Our draft
Water Resources
Management Plan

9:Demand-Side Option Development

Contents

9 Demand-Side Option Development

Document purpose:

This chapter sets out our approach for developing and selecting the demand-side options. We have slightly different approaches for our efficiency, leakage and metering option development. Our approach builds on our demand forecasts and water resources strategy to identify the potential, feasible options that will go forward for final assessment to build our Plan. We list our unconstrained, constrained and feasible options and comment on our approach, selection and decision-making.

Summary:

We have developed a range of demand-side options comprised of leakage management, metering and a variety of water efficiency options. We developed this through effective engagement with industry experts, internal stakeholders and executive engagement and conversations through the West Country Water Resources Group and Regional Planning process.

The options were informed by well-developed unit costs and subjected to external assurance. The MLD benefits were derived from a range of sources, including UKWIR, Artesia and Water UK reports and publications. The full range of references are listed under their appropriate sections.

These were screened and short-listed using a comprehensive set of criteria. For metering and leakage, these were then developed into a number of metering and leakage scenarios to inform the creation and optimisation of our least-cost and best value adaptive plans.

These formed the basis of the feasible options which were inputs into our decision-making process defined in Chapter 10.

There are several next steps planned for completion prior to our final plan, these comprise:

- **Metering:** As part of finalising our PR24 household metering strategy, costs and benefits will be reviewed and updated. As part of our response to 2022 drought, we will use our learning from our "Stop The Drop" campaign to inform a non-household metering strategy.
- **Water efficiency:** We have work ongoing with the agrifood sector (agriculture, horticulture, food and drink supply-chain businesses) to identify additional demand-side options including reduced reliance on potable water use, water efficiency, increased resilience to drought, with the potential additional environmental benefits achieved through the identification of nature-based solutions, effluent re-use, decentralised water storage.
- **Water efficiency:** Reviewing findings from recent non-household water-saving trials, to inform revised costs and benefits for inclusion in the plan.
- **Leakage**: As part of finalising our PR24 leakage strategy, costs and benefits will be reviewed and updated. This work will also be revised with agreed changes to our WRMP24 baseline.

1 Our general approach

Our approach follows the Water Planning guidance and is similar to our approach used for WRMP19. We start with a comprehensive, unconstrained list of options and we apply a rigorous process, using our screening criteria to first develop a constrained list and then our feasible list of options.

The master list is considered as a whole and developed until there is a complete list of feasible supply, demand and efficiency options ready for plan development. The feasible supply-side and demand-side options are taken forward for further planning, scenario development, and economic analysis to develop our overall best value plan. The latter stage of this process is described in **Chapter 11: Our best value plan**.

Alongside our processes, which include screening and option selection, the list of options has also been presented and discussed with our stakeholders throughout the planning process.

To ensure alignment with the Regional Plan, our options have been developed in collaboration with the West Country Water Resources (WCWR) Regional Group and with Wessex Water.

Our feasible options for water efficiency, metering and leakage were then further developed by external consultants.

Our options development process has considered and/or been informed by

- Robust unit costing data, which has been externally assured (See Chapter 12)
- Expert studies, learning from programmes, including Green Recovery and other wider industry benchmarking to inform options benefits – this is particularly relevant for the metering and water efficiency options
- Greenhouse gas (carbon) estimates for each option (See Annex A of this chapter for a summary of the methodology used)
- Options dependency (particularly relevant on the demand side where interactions between metering, leakage and water efficiency are complementary and drive combined benefits)
- Impacts on the environment, River Basin management plans and the Water Framework Directive, including environmental and social impacts
- Drinking water safety plan risk
- The ability to adapt the option to future changes and uncertainty
- Appropriate Strategic Environmental Assessments and Habitats Regulation assessments (Refer to Chapter 13 for information)
- Customer support for the option (refer to Chapter 3)

1.1 Developing the unconstrained list

Options are required to be developed and ultimately selected to address the following needs where they arise:

- To ensure the efficient use of water by reducing the amount of water lost from our network
- To support and encourage customers to reduce their usage through awareness, metering, re-use, and tariff reform etc.
- To address government expectations and targets
- To address customer or local stakeholder preferences, concerns and issues

Our **Chapter 7: Headroom, Baseline and Future Challenge** has identified that all these needs apply, and therefore, we have developed options for all areas.

We have divided the different types of options that we must consider into the following categories as they generally required quite different kinds of solutions, Table 1.

Scheme Type	HH	Non-HH
Incentives	Y	Y
Metering	Y	Y
Non-potable (alternatives to drinking water)	Y	Y

Scheme Type	HH	Non-HH
Policy Related	Y	N/A
Research	Y	N/A
Tariffs	Y	Y
Water Efficiency	Y	Y
Water Retailer Savings	N/A	Y

Table 1: List of Generic Demand-Side Options

For each category, a set of unconstrained options was developed, being intentionally comprehensive to ensure that nothing was missed and that all possible options were considered. They were not limited, at this stage, by factors such as environmental and planning restrictions; health and safety regulations; legal restrictions; promotability; and/or risk.

We combined our previous WRMP19 options into the generic lists and then identified further options at the household, non-household, WRZ, and company-wide levels.

Through our regular meetings with our wider stakeholders (Refer to Chapter 3 for more details) and the West Country Water Resource Group (WCWRG), we have ensured that we have identified any regional or joint water company options.

1.2 Changes in approach since WRMP19

Our overall methodology largely remains the same as that used in WRMP19. Our process and data sources have not fundamentally changed since WRMP19, although the most current data available has been used.

2 Developing our water efficiency options

Our water efficiency demand-side options have been developed with assistance from the Wood Group UK Limited, which worked for West Country Water Resources Group to develop regional options.

We have developed and screened these options through regular engagement and interaction with our established working groups and Programme Steering groups and through discussion with the WCWRG. We have therefore engaged with representatives from Bristol Water and Wessex Water as well as our own internal teams through the option development stage. Wider engagement includes Waterwise, Retailers, and other industry experts, to gain insight on the latest best-practice. Our engagement approach is set out in Chapter 3, including case studies around the Agri-food sector.

This stakeholder engagement has played a key role in finalising the selection of options that were taken forward for a more detailed review of costs and benefits.

2.1 Coarse screening of unconstrained options

All unconstrained options were developed and modified collaboratively with internal SWW stakeholders. Both household and non-household options were developed. We also received input from external stakeholders through workshop events.

The following Table 2 summarises the numbers of unconstrained options developed according to type.

Option type	Sub-option type	Household	Non-Household
Incentives	Incentives	4	1
Metering	Metering	9	3
Non-potable Water (NPW)	Rainwater harvesting	3	4
	Greywater harvesting	1	
	Non PWS - switch to use/increased use of non-potable resource	-	1
	Reclaim industrial wastewater	-	1

Option type	Sub-option type	Household	Non-Household
	Winter storage support	-	1
Policy related	Policy related	5	-
Research	Research	1	-
Tariffs	Tariffs	12	4
Water efficiency	Water Use Audits	4	7
	Water saving devices	5	-
	Self-installation of water saving devices	1	-
	Plumber installation of water efficient goods	1	-
	Partner efficiency goods and installation	5	-
	Advice and guidance	7	3
Water retailer save	Water retailer save	-	1
Total		**58**	**26**

Table 2: Unconstrained list identified

The following coarse screening criteria were used to remove unfeasible options prior to further option development, see Table 3.

Scheme Type	Rationale
Technical feasibility	Does the option use proven solutions that can be deployed within the WCWR region?
Environmental risk	Does the option present an unmitigable risk to the environment?
Delivery	Can the option be associated with an appropriate level of certainty in achieving the level of demand reduction targeted?
Consistency with regulations and policies	Is the option in line with existing company and regulatory stances and policies?

