's resilience standards.

63. While we are confident in our ability to roll out smart meter coverage within the given time frame, and we include a more detailed plan for this in our business plan submission.

### Low-emission HGVs and fleet by 2030

64. Ofwat's fast technology scenario is designed to advance the usage of lower emission heavy goods vehicles (HGVs) by 2030. Ofwat is encouraging water companies to adopt innovative and sustainable technologies in their transportation operations which will likely have the following potential impacts:

- Reduced carbon emissions: reducing carbon emissions would decrease our impact on the environment and our customers carbon footprint. It would also help align us with any future government regulations in respect of private companies' carbon footprints.
- Improved efficiency: adoption of low-emission HGVs could improve the efficiency of water companies' transportation operations, leading to reduced fuel consumption and cost savings.
- Enhanced environmental performance: the adoption of technologies that reduce the environmental impact of their transportation operations, such as electric or hydrogen fuel cell vehicles. This would help water companies to meet their environmental performance targets.
- Increased innovation: the development of new and more efficient technologies, benefiting both the water industry and the wider transportation sector.
- Improved reputation: adoption of low-emission HGVs and other sustainable transportation technologies would improve the reputation of water companies, demonstrating their commitment to environmental sustainability and social responsibility.

65. We have the following opportunities available in order to achieve Ofwat's low emission HGV target:

- Investment in low-emission vehicles: this would require a significant investment in new technology and infrastructure, as well as staff training and support.

- Collaboration with vehicle manufacturers and suppliers: this would involve joint R&D projects, as well as partnerships with suppliers to provide charging or refuelling infrastructure.

### Carbon-free baseload electricity by 2035

66. The advantages of having a carbon-free baseload electricity by 2035 are as follows:

    - Reduced carbon emissions: by using carbon-free baseload electricity, we could significantly reduce its carbon emissions. This would help the company to meet its carbon reduction targets and contribute to the UK's wider climate goals.
    - Improved energy efficiency: carbon-free baseload electricity could also help us to improve our energy efficiency by reducing the need for onsite generation and storage.
    - Increased cost savings: carbon-free baseload electricity could also lead to increased cost savings. Renewable energy costs have been decreasing rapidly in recent years and are expected to continue to fall. By transitioning to renewable energy sources, we could potentially save on our cost of energy over the long term.
    - Improved public image: the transition to carbon-free baseload electricity could also improve our public image. Consumers are increasingly concerned about climate change and the environmental impact of their actions. By using renewable energy, we can demonstrate our commitment to sustainability.
    - Reduced operational risk: carbon-free baseload electricity could also enhance our resilience by reducing our dependence on fossil fuels. Renewable energy sources are inherently in greater supply than fossil fuel sources, and switching to renewable energy could help to reduce the risk of disruption to our operations.

67. Achieving carbon-free baseload electricity by 2035 would require a significant effort on our part, as well as coordination and collaboration with Ofwat and other stakeholders. In order to achieve this requirement we have made the following considerations:

    - Increased investment in renewable energy: this would require a significant investment in new infrastructure, such as wind turbines or solar panels, and may require us to work with renewable energy developers and suppliers to secure renewable energy sources.
    - Power purchase agreements ("PPAs"): we could enter into long-term PPAs with renewable energy suppliers, whereby the company agrees to purchase a certain amount of renewable energy at a fixed price over a certain period. This would provide us with a stable source of renewable energy and could potentially reduce the overall cost of energy.
    - Energy storage: we could invest in energy storage solutions, such as batteries or pumped hydro storage, to ensure that we have access to carbon-free baseload electricity even when renewable energy sources are not producing electricity.
    - Collaboration with other utilities: we could collaborate with other water utilities or energy companies to share renewable energy sources and reduce the overall cost of transitioning to renewable energy.

## Full open access to datasets across water companies and other utilities, through common data sharing protocols by 2035

68. Having full open access to datasets across water companies and other utilities through common data sharing protocols by 2035 would have the following benefits:

- Improved decision-making: with access to a wider range of data, we could make more informed decisions about its operations and strategy.
- Enhanced efficiency and innovation: by sharing data with other utilities, we could identify opportunities for collaboration and cost savings. For example, we could share data on asset management and maintenance with other water companies to coordinate repairs and reduce downtime. Moreover, we could use data from other utilities to innovate and develop predictive maintenance algorithms that reduce the risk of asset failure.
- Improved customer service: by sharing data with other utilities, we can improve our customer service by providing more accurate and timely information to customers. For example, we could use data from other utilities to provide customers with more detailed information about their water usage and how to reduce their bills.
- Better risk management: with access to a wider range of data, we could better identify and manage risks associated with our operations. For example, we could use data from other utilities to identify potential water quality issues and take pre-emptive action to prevent contamination.

