

Draft Water Resources Management Plan 2024 Annex 17: Leakage Strategy

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from
**Southern
Water** 

1.1. Our Overall Approach to Leakage

Managing leakage is an important part of our water resources strategy. A low level of leakage is desirable for its environmental benefit because it defers the need to invest in new resources which would otherwise be needed to meet increases in demand over time. It also demonstrates to our customers that while we are asking them to use water more efficiently as part of our Target100 initiative, we are also making efforts at our end to reduce losses by as much as we can.

We committed to reduce leakage by 50% by 2050 in WRMP19. As part of this commitment, we included a reduction in leakage of 15% over AMP7 as one of our PR19 performance targets. We, along with all other water companies, have made a Public Interest Commitment to triple the rate of sector wide leakage reduction by 2030. (<https://www.water.org.uk/publication/public-interest-commitment/>)

UK water companies are expected to significantly reduce their leakage with a 50% leakage reduction by 2050 being set as the benchmark through the National Framework (Environment Agency, 2020). This framework sets the approach for using regional plans to achieve the objectives. We are part of the Water Resource South East group for this purpose ensuring that our water resource management plans align to deliver a single regional plan. (National_Framework_for_water_resources_summary.pdf (publishing.service.gov.uk))

Maintaining resilient supplies in the face of climate change and a growing population, whilst at the same time reducing the amount of water we take from the environment, represent the biggest challenges to our future demand planning. Our supply area is classified as an area of serious water stress by the Environment Agency (2021) and leakage, as part of an overall programme to reduce total demand, is a core component of maintaining supply-demand balance in the future.

Beyond AMP7, we have considered the following leakage reduction scenarios:

- Baseline: No further reduction from the 2024-25 level in line with WRPG.
- Low leakage reduction scenario: Leakage reduces by 50% by 2050 and by 53% by 2059 (compared to 2020); remains constant thereafter.
- Medium leakage reduction scenario: Leakage reduces by 55% by 2050 and by 57% by 2059 (compared to 2020); remains constant thereafter.
- High leakage reduction scenario: Leakage reduces by 62% by 2050 (compared to 2020); remains constant thereafter.

In addition to traditional methods of leakage reduction such as active leakage control and mains replacement programmes, we are planning on making use of emerging technologies to achieve significant reductions in leakage over time. The four leakage profiles are shown in Figure 1.

We have assumed that the reduction in the two components of total leakage i.e. distribution losses and supply-pipe losses will proportionately be the same as overall leakage.

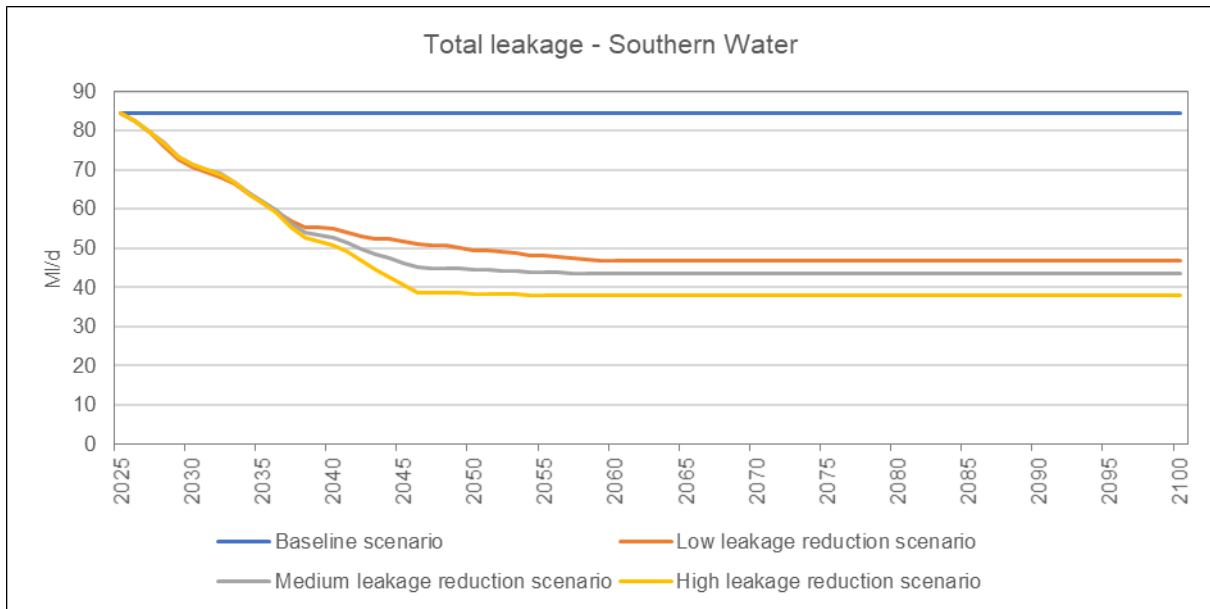


Figure 1: Total leakage reduction scenarios.