Table 3: Coarse screening criteria

The primary reason for discounting options was due to the lack of certainty in delivery in achieving the demand savings because of

- The levels of customer uptake required within the timeline
- The levels of behavioural change required within the timeline
- Negative customer relationships (driven by undesirable tariffs for example)
- Unfavourable or financial impacts on some customer groups
- The challenges with implementation

The following Table 4 summarises the numbers of options that were discounted at the coarse-screening stage.

Option type	Household		Non-household	
	In	**Out**	**In**	**Out**
Incentives	4	0	1	0
Metering	9	0	3	0
Non-potable	2	2	7	0
Policy related	5	0	-	-
Research	1	0	-	-
Tariffs	2	10	0	4
Water efficiency	21	2	10	0
Water retailer save	-	-	1	0
Total	**44**	**14**	**22**	**4**

Table 4: Results of coarse screening

2.2 Developing the constrained and feasible options

We developed screening criteria to enable the most feasible, best-value solutions to be identified, as set out in Table 5 below.

Theme	Criteria
Promotability	Does the option align with regulator and/or customer/stakeholder expectations or regulations?
Alignment to Company / Regional Position	Does the option align with or complement current (or planned) company and regional policy/position?
Environmental	Does the option contribute to environmental enhancement or protection?
Socio-economic	Does the option contribute to or present opportunities for socioeconomic benefits? (e.g., supporting vulnerable customers, partnership working, supporting bill affordability)
Flexibility / Adaptability	Is the option adaptable to changing circumstances/technology/pressures in the future once implementation has begun?
Scalability	Does the nature of the option present opportunities for implementation at various scales? E.g. if the option could be rolled out quickly or slowly; if the option could be implemented in phases to allow for trials; if the option could be implemented at a local/targeted scale and region-wide.
Regional Delivery	Does the option present an opportunity for enhanced or improved delivery if applied at a regional level as opposed to water companies working independently on implementation? E.g. efficiencies in the development of research, materials, and IT platforms; opportunities to build regional behavioural changes.
Maintaining Savings Long-term	Can the savings generated by the option be relied upon in the longer term? E.g., is repeated action needed; do devices need to be replaced; are other changes likely to undo the effects?
Cost	Is the cost of implementation proportionate to the savings likely to be achieved?
Mutual Exclusivities	Is another mutually exclusive option clearly preferred? This is intended to be a high-level review and not to replace the more detailed exclusivities assessment which will follow the screening.

Table 5: Screening Criteria

Table 6 below shows the results of the fine-screening process. These options were discounted for the following primary reasons:

- The option was not mutually exclusive with another more-preferred option
- The option benefitted only a small set of customers
- Uncertainty in quantifying customer uptake and therefore likely level of benefits

Option type	Household		Non-household	
	In	**Out**	**In**	**Out**
Incentives	3	1	0	1
Metering	8	1	2	1
Non-potable	2	0	3	4
Policy related	5	0	-	-
Research	1	0	-	-
Tariffs	0	2	-	-
Water efficiency	14	7	9	1
Water retailer save	-	-	1	0
Total	**33**	**11**	**15**	**7**

Table 6: Summary of screening process

As a result of the screening process, it was determined that the following schemes would not be taken forward for detailed development (Table 7).

Option reference	Option brief description	Commentary
NHH_A_006	Business Efficiency Visit (BEV) - water efficiency audit/leakage detection – in-person targeted at the leisure sector (golf)	This type of measure is being considered in more detail via the collaborative water company project working with the golf and leisure sectors.
NHH_E_002	SMART Online - Water smart online tools and resources	While other non-household options are considered here, this measure is viewed as particularly challenging due to the clear remit of the water retailers to provide billing systems. We remain keen to work with retailers on options in this area.
NHH_E_003	Business user campaigns	It is assumed that roll out of smart metering would include enhanced billing information and usage data accessibility.
NHH_N_005	Supplementary or alternative non-PWS supply	While this remains a potentially viable option, it is currently generic in nature. Alternative, or supplementary, supplies would be highly specific to each user and situation. This makes the development of costs of potential demand reduction/offset very challenging.
NHH_E_004	A 3rd party takes ownership of water management in new large-scale commercial developments driving down demand by integrating water efficiency and water conservation into designs	There is a limited ability to generate evidence-backed numbers. Bespoke solutions would be needed. In addition, this risks going against the view of the WRNF to alleviate local pressure on water resources.
HH_E_010	Home Efficiency Visits (HEVs) - water efficiency audit - combined with energy efficiency audits	Partnership delivery of HEVs to be considered once only - in this case via HH_E_009. Partnerships deliver reduced costs in visits, but benefits remain the same. The sensitivity testing would then be done via the number of households targeted.

Option reference	Option brief description	Commentary
HH_E_014	Water efficiency forming part of the National Curriculum	Assumptions to be similar/covered by standard 'school visits' option. The difference would be in the scale in receipt of messaging.
HH_E_016	Media campaigns to influence water use	Difficult to distinguish from baseline media campaigns. NB] We will progress baseline media campaigns s a means of managing demand.
HH_E_018	Distribution of water saving information via bills and leaflets	Difficult to distinguish from baseline media campaigns.
HH_E_019	SMART metering App	This is simply a very specific mechanism for improved visibility of usage data to effect changes in behaviour. Smart metering roll out would be expected to come with enhanced access to usage data.
HH_I_004	Community competition	Superseded by HH_E_017 which ultimately targets efficiency communications and engagement at certain groups/communities already. The sensitivity testing of this option would be via number of customers offered, and uptake rates.
HH_P_004	New development standards - water neutrality	Of relevance to aspirational, trial-based schemes, rather than a policy that can be rolled out as a WRMP option. This may be considered as part of the joint research programme. We remain open to opportunities to work with house builders and will investigate options for delivery alongside the WRMP activities.
HH_R_001	Combined research into reducing water demand	Not quantifiable. It is a good idea, but it is not something that we can cost up and generate savings from directly.

Table 7: Discounted options

During this screening process and our ongoing stakeholder engagement work with key sectors (described in Chapter 3), it has become clear that some of the demand-side options discounted during the screening for this WRMP still have huge potential to deliver significant demand management outcomes over the coming AMP cycles.

For example, while the delivery of demand-side solutions with stakeholders/customers in the agrifood sector (agriculture, horticulture, food and drink supply-chain businesses) is currently considered to be very challenging and the evidence-base to support options in this area is poorly developed, the barriers to this approach are certainly not insurmountable and the potential water saving benefits that could be achieved by working with this and other similar sectors remain significant. Considering this, we are continuing the development of options from our unconstrained list using a collaborative, strategic and evidence-based approach prior to the publication of our final plan in 2023 – see the summary of our approach below and further details in Chapters 3 and 4.

Farm water efficiency and resilience: developing NHH demand-side options with the agrifood sector

As a large group of non-household water users, the 'agrifood' sector (agriculture, horticulture, food and drink supply-chain businesses) has the potential (individually and/or collectively) to make a significant contribution to the delivery of demand-management outcomes.

In addition to demand-side outcomes (e.g., reduced reliance on potable water use, water efficiency, increased resilience to drought), the sector also has huge impact potential in relation to supply-side outcomes (e.g., nature-based solutions, effluent re-use, decentralised water storage) and to help us meet our environmental ambitions (e.g., increased resilience, biodiversity enhancements, carbon sequestration, etc).

We are in dialogue with key stakeholders from the agrifood sector (NFU, land management organisations/advisors, landowners, regulators, water retailers, environmental NGOs, and practitioners) and in July 2022 we established a collaborative working group to co-design a water resources management approach for the agrifood sector.

Early in 2022, this group is meeting to design and initiate a programme of engagement and demand management options with agrifood businesses across the Region, working in close association with water retailers with non-household (NHH) customers in the South West Water area.

2.3 Feasible efficiency options

Following the screening, 20 household and 10 non-household demand-side options were selected for further detailed profiling and development as part of a collaborative project with WCWRG members. These were developed collaboratively with stakeholders within operations, asset management and engineering, supported by our cost consultants, and engineering consultants undertaking both carbon[1] and environmental assessments.