69. Achieving full open access to datasets across water companies and other utilities through common data sharing protocols would require a coordinated effort by Ofwat, water companies, and other stakeholders. Here are some potential approaches:

- Standardisation of data sharing protocols: we could work with Ofwat and other companies to develop common data sharing protocols that ensure data is shared in a consistent and interoperable manner. This would require agreement on data formats, metadata standards, and security and privacy protocols.
- Investment in technology and infrastructure: we recognise the need to invest in technology and infrastructure to enable data sharing, such as cloud-based platforms and data storage solutions. This would require a significant investment in new hardware, software, and staff training.
- Development of data analytics capabilities: water companies would need to develop data analytics capabilities to make use of the data shared by other utilities. This would require investment in machine learning and artificial intelligence tools, as well as staff training in data analytics.

## The whole-life financial cost of low-carbon construction materials equals that of conventional building materials by 2035

70. If the whole-life financial cost of low-carbon construction materials equals that of conventional building materials by 2035, there could be several positive impacts for us:

- Reduced carbon emissions: low-carbon construction materials generally have a lower carbon footprint than conventional building materials. By using low-carbon construction materials, we could significantly reduce our carbon emissions associated with new construction projects. This would help the company to meet its carbon reduction targets and contribute to the UK's wider climate goals.

- Cost savings: if the whole-life financial cost of low-carbon construction materials equals that of conventional building materials, it could result in cost. Low-carbon construction materials may have higher upfront costs, but they typically have lower operational and maintenance costs over their lifetime. By using low-carbon construction materials, we could potentially save money on maintenance and replacement costs over the long term.
- Improved public image: the use of low-carbon construction materials could also improve our public image. Consumers are increasingly concerned about climate change and the environmental impact of their actions. By using low-carbon construction materials, we can demonstrate our commitment to sustainability.

71. As a water-only company, we can achieve cost parity between low-carbon construction materials and conventional building materials by adopting a range of strategies:

- Partnering with suppliers: by working closely with suppliers to encourage the adoption of low-carbon construction materials. This could involve incentivizing suppliers to provide low-carbon materials or collaborating with them to develop new low-carbon materials.
- Leading in innovation: encouraging innovation in low-carbon construction materials by investing in research and development or partnering with academic institutions and other research organizations. This would involve identifying gaps in the market where low-carbon materials could be more cost-effective than conventional materials.
- Building public awareness: educating its customers and the wider public about the benefits of low-carbon materials and encourage them to prioritize environmentally responsible materials in their construction projects. This could include providing information on the environmental impact of different materials or showcasing examples of projects that use low-carbon materials.
- Influencing policy: engaging with policymakers to advocate for policies that support the adoption of low-carbon construction materials. For example by lobbying for financial support or incentives for low-carbon materials or advocating for sustainability standards that encourage their adoption.

72. Overall, achieving cost parity between low-carbon construction materials and conventional building materials would require a coordinated effort from us and our partners. By adopting a range of strategies, we can help to reduce the environmental impact of our operations, lower our costs, and enhance our sustainability.

## Increasing reliance on technology produces progressively higher risks of failure and threats from cybercrime, creating possible need for non-digital backups throughout the period to 2050

73. Increasing reliance on technology can create higher risks of failure and threats from cybercrime. In turn, this may necessitate the need for non-digital backups throughout the period to 2050. The consequences of increased reliance on technology are outlined below:

- Increased risk of technology failures: as we rely more on technology, there is a greater risk of technology failures. These failures could disrupt the company's operations, resulting in water outages or other service disruptions.
- Greater risk of cyber threats: as technology becomes more pervasive, the risk of cyber threats also increases. Cyberattacks could compromise our data or

systems, potentially resulting in loss of sensitive customer information or other critical data.

