Appendix 2 Leakage and Pressure Management

October 2022

CONTENTS

1 AMP7 LEAKAGE ACTIVITY – PRE-DROUGHT (2021/22)

Background

Leakage is monitored and reported by South West Water in terms of operational areas. There are seven areas, six in the South West and one in Bournemouth (A7). Areas 1 & 2 are the operational areas within the Colliford Water Resource Zone ("**WRZ**").

Figure 1 – Operational Area 1

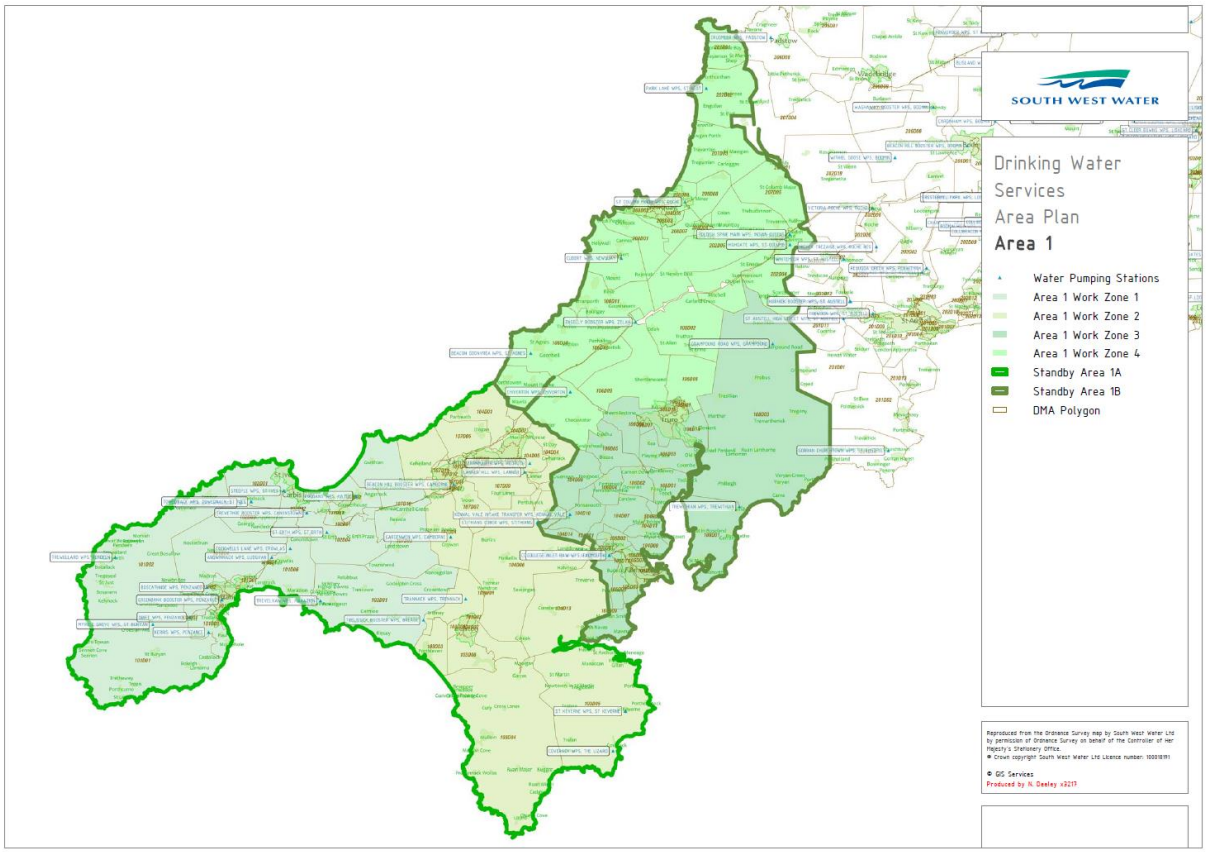
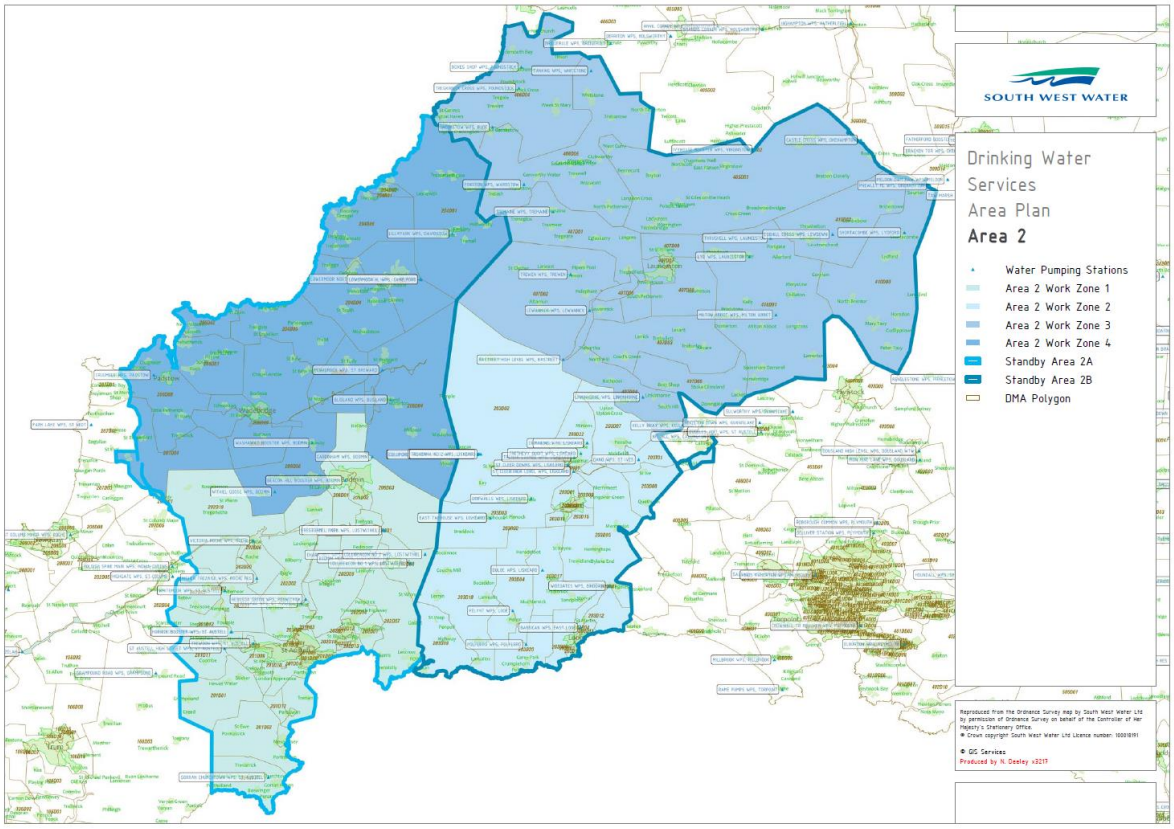