The list of feasible options identified is shown in the following tables: Table 8 and Table 9.

Option ID	Title	Description
HH_M_009	Watersmart	This option makes use of customer meter and other data to provide personalised bills and behavioural nudges (e.g., comparisons against local averages).
HH_A_002	Home Efficiency Visits (HEV) – Audit with Device - Metered	Visits include undertaking a water audit, advice and tailored retrofits of free water-efficient devices where required (e.g., leaky loo fix) to households with a meter already installed.
HH_A_003	Home Efficiency Visits (HEV) – Audit with Device - New Meter	Visits include undertaking a water audit, advice and tailored retrofits of free water efficient devices where required (e.g., leaky loo fix). HEVs are provided alongside the company's ongoing smart meter rollout.
HH_A_004	Virtual Home Efficiency Visits (VHEV) – Audit with Device	Virtual home use assessment undertaken online. The assessment provides advice, recommendations and actions, and could include sending free water efficiency devices for self-install or a professional plumber visit (e.g., for leaky loo fix).
HH_E_004	Leaky Loos Wastage Fix	This option is to find and fix leaky loos using data from metered customers, and through awareness campaigns and initiatives for unmetered customers. Customers would be able to identify leaky loos using simple measures such as leak strips or drops of food dye in the cistern. Water companies would then arrange for repair or replacement of the faulty cistern mechanism at no cost to the customer. The effectiveness of this intervention will be proportional to smart-meter penetration, as smart-meter data will indicate which households have high levels of continuous flow. This is here as a stand-alone option but could be seen as an add-on to the HEVs.
HH_E_008	Large/Small Developers - Devices	Work in partnership with selected developers to ensure all homes are designed to enhanced water efficiency standards beyond building regulations, through the installation of high-efficiency water fittings.

[1] Refer to Annex A for more information on Carbon assessments, Chapter 13 sets out the SEAA assessments and findings.

Option ID	Title	Description
HH_E_009	Home Efficiency Visits (HEVs) – Local Authorities etc.	Visits include undertaking a water audit, advice and tailored retrofits of free water efficient devices where required. Targeted at specific housing stock of local authorities or housing associations. The visits are selected based on high potential for water savings.
HH_E_013	School Visits	This option involves working in partnership with schools across the WCWR region to promote water efficiency. The aim is that education regarding water efficiency starts at an early age and therefore will result in long-term demand savings. This would be tailored for children for the different key stages. It would provide lesson plans and materials to allow teachers to deliver water efficiency lessons, this would be provided to all schools. This would also be accompanied by a set number of school visits each year (targeted to areas of high water use or demography).
HH_E_017	Targeted Water Efficiency Programmes	A focused water efficiency programme at targeted locations across the WCWR area including advertising, education, and other outreach work.
HH_I_001	Targeted Incentives Scheme	This option will offer non-financial incentives in the form of shopping vouchers/discounts, prize draws and charity donations to increase awareness and motivation to reduce water use; it will be delivered in association with a reward scheme, such as 'Greenredeem'. The option will include the use of innovative apps and website content while maximising the benefits offered through smart metering data. This will be targeted at new smart metered customers.
HH_N_001	Rainwater Harvesting	This option would work with developers to provide a community-wide rainwater harvesting system to provide a non-potable supply for toilets and washing machines for new properties. Water is collected from roof runoff and a sustainable drainage system is created. The collected water goes through a basic level of treatment. Rainwater harvesting is included in the development to meet planning conditions. Potential to replace approximately 30% of household consumption.
HH_N_003	Communal Community-based Rainwater Harvesting	Work with the Council to identify community-based rainwater harvesting twinning schemes, e.g., where buildings that have low demand but can generate high rainfall yields are located next to buildings or other demands with high non-potable demand (e.g., for irrigating or dual-supply toilet flushing). The rationale behind this option is that the harvested rainwater will replace water that had been or would have been taken from public mains supply.

Table 8: List of Demand-Side Feasible Options – Household Efficiency

Option ID	Title	Description
NHH_A_001	Business Efficiency Visits (BEV)	Visits to businesses including undertaking a water audit, advice and tailored retrofit of free water efficient devices to bathrooms and kitchens only (not wider process water). Business sectors are targeted based on high potential for water savings. BEVs are undertaken following liaison with Water Retailers. Specific BEVs to target individual customers through detailed analysis of MOSL data.
NHH_A_003	Business Efficiency Visits (HEV) – Targeted Business Leakage	BEV particularly targeted at leakage detection and fixing. Targeted where high-water usage would indicate that leakage might be occurring. BEVs are undertaken following liaison with Water Retailers. Specific BEVs to target individual customers through detailed analysis of MOSL data.
NHH_A_004	Business Efficiency Visits (HEV) – Agriculture Leakage	This option specifically targets the agricultural sector and is delivered in partnership with a third party (e.g., FWAG South West, AHDB, NFU). Expert water audit is provided on farms including advice, improvements, and fixes (target of the dairy sector).
NHH_A_005	Business Efficiency Visit (BEV) – Targeted Large Business Leakage	This option provides targeted visits by process engineers to large-scale businesses to look at how water use can be reduced on site. The output will be recommendations with indicative cost and efficiencies that could be achieved. Solutions could include zero liquid discharge (ZLD) and water reuse. This option would also consider any potential for the use of non PWS supplies. Target visits based on MOSL data to a limited number of large-scale water users.
NHH_A_007	Virtual Business Efficiency Visit (VBEV) - Water Audits and Devices	Virtual business use assessment undertaken online with an online efficiency representative. The assessment provides advice, recommendations, and actions, and could include sending free water efficiency devices for self-install or a professional plumber visit (e.g., for leaky loo fix).
NHH_E_001	Sector Specific Water Efficiency Advice	The development of a central website/customer engagement dashboard website to provide information on water efficiency campaigns and online tools for customers to engage with that provide water efficiency advice (e.g., water calculators - effectively acting as a self-audit) and wider resources. This could be extended to allow customers to log in to their accounts to look at real-time water use from Smart meters: advice would then be more tailored.
NHH_N_001	Rainwater Harvesting	This option would work with developers to provide rainwater harvesting systems to provide a non-potable supply for use within the new commercial properties. Water is collected from roof runoff and a sustainable drainage system is created. The collected water goes through a basic level of treatment. Rainwater harvesting is included in the development to meet planning conditions.

Option ID	Title	Description
NHH_N_006	Reuse Treated Wastewater Effluent	Reuse treated wastewater effluent from industrial customers is used for supply to industrial customers. This reclaimed water could be used for industrial/commercial use rather than potable water.

Table 9: List of Demand-Side Feasible Options – Non-Household Efficiency

In developing our options, we have considered different levels of uptake, the duration of savings and the costs to develop Low (pessimistic), Middle and High (optimistic) values for each option.

Key assumptions were extracted from the Artesia Report 2019 - "Water UK - Pathways to long-term PCC reduction" and applied to SWW population numbers from APR22. See Table 10 for a summary of references and assumptions.