- Need for additional resources: if we implement non-digital backups, this may require additional resources and investment to maintain these systems. This could include physical backups such as paper records or manual processes to be used in the event of a technology failure or cyberattack.
- Increased complexity: maintaining both digital and non-digital systems can increase the complexity of our operations. This could require additional training and expertise to ensure that staff can effectively use and manage these systems.
- Impact on customer service: technology failures or cyberattacks could impact the level of customer service that we are able to provide. This could result in customer dissatisfaction or damage to the company's reputation.

74. We can combat the risks associated with increasing reliance on technology in several ways:
    - Investing in robust cybersecurity measures: investing in firewalls, encryption, and other cybersecurity measures to protect its systems from cyber threats.
    - Implementing redundant systems or backups: implementing redundant systems or backups to ensure that we can continue to provide service in the event of a technology failure. This could include physical backups such as paper records or manual processes that can be used in the event of a technology failure or cyberattack.
    - Providing staff training and support: providing staff with training and support to effectively manage and maintain digital and non-digital systems. This would ensure that staff are equipped to manage systems in the event of a technology failure or cyberattack.
    - Partnering/Collaborating with other companies and stakeholders: we could partner with other third parties to share best practices and resources for managing cybersecurity risks. This would enable the company to learn from others and benefit from the collective experience of the industry.
    - Continuous monitoring and testing: we should continuously monitor and test our systems to identify vulnerabilities and address them before they can be exploited by cybercriminals.

75. To combat the risks associated with increasing reliance on technology and the threats from cybercrime, we should consider the following technologies:

- Cybersecurity solutions: investing in cybersecurity solutions such as firewalls, intrusion detection and prevention systems, and security information and event management (SIEM) tools can help us to protect our networks, systems, and data from cyber threats.
- Cloud computing: moving some, or all, of our IT infrastructure and applications to the cloud can help us reduce risk exposure and improve disaster recovery capabilities. Cloud providers typically offer robust security measures, data backups, and redundancy options.
- Data analytics and artificial intelligence (AI): investing in data analytics and AI solutions can help detect potential threats and vulnerabilities in its systems and networks. These solutions can also help us identify anomalies and suspicious activities in its data, which can help prevent cyber-attacks and other security incidents.

- Internet of Things (IoT) devices: deploying IoT devices such as sensors and meters can help us monitor infrastructure and detect potential issues before they become major problems. IoT devices can also help us optimize operations and reduce energy consumption.
- Backup and recovery solutions: investing in backup and recovery solutions will help us ensure that we can quickly recover from any technology failures or cyber-attacks. This could include offsite backups, redundant systems, and disaster recovery plans.

76. By investing in these technologies, we can help mitigate the risks associated with increasing reliance on technology and improve its overall security posture.

### Any other important parameters

77. To the extent that there are any other important technology scenario parameters that are not covered above, it would be helpful to cover them here. Ofwat lists 'wider considerations' such as, but not limited to, internet of things, fifth industrial revolution emissions-reducing technologies and societal attitudes.

78. In this section we consider whether the pre-defined Ofwat scenarios and parameters capture and cover:

    **(a)** Influence and growth to water recycling and purification to address leakage, PCC, and other key targets?

    **(b)** an "unproven" technologies:

    - **(i)** Nanotechnology: nanotechnology can be used to develop water-efficient materials and coatings for appliances and fixtures. For example, nano-coating can reduce the amount of water needed for cleaning, while nano-filters can be used to purify wastewater for reuse.
    - **(ii)** Virtual and augmented reality: virtual and augmented reality can be used to simulate water usage and educate consumers about water-efficient behaviours.

    **(c)** The introduction and exploration of water trading platforms and technologies which can help water companies collaborate and share water resources across regions. These platforms allow water companies to buy and sell water rights, making it possible to transfer water from areas of surplus to areas of deficit.

    **(d)** Atmospheric water generation: This technology involves capturing water from the air using condensation or dehumidification. This can be done using machines that extract water vapor from the air and convert it into potable water. While atmospheric water generation is currently more expensive than other water supply options, it has the potential to become more cost-effective as technology improves.

    **(e)** Cloud seeding: cloud seeding is a technique that involves adding particles like salt or silver iodide to clouds to induce precipitation. While the effectiveness of cloud seeding is still debated, it has the potential to increase rainfall in regions that are experiencing water scarcity.