To balance the risk in our plan, our WRMP table forecasts are based on meeting the National target of 50% leakage reduction. Due to the challenges of being designated an area of serious water stress and the forecast supply-demand balance we have selected the high leakage reduction scenario to set out the activities we plan to do. This keeps the ambition open for longer term leakage reduction decisions to be made for the Final WRMP and for WRMP29, and allows forecasts to be updated at WRMP29, but without introducing excessive risk.

1.2. AMP7 Progress

We have maintained our leakage activities in line with our WRMP19 programme. However, the Covid-19 pandemic led to an increase on water demand and subsequent higher network pressures which are related to greater leakage. We achieved our leakage performance commitment in 2020/21 but were unable to counter the impact of the demand and pressure changes on leakage in 2021/22 and narrowly missed our performance commitment target in 2021/22.

We are maintaining and increasing the level of field detection resources in line with our action plan to reduce leakage and aim to achieve our target by 2025 at the latest.

Up to and during AMP7, leakage has primarily been managed through the following interventions:

- Repairing leaks that have been reported to us by our customers. These leaks tend to be short term in duration and do not have a significant contribution to the annual average leakage level.
- Proactively detecting and repairing leaks on our network. These leaks are hidden from sight and are targeted through our district meter areas (DMA). They are longer running leaks and are the largest contribution to our reported leakage level.
- Detecting and facilitating the repair of leaks on the underground customer side network, the pipework between the property and the property boundary. These leaks are often hidden from sight and are estimated to contribute c. 18% of total leakage.

- Optimising pressures within our network, minimising fluctuations and excessive pressure, and providing a more stable pressure to our customers and reducing the number of bursts as a consequence.
- Replacing the oldest mains within our network, which tend to be those that burst and leak the most. This has a two-fold effect of not only reducing leakage but also reducing supply interruptions to our customers.

We have used this learning to develop our leakage programme for WRMP24.

1.3. WRMP24 Plan

Reducing overall demand is critical to the long-term delivery of supply-security. Our approach to developing the WRMP24 plan was to develop a blend of options for meeting the leakage target. It builds on our AMP7 activities by including innovative remote sensing technology and using smart meter data to identify leaks – including on customer supply pipes. The result is a programme that has both known performance delivery but with stretching performance in new areas.

A number of options were initially considered for inclusion in the planning scenarios. An outline of these and whether they were adopted within the planning scenarios shown below:

Intervention	Potential Benefit Area	Option Commentary	Adopted in Plan
Enhanced Find and Fix	Locate	Enhanced leakage detection – resulting from a more data driven approach to area prioritisation – can reduce leakage within a DMA to less than 10%. Increased use of this approach, linked to an increasing availability of network data will enable more DMA's to be reduced and held at this level or lower.	Yes
Satellite/Drone surveying	Locate	This technology is being trialled as part of the AMP7 leakage programme and is primarily focused on detecting leaks on rural networks, especially trunk mains. Trunk mains leakage is a small component of overall leakage and therefore benefit for leakage reduction is considered minimal.	No
Pressure Management	Prevent	Over 55% of DMA's are fed from a pressure managed system. Almost 80% of these schemes have been optimised during the first 2.5 years of AMP7. Opportunities for pressure management still exist, especially the intelligent control of network booster pumps although opportunities and benefits are diminishing over time.	Yes
Improved Repair Techniques	Mend	Repair data does not suggest that there is an issue with repair quality with a low number of repeat visits undertaken.	No
Smart Metering	Aware	Smart metering is a key demand reduction driver in AMP8 and beyond and will increase visibility of customer side leakage as well as improve leakage targeting through better disaggregation of demand data at DMA level.	Yes