Option ID	Description	References
HH_M_009	Watersmart is rolled out with the SMART metering roll out. It is assumed it will be offered to all newly metered customers (e.g., 90% of households by 2050 in the mid scenario). However, it is assumed only 50% of customers will take up the service. Expected savings of the option are based on voluntary metering savings estimates from the Artesia Report 2019.	Table 5 Artesia 2019 Table 7 Artesia 2019
HH_A_002	HEVs are offered to metered customers; uptake percentage is set as the target goal by 2030 (end of next AMP period) and assumes HEVs are offered until that target is reached (e.g., 13% in the mid scenario). Assume each HEV visit achieves the average PCC water savings expected from HEVs. Even if some visits are unsuccessful in significantly improving efficiency, this is incorporated in the calculation as the PCC savings used are an average, i.e., some households will produce higher than the average PCC savings in contrast. The same number of HEVs are then repeated each following AMP cycle to maintain a consistent effect (i.e., HEVs are assumed to have a five-year life before needing to be repeated).	Table 5 Artesia 2019 Table 7 Artesia 2019 Table 25 Artesia 2019
HH_E_004	It is assumed that only 5% of households have 'leaky loos'. The target uptake percentage of this option is set as the target number of this 5% that the water company is aiming to find and fix over the next 25 years. Of the find and fix repairs carried out (e.g., 30% target in the mid scenario) it is then assumed that 4 out of 5 fixes will resolve the issues, hence it is calculated with an 80% success ratio, i.e., of all the households costed to use the option, 80% will achieve average leaky loos PCC savings.	Table 5 Artesia 2019 Table 7 Artesia 2019 Table 25 Artesia 2019

Option ID	Description	References
HH_E_009/ HH_E_010	It is assumed that approximately 11% of company-area households are housing associations/corporate landlords (based on numbers from the Bournemouth area). The uptake percentage of this option is set as the target goal by 2030 (end of next AMP period) and assumes HEVs are offered until that target is reached (e.g., 13% in the mid scenario). Assume each HEV visit achieves the average PCC water savings expected. Even if some visits are unsuccessful in significantly improving efficiency, this is incorporated as the PCC savings used are an average, i.e., some households will produce higher than the average PCC savings in contrast. The same number of HEVs are then repeated each following AMP cycle to maintain a consistent effect (i.e., HEVs are assumed to have a five-year life before needing to be repeated).	Table 5 Artesia 2019 Table 7 Artesia 2019 Table 25 Artesia 2019
HH_E_013	For school visits to promote water efficiency it is assumed that each company will aim to visit 55 schools/classes a year with approx. 30 children per class (in the mid scenario). This translates to 1,650 children/households impacted by the option. Of these 1,650 households, it is assumed that 50% will go on to achieve PCC savings. This is set as a yearly target continuing for the full 25 years.	Table 5 Artesia 2019 Table 7 Artesia 2019 Table 25 Artesia 2019
HH_E_017	This option assumes only 1% of households in a company zone are targeted within a specific community/religious group. Of these 1% an uptake goal of 38% is targeted (in the mid scenario) and assumed to be achieved in 5 years (end of AMP period), e.g., 38% of the 1% of households targeted in the mid scenario all are assumed to establish PCC savings related to behavioural change.	Table 5 Artesia 2019 Table 7 Artesia 2019
HH_N_001	This rainwater harvesting option is offered to all new developments/developers. Of those offered, it is assumed that 30% take up the scheme (in the mid scenario) of which all are assumed successful in establishing the average PCC savings related to rainwater harvesting installation.	Table 5 Artesia 2019 Table 7 Artesia 2019
HH_N_003	This Rainwater harvesting option is promoting community 'rainsharing'. It is assumed to only be applicable to a small group of households (400 in the mid scenario). Of those 400 households in the groups identified as suitable, it is assumed that all take up the scheme and are successful in establishing the average PCC savings related to rainwater harvesting installation.	Table 5 Artesia 2019 Table 7 Artesia 2019

Table 10: Water Efficiency option reference data

This approach involved developing yearly cost and demand savings profiles for each option over a 25-year planning horizon (2025-2050) at a company level, before being combined into regional totals.

For our draft plan, we have assumed the middle-case estimates for the options.

2.4 Developing our optimum strategy to achieve PCC reduction.

We have used these water efficiency options to develop an optimum blend of demand-side interventions to achieve a PCC reduction to 110 l/p/d. to achieve the government National Framework targets by 2050.

Our work has been informed by work undertaken by Wood, for the West Country Regional Plan (Appendix 6.2). Water labelling has been informed by The WRSE Group report “Government demand management savings and implementation profiles” (February 2022).

With each strategy, we have assumed that water labelling contributes a 30% saving by 2050.

A summary of the PCC strategies developed is set out below:

Description of Strategy		Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6
		To achieve 110 l/p/d by 2050 with a Linear Profile	To achieve 110 l/p/d by 2050 with a Front-Loaded Profile	To achieve 110 l/p/d by 2050 with a Back-Loaded Profile	To achieve 110 l/p/d by 2045 with a Linear Profile	To achieve 110 l/p/d by 2040 with a Linear Profile	To get halfway to 110 l/p/d by 2050 with a Linear Profile
Watersmart – Customer feedback from metering (HH_M_009)	Years active	25	13	25	20	15	
	Vol of interventions	258,800 customers contacted	166,172 customers contacted	258,800 customers contacted	221,746 customers contacted	181,575 customers contacted	
	% Contribution to PCC target	15.734 Ml/d 16%	12.139 Ml/d 13%	15.734 Ml/d 16%	14.920 Ml/d 13%	8.640 Ml/d 9%	
Home efficiency visits (HEV) - water efficiency audit with free water efficiency device installation – metered (HH_A_002)	Years active	4		5	5	5	
	Vol of interventions	111,810 house visits		165,594 house visits	134,138 house visits	246,863 house visits	
	% Contribution to PCC target	9.213 Ml/d 10%		17.312 Ml/d 18%	12.952 Ml/d 14%	30.033 Ml/d 32%	
Leaky Loos Wastage Fix: large-scale targeted fixes (HH_E_004)	Years active	25	13	15	19	9	
	Vol of interventions	11,861 leaky loos fixed	5,849 leaky loos fixed	7,432 leaky loos fixed	8,871 leaky loos fixed	3,965 leaky loos fixed	
	% Contribution to PCC target	0.730 Ml/d 1%	0.454 Ml/d 0%	0.385 Ml/d 0%	0.509 Ml/d 1%	0.275 Ml/d 0%	
Home Efficiency Visits (HEVs) - water efficiency audit - local authorities, housing associations, corporate landlords)/Home Efficiency Visits (HEVs) - water efficiency audit - combined with energy efficiency audits (HH_E_009) (HH_E_010)	Years active	5	5	5	5	5	
	Vol of interventions	48,292 house visits	74,889 house visits	39,266 house visits	59,911 house visits	44,933 house visits	
	% Contribution to PCC target	6.079 Ml/d 6%	10.002 Ml/d 10%	4.807 Ml/d 5%	7.913 Ml/d 8%	5.803 Ml/d 6%	

Description of Strategy		Strategy 1 To achieve 110 l/p/d by 2050 with a Linear Profile	Strategy 2 To achieve 110 l/p/d by 2050 with a Front-Loaded Profile	Strategy 3 To achieve 110 l/p/d by 2050 with a Back-Loaded Profile	Strategy 4 To achieve 110 l/p/d by 2045 with a Linear Profile	Strategy 5 To achieve 110 l/p/d by 2040 with a Linear Profile	Strategy 6 To get halfway to 110 l/p/d by 2050 with a Linear Profile
School visits water efficiency programme (HH_E_013)	Years active	25	18	25	20	15	
	Vol of interventions	41,250 children reached	29,700 children reached	41,250 children reached	33,000 children reached	24,750 children reached	
	% Contribution to PCC target	1.227 Ml/d 1%	1.061 Ml/d 1%	1.227 Ml/d 1%	0.896 Ml/d 1%	0.585 Ml/d 1%	
Water efficiency programmes targeted at specific groups (e.g., community, religious groups) (HH_E_017)	Years active	5	5	5	5	5	
	Vol of interventions	19,829 house visits	19,829 house visits	19,829 house visits	15,863 house visits	11,897 house visits	
	% Contribution to PCC target	0.633 Ml/d 1%	0.633 Ml/d 1%	0.633 Ml/d 1%	0.499 Ml/d 1%	0.366 Ml/d 0%	
Rainwater harvesting is included in new developments to meet planning conditions - community developments (HH_N_001)	Years active	17	13	12	20	15	
	Vol of interventions	36,082 new houses targeted	31,407 new houses targeted	25,168 new houses targeted	46,228 new houses targeted	35,385 new houses targeted	
	% Contribution to PCC target	12.845 Ml/d 13%	17.516 Ml/d 18%	7.292 Ml/d 8%	18.486 Ml/d 20%	12.535 Ml/d 13%	
Communities direct harvested rainwater into a centralised shared resource (HH_N_003)	Years active	16	13	12	4	5	
	Vol of interventions	6,400 new houses targeted	5,200 new houses targeted	4,800 new houses targeted	1,600 new houses targeted	2,000 new houses targeted	
	% Contribution to PCC target	2.202 Ml/d 2%	2.882 Ml/d 3%	1.401 Ml/d 1%	0.229 Ml/ 0%	0.974 Ml/d 1%	
Home efficiency visits (HEV) - water efficiency audit with free water efficiency device installation – New Meter (HH_A_003)	Years active		2				
	Vol of interventions		25,376 house visits				
	% Contribution to PCC target		2.268 Ml/d 2%				

