DM Options summary -DRAFT

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1 Scenarios

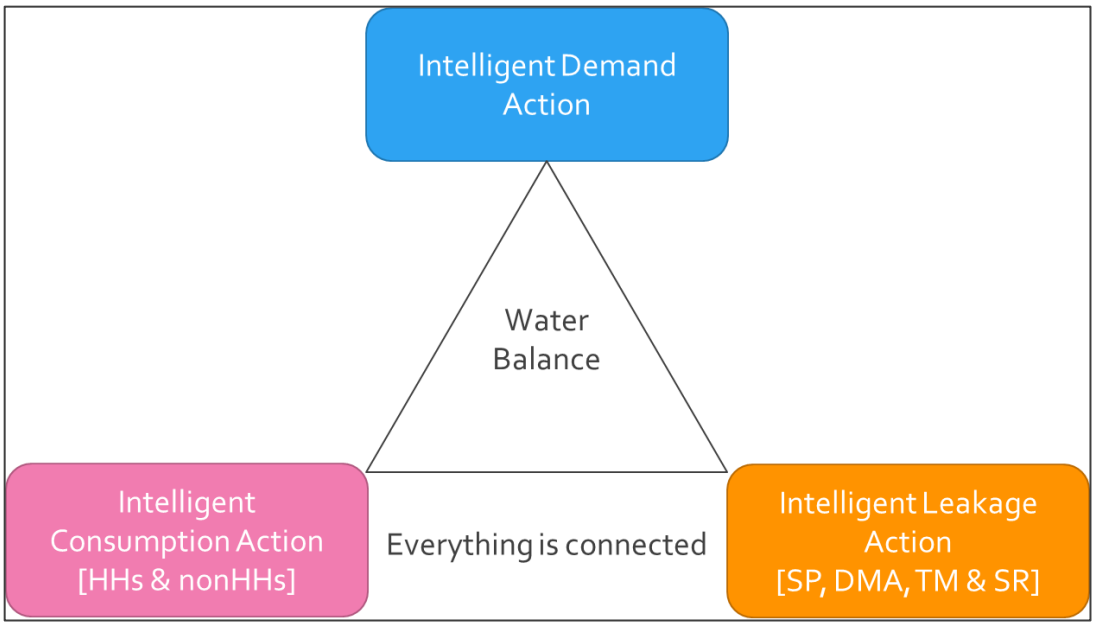
In addition to PCC, Leakage and NHH reduction pathways, we have considered additional scenarios for Smart Network and Water Labelling.

1.1 Smart Network

As part of this project, we have considered Smart Network scenarios, which represents an integrated approach to demand management built on the foundation of installing smart meters on all households. This considers the benefit of South Staffs Water implementing smart metering in AMP8, AMP 9 or not at all.

Smart metering on its own does not deliver demand reductions, but it facilitates demand reductions across households, non-households and leakage through behaviour change and targeting savings in specific locations. To facilitate these changes there needs to be a bringing together of all the data, to allow analysis to be carried out to support behaviour change and efficient and effective targeting of options. This also allows the demand management options to be considered in the context of the whole water balance, as illustrated in Figure 1.