## SES Water key parameters considered

79. As stated the technology requirements are not a question of if, but when. As such our parameter considerations relate to the speed of deliverance of the requirements in this scenario rather than an assessment of which requirements are needed. Below we set out the key parameters considered in this scenario.

    - Investment required: this consideration should consider not only the size of the capital expenditure but the timing of the capital outlays.

- Internal expertise: the personal and knowledge required to operate and manage the technologies is a vital consideration and should be considered with equal importance as the investments themselves.
- Partnerships: a number of the technologies would benefit from collaboration with other parties in order to advance the research and development of said technologies and increase the speed of deliverance and effectiveness of the technologies. This includes the standardisation of practices and sharing of data with parties for the benefit of all parties.
- Public awareness: the adoption of technologies and transition of water supply to a technology-based enterprise requires a level of education to the customer in order to help them make the transition to technology-based water use.

80. The key parameters for modelling the technology scenarios are, therefore:
    - Carbon-free baseload electricity
    - Low emissions HGVs and fleet
    - Low carbon construction materials
    - Access to datasets across water companies and our other technology initiatives
    - Smart metering levels.

81. We set out further details in the table[s] below, which summarises the faster and slower LTDS technology scenarios as defined by Ofwat.

### Table 6: Faster and Slower Technology Scenario Parameters

| Variable | Faster | Slower |
|---|---|---|
| Carbon-free baseload electricity | 2035 | 2035 |
| Low emissions HGVs and fleet | 2030 | 2040 |
| Low carbon construction materials | 2035 | 2050 |
| Access to datasets across water companies & other SES Water technology initiatives | 2035 | 2050 |
| Smart metering levels | 2035 | 2040 |

*Source: Faster and slower outcomes from PR24 and beyond: Final guidance on long-term delivery strategies, p38-39.*

# E. The impact of the LTDS demand scenarios on SES Water

Ofwat has defined two common reference scenarios for demand, a "high demand scenario" and a "low demand scenario." This section sets out how these scenarios apply to us.

82. The LTDS Guidance describes these scenarios as follows:

**High demand scenario**

**Growth:** use the higher of the two forecasts specified in Box 4 below.

**Building regulations and product standards:** assume no change over the period to 2050.

**Low demand scenario**

**Growth:** use the lower of the two forecasts specified in Box 4 below.

**Building regulations and product standards:** assume the introduction in 2025 of a mandatory government-led scheme to label water-using products, linked to tightening building regulations and water supply fittings regulations. Companies should refer to the 'Water labelling only (with minimum standards)' scenario used in the Water UK study, 'Pathways to long-term PCC reduction'.[63]

**Box 4: Growth forecasts to be used in England and Wales**

**England**

1) population, property and occupancy forecasts derived from **local plans published by the local council or unitary authority**, as used in the latest round of WRMPs, in line with the water resources planning guideline.[64]

2) population, property and occupancy forecasts derived from **ONS population and household projections**, as used in the latest round of WRMPs, in line with the water resources planning guideline.

*Source: "PR24 and beyond: Final guidance on long-term delivery strategies", Ofwat, April 2022, page 42-43.*

83. Ofwat's LTDS high and low demand scenarios are characterised by:
    - Growth; and
    - Building regulations and product standards.

84. The growth forecasts are determined by plans published by the local council or ONS population and household projections. The building regulations and product standards are determined by the water saving intervention recommendation of a Water UK study.[10]

85. Ofwat notes that "the core pathway should include investment to meet outcomes under the high demands scenario."[11]

86. Ofwat has not included future changes in consumer behaviour in these scenarios.

[10] "Pathways to long-term PCC reduction", Water UK, August 2019
[11] "PR24 and beyond: Final guidance on long-term delivery strategies", Ofwat, April 2022, p42

87. As noted above, we have adopted a multi-step approach to modelling these scenarios, considering at a high level, what actions, options and schemes would be technically feasible and legally compliant in each scenario, and modelling optimal combinations of those to meet the specific parameters of each scenario. We have, specified both the high-level considerations taken into account when designing solutions, as well as the specific scenario parameters that would apply to us in these scenarios.