Description of Strategy		Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6
		To achieve 110 l/p/d by 2050 with a Linear Profile	To achieve 110 l/p/d by 2050 with a Front-Loaded Profile	To achieve 110 l/p/d by 2050 with a Back-Loaded Profile	To achieve 110 l/p/d by 2045 with a Linear Profile	To achieve 110 l/p/d by 2040 with a Linear Profile	To get halfway to 110 l/p/d by 2050 with a Linear Profile
Partnerships/targeting of large/small developers to install water efficient devices/Reducing infrastructure connection charge for properties built to a high water efficiency standard (HH_E_008) & (HH_I_002)	Years active		6				
	Vol of interventions		15,627 WEDs installed				
	% Contribution to PCC target		1.790 Ml/d 2%				
Metering contribution (Meter1)	Years active	25	25	25	20	15	25
	Vol of interventions	258,800 smart meters installed	258,800 smart meters installed	258,800 smart meters installed	221,746 smart meters installed	181,575 smart meters installed	258,800 smart meters installed
	% Contribution to PCC target	18.812 Ml/d 20%	18.812 Ml/d 20%	18.812 Ml/d 20%	17.272 Ml/d 18%	14.995 Ml/d 16%	18.812 Ml/d 40%
Government policy (HH_P_002)	Years active	25	25	25	20	15	25
	Vol of interventions						
	% Contribution to PCC target	28.667 Ml/d 30%	28.667 Ml/d 30%	28.667 Ml/d 30%	23.658 Ml/d 25%	18.759 Ml/d 20%	28.667 Ml/d 60%

3 Developing our leakage options

Leakage is a core demand management activity as well as being key to meeting customer and regulator expectations. South West Water has operated under its economic level of leakage for many years, trialling innovative techniques to become more and more efficient in delivery. Our leakage demand-side options build on our experience and expertise of exploring new activities, such as satellite leak detection, and working with RPS, a respected consultancy in leakage, to develop core leakage options. We will continue to recognise and pilot new technology and activities to supplement these options and drive efficient delivery. Our process follows the same guidance as the supply-side option development and is equivalent, albeit with slightly different criteria and the use of modelling to develop and optimise the options.

Following initial qualitative screening, options have been selected for detailed modelling and optimisation using the RPS Strategic Optimisation of Leakage Options for Water Resources (SoLow) tool. The modelling determines the most efficient mix of leakage-reduction options to deliver a range of leakage-reduction scenarios.

All scenarios have been assessed against our historic 2017/18 leakage performance levels. We used a value of 128.3 Ml/d (re-baselined to be fully compliant with the consistency of reporting methodology) and forecasted the end of AMP7 performance/target to be 98.4 Ml/d in 2024/25 (annual figure). Further work is planned as part of PR24 to review costs and benefits and align the plan to any revised 2025 baseline leakage position.

3.1 Coarse screening of unconstrained options

During the initial scoping of each leakage option on the unconstrained list, it was determined that each of them was theoretically viable and should be progressed through to the unconstrained list.

Further discussion and analysis were undertaken to develop these options, with current company policies and potential benefits used to reduce the list to constrained options.

The options considered were:

- **Active leakage control**: use of 'lift and shift' acoustic logging, intensive and baseline levels of active leakage control and permanent acoustic logging
- **Asset Renewal**: a blend of mains and communication pipe renewals
- **Customer supply-pipe leakage**: reducing repair times
- **Pressure management**: controlling pressure transients and pressure management
- **Trunk main interventions**: Loggers, monitoring, asset renewal, active leakage control

3.2 Developing the constrained and feasible options

We have used best-practice techniques, and industry-based assumptions to develop individual leakage options, supported by our network data knowledge and experience.

We have used leakage data and data relating to our district metered areas (DMAs) and their watermain characteristics from our corporate systems. A base year of 2020/21 has been used as the most complete data sets are available from this year. The base year has been kept consistent throughout all leakage options.

Leakage options have been built at WRZ level. This analysis assessed Bournemouth, Colliford, Roadford and Wimbleball and the leakage reductions required to achieve the scenario targets[2].

SWW has a long standing policy of sudsidising supply pipe repairs and replacements to assist customers and this is considered part of base maintenance. This policy contributes to improving the baseline levels of leakage in our plan, and we are assuming that this activity continues from 2024-25 onwards (refer to chapter 6 for leakage baseline assumptions). Any changes in the ownership of supply pipes after AMP7 would enhance this demand management measure. This activity is part of managing leakage and addressing the leakage natural rate of rise. The options discussed on the next page are additional network enhancement activities over and above this baseline customer focussed activity.

Through learning from our recent response to drought over the last 6 months and our access to significant data from the high levels of meter penetration, we have started trials on how we can identify customer supply pipe leaks and incentivise the customers to further-reduce leakage, by repairing or replacing supply pipes more quickly.

[2] Due to the lack of baseline data, this analysis was not undertaken for the Isles of Scilly – refer to Chapter 14 for further information.

3.3 Feasible leakage management options

Table 11 below summarises the list of feasible options.

Of the eighteen sub-options, the following options were discounted:

- **Lift and shift acoustic logging.** This option was discounted because it was considered part of current baseline activities.
- **Subsidising customer supply pipe repairs to reduce repair time**: Through learning from our recent response to drought over the last 6 months and our access to significant data from the high levels of meter penetration, we have started to compile data and insight on how we can identify customer supply pipe leaks and incentivise customers to further reduce leakage by repairing or replacing supply pipes more quickly. For our draft plan, we have not yet got sufficient evidence to support the effectiveness of repair subsidies to reduce repair times and thus further reduce leakage.[3] We will revisit our evidence base prior to submitting our revised draft plan and include this option if deemed feasible.

Note that reduction of supply pipe leakage is a benefit that is included within our metering options, from smart metering information combined with Watersmart within the option "HH_M_009" described in Sections 4.3.2 and 3.2 of this chapter.

Option	Sub-Option	Description	Feasible?
Active Leakage Control	Standard ALC	Continuation of standard Active Leakage Control (ALC) practices. Provides a baseline maintenance of leakage that other options can enhance.	Y
	Lift and Shift acoustic logging	Widespread implementation of lift and shift technology to improve the efficiency of standard detection activity.	N
	Intensive ALC	Substantial temporary increase in standard ALC activity within target DMAs.	Y
	Permanent Acoustic Logging	Installation of permanent acoustic loggers across network to create greater granularity of acoustic leakage detection data improving detection efficiency.	Y
Asset Renewal	Mains and Comms Renewal	Renewal of mains and communication pipes for targeted materials across the network.	Y
	Mains Only Renewal	Renewal of mains pipes for targeted materials across the network.	Y
	Comms Only Renewal	Renewal of communication pipes for targeted materials across the network.	Y
Customer Supply Pipe Leakage	Customer Supply Pipe Repairs	Subsidised customer supply pipe repair to reduce repair times.	N
Pressure Management	Advanced Pressure Management	Considers the installation and optimisation of PRVs, and where appropriate, the installation of new booster pumps to properties at higher elevations to allow pressure to be reduced in lower-lying areas.	Y
	Pressure Transients	Programme of investment to reduce the occurrence of pressure transients.	Y
Trunk Mains	Trunk Main Asset Renewal	Renewal of pipes within Trunk Main Assets	Y
	Trunk Main Additional ALC	Increasing standard ALC activity within Trunk Main Assets to be on par with DMAs.	Y

[3] This is different to our current policy of providing free customer supply pipe repairs or replacements, which are in our baseline activities, and are assumed to continue.