Intervention	Potential Benefit Area	Option Commentary	Adopted in Plan
Smart networks / digital twin	Aware and locate	Introduction of a digital twin model in AMP7 and an extension of the number of sensors across the network will significantly improve the visibility of network behaviour and improve the targeting of leakage detection activity. This includes the trialling of fibre optic technology to provide enhanced data, thereby improving leakage detection response.	Yes
Situational Awareness	Aware	This tool has been developed during AMP7 to increase awareness and reduce response times to network events. Additional benefits are forecast by linking this capability with smart networks/digital twins by enabling a proactive rather than reactive response to issues.	Yes
Mains replacement	Prevent	Network deterioration is estimated at 2.2 MI/d per year. Mains replacement would result in the stabilisation of the NRR and remove the requirement to continually increase the amount of activity required to hold leakage levels constant.	Yes
Communication pipe replacement	Prevent	Around 7500 communication pipe repairs are undertaken each year as part of the leakage programme. Over 87% of these are repairs. Moving to a relay only policy would result in a longer life repair and a reduction in the rate of failure in the future as assets are renewed.	Yes
Supply pipe adoption	Mend	The adoption of customer supply pipes would introduce a significant up lift in asset liability at Southern Water and are not likely to realise a significant benefit over and above those presented through the smart metering roll-out.	No

Table 1: Options initially considered for inclusion in the planning scenarios

The plan was built by an assessment of the costs and benefits of each individual option available. These were then summated to give an overall programme.

The planned interventions included in WRMP24 are summarised below:

- **Traditional find and fix:** this function of this activity is to offset the natural rate of rise (NRR) in leakage. This represents the amount that leakage would increase by over the year if no leakage repairs were undertaken. Our most recent assessment of NRR is that leakage would increase by 120 MI/d per annum.
- **Enhanced find and fix:** this involves the use of more advanced analytics to assess the level of leakage within a DMA and target appropriate interventions. This may involve more time consuming leakage detection survey techniques or improving the data and allowances used to calculate leakage at a DMA level. This type of enhanced activity is able to reduce leakage at a DMA level to less than 10%. However, the challenge becomes maintaining this level across all DMA's.

- **Smart metering:** The roll-out of smart meters is planned for AMP8, replacing the existing AMR meters. Smart meters provide more frequent information about consumption patterns which in turn allows the leakage calculation to be more accurate and at a more granular level. Leveraging this data will result in an improvement in the way enhanced find and fix activity is targeted enabling more DMA's to be maintained at a lower leakage level. Additionally, smart meters monitor for customer side leaks and generate alarms once a leak is detected. This will enable more customer side leaks to be detected and to reduce the run time of a leak. We estimate this will half the amount of customer side leakage included in our overall reported leakage level.
- **Digital Networks:** Digital networks have the potential to change the way we target and detect leaks. Using near real-time data modelling techniques and incorporating an increased number of network sensors, such as pressure and acoustic loggers, smart meters and water quality sensors, can result in earlier identification of leakage outbreaks and narrow the area of interest significantly with the result that leak detection times are reduced. We estimate that this benefit can be realised with an average of 6 sensors per DMA. The advantage of these digital models is that as well as providing a leakage reduction mechanism they also provide an opportunity for increased efficiency as survey times will be reduced through improved targeting. This is achieved through accurate measurement, preventative maintenance, raised confidence in intervention identification and prioritisation of actions.
- **Advanced Pressure Management:** The water network is increasingly covered by pressure management and a significant amount of optimisation has been undertaken to minimise pressure variances. However, there is scope to expand this technology and approach to pumping assets. By changing the operating method of a pump to a controlled, rather than fixed output, pressures can be better managed within the network giving rise to similar benefits to more conventional pressure management techniques. Stabilising network pressures leads to a reduction in network fatigue, extending the life of network assets and reducing the number of burst events. Pressure management can create difficulties with leakage detection techniques that rely on acoustics to locate leaks as pressure management valves can introduce noise into the network masking leak noise. The implementation of digital modelling techniques gives opportunity to overcome some of these issues.
- **Asset Renewal:** Our latest review indicates that NRR is deteriorating at 2.2 MI/d per year. Unchecked this would require an additional 11 MI/d of activity to be included in the plan is 2029/30 to maintain leakage at a constant level. Prevention of network deterioration is achieved by renewing the network as a rate that either maintains or improves network condition. We have included two asset renewal interventions in our plans:
 - **Mains renewal:** Through asset deterioration modelling we estimate the we need to replace 250km of network a year to offset deterioration in leakage. This is a significant increase in the level included in our PR19 plans but reflects our best and most current view of the state of our network. Our approach will require targeted mains replacement whilst minimising traffic disruption arising from mains replacement activity
 - **Communication pipe renewal:** The communication pipe is the section of the network that delivers water from a water main to the boundary of a property. Between April 2020 and March 2022 we completed 14,913 communication pipe leak fixes. Of these, over 87% were repairs. The delta between the average repair cost and relay cost is less than the cost of a second repair. We have therefore included an intervention that will result in all communication pipe leak fixes being undertaken as a renewal of the asset. This will result in a sustainable leak reduction through a fix that should have an 80 year plus life.