Figure 1: The concept of an integrated Smart Network approach



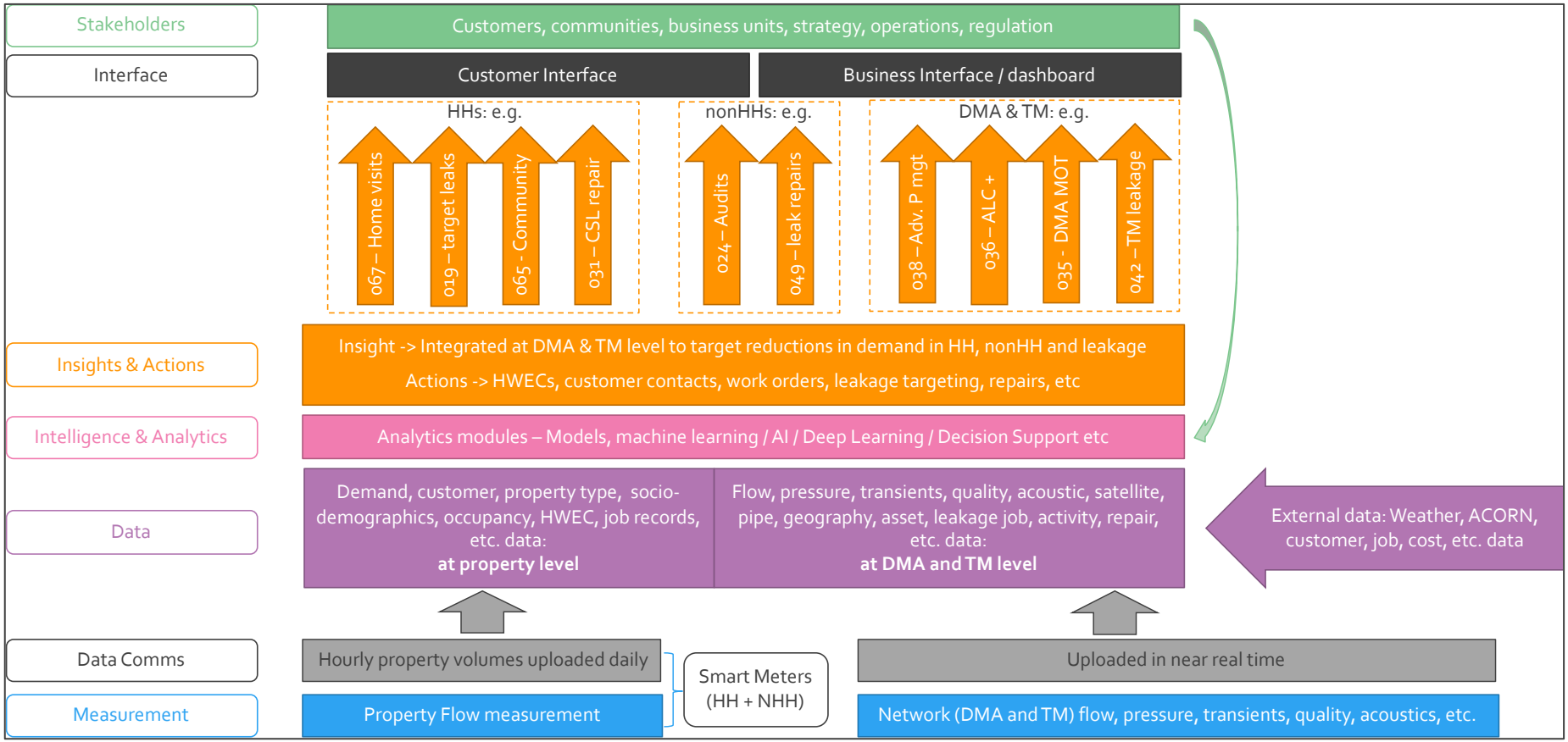
An overview of the Smart Network concept is shown in Figure 2, this presents the concept as an enabling option, which provides a common data and analytics process that combine property and network data to support intelligent demand reduction actions in households, non-households, DMAs and the trunk main system.

A key point is that the Smart Network data provides the actionable insight to enable selected options to deliver more than they currently can, and to evolve over time.

The rollout of Smart Network metering is not included as a cost in itself, as this represents a baseline activity rather than a demand management option, as these are assets that are maintained and replaced outside of this process.

In the optimisation process, we have used the Smart Network as an enabling option. The cost evaluation is carried out slightly differently to the other options. For each option where Smart Network can improve the efficiency (in terms of yield or cost) we have created two versions, one with and one without Smart Network. We can run both versions of the options through the optimiser and then compare the total costs with and without Smart Network. We can then evaluate the total cost of the suite of options to deliver the household, non-household and leakage reductions for each Scenario, and consider the non- Smart Network and Smart Network versions against the cost of implementing smart metering with Smart Network.

Figure 2: Smart Network overview



1.2 Water labelling as a government led demand reduction

We have included Water Labelling as an enabler in the optimiser.

The water savings from water labelling are described in Table 6 of the final report for the WaterUK PCC pathways project[1]. After consultation with WRSE, we were directed to use the 'lower savings estimate' for water labelling with minimum standards.

For the optimiser, these savings are netted off the PCC pathway for household consumption reduction, before the optimiser is run.

We make the assumption that government starts to implement water labelling in 2025.

2 Option definitions

2.1 Household Options

2.1.1 Community rainwater harvesting (2021-002)

Option summary

Similar to the exemplar North West Cambridge scheme, this would be an intervention for new developments where water collected through roof runoff and a sustainable drainage system is collected in a lake on the development. This water then undergoes basic treatment before being supplied through a separate supply system for toilet flushing, outside use and potentially clothes washing.

Option characteristics

The characteristics of this option are:

Identify discrete, new housing developments at pre-planning stage, above an agreed threshold size (e.g. 500 properties), as candidates for community level rainwater harvesting.

- Initiate discussions with site owners and developers about the possibility of jointly developing a community level rainwater harvesting system.
- Continue discussions to identify roles, responsibilities, funding and related strategic issues, where there is interest.
- Agree contractual arrangements with developer, contractors, site owners and others as needed.
- Be involved in design of rainwater system including collection, treatment, storage, back-up mains supply, pumping, supply provision and metering.
- Commission and test the system.
- Monitor the system performance in situ over a number of years. Assess mains water saved. Share results, insights and lessons learnt.

[1] AR1286_WUK-PCC-pathways_technical-report_FINAL_20190911.pdf

- Use lessons-learnt from each development to improve future schemes.

How feasible is the option?

The North West Cambridge development is the best example of the construction and installation of a community level rainwater system for the supply of non-potable water. This scheme resulted from interest in the site owners and developers (the University of Cambridge) and Cambridge Water, to develop a sustainable site. This was also enabled by planning support from the local authority.