Figure 2 – Operational Area 2



1.1 Leakage position 2021/22 - pre drought

South West Water achieved its best ever reported, in-year, leakage performance in 2021/2022, 90.6 Mld. This ensured the three-year rolling target was met, following a deviation from target in the year 2020/21, and aligning performance to the AMP's overall reduction target of 15%. 2021/22 performance improvements were developed through implementing industry best practice, which resulted in the establishment of an in-year leakage recovery plan (Distribution Input Recovery Plan) with enhanced governance and controls including:

- Operational and investment plan to reduce leakage levels
- Pressure management activities
- Increase detection staff / new processes and technology to increase number of leaks found
- Increased leak repair resource to reduce leak repair work basket
- Customer side leakage enhanced processes
- Increased telemetry, data review and analysis

- New /enhanced leakage management and estimation software platforms
- Alignment of leakage operational and reporting teams
- Weekly working group meetings
- PMO approach using project management tool for governance, monitoring, recording of activities within plan
- Commissioning of external reviews by industry experts
- Increasing / improving our coverage of properties within consumption monitors – enhancing individual monitors and expansion of Small Area Monitors (SAM's)
- Review of all reporting inputs, factors and allowances to ensure that demand (consumption) and leakage are reported more accurately.

The activities above focused on operational improvements, network leakage reductions and leakage reporting enhancements, and have delivered significant reductions in leakage with target achievement reported for 2021/22 in-year and 3-year average leakage levels. Continuation of our leakage reduction plans are expected to achieve the targets for the remainder of the AMP7.

The workstreams resulted in a change to reported leakage from an in-year position of 136 Mld 2020/21 to 91 Mld in 2021/22. The reduction leakage can be summarised by the leakage reduction plan workstreams as follows in subsections 1.2 to 1.6 below:

1.2 Leak Detection and repair – 20 Mld – 2021/22

Leakage detection and repair in the year 2021/22 was centred providing fast-track leakage reduction with minimal lead times. Significant additional funding was approved and allocated for the delivery of the leakage reduction plan.