The interventions outlined above have been set to give the groundwork to maintain the ambition to reduce leakage by almost 62% by 2050 to ensure the future targets can be kept open. We have completed the WRMP tables on this basis. It means we undertake activity now, to keep options open for the future.

We are keen in the consultation process to understand stakeholders view on this. In particular, if we should retain a 62% reduction but with the associated risk this contains due to the uncertainty on whether levels can be met; or, as in this plan, have a delivery programme that still works to 62% reduction, but have a demand forecast that adopts a more confident 50% leakage reduction level.

Leakage Reporting

The leakage levels used in WRMP24 are consistent with our current leakage reporting methodology for the PR19 period. The only adjustment we have made to our 2019/20 reported figures (shadow leakage methodology version) is to replace the reported leakage figure with the 2019/20 benchmark figure set by Ofwat (99.90MI/d) for measuring progress against PR19 leakage reduction target. This has been done to make sure that our leakage reduction targets over the short, medium and long-term are consistent between WRMP24 and PR24.

Although we report largely consistently against the leakage reporting guidelines we are continually reviewing our approach to ensure that we are calculating our leakage levels and the source of leakage (e.g. trunk mains, distribution network or customer side) as accurately as possible.

Should better information be available we will take a view on whether it is appropriate to restate our leakage position in line with the mechanism set out by Ofwat to undertake this update within an AMP period. This may result in additional interventions being identified by which leakage may be reduced. For example, trunk mains leakage is currently assessed to be relatively low (less than 1% of total leakage). Should this level increase then it may be appropriate to include a targeted intervention for trunk mains.

1.4. Detailed Benefit and Cost Assumptions

This section sets out the specific costs and benefits of the planned leakage programme.

- **Find and Fix**

Conventional find and fix methods (such as sounding, leak noise correlating and acoustic noise logging) is considered to be the primary measure for offsetting the natural rate of rise in leakage. The current assessment of NRR is that this equates to 120 MI/d of activity per annum. There is an underlying assumption in the WRMP24 plan that this activity will continue to offset NRR in future years and therefore this is not included as an enhancement activity.

For reference, the initial budget for find and fix for 2022/22 was £16.5m.

- **Enhanced Find & Fix**

On a DMA by DMA basis, Enhanced Find and Fix processes can reduce leakage to less than 10% of the water supplied to the DMA. Expanding this capability and leveraging the opportunities that are anticipated from the Digital Tools option we expect to be able to reduce leakage in more DMA's to 10% and to be able to hold them at this level, or lower.

Digital tools and the availability of more granular demand data will significantly improve leakage targeting and the understanding of the quantum of leakage that exists within a DMA. Increases in

demand, especially during the summer months, that currently are reported as leakage, at DMA level, will be correctly captured and there is the possibility that the leakage calculation may move away from the current approach of using the flow during an hour at night and then estimating demand to a water balance approach where consumption is subtracted from demand and the residual assumed to be mostly leakage. This will remove a number of assumptions and extrapolations from the current calculation and improve the detection technicians confidence that leakage exists within the area under investigation.

The initial leakage benefit has been assessed as the difference between the forecast leakage level at 2024/25 (84.3 MI/d) and 10% of the initial estimate of DI for 2021/22 (561.3 MI/d), equating to 28.2 MI/d. Three scenarios were then proposed delivering this benefit over 15 years (in the low scenario) to 10 years (in the high scenario).

During the leakage modelling phase, enhanced find and fix was used as the residual option by which the required leakage profile was achieved – i.e. the balancing factor. This resulted in a lower requirement being selected than was originally proposed, with a total reduction of 18.8 MI/d being required over 15 years. However, by 2050 a total of 30.55 MI/d of benefit has been included in the plan, a 2.3 MI/d increase over the initial scenario.

The cost benefit of the selected scenario and the initial options is shown in Table 2 below:

Enhanced Find & Fix Benefits and Costs	AMP8			AMP9			AMP10			AMP11			AMP12		
	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d
Low	9.4	15.0	1.6	9.4	15.0	1.6	9.4	15.0	1.6	4.5	7.2	1.6	1.3	2.1	1.6
Med	11.7	18.8	1.6	11.7	18.8	1.6	5.4	8.6	1.6	1.2	1.9	1.6	1.3	2.1	1.6
High	14.1	22.6	1.6	14.1	22.6	1.6	1.0	1.7	1.6	1.2	1.9	1.6	1.3	2.1	1.6
Selected	4.1	6.6	1.6	6.7	10.7	1.6	8.0	12.8	1.6	9.6	15.4	1.6	2.1	3.4	1.6

Table 2: Enhanced Find and Fix cost benefit of the selected scenario and the initial options

- Smart Metering**

Three benefits scenarios were considered as part of the Smart Metering benefits analysis. The cumulative benefits for these are summarised in Table 3 below:

Scenario	2025-26	2026-27	2027-28	2028-29	2029-30	2031-40
Low	-	-	2.87	4.30	5.86	5.86
Mid	-	-	3.68	5.50	7.51	7.51
High			4.49	6.71	9.16	9.16

Table 3: Smart Metering benefits analysis

In line with the assumptions used in the PCC component of demand management, the Mid scenario was used for the Leakage component.