At the time of writing the rainwater harvesting system is in place but has not been commissioned due to problems with the treatment plant which treats the collected rainwater before it is pumped into supply. It is understood that this is a site-specific issue, but due to lack of leadership, it has become a blocker to full implementation of the scheme. All other components are understood to be working and ready.

This example illustrates the need for:

- Site owner and developer support.
- Careful planning and anticipation of the engineering challenges associated with a novel approach to water supply
- Strong leadership amongst all key stakeholders to drive the scheme forward and overcome problems.

Benefits of the option

An appropriately designed system should significantly reduce the demand for potable water, by supplying water for toilet flushing and potentially other uses – e.g. outside use – from an onsite source.

The recent Waterwise report into rainwater harvesting and greywater system costs and benefits highlighted that "The overall benefit increases both as the collection area and demand increases, this is primarily due to the size of the storage tank. Further to this when the wider social (indirect) benefits, such as reduced demand on water infrastructure, CO_2 savings and flood damage reduction are also considered, the potential benefits over a 20 year system lifetime increase substantially."[2].

The savings from each system will depend on design, storage, rainfall and demand patterns. For this study we have assumed the same saving of 83 l/prop/d as for option 603 – communal rainwater reuse, from the WRMP19 work. Costs are based on the feasibility study estimates for North West Cambridge.

[2] https://www.waterwise.org.uk/knowledge-base/independent-review-of-costs-and-benefits-of-rwh-and-gwr-options-in-the-uk/

2.1.2 Targeting properties for efficiency Water Neutrality (2021-006)

Option summary

Water neutrality is when the additional demand from new development is minimised as far as possible and then offset by reducing demand in the surrounding area. The original water neutrality studies[3] looked mainly at offsetting new demand by reducing demand in existing households. Offsetting could also be done by reducing leakage and/or non-household demand.

Option characteristics

The main characteristics of this scenario are as follows:

- Setting limits on the demand from new development. This is likely to require consumption standards for new homes, which could be based on the existing whole building standard set out in the Housing Regulations, or as part of minimum standards for water labelling linked to building regulations (one of the options being considered here).
- Estimating the total volume from new development that needs to be offset.
- Identifying the options for offsetting this new demand. Options could be taken from this list of feasible options for existing households, non-households and for leakage. Options are likely to include household and non-household retrofits.
- Developing a mechanism and funding for delivering the offsetting measures. This could be delivered by the water company if retrofit schemes are funded through business plans, or through other routes. Engagement with local authorities and development corporations (where appropriate) are likely to be important.

How feasible is the option?

All the component parts of water neutrality have been delivered in isolation, and in fact are contained within this feasible option list. Therefore in theory, water neutrality is feasible. Delivering water neutrality as a deliberate and coherent package of measures has not been done to date. The main challenges are likely to be associated with the engagement, co-ordination and co-operation of a wide range of stakeholders, which in itself if likely to be a considerable task.

Benefits of the option

In broad terms, achieving water neutrality enables new development to be delivered without needing to abstract any additional water from the environment. From water company perspective, neutrality would significantly reduce per capita and per household consumption.

For this option we have assumed that nine homes have to be retrofitted to offset the demand from one new home, and that 20% of the household targeted for retrofits will end up taking part. Therefore 45 homes will need to be targeted to offset the demand from one new home. This offset rate is slightly higher than that reported in the 2007 report into water neutrality in the Thames Gateway[4], which estimated between 3 and 8 properties would need to be

[3] For example: Environment Agency (2007) Towards water neutrality in the Thames Gateway Science report: SC060100/SR3

[4] Towards water neutrality in the Thames Gateway: Modelling baseline, business-as-usual and

retrofitted per new home. This is because the 2007 report estimated a large proportion of savings from retrofitting dual flush toilets into existing properties, and it is likely that this saving is much reduced due to replacement of larger flush toilets over the past few years.

2.1.3 Household water efficiency programme (Partnering approach, home visit) (2020-012)

Option summary

Home water efficiency visits can result in useful reductions in water use through the provision of water saving kits, plumber installed retrofits, and by encouraging behaviour change.

Option characteristics

Properties are contacted and invited to take place in a home water efficiency visit

Advice is provided where water use is higher than expected for other reasons. Companies would deliver campaigns to encourage households to adjust their water use behaviours and practices. it is assumed that more engaged customers will request water savings devices, retrofit advice and other tips, after being contacted as part of a community-wide education and engagement programme. Customers will fit devices themselves, where appropriate

How feasible is the option?

Most water companies are engaged in water efficiency programmes of this type, so the option is feasible.

Benefits of the option

Evidence from Thames Water[5] and Waterwise/Ricardo AEA[6] suggests that around 5% of households have a leaky loo and that the average daily water loss from this is around 200 litres per day. For this option we have assumed that a reduced of 31 l/property per day through a visit and provision of water saving devices. This option will be less efficient than targeting options as it will be applied to all households, not those with high use.

2.1.4 Housing Associations - targeted programme (2021-036)

Option summary

This option involves direct company liaison with housing associations to promote water efficiency to residents. An initial audit, or communication is followed up with regular communications as new water saving techniques and devices enter the market.

pathway scenarios (2007