Option	Sub-Option	Description	Feasible?
	Trunk Main Flow Monitoring Zone	Setting up of a Flow Monitoring Zone with large-diameter flow meter and logging equipment.	Y
	Trunk Main Logging	As Flow Monitoring Zone policy, but with loggers.	Y
Innovation	ALC Innovation	Investment in ALC innovative research and development	Y
	Asset Renewal Innovation	Investment in asset renewal innovative research and development	Y

Table 11: List of Leakage Management Feasible Options

We have applied best-practice techniques in conjunction with RPS to develop the individual leakage options. In support of our leakage planning and optimisation, we have specifically used the WaterUK leakage roadmap[4] and the UKWIR report on the economics of balancing supply and demand[5]. UKWIR guidance has been used for calculating the natural rate of rise[6] [7] and our Active Leakage Control (ALC) cost functions were developed by incorporating the latest recommendations from the UKWIR best practice report[8]. Other guidance that informed the derivation of the benefits for different options includes asset renewal[9] and the targeting of specific pipe material[10]; pressure management and reducing transients[11]; trunk main flow monitoring[12]; and the potential benefits from investing in innovation[13]. Carbon and greenhouse gas emissions have also been calculated for the options and are shown in the WRMP data tables (Table 4).

Leakage data and data relating to DMA and mains characteristics were provided for the base year of 2020/21, which was kept consistent throughout all leakage options. High-level base cost information for each of the leakage options was used with expected maintenance and asset replacement frequencies. Other costs have been derived from RPS industry experience. This information has been used to construct discounted and undiscounted whole-life costs over the discount period. Leakage options were built at WRZ level. Table 12 sets out the data sources used for the development of our leakage scenarios.

Data required	Year (s)	Source
Repair data complete with labelling of detected/reported, district metered area (DMA), Water Resource Zone (WRZ) and Area references, pipe type and repair start and completion dates.	2019/20	Waternet
DMA property count	2019/20	Waternet
Yearly NRR results complete with mains length, property counts and DMA cohort allocations.	2013/14 – 2020/21	Waternet
Minimum Achievable Leakage (MAL)	2019/20	Calculated by RPS
Reported MLE leakage	2018/19 – 2019/20	South West Water
Marginal Cost of Water (MCoW)	2019/20	South West Water
Distribution mains data	2019/20	South West Water
Daily leakage per DMA	2017/18 – 2019/20	Waternet
Daily Hour to Day Factor (HTD) and Average Zonal Night Pressure (AZNP)	2019/20	South West Water

Table 12: Base data and source

4 WaterUK (2022). A Leakage Routemap to 2050 https://www.water.org.uk/wp-content/uploads/2022/03/Water-UK-A-leakage-Routemap-to-2050.pdf
5 Atkinson, J., Buckland, M (2002). Economics of Balancing Supply and Demand (EBSD) Guidelines NERA UKWIR 02/WR/27/4
6 Manning, C (2005).Natural Rate of Rise of Leakage, UKWIR 05/WM/08/33
7 Butler, M., Grimshaw, D., (2009). Factors Affecting the Natural Rate of Rise of Leakage, UKWIR, 09/WM/08/40
8 Cunningham, A., et.al (2011). Best Practice for the derivation of cost curves in economic level of leakage analysis, UKWIR 11/WM/08/46
9 Butler, M. Cathery, T. Mander, P. The Impact of Burst Driven Mains Renewal on Network Leakage Performance, UKWIR, 18/WM/08/67 (2018)
10 Long term performance of plastic (PE) pipes, UKWIR, 20/WM/03/22 (2020)
11 The occurrence and causes of pressure transients in distribution networks, UKWIR, pre-publication (2022)
12 Best Practice for Upstream Flow Monitoring Zones, UKWIR, 20/WM/08/74 (2020)
13 Transferring Minimal Excavation Methods to The Water Industry, UKWIR, 22/WM/12/1, 2022

3.4 Developing our leakage strategies

We undertook modelling to develop several leakage scenarios to deliver the long-term 50% reduction required. These scenarios enabled us to test the robustness of the activities in achieving the required leakage targets, see Table 13 below.

Scenario	Target Leakage (annual figure)	Leakage Reduction (Ml/d)
1 – No Reduction	Start Leakage 98.4 Ml/d maintained to 2049/50	0
2 – Linear 50% by 2049/50	Start Leakage 98.4 Ml/d 2029/30: 86.9 Ml/d 2049/50: 64.2 Ml/d	34.15
3 – Front Loaded	Start Leakage 98.4 Ml/d 2029/30: 79.9 Ml/d 2049/50: 64.2 Ml/d	34.15
4 – Back Loaded	Start Leakage 98.4 Ml/d 2029/30: 92.6 Ml/d 2049/50: 64.2 Ml/d	34.15
5 – Linear 50% by 2044/45	Start Leakage 98.4 Ml/d 2044/45: 64.2 Ml/d, maintained to 2049/50	34.15
6 – Linear 50% by 2039/40	Start Leakage 98.4 Ml/d 2039/40: 64.2 Ml/d, maintained to 2049/50	34.15
7 – Linear 25% by 2049/50	Start Leakage 98.4 Ml/d 2049/50: 96.2 Ml/d	c. 5

Table 13: List of Leakage scenarios

We have developed the above options for each of the scenarios set out below.

These leakage reduction scenarios were developed using RPS's SoLow model. The model developed a least-cost blend of leakage options for each of the above scenarios, selecting which leakage options are needed and when (with a maximum yearly limit set per option). A summary of the optimised strategies is shown in Table 14.

Scenario	Primary benefits achieved through the following leakage options	Total discounted cost £m (2024/25 – 2049/50)
1 – No Reduction:	Continues with base levels of active leakage control	£445.7m
2 – Linear 50% by 2049/50	c. 3,400km of mains/communication pipe renewals, in combination with pressure management and trunk main ALC	£874.27m
3 – Front Loaded	Not feasible.	Considered undeliverable
4 – Back Loaded	c. 6,100 km of mains/communication pipe renewal starting after 2034, including pressure management, intensive ALC and management of pressure transients	£929.39m
5 – Linear 50% by 2044/45	c. 4,600 km of mains/communication pipe renewal, including a blend of other leakage options	£823.90m
6 – Linear 50% by 2039/40	c. 4,000 km of mains/communication pipe renewal, including a blend of other leakage options	£931.68m
7 – Linear 25% by 2049/50	No mains renewal: reduction achieved using pressure management and acoustic logging	£459m

Table 14: Summary of Leakage scenarios (2020/21 price base, pre-effiiciency)

4 Developing our smart metering options

We have assessed a range of metering options and then used these to develop a range of scenarios to inform our overall metering strategy. SWW commissioned AECOM and ICS to create a domestic metering model which accounts for the different costs, customer behaviours and other benefits associated with smart metering for these different scenarios.

The metering model is developed within the whole-life cost asset modelling platform that SWW uses for business planning and includes other benefits within its optimisation, e.g., Carbon[14].

A range of options and scenarios were tested against 1) The type and pace of metering technology, and 2) the scale, pace and approaches to convert unmeasured customers to metered customers.

The following section currently discusses our household metering strategy. Further work is planned for non-household metering prior to submitting our revised draft plan. South West Water has only c.3,000 unmeasured non-household (business) properties, which represents only c.4% of all non-household properties. We are currently developing our metering strategy for Non-household customers and will use the recent engagement with retailers and businesses as part of our 'Stop the Drop' campaign for Drought 2022 to develop this strategy with retailers to include in our Final WRMP published later in 2023.