An enhanced leadership framework was established:

- 12 new staff were recruited into these teams in leadership roles
- 35 additional partner / contractor roles were created for leak detection
- 24 extra two-man repair crews were employed (again via our partner contractors) to fix the additional leaks identified and reduce the overall leakage workbasket. Additionally, a further 5 support drivers and 4 supervisors were engaged to support the increased number of repair crews
- The additional crews and support staff were brought in from further afield (some from the North-west) meaning that South West Water provided accommodation for them throughout their engagement
- Productivity and performance also increased from the use of new equipment and technology and from enhancing our own performance management.

Leakage detection activities by South West Water are delivered via a blend of direct and subcontracted labour. As part of our enhanced leakage plans, South West Water added

35 additional staff via our partner contractors to increase the volume of leak detection activities.

These teams provided leak-noise survey and Point of Interest ("**POI**") investigation resource, using digital analysis to provide next day issuing of work for leakage technicians to follow-up and carry-out 'pin-point' detection to promote repair jobs.

The assessed benefit of the additional detection (find) resource is 8 Mld, this being assessed from the increase in numbers of leaks detected.

The additional repair crew resource employed to fix leaks enabled a reduction of the overall leakage work basket from 800 open jobs at any given time (equating to volume of 15 - 20Mld) to less than 200 (5 Mld volume), as a result of the additional partner resources deployed. Therefore a 10-15 Mld benefit is derived from this activity (used 12 Mld mid-point for this overall assessment).

In addition to increased resource in traditional leak identification and repair, South West Water used the latest satellite detection techniques to improve performance. Utilis satellite imagery analysis utilises advanced algorithmic analysis to track the spectral signature of potable treated water (chlorine residual) in the ground.

More than 3,300 POIs were identified regionally. In many cases multiple leaks were identified at single POIs, leading to a conversion rate of around 50%. This technique was especially effective over our large stock of rural DMA's and trunk mains which often cover very large geographic areas and are difficult and time-consuming to investigate using traditional people-on-the-ground techniques. Traditional acoustic techniques are also challenging in such DMAs with long pipe lengths and few connections or mains fitting off which to monitor for leakage noise.

Dedicated experts were assigned to POI investigations to help promote success from the detailed analysis of the POIs through to sending detection staff in on-the-ground.

1.3 Pressure management activities – 6 Mld

South West Water have extensively invested in pressure management and 'network-calming' activities to control excess pressures that lead to more leaks and bursts and higher leakage.

New pressure control systems as well as undertaking maintenance on existing systems have been constructed. A project team comprising internal and dedicated external resourced enabled us to expedite delivery.

We prioritised no-interruption techniques for installation sites, using under-pressure valves and tees at all sites where more than 50 customers would experience a supply interruption of more than three hours. This enabled simpler planning and faster delivery.

A direct communication with our local highways' authorities' team was established for this workstream which again enabled us to minimise process delays and fast-track delivery.

New and optimised pressure control valves were set to reduce pressure throughout the Diurnal period.

A summary of project outputs is included below:

- 61 new pressure reducing valves ("**PRVs**") (with controllers) installed and optimised (plan continues to run with circa 25 new schemes under construction).
- 131 new controllers retro fitted on existing PRVs and optimised.
- 358 existing PRV controllers optimised.
- 240 PRV's serviced.
- 457 data logging projects carried out for pressure management investigations.

The measured output of the whole pressure management workstream amounted to c.6 Mld.