88. This section is structured as follows:

- An overview of the growth forecasts
- An unpacking of the building regulation and product standards recommended by Ofwat
- A summary of demand forecasts

## Growth forecasts

89. Due to the ONS projections being lower than the local council forecasts throughout the forecast period, Ofwat’s demand scenarios are easily understood:

- The low-demand scenario is based on the ONS projections; and
- The high-demand scenario is based on the Local Council Housing Plans

90. Ofwat notes that “the core pathway should include investment to meet outcomes under the high demands scenario.”

## Building regulation and product standards

91. For the potential impact of changes, Ofwat relies on a study by Artesia and Water UK from 2019. The key takeaway from this report is that “*a mandatory government-led scheme to label water-using products, linked to tightening building regulations and water supply fittings regulations, was the ‘single most cost-effective intervention to save water’*”.[12]

92. The Artesia report also raises a number of key points for consideration. For example, multiple government functions have called for a reduction for personal water use to improve resilience against a growing risk of severe drought impacts.

93. In particular, the Artesia report notes that National Infrastructure Commission suggested reducing demand for water to 118 litres per head per day by 2050. The report also finds that the best strategy for maximising demand reductions involves government and water companies working together to deliver mandatory water labelling and increased smart metering beyond the ambition in water company plans (at the point the report was written).

94. The latter point is particularly important, given Ofwat’s encouragement to incorporate the report’s findings. We have considered whether the current water consumption reduction measures are ambitious enough in the low demand scenario.

95. The data outlined below demonstrates the forecast reduction savings as a result of the recommended intervention. WRSE produced forecasts of savings from improved water labelling and building standards after 10 years (2035) and after 25 years (2050), with the annual data being linearly interpolated between these values. The low demand scenario corresponds to the “Water Labelling (with minimum standards)” forecast and the high

[12] Water UK, Pathways to long-term PCC reduction, Page 4. https://www.water.org.uk/wp-content/uploads/2019/12/Water-UK-Research-on-reducing-water-use.pdf

demand scenario corresponds to "Water labelling (no minimum standards)" forecast. Specifically, by the year 2049-2050:

- the LTDS low demand scenario estimates savings of 10 litres per head per day; and
- the LTDS high demand scenario estimates savings of 5.8 litres per head per day.

## Key parameters considered in the demand scenario

96. We note Ofwat's suggestion that the core pathway should account for the high demand scenario. As discussed the demand forecasts are dictated by either ONS projections of population growth, or Local Council Housing Plans of housing growth. Further to this core drivers of demand are smaller factors that influence consumers use of water: (i) government intervention to reduce water usage which would impact demand, (ii) smart Metering rollout would likely reduce water usage and (iii) other factors that reduce water demand. For example, rising cost of living leading to a reduction in usage and public awareness around water waste.

97. The key parameters considered by us for the demand scenario are therefore:

- Housing growth;
- Population growth;
- Government Intervention to reduce usage;
- Smart metering; and
- Other consumption reductions.

## Scenario outcomes

98. In the tables below we outline the outcome of key variables under the high and low demand scenarios. The table sets out three signpost years being: (i) the base date of forecasts (2019-2020), (ii) the first year of the PR24 plan (2025-2026), and (iii) the last year of the PR24 plan (2049-2050). The demand forecasts move linearly between these three signpost years.

## Table 7: High demand scenario parameters

| Variable | Units | 2019-20 | 2025-26 | 2049-50 |
|---|---|---|---|---|
| Housing Growth | Properties 000's | 291.68 | 312.45 | 372.59 |
| Population Growth | Population 000's | 734.50 | 756.87 | 863.57 |
| Government Intervention Level* | Average household PCC (l/h/d) | (No additional Government intervention impact) | 148.5 | 145.4 |
| Smart Metering | Smart meters 000's | 0.00 | 35.75 | 315.38 |
| Demand | Distribution input, Ml/d | 164.85 | 157.27 | 141.03 |

*Source: SES Water and WRSE data*
**Note: In this scenario there is no Government intervention on building regulations or product standards. Impact relates only to water labelling.*

## Table 8: Low demand scenario parameters

| Variable | Units | 2019-20 | 2025-26 | 2049-50 |
|---|---|---|---|---|
| Housing Growth | Properties 000's | 291.68 | 311.00 | 346.57 |
| Population Growth | Population 000's | 734.50 | 753.16 | 795.67 |
| Government Intervention Level* | Average household PCC (l/h/d) | (No additional Government intervention impact) | 146.6 | 104.3 |
| Smart Metering | Smart meters 000's | 0.00 | 35.51 | 290.59 |
| Demand | Distribution input, Ml/d | 164.85 | 157.27 | 125.69 |

*Source: SES Water and WRSE data*
**Note: In this scenario, Government interventions cover building regulations product standards and water labelling.*

# F. The impact of the LTDS abstraction reductions scenarios on SES Water

## Introduction

The LTDS guidance has defined two common reference scenarios related to abstraction reductions. These are the "High abstraction reductions scenario," which may be regarded as an adverse scenario, and a "Low abstraction reduction scenario" which may be regarded as more benign, as more abstraction would be permitted in the low abstraction reduction scenario than in the high abstraction reduction scenario. This section sets out how these scenarios apply to us.