The benefit assumed through this option is equivalent to a c. 48% reduction in the level of customer side leakage from the assumed level, in 2024/25, of 15.8 MI/d.

The smart metering programme will enable the identification of customer side leaks to occur earlier in their life thereby reducing the run time of a leak. It will not reduce the number of leaks occurring as asset replacement is not being undertaken. The nature of the supply pipe leak repair offering (i.e. customer fix or free fix) is likely to influence the level of benefits that can be realised as this can materially impact the time taken to repair due to the level of influence the company has on the repair process.

The costs for the smart metering programme have not been included in the leakage costs as they are already captured elsewhere in the demand programme, thereby avoiding any double counting.

- **Digital Networks**

This option contains a number of component parts that contribute to the overall benefit, namely:

- **Digital Twin modelling:** By modelling network behaviour in near real-time leakage management will move to a more data centric approach, improving leak detection efficiency, reducing leak run times and improve the understanding of outcomes against actions. AMP8 provides the perfect opportunity to develop this technological approach due to the significant increase in data that will result from the roll out of smart meters. In addition, it is estimated that by deploying, on average, 6 pressure sensors per DMA, leakage detection targeting and burst event response could be significantly improved from current levels generating both leakage savings and efficiencies.
- **Situational Awareness:** This is a tool that is being developed in AMP7 to increase awareness and response rates to network events, such as bursts, water quality and pump failures. There is an opportunity to further develop this capability by linking with the digital twin modelling to enable proactive maintenance and response to situations before they become events.

We have estimated that, implemented across the whole network, these two solutions could result in leakage benefits of between 4.2 MI/d and 12.6 MI/d across a 25 year planning horizon.

The cost of implementing this technology has been calculated based on a unit rate of £307 per pressure logger and unit. An allowance of £6.1m has been included to cover the development and optimisation of the digital twin and situational awareness tools. Both these costs will be incurred in AMP8 as part of the development and implementation phase.

An ongoing cost of £0.55m has been included to cover logger battery replacement and maintenance.

- **Fibre Optic Networks:** This is a pioneering technology that uses either new or “dark” (unused capacity within the existing fibre optic network) to detect leakage. This technology is not yet proven but is considered to be worth exploring over AMP8 and AMP9 to both prove the viability and cost effectiveness of the technology and quantify the additional benefits that may be generated over and above those included in the digital twin/situational awareness capability.

An initial cost estimate of £5m has been included in AMP8 and AMP9 to develop the understanding of the applicability of this technology to leakage detection. Trials are likely to include laying new fibre optic networks near the existing water network as well as investigating the use of existing fibre optic networks.

No leakage benefit has been included in AMP8 or AMP9. Leakage benefits of between 0.2 MI/d and 0.4 MI/d a year were included from AMP10 onwards on the basis that this technology will be proven during this period. This is considered a low-risk approach as this level of benefit could be covered by the other options within the plan. This benefit is deteriorated over subsequent AMPs reflecting a reduction in ongoing opportunities arising from reducing leakage levels.

The cost benefit table for these options over the next 25 years is shown below:

Digitisation/Smart Networks Benefits and Costs	AMP8			AMP9			AMP10			AMP11			AMP12		
	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d
Low	0.8	8.3	9.8	0.8	0.6	0.7	0.8	0.6	0.7	0.8	0.6	0.7	0.8	0.6	0.7
Med	1.7	8.3	4.9	1.7	0.6	0.3	1.7	0.6	0.3	1.7	0.6	0.3	1.7	0.6	0.3
High	2.5	8.3	3.3	2.5	0.6	0.2	2.5	0.6	0.2	2.5	0.6	0.2	2.5	0.6	0.2

Table 4: Digitisation/Smart Networks cost benefit table for options over the next 25 years

Fibre Optic Networks Benefits and Costs	AMP8			AMP9			AMP10			AMP11			AMP12		
	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d
Low	0.0	5.0	-	0.0	5.0	-	1.0	5.8	5.8	0.9	5.8	6.9	0.7	5.8	8.1
Med	0.0	5.0	-	0.0	5.0	-	1.5	5.8	3.9	1.3	5.8	4.6	1.1	5.8	5.4
High	0.0	5.0	-	0.0	5.0	-	2.0	5.8	2.9	1.7	5.8	3.4	1.4	5.8	4.0

Table 5: Fibre Optic cost benefit table for options over the next 25 years

In both cases the selected scenario used in the plan was the low scenario.