4.1 The feasible options

The following feasible metering options were considered:

New meter installs (type of technology)

- Replace an existing meter with an Automatic Meter Reading (AMR) meter; this is our current metering strategy.
- Replace an existing meter with an AMI/smart meter and deploy a communication network to enable AMI technology. AMI meters, unlike AMR meters, enable continual communication of consumption data to the company (and our customers) more quickly and easily.
- Install a new AMI meter (where customers are previously unmeasured) through the following metering policies:
    - Meter-optants, which are at the customer's request
    - Change of occupancy (CoO), where meters are installed when the unmetered property is sold
    - Compulsory metering (only modelled in detail for Bournemouth and IoS regions); meters are installed, where feasible, for all customers.
    - New connections (new developments)

Replacement of existing meters (type of technology):

- Proactive replacement of meters to meet defined time frames
- Reactive replacement of meters at end of life

Increasing our metered customer base (scale, pace and approach to convert customers)

When considering 'change of occupier metering' there are two variations:

1. Installation of smart meters at the time a property is sold with the new owner being billed based on usage
2. Installation of a smart meter at all properties with the existing occupier not being billed based on usage but if the property is sold, the new occupier becomes billed based on usage

In total, three variations were assessed as part of the non-optants approach:

- Variation 1: Change of occupancy – meters installed at the time of property sale (reactive)
- Variation 2: Change of occupancy – meters installed on mass now (pro-active)
- Variation 3: Compulsory metering – meters installed on mass now

[14] Refer to Annex A for further information on Stantec's approach to estimating Carbon for our metering options.

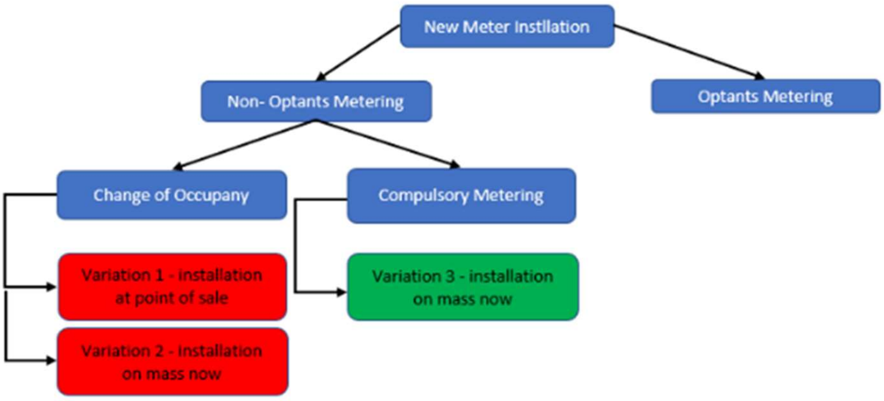

Figure 1: Metering options assessed

4.2 Developing our metering scenarios

Combinations of the above options were considered for each of the four WRZs and developed into six scenarios. An understanding of the level and timing of the supply deficit was considered in developing the metering scenarios. The pace of meter replacements was also varied, recognising that the full benefits of smart metering are only achieved when a specific zone or region has "near-full smart meter penetration" when wider benefits are considered, e.g., carbon reductions from reductions in meter reading vehicle movements.

The model was calibrated to provide a range of outputs per WRZ. The primary variables used for the model scenarios were

- **Replacement of Existing Meters** - demand side savings are required by a specific time, in line with the supply/demand forecasts and, as such, a proactive programme was varied under different time horizons (2030, 2035, 2040). In addition, a purely reactive meter replacement scenario was run to understand a baseline programme.
- **New Meter Installs** – optants and new connection rates are largely outside the control of SWW and, as such, were generally a constant in the various model scenarios. However, compulsory metering vs. change of ownership metering were varied under different scenarios.

The following Table 15 summarises these metering scenarios.

		Replace proactively with AMI smart meter				Increasing metering	
#	**Short Name**	**Never**	**On failure**	**by 2030**	**by 2035**	**Compulsory**	**Change of Occupier**
1	Reactive **(baseline)**	-	All	-	-	-	-
2	Reactive & CoO	-	All	-	-	-	All
3	2030 Smart & Compulsory	ROA	BOU	WIM, COL	-	BOU	-
4	2030 Smart & CoO	ROA	BOU	WIM, COL	-	-	All
5	2035 Smart & Compulsory	ROA	BOU	-	WIM, COL	BOU	-
6	2035 Smart & CoO	ROA	BOU		WIM, COL	-	All

Table 15: Metering scenarios developed. Note: BOU = Bournemouth, COL = Colliford, ROA = Roadford, WIM = Wimbleball

For each modelled scenario, the WRZs were assessed independently to identify the costs and benefits. The preferred plan was developed based on the combination of model scenarios for each WRZ, see section 4.4.

4.3 Basis of Metering Model

4.3.1 Costs

The metering model takes into consideration the unit costs associated with the differing complexities of meter installations; i.e., for new meter installs and meter replacements. For example, a new meter will require excavation, which increases complexity and cost, a meter exchange will generally be able to use the existing meter chamber, meaning it can be delivered much more easily and cheaply. These costs were derived from a combination of historical outturn costs and the outcome of SWW'S metering tender framework.

The cost of replacing an existing meter is also much lower than installing a new meter (Table 16 and Table 17). However, the PCC benefits for a new meter installation are greater (see Section 4.3.3 below) as the customer moves to metered charges as opposed to an upgrade meter. These factors inform the cost-benefit ratios of different strategies which are factored into our metering model to allow us to identify the optimum balance in consideration of the individual supply/demand requirements for each water resource zone.

With respect to new-build properties, SWW does not incur an installation cost as an AMI-ready AMR meter is supplied to the property developer who undertakes the installation as part of the property build. AMI-ready AMR meters allow for readings to be taken as an AMR meter but with the potential in the future to be used as an AMI meter. This ensures that an element of the metering benefits can be realised instantly as soon as AMI infrastructure is in place.

Meter read costs for visual-read and AMR meters have both been based on historical outturn costs and are shown as the costs per meter read per year (Table 18). These costs are inclusive of staff, equipment and transportation costs and are based on undertaking two meter readings per year. AMI meter-read costs are from a recent tender process. These costs are inclusive of network costs (including licenses and rental of the network, communication fees and support services), meter management solution to allow the management and viewing of metered data, encryption and decoding of data to SWW internal system, and management of the data into SWW billing system.

The table below shows the key cost inputs that have been used in the metering model:

Table 16: Replacement of an existing meter for a new AMI/AMR meter:

Area	Install Costs	Meter Purchase	Sub-Total
External Screw In / Screw Out Meter Exchanges	£31	£49.80	£80.8

Table 17: Installation of a meter to a previously unmetered property (as part of a proactive street-by-street installation):

Area	Install Costs	Meter Purchase	Sub-Total
External Meter install (previously unmetered)	£307[15]	£49.80	£356.8
Internal Meter install (previously unmetered)	£157	£49.80	£206.8
New Build Property	£0	£49.80	£49.80

Table 18: Meter Operational Costs:

Area	Annual meter read (£ per meter)
AMI meter	£3.40
AMR meter	£1.04
Visual read meter	£2.08

The above table includes costs for the network infrastructure and transmission of data. Additional costs for SWW system upgrades necessary to facilitate data management of this scale have not currently been included and a full metering strategy is under development to inform PR24. These costs will therefore be included in the revised draft plan.

[15] These costs are based on street-by-street installation, which is a more efficient installation approach with reduced travel, and greater installation certainty.