Ofwat defines the scenarios as follows:

### High abstraction reductions scenario

In England, use a scenario aligned with the Environment Agency's 'enhanced' scenario.[67]

In Wales, we do not require companies to test a high abstraction reductions scenario.[68]

### Low abstraction reductions scenario

In both England and Wales, assume only currently known legal requirements for abstraction reductions up to 2050.

*Source: "PR24 and beyond: Final guidance on long-term delivery strategies", Ofwat, April 2022, page 44.*

99. Ofwat's LTDS high and low demand scenarios are characterised by:

- Growth; and
- Building regulations and product standards.

100. The LTDS adverse high abstraction reductions scenario requires us to align with the Environment Agency's ("EA's") 'enhanced' scenario. The enhanced scenario is defined by the EA as an outcome which sees greater environmental protection for Protected Ares and Sites of Special Scientific Interest ("SSSIs") rivers and wetlands, principal salmon and chalk rivers. We have also considered local priorities in our area and undertaken further local and regional analysis to supplement the 'enhanced' scenario.

101. The current UK Government guidance on abstraction reduction seeks to protect the condition of chalk rivers including the Darent, Hogsmill and Wandle rivers.

102. The LTDS benign low abstraction scenario requires us to assume only current known legal requirements. The benign low abstraction scenario cannot be considered a 'business as usual' scenario, as abstraction reduction interrelates to climate change. The

'business-as-usual' scenario assumes higher future greenhouse gas emissions than in Ofwat's benign low reference scenario for climate change.

103. As noted above, we have adopted a multi-step approach to modelling these scenarios, considering at a high level, what actions, options and schemes would be technically feasible and legally compliant in each scenario, and modelling optimal combinations of those to meet the specific parameters of each scenario. We have, therefore, specified both the high-level considerations taken into account when designing solutions, as well as the specific scenario parameters that would apply to us in these scenarios.

104. This section is structured as follows:

- A discussion of factors to consider in the high abstraction reduction scenario
- A discussion of factors to consider in both the high and low abstraction reduction scenarios
- A summary of key parameters considered

## Ofwat LTDS adverse high abstraction reduction scenario – Enhanced

105. Under the enhanced scenario, greater environmental protection will be seen, and abstraction will be capped as a percentage of natural flows from various sources. This is likely to affect sites at Eden/Medway, Upper Darent, Mole and Wandle. Abstraction reduction in the enhanced scenario will therefore limit our ability to match increasing demand and potentially lead to issues in supply to its customers. We have assessed the system capacity to supply water to our customers given increased abstraction reductions to any one of, or any combination of, these sites.

106. Ofwat's high abstraction reduction scenario requires us to model our abstraction reduction around the Environment Agency's 'enhanced' scenario. The scenario provides greater environmental protection for protected areas and sites of special scientific interest ("SSSIs"). We have considered the local priorities of our region to supplement our assessment, in particular the condition of its chalk rivers.

107. In the high abstraction reduction scenario, daily abstraction is expected to be 146.39 Ml/d, a 16.6% reduction in comparison to the low scenario. This would require us to reduce abstraction by just under 30Ml/d from ground water sources across catchments within our supply area.

108. In isolation, the high abstraction reduction scenario would have a severe impact on our ability to meet our customers' water demand. We have, therefore, identified the additional enhancement expenditure required, including a new groundwater source, which is included in our WRMP alternative adaptive pathway.

### LTDS benign low abstraction reduction scenario – business-as-usual

109. Business-as-usual is the extreme scenario where only current legal requirements are assumed. Under this scenario, few further considerations should be made other than the current working assumptions of our current operations.