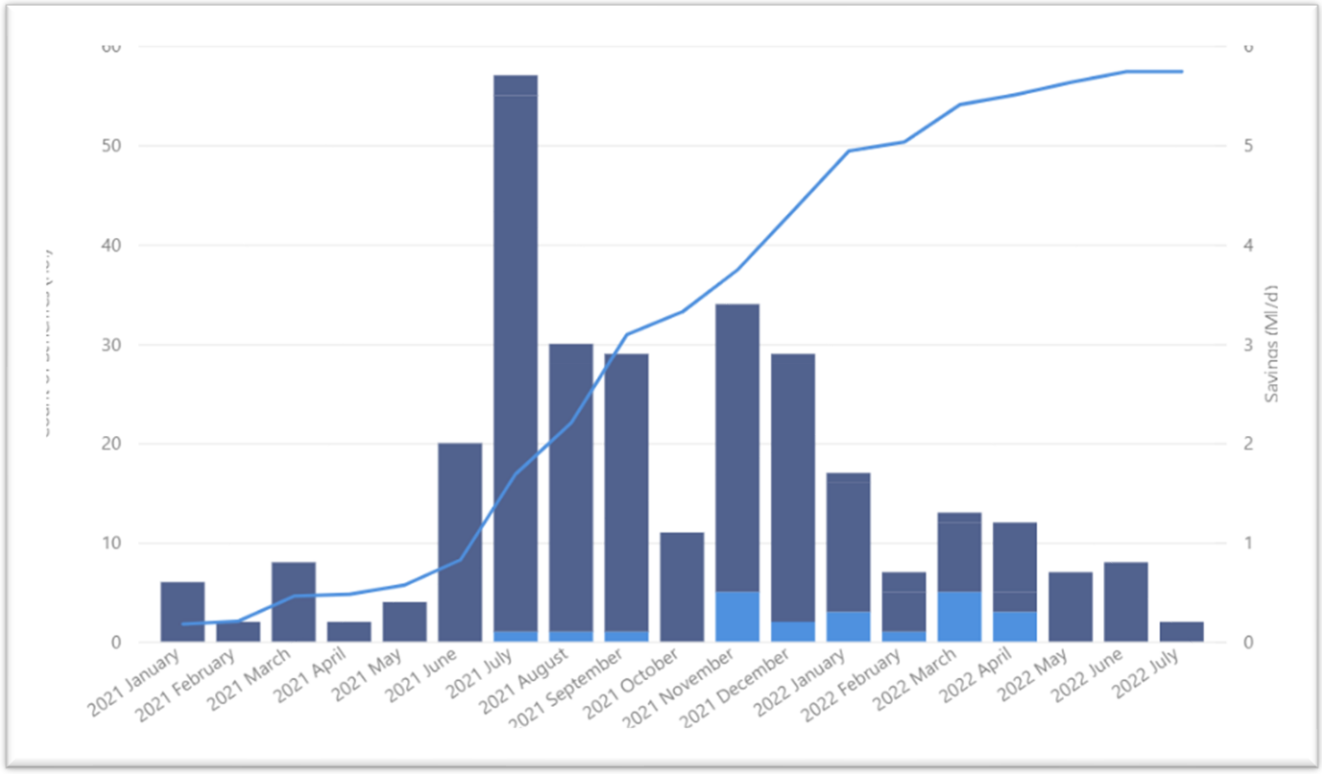
See Figure 3 below showing the relationship between new pressure valves installed and total leakage reduction.

Figure 3 - Total leakage reduction

Blue cumulative Trend line – Total leakage reduction

Light blue bars - New Pressure Valve digital Controllers

Dark blue bars – new pressure valves installed



1.4 Trunk Mains – 3 Mld

Specialist suppliers were appointed to provide active leakage control services to upstream assets e.g. trunk mains and service reservoirs. These additional upstream resources supported the location and repair of c.3 Mld from trunk mains.

1.5 Service Reservoirs ("SR") – 1 Mld

South West Water's SR cleaning program had been enhanced, during every SR clean a drop test was conducted. Leakage can be identified by the drop test, as can 'passing' valves. The assessment data from the increased drop test activity was fed into the reporting component, providing a small benefit of c.1 Mld.

1.6 Customer Side leakage – 14 Mld

Losses from customer supply pipes continues to be a significant component of reported water loss. Enhancing active leakage control efforts in this area was also identified as a high-priority, fast-reacting activity.

Three primary routes of identifying private losses exist:

- higher consumption / bill triggers (84% meter coverage in South West Water),
- customer contacts reporting a leak and
- leaks detected via targeted DMA ALC sweeps.

All potential leaks are investigated and, subject to several threshold parameters, an ex-gratia offer can be made to facilitate the fix of the leak. This is the fastest way to ensure a repair is made, with notice and enforcement processes risking protracted leak-run times.