- Advanced Pressure Management**

Advanced pressure management has been a successful lever for leakage reduction during the first part of AMP7 and it is expected that this will continue over the remainder of AMP7 as part of the overall AMP7 leakage reduction programme.

Given the current coverage of pressure management it is likely that there will be fewer opportunities to deliver future incremental benefits. Additional options are being explored as part of the AMP7 programme of work, especially in relation to the smarter control of booster pumps. This work is in its infancy and therefore future benefit, especially residual benefit post AMP7, is difficult to forecast.

We have therefore taken a cautious approach to estimating the level of benefit that may be achieved through pressure management and a range of benefit of between 6 MI/d and 12 MI/d over AMP8, AMP9 and AMP10 were modelled.

The costs for this programme of activity were based on unit rates derived for the initial draft of WRMP24.

The cost benefit table for the next 25 years is shown in Table 6 below.

Advanced Pressure Mgmt Benefits and Costs	AMP8			AMP9			AMP10			AMP11			AMP12		
	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d
Low	1.8	1.6	0.9	2.4	2.1	0.9	1.8	1.6	0.9	0.0	0.0	-	0.0	0.0	-
Med	4.5	4.0	0.9	4.5	4.0	0.9	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
High	6.0	5.3	0.9	6.0	5.3	0.9	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-

Table 6: Advanced Pressure Management cost benefit table for the next 25 years

The selected scenario used in the plan was the low scenario.

- Asset Renewal**

Our latest analysis (August 2022) indicates that Natural Rate of Rise – the rate of increase in leakage assuming no interventions are undertaken – is deteriorating at 2.2 MI/d per annum. Off setting deterioration requires asset replacement. For the purposes of the leakage plan this has been considered in two parts – mains replacement and communication pipe replacement.

o **Mains Replacement**

In AMP7 we planned to renew 259km of mains over the five-year period. Modelling work undertaken for WRMP24 indicates that 250km of mains replacement would deliver a leakage benefit of between 1.8 MI/d and 2.7 MI/d. Consequently, based on current estimates of NRR, we need to replace 250km of mains per annum to offset deterioration in NRR.

These assumptions were validated against our Pioneer risk model which indicated that replacing 250km of mains would result in a leakage benefit of 1.4 MI/d through the replacement of targeted sections of mains. We have assumed that through targeting the most leaky DMA's and not just the pipes that burst most we can outperform the risk model assumptions.

Although we also considered higher levels of mains replacement, the selected option of 250km p.a. represents a significant increase from the PR19 levels of mains replacement and were therefore discounted.

The costs for this programme of activity were based on unit rates derived for the initial draft of WRMP24.

The cost benefit table for the next 25 years is shown in Table 7 below.

Mains Replacement Benefits and Costs	AMP8			AMP9			AMP10			AMP11			AMP12		
	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d
Low	8.9	413.8	46.5	8.9	413.8	46.5	8.9	413.8	46.5	8.9	413.8	46.5	8.9	413.8	46.5
Med	10.7	413.8	38.8	10.8	413.8	38.5	10.8	413.8	38.3	10.9	413.8	38.1	10.9	413.8	38.0
High	13.3	413.8	31.0	12.8	413.8	32.4	12.3	413.8	33.6	12.0	413.8	34.5	11.7	413.8	35.2

Table 7: Mains Replacement cost benefit table for the next 25 years

The selected scenario used in the plan was the low scenario.

o **Comms Pipe Replacement**

We undertake c. 7,500 communication pipe leak fixes a year. The majority of these are repairs rather than relays (full replacement of the asset). Over the two years covering April 2020 to March 2022 over 87% of leak fixes were repairs. The NRR analysis does not define the contribution individual repair types have to the overall deterioration rate. Therefore, for the purposes of scenario modelling, we have assumed that replacing rather than repairing these assets will reduce the deterioration rate by between 18%, for the low scenario, and 36% for the high scenario.

We have also assumed that the current rate of detection of leaks on communication pipes remains at the current level and that benefit will reduce over time. This is because of an increased asset replacement rate.