110. The current known Government plans likely to affect us include the following:[13]

- Ensuring water companies take a leading role in investment to resolve historical issues and prevent future issues in respect of unsustainable abstraction.
- Adjusting permanent licences shown to be seriously damaging.

[13] https://www.gov.uk/government/publications/water-abstraction-plan-2017/water-abstraction-plan-environment

- Regulating all significant abstractions that have been historically exempt.

## Key factors in consideration for both the high and low abstraction reduction scenarios

111. The abstraction reductions are location specific in both the high and low scenarios. We understand that these are listed explicitly in the EA's 'enhanced scenario' for the LTDS adverse high abstraction reductions scenario, and that the currently known legal requirements are also available. We will need to establish whether any further abstraction constraints apply at any abstraction locations for physical reasons (particularly climate change).

112. When assessing schemes for compatibility, it will be important to check that any location specific schemes (particularly water resource schemes) are compatible with the locations where abstractions will continue to be permitted and physically available in sufficient quantities for the schemes.

## Key parameters considered for abstraction reduction scenarios

113. Abstraction reduction is heavily dependent on regulation, specifically the abstraction licences issued to water companies. Licences and regulations limit abstraction in extreme scenarios such as droughts when water is not as plentiful. Hence the parameters we have considered are specified by the constraints of these licences and the demand for our water. The key parameters are therefore:

    - Issuance/extension of new licences for extraction sites
    - Predicted abstraction to meet demand.
    - Abstraction reduction in the ("1/500") scenario

114. The table below provides a summary of the benign and adverse scenarios.

**Table 9: Abstraction reduction parameters**

| Scenario | Water available for use[14] on full implementation of abstraction reduction (Ml/d) |
|---|---|
| Benign<br>(Legal minimum requirement) | 175.68 |
| Adverse<br>(Enhance modelling) | 146.39 |
| % difference to Benign Scenario | 16.6% |

*Source: SES Water*

[14] Calculated for this purpose as deployable output with any climate change factors and the relevant reduced abstraction levels.

# G. SES Water's bespoke scenarios relating to bad debt and supply chain resilience

In addition to testing against the eight common reference scenarios, the final guidance on long-term delivery strategies also requires companies to test their plans using "wider scenario testing, beyond the reference scenarios".[15] In line with this, we have idented and tested is plans in two additional plausible extreme scenarios that reflect local and company specific concerns. This section sets out how these scenarios apply to us.

115. With respect to the wider scenario testing, the LTDS guidance notes that Ofwat expects "*companies to use wider scenario planning, as deemed necessary, to:*

- *test against any relevant factors not specified in the reference scenarios, such as company-specific or local factors;*
- *demonstrate that the strategy is resilient to a range of risks;*
- *demonstrate that risks are understood and have been considered in the development of the strategy; and*
- *help to validate the strategy, and/or to test whether alternative options and programmes would be more appropriate, including the different adaptive pathways set out in the strategy*".[16]

116. In line with this, we have identified and tested is plans in two additional plausible extreme bespoke scenarios that reflect local and company specific concerns, namely bad debt and supply chain resilience. This section is, therefore, structured as follows:

- We summarise the approach we adopted to deriving our bespoke scenarios.
- We set out our bespoke scenario relating to bad debt.
- We set out our bespoke scenario relating to supply chain resilience.

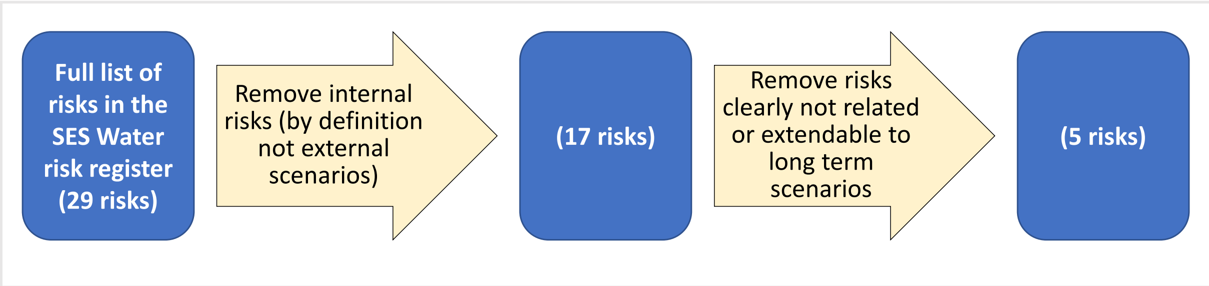
## SES Water's bespoke scenario derivation