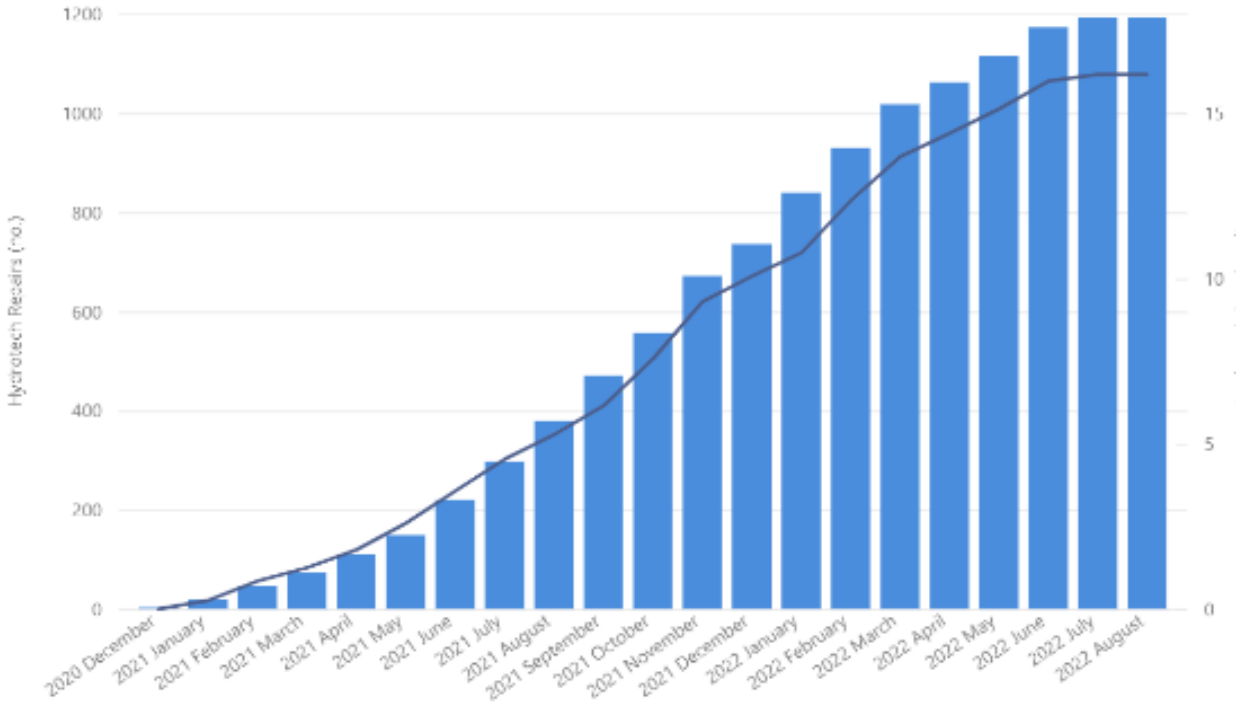
As part of our enhanced leakage strategy, the trigger thresholds for considering an ex-gratia repair / intervention were reduced from 10 litres per minute and over to 5 litres per minute and over.

In addition, our policy preference was changed to pipe renewal rather than spot repair. Where the supply pipe material is one of an identified type, the customer is offered a full renewal free of charge, instead of a spot fix, to reduce the number of repeat private leaks on high-risk pipe types.

With c.84% of customers on measured accounts, and close to 100% having a boundary facility to fit a meter, South West Water can readily determine leak flows. In the year 2021/22 c.14 Mld of leakage reduction was on customer supply pipes, a record high for this activity for SWW.

Figure 4 below represents the total leakage saved (trend) and interventions (customer leak repairs and pipe renewals) required to achieve the leakage reduction.

Figure 4 - Graph showing total leakage saved against leakage repairs



2 PRE-DROUGHT 2022 WATER LOSS ACTIVITY AND PERFORMANCE IMPROVEMENTS (JUNE TO DATE)

Responsiveness to the water losses, including leakage, in response to drought has seen the redeployment of the maximum sustainable level of direct labour water loss technicians into operational areas 1 and 2.

A total of 36 field technicians have been working in operational areas 1 and 2 since June 2022, the normal number being c.15. The additional field force has led to significantly increased numbers of found leaks. The average of the detected leaks in the rolling prior 12 months being near doubled in August and September tracking to a similar number.