The cost of this programme of activity is calculated based on the difference of the cost of repair and the cost of a relay, assessed as £417, on average (based on average unit rates for 2021/22).

The cost benefit table for the next 25 years is shown in Table 8 below:

Comms Pipe Replacement Benefits and Costs	AMP8			AMP9			AMP10			AMP11			AMP12		
	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d
Low	1.8	13.6	7.7	1.4	13.6	9.9	1.1	13.6	12.8	0.8	13.6	16.6	0.6	13.6	21.4
Med	2.7	13.6	5.1	2.1	13.6	6.6	1.6	13.6	8.6	1.2	13.6	11.1	1.0	13.6	14.3
High	3.5	13.6	3.8	2.7	13.6	5.0	2.1	13.6	6.4	1.6	13.6	8.3	1.3	13.6	10.7

Table 8: Pipe Replacement cost benefit table for the next 25 years

The selected scenario used in our plan was the low scenario.

By selecting these two asset renewal options, deterioration in the network has been largely been addressed. The small shortfall (0.3 MI/d in AMP8) has been addressed through Enhanced Find and Fix.

The overall cost benefit table of the selected plan is shown in Table 9 below.

WRMP24 Leakage Reduction Benefits and Costs	AMP8			AMP9			AMP10			AMP11			AMP12		
	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d	MI/d	£m	£m/MI/d
Advanced F&F	4.13	6.61	1.60	6.69	10.70	1.60	7.98	12.77	1.60	9.60	15.36	1.60	2.14	3.43	1.60
Comms Pipe Replacement	1.77	13.59	7.68	1.37	13.59	9.93	1.06	13.59	12.83	0.82	13.59	16.58	0.63	13.59	21.43
Advanced Pressure Management	1.80	1.59	0.88	2.40	2.12	0.88	1.80	1.59	0.88	0.00	0.00	0.88	0.00	0.00	0.88
Smart Metering	7.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Digitalisation/Smart Networks	0.84	13.26	15.75	0.84	5.55	6.59	1.84	6.38	3.46	1.69	6.38	3.77	1.56	5.83	3.72
Mains Replacement (Net of NRR)	-2.11	413.75	46.52	-2.11	413.75	46.52	-2.11	413.75	46.52	-2.11	413.75	46.52	-2.11	413.75	46.52
Total Reduction Requirement	13.95	448.80	16.59	9.19	445.72	20.49	10.58	448.08	19.18	10.01	449.08	19.70	2.24	436.59	31.26

(Note: Total mains replacement benefit is 8.89 MI/d)

(Note: No cost for Smart Metering included. Assumed to be included in Demand programme)

Table 9: WRMP24 Leakage Reduction cost benefit table for the next 25 years

We have structured the plan to meet the long-term 62% leakage reduction, whilst reflecting uncertainty by setting a planning forecast of 50% which balances the need to both reduce leakage over the long-term with a plan that has an appropriate level of risk.

1.5. Resource Zone Breakdown

The options and selected plan have been disaggregated to water resource zone level. The splits have been derived using water resource zone specific factors based on:

- **Property numbers** – Used to apportion the benefits of communication pipe renewals.
- **Mains length** – Total mains length was used to apportion the benefits of Digitalisation/Smart Networks
- **Leakage level** – Used to apportion the benefits of advanced pressure management and the customer side leakage benefit of smart metering
- **Proportion of NRR** - The Natural Rate of Rise study derived levels for each water resource zone. This allowed deterioration rates to be calculated at resource zone level and the ratios of the deterioration rates were used to apportion the requirement for mains replacement.

The resultant water resource zone activity tables are shown in Table 10 below.

Plan (Andover)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.1	0.2	0.3	0.3	0.1
Smart Metering	0.3	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.1	0.1	0.1	0.0	0.0
Digital Networks	0.0	0.0	0.1	0.1	0.1
Comms Pipe Replacement	0.1	0.0	0.0	0.0	0.0
Mains Replacement	-0.1	-0.1	-0.1	-0.1	-0.1

Plan (Kingsclere)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.1	0.1	0.2	0.2	0.0
Smart Metering	0.1	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.0	0.0	0.0	0.0	0.0
Digital Networks	0.0	0.0	0.0	0.0	0.0
Comms Pipe Replacement	0.0	0.0	0.0	0.0	0.0
Mains Replacement	0.0	0.0	0.0	0.0	0.0

Plan (Hants Rural)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.1	0.1	0.2	0.2	0.0
Smart Metering	0.1	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.0	0.0	0.0	0.0	0.0
Digital Networks	0.0	0.0	0.0	0.0	0.0
Comms Pipe Replacement	0.0	0.0	0.0	0.0	0.0
Mains Replacement	0.0	0.0	0.0	0.0	0.0