4.3.2 Benefits (MLD)

The current benefits included within our metering options that have been presented in our dWRMP are as follows:

- **Per Capita Consumption (PCC) reductions:** As customers move from unmetered to metered supplies, usage has been seen to decrease. An additional reduction has been seen when customers move from a visual-read or AMR meter, which provides a reading every two months, to an AMI meter which provides near instantaneous data. Our modelling assumes a benefit of c.42 l/person/day for the movement of customers from unmeasured to measured charges. This is lower than the difference in measured vs. unmeasured consumption we observe and report in our annual returns to reflect the fact that some high users may not change their habits by metering alone. A benefit of 3 l/person/day is assumed for upgrades of meters to smart meters. These benefits are based on research by Artesia Consulting for the WCWRG.
- **Customer Side Leakage:** Private service pipe leakage is currently very difficult to quantify from network leakage. By reading our customers' meters six-monthly, or yearly, we can provide the near instantaneous visibility of usage trends that is needed to identify the early occurrence of these leaks and quantify the amount of supply pipe leakage and plumbing losses to target loss resolution. Further to this, identification will only occur following a meter read, meaning that a leak could be ongoing between 6 and 12 months. This water usage is known as continuous use and is independent of customer behaviour. We expect the availability of customer leakage flow rates and significantly reduced identification times to reduce customer side leakage when moving to AMR or AMI meters and we have set out our assumptions below.
- **Customer Side Wastage**: In addition to water lost through customer supply pipes there is also inadvertent water usage through leakage on customer equipment, taps, and toilets. This water usage is also continuous and is independent of customer behaviour. The benefits are assumed within the PCC and leakage figures above.

Table 19: Leakage benefits from metering

Customer leakage from differing metering options	Leakage (Litres per property per day)
Unmetered	34.7
Visual Read/AMR Meter	19.1
AMI Meter	10.5

Table 20: Per Capita Consumption benefits from metering

Area	PCC Reduction (Litres per person per day)
Unmetered to Metered	42
Visual Read / AMR metered to AMI	3

4.3.3 Cost-benefit of metering options

Based on the costs and benefits set out above, metering an unmetered property compared to upgrading the metering has different costs and benefits which are summarised below:[16]

	Average Cost of meter install	PCC reduction (l/pers/d)	Leakage reduction (l/prop/d)	Total litres/d per meter	£ per litres/d
Unmetered to AMI	£466, £307, £157	42	24.2	125	£3.73
Visual Read / AMR to AMI	£80.80	3	8.6	15.8	£5.11

Table 21: Cost-benefit of different metering options.

[16] Note that this table is a simplified cost-benefit analysis which does not take into consideration ongoing Opex costs and differing asset lives for the different meters. It does however allow us to conclude that both a street-by-street deployment of new meters and replacement both offer a good MLD benefit per £ invested.

As discussed in Section 4.1, we also considered three variations as part of our non-optants approach – these options were discounted due to having a high cost, lower certainty and reduced MLD benefit. These are summarised below for completeness.

Table 22: Discounted non-optant metering options.

Metering option	Average installation rate per property	Assumptions/considerations
Change of occupancy metering at time of property sale (reactive)	£466	A blended rate based on a mixture of internal and external meters. This cost reflects the additional travel for a one-off meter install. This cost is likely to increase as meter penetration increases.
Change of occupancy (install meters on mass) but only switch to metered bill when property is sold	Consistent rates to Table 17 above	Comparable costs. Dual billing would enable leakage efficiencies to still be realised but would reduce the ability to achieve meter-driven water efficiency benefits.

4.3.4 General Assumptions

Below are some of the key assumptions made in developing the preferred and lowest-cost plan for metering:

- When a customer requests the installation of a smart meter 65% of the requests result in a meter being installed. In 35% of instances, it is not viable to install a meter, due to either prohibitively high installation costs, or due to pipework configuration (e.g., shared inlets on flats, making a meter installation not possible).
- The occupancy rate per property is 2.4 people.
- Annual meter read costs are based on undertaking two readings per year.
- Optimism bias has not currently been included in the costs presented above. An allowance for optimism bias will be included for in our revised draft plan.
- We have assumed that our meter optants will be a decreasing % of the unmetered population over time. This reduction is based on historic trends observed through deliver of the meter-optant programme.
- Table 23 sets out the average operating life of each meter used within the metering model.

Type of Meter	Average life (years)
Visual read meter	25
AMR meter	18
AMI meter	18

Table 23: Metering average operating life (used within metering model)

A range of further benefits are possible but have not been quantified for the purposes of our draft WRMP:

- **Reduction in travel and carbon emissions**: With AMI smart meters, the data is automatically transmitted; therefore, the need to drive to each domestic property to take a meter reading is removed, thus reducing the number of metering resources required and helping to support the reduction of our carbon emissions.
- **Reduction in customer bill queries**: Live and accurate meter data will reduce the number of calls from customers to query bills.
- **Reducing printing and delivery costs by increased paperless bills**: Live meter data drives a customer move from paperless to online billing, reducing the costs associated with printing and sending paper bills.
- **More effective leakage targeting**: In addition to reducing customer leakage, combined domestic and network metering would provide more efficient targeting of network leakage.
- **Demand reductions reduce network investment for future growth**: A reduction of overall water demand would mean that the existing network infrastructure would be better equipped to deal with future growth forecasts, delaying investment.

The benefits above have been checked against recent industry literature[17,18] and peer reviewed by industry experts to ensure they are of the correct magnitude and achievable. A copy of the cost assurance completed by Artesia is included in Appendix 12.3.

These scenarios were used as an input into our EBSD modelling. The optimisation and selection process is discussed further in **Chapter 10.**

4.4 Summary of modelled scenarios

A summary of the different scenarios with the resulting costs and MLD benefits (2025 -2050) is included in Table 24 below. Note, that as part of completing our finalised metering strategy for PR24, we will be reviewing all costs and benefits, and this will form the basis for our revised draft plan for Statement of Response.

#	Short name	Capex (2025/26 to 2029/30, £m)	2030 meter penetration (AMI / Total)	MLD Benefits (by 2030)	MLD Benefits (by 2050)
1	Reactive (Baseline)	17	24% / 86%	14	14
2	Reactive & CoO	40	29% / 90%	10	38
3	2030 Smart & Compulsory	64	63% / 87%	13	29
4	2030 Smart & CoO	81	71% / 90%	15	38
5	2035 Smart & Compulsory	41	43% / 87%	9	25
6	2035 Smart & CoO	64	52% / 90%	14	39

Table 24: Summary of metering scenarios considered

[17] Artesia (2022) A Strategy for Enhancing Metering Technology
[18] Artesia (2019) A Strategy for Enhancing Metering Technology

Annex A: Green House Gas/ Carbon accounting methodology

Work has been undertaken by our consultants to assess the carbon impact of existing leakage management options (RPS) and metering and water efficiency options (Stantec). We have assessed embedded and operational carbon, and also quantified the carbon savings resulting from reduced water production and treatment.

The approach taken for existing leakage management options has been to introduce carbon calculations models and to feed these through to the SoLow optimiser. They have been aligned with previously optimised leakage reduction scenarios to generate carbon summaries and totals for chosen options. The leakage management options that have been optimised within SoLow have been built up from lifetime costs. A total annual cost for each year of the 80-year period was then calculated, considering the ongoing maintenance for leakage management options such as permanent acoustic logging and pressure management.

For the demand side, options (meters and water efficiency work) have been estimated using a Stantec tool which is consistent with the SWW carbon accounting tool. They have been aligned with previously optimised demand interventions to generate carbon summaries and totals for chosen options. For new and replacement meters, evidence from Ofwat (2011) and Environment Agency (2010) was used. The carbon reduction was calculated over a 25-year horizon.

In both approaches, the assessment methodology follows the UKWIR guidance (2012 and updated in 2022), which sets out how to calculate embodied and whole-life (operational) carbon for water industry assets. This has been applied alongside the HM Treasury (2022) Green Book.

The following reports have been used to inform our carbon accounting methodology:

- UKWIR (2012) A framework for accounting for embodied carbon in water industry assets, Report number CL01B207.
- UKWIR (2022) Calculating whole-life/Totex carbon, Report number 22/CL/01/32
- Ofwat (2011) Exploring the costs and benefits of faster, more systematic water metering in England and Wales.
- Environment Agency (2010) Energy and carbon implications of rainwater harvesting and greywater recycling, Report: SC090018.

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