Figure 5 – Detected Leaks in Operational Areas 1 and 2

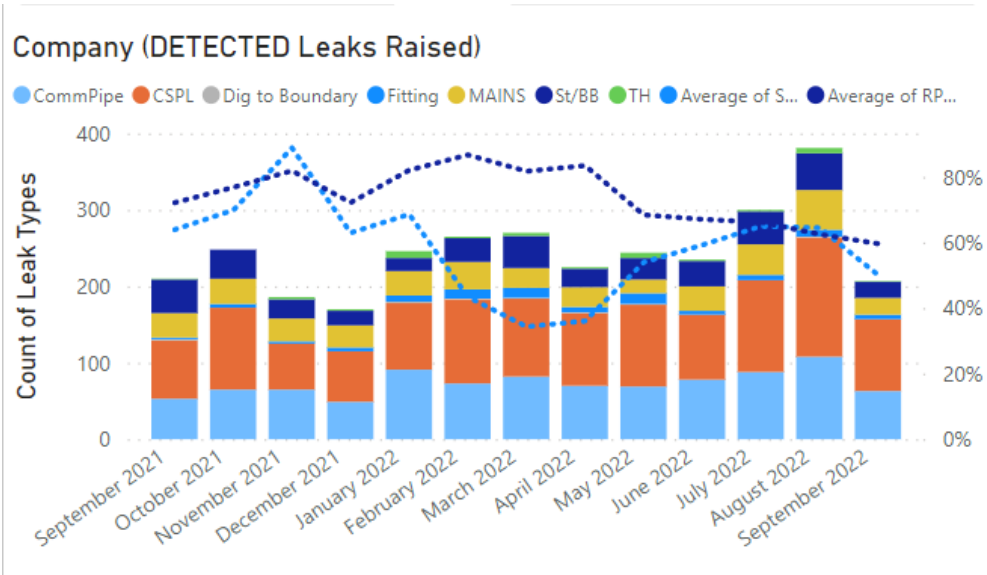
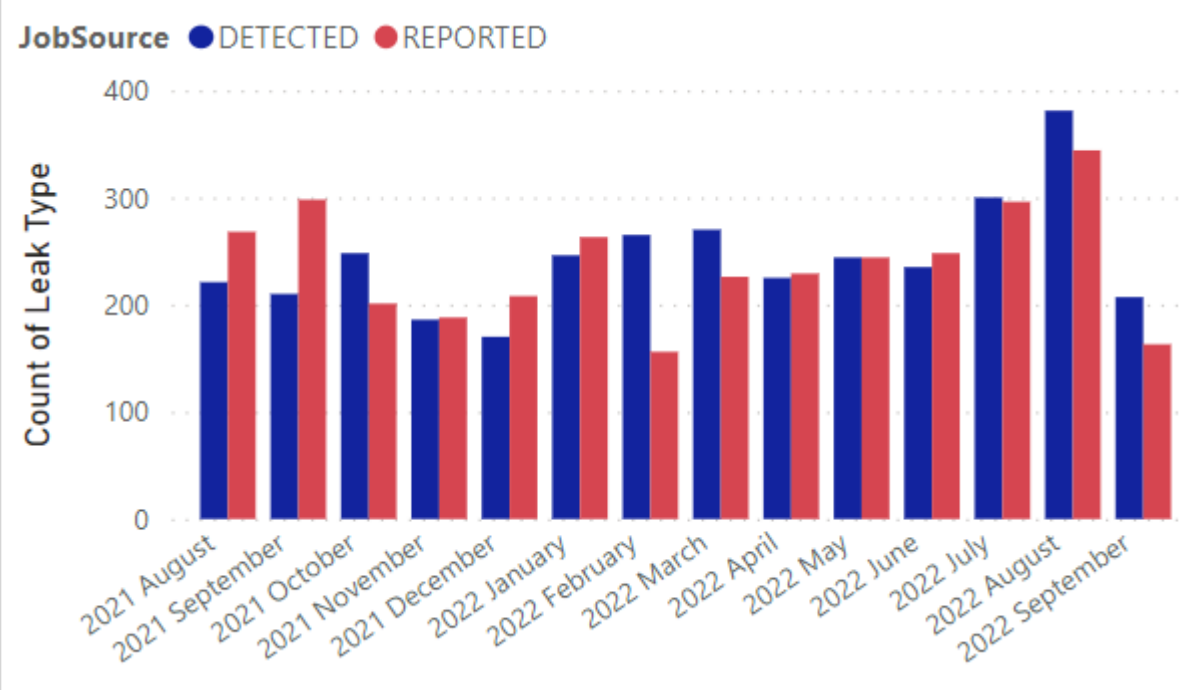


Figure 6 below shows the number of detected leaks compared to customer reported leaks in operational areas 1 and 2. Detected leaks are found due to their typical invisibility and the reported leaks are reported to us due to the visibility. Reported leakage is often responded to more quickly, with detected leakage requiring additional effort to locate the leak e.g. with acoustics or listening equipment.