117. Here we set out the process taken to identify the two bespoke scenarios. To determine the relevant additional scenarios, we analysed our risk register to identify whether any of the risks listed should form an additional LTDS scenario. Not all risk register entries can be used to inform a specific LTDS scenario. Of those risk register entries that can be used to inform a specific LTDS scenario, some of these scenarios are already reflected in Ofwat's list of mandated scenarios. To take account of this, we have undertaken our analysis in a series of stages, starting with the full list of risks on our risk register, and using appropriate criteria to narrow down the list. Our filtering process is summarised in the following diagram:

[15] "PR24 and beyond: Final guidance on long-term delivery strategies", Ofwat, April 2022, Page 9

[16] "PR24 and beyond: Final guidance on long-term delivery strategies", Ofwat, April 2022, Pages 44-45

**Figure 1: Identification of bespoke scenarios based on SES Water risk register**




*Source: BRG analysis of SES Water risk register.*

118. Some of these 5 risks were already adequately covered by the common reference scenarios, and the remaining risks could be covered by considering two scenarios:

- a scenario related to the level of bad debt; and
- a scenario related to supply chain resilience.

## SES Water's bespoke scenario relating to bad debt

119. We are very aware of the financial challenge that high inflation and the cost-of-living crisis is already placing on our customers, and we don't yet know what the future may hold. Consequently, we want to make sure our plan can cope if increasing numbers of people are not able to pay for their water services on time or in full, so that we can still provide a good service to our customers and continue to offer much reduced prices in the form of social tariffs to customers in the most need of financial assistance. We have, therefore, tested our plans in a bespoke bad debt scenario.

120. The bad debt scenario reflects the circumstances where there are one or more extended periods where a material proportion of customers suffer sustained financial hardship (or believe that they are going to suffer sustained financial hardship) to the point where they do not pay their water bills, or only pay a proportion of their water bills.

121. The core assumptions for this scenario are that bad debt is higher than planned for a 3-year period as per the table below:

**Table 10: Incremental bad debt assumptions for the bad debt scenario**

| | Percentage increase in bad debt above the base level (%) |
|---|---|
| First year of incremental bad debt | 60% |
| Second year of incremental bad debt | 40% |
| Third year if incremental bad debt | 20% |
| (Fourth year) | Bad debt returns to base level |

*Source: SES Water*

122. The other parameters for this scenario are those of the "mid-scenario" described in Section B, above.

123. For the avoidance of doubt, this scenario is particularly relevant to us because the demographics of our region mean that our customers are disproportionately more likely to change their payment behaviour in periods of economic downturns.

## SES Water's bespoke scenario relating to supply chain resilience

124. Socio-economic and other external factors might affect us through extended disruptions to our supply chain or labour force. Our normal suppliers may no longer be able to provide us with the equipment we need, or a large number of our colleagues may not be able to work for an extended period (perhaps because of another pandemic, major reset in international trading relations, or war). We think it is important to test if our plan can cope with these sorts of situations for extended periods. We are therefore investigating a scenario that tests what we would need to do in the case of such extended disruptions to out supply chain.

125. Naturally, our original supply chain would be the most efficient option, and have an optimal balance of insourcing vs outsourcing, so we would face additional costs to utilise an alternative supply chain. The core assumptions for this scenario are, therefore, that:

- Such supply chain disruption happens once every 10 years with an initial impact that tails off over the subsequent years.
- This disruption has the potential to raise wholesale totex (including developer services) and retail costs by 10% in year 1 of the disruption, 5% in year 2 of the disruption and 5% again in year 3 of the disruption, over and above the level of costs in our base case, with costs returning to the planned level for year 4.

126. For the avoidance of doubt, we are more vulnerable than other companies to the impact of this type of disruption by virtue of its small size. Most other companies place sufficiently large orders from their supply chains to warrant having panels of providers for services and equipment. So, for a large company, if one provider is unable to supply them, they already have other providers lined up that they can use. In contrast, our small scale means that we cannot afford to have a large selection of subcontractors in our supply chain for any given service, and, indeed, we are likely to have only a single provider for each product or service. This means that we would need to re-procure those services if that provider were unable to deliver.