Plan (Meadway East)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.7	1.1	1.4	1.6	0.4
Smart Metering	1.2	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.3	0.4	0.3	0.0	0.0
Digital Networks	0.1	0.1	0.2	0.2	0.2
Comms Pipe Replacement	0.2	0.2	0.1	0.1	0.1
Mains Replacement	-0.3	-0.3	-0.3	-0.3	-0.3

Plan (Southampton East)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.4	0.7	0.9	1.1	0.2
Smart Metering	0.9	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.2	0.3	0.2	0.0	0.0
Digital Networks	0.1	0.1	0.2	0.2	0.2
Comms Pipe Replacement	0.3	0.2	0.2	0.1	0.1
Mains Replacement	-0.3	-0.3	-0.3	-0.3	-0.3

Plan (Meadway West)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.5	0.8	0.9	1.1	0.3
Smart Metering	0.8	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.2	0.3	0.2	0.0	0.0
Digital Networks	0.1	0.1	0.1	0.1	0.1
Comms Pipe Replacement	0.1	0.1	0.1	0.1	0.0
Mains Replacement	-0.2	-0.2	-0.2	-0.2	-0.2

Plan (Southampton West)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.1	0.2	0.2	0.2	0.0
Smart Metering	0.2	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.1	0.1	0.1	0.0	0.0
Digital Networks	0.1	0.1	0.1	0.1	0.1
Comms Pipe Replacement	0.1	0.1	0.1	0.0	0.0
Mains Replacement	-0.1	-0.1	-0.1	-0.1	-0.1

Plan (Sussex - Brighton)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.5	0.8	1.0	1.2	0.3
Smart Metering	0.9	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.2	0.3	0.2	0.0	0.0
Digital Networks	0.1	0.1	0.2	0.2	0.2
Comms Pipe Replacement	0.3	0.2	0.2	0.1	0.1
Mains Replacement	-0.3	-0.3	-0.3	-0.3	-0.3

Plan (Winchester)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.2	0.3	0.3	0.4	0.1
Smart Metering	0.3	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.1	0.1	0.1	0.0	0.0
Digital Networks	0.0	0.0	0.1	0.1	0.1
Comms Pipe Replacement	0.0	0.0	0.0	0.0	0.0
Mains Replacement	-0.1	-0.1	-0.1	-0.1	-0.1

Plan (Sussex North)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.5	0.8	1.0	1.2	0.2
Smart Metering	0.9	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.2	0.3	0.2	0.0	0.0
Digital Networks	0.1	0.1	0.3	0.3	0.2
Comms Pipe Replacement	0.2	0.1	0.1	0.1	0.1
Mains Replacement	-0.3	-0.3	-0.3	-0.3	-0.3

Plan (Hastings)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.1	0.2	0.3	0.4	0.1
Smart Metering	0.3	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.1	0.1	0.1	0.0	0.0
Digital Networks	0.0	0.0	0.1	0.1	0.1
Comms Pipe Replacement	0.1	0.1	0.1	0.0	0.0
Mains Replacement	-0.1	-0.1	-0.1	-0.1	-0.1

Plan (Sussex - Worthing)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.2	0.4	0.4	0.5	0.1
Smart Metering	0.4	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.1	0.1	0.1	0.0	0.0
Digital Networks	0.1	0.1	0.1	0.1	0.1
Comms Pipe Replacement	0.1	0.1	0.1	0.1	0.0
Mains Replacement	-0.1	-0.1	-0.1	-0.1	-0.1

Plan (Isle of Wight)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.3	0.4	0.5	0.6	0.1
Smart Metering	0.4	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.1	0.1	0.1	0.0	0.0
Digital Networks	0.1	0.1	0.1	0.1	0.1
Comms Pipe Replacement	0.1	0.1	0.1	0.1	0.0
Mains Replacement	-0.2	-0.2	-0.2	-0.2	-0.2

Plan (Thanet)	AMP8	AMP9	AMP10	AMP11	AMP12
Find & Fix	0.3	0.5	0.6	0.7	0.2
Smart Metering	0.5	0.0	0.0	0.0	0.0
Advanced Pressure Management	0.1	0.2	0.1	0.0	0.0
Digital Networks	0.1	0.1	0.2	0.1	0.1
Comms Pipe Replacement	0.1	0.1	0.1	0.1	0.1
Mains Replacement	-0.2	-0.2	-0.2	-0.2	-0.2

Table 10: Water resource zone activity tables