Figure 6 – Detected Leaks compared to Customer Reported Leaks in Operational Areas 1 and 2



The intense dry period is placing significant pressure on the national supply chain, despite this, we've secured ten full time employees ("**FTE**") from three organisations to support us with a range of leak detection activities. The support ranges from specialist Trunk Main to conventional 'stick listening' for leak noise.

The business is investing £1.3m on initiatives to further reduce water losses in operational areas 1 and 2:

Table 1 – Initiatives to reduce water loss in CUT zones

Drought Project Description
DMA OPTIMISATION
Aqualogic DMA Ownership / Optimisations
Digital Twin (Model Development)
Digital Twin (follow Up Field Services)
BABE AND TM DMW SURVEYS
DEPLOYMENT OF SENSORS IN DMAS
DEPLOY ACOUSTIC AND PRESSURE SENSORS
PRESSURE MAMAGEMENT OPTIMISATION CORNWAL
Basic hydraulic Limiting of Valves
Installation of New Valves and controllers
LOSSES AT SWW SITES (WWTW)
WEEKEND WORKING/OVERTIME/INCENTIVISATION
CUSTOMER LEAK REPAIRS
WATER EFFICIENCY
SUPPLY CHAIN ADDITIONAL ALC RESOURCES
WLLS Resources x 4
MWS Resource x 6
ENHANCED HH NHH SUPPLY PIPE LEAK DETECTION
SATELLITE SCANNING AREAS 1 & 2 ANALYTICS

3 WATER LOSS MITIGATION SUB PROJECTS

3.1 Pressure Management (universal) – 0.7 Mld - completed

All pressure control valves installed within operational areas 1 and 2 have been further optimised to achieve the absolute minimum pressures possible and therefore lessen daily input flows to zone. Precisely measuring the benefit is challenging as summer demand, particularly overnight demand, is exceptionally high.

3.2 Pressure Management – 0.3 Mld – March 2023

Further schemes will be focused in operational areas 1 and 2 with the works carried out the same as above. The existing savings from the above works have been used to extrapolate the savings, however due to diminishing returns the savings are heavily reduced.

3.3 District Metered Area ("DMA") Optimisation – 0.5Mld – full affect March 2023

The specific target level for every reporting DMA is well established. The Minimum Achievable Leakage ("**MAL**") are known for all DMAs. In Cornwall, those MAL values are being re-evaluated. South West Water has commissioned the services of the expert supply chain to undertake in-depth studies of DMA performance. The DMA Ownership and Optimisation pilot has incentives built into the contract to drive innovative solutions for water loss and usage reductions in the selected DMAs. The DMAs selected are ranged to ensure the maximum opportunity for demand reduction is possible. In selected DMAs South West Water shall be:

- Operating at MAL
- Ensuring consistent standards
- Providing trunk main focus
- Targeting high non-household consumers

The project plan was altered in June to singularly focus on operational areas 1 and 2.

3.4 Customer Supply pipe Leakage – 2.0Mld. 1.0Mld delivered – full affect March 2023

Enhanced customer leakage offerings have been part of our BAU process since 2020 when a dedicated team of customer leakage technicians was established. The fully resourced team amount to 23 FTE.

High volume regional household leaks have been the focus since the team's establishment in 2020. The year 2021/22 was a record year for water loss mitigations. 14

Mld of leaks were identified and fixed. We are prioritising this WRZ and during 2021/22 have lowered the volumetric intervention threshold twice, starting at 10 litres per minute ("**LPM**") to 7 LPM. To further increase leakage opportunity the threshold was reduced to 5 LPM.

In response to the exceptional shortage of rainfall ("**ESOR**"), a number of changes were made to maximise the benefit in the WRZ. They included:

- Relocation of all regional resources to the Colliford Zone (14 FTE)
- Full removal of the LPM threshold
- Focusing on full supply pipe renewal over spot repair - no likely future leaks
- Large media campaign advertising the enhanced supply pipe leakage service
- Increased maintenance resource from frame worked supplier

The estimate of 2.0Mld of water leakage mitigation is based on typical awareness routes, scale of water loss and complexity.

Normal routes to awareness are:

- CSPL identified by active leak control staff when detecting
- Customer reporting suspected leak
- Customer reporting high bill (Measured)
- Customer not aware of higher bill – internal account volume trigger

Plans are in place to further increase maintenance resources should it be required.

In September 2022 an additional £2m has been allocated. The money will support the needed technicians and repair operatives to find and fix up to another 2000 customer leaks, tripling the current run rate. This investment will see resources focus in operational areas 1 & 2 but also support high value (volume of loss) customer leaks in the wider area, 3 – 6 inclusive.

3.5 Deferment of all operational water using network processes – 1.0 Mld delivered

All water using network tasks have been suspended. Most notable is the cessation of mains cleaning tasks. The process requires the acceleration of pipe flow velocity to generate a scouring energy at pipe/water interface. This effectively shears off settled/loosely bonded materials. The velocity increase is achieved by generating a measured discharge of water from washout and fire hydrants. Flows are calculated based on the pipe diameter and can be as much as 1500LPM.

3.6 Satellite scanning for leaks – 0.5 Mld, full effect Dec 2022

In 2021 South West Water commissioned a full regional survey of the buried pipe estate (18,000 km). The scan identified circa 3000 POIs.

Current methodology for these POIs has been to focus on rural areas where other technologies and practices struggle to identify leaks, given the nature of the POIs and works involved roughly 1000 POIs have been investigated (30%) with a resulting conversion rate of POIs to leaks between 10-20%.

An additional scan has been commissioned to cover Cornwall and North Devon, a total of 6000km, which is expected to generate around 1300 additional POIs. A dedicated team has been established to focus on these POIs over the next three months, the expectation that roughly 195 leaks are identified that would typically go un-noticed.

3.7 Leakage Performance

Annual daily average leakage is reported at year end. Weekly leakage performance is measured and reported but components that lead to the annual daily average are variable, so a range of trends are used. For targeting purposes, the most influencing parameter, the allowances used to determine actual night time leakage (0300 – 0400) are dual – averaged and profiled. Allowances vary through the year and are determined by the flow data logging of a large representative cohort of households. This value is a lagging metric and isn't fully determined until year end.

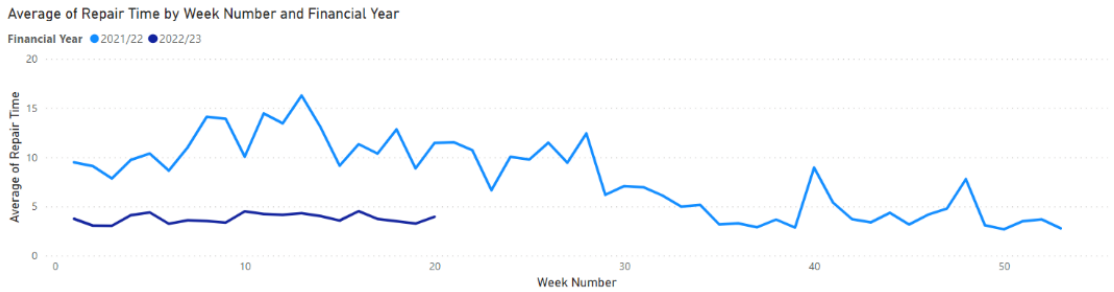
Leakage performance charts use both the average and profile household night use allowances to indicate water losses. The most likely value of leakage is the seasonally adjusted allowance line and an indicator of dynamic changes in leakage from natural rate of rise (leakage occurring) and leakage reduction from finding and fixing.

3.8 Work basket – Targeting maximum of four-day clearance

South West Water's Repairs and Maintenance partner, has doubled its repair and maintenance resource from 200 to 400 and deferred other workstreams e.g. new connections. In operational areas 1 & 2, the work basket being cleared of all leaks in circa 48hrs.

- Area 1 (Tolgus) – 33 live jobs (22nd Sept), total live volume using 'Equivalent Service Pipe Bursts' ("**ESPB**") formula 1.25Mld
- Area 2 (Castle Canyke) – 40 live jobs (22nd Sept), total live volume using ESPB formula 1.32Ml

Figure 7 - Average Repair Time by Week for 2021/22 and 2022/23



3.9 Digital Twin - 0.3 Mld, full effect Dec 2022

This project is being run as a trial to understand the full benefits of “digital twin” which aims to recreate a digital version of a DMA, the digital version is created based on mains, property, flow and pressure data and allows for the identification of potential leaks, high demand or DMA breaches by comparing the digital twin which is not aware or does not have these “anomalies” built in.

Two DMAs have been targeted with an estimated saving 0.3 Mld, this saving is based on returning the DMAs current leakage back down to its historic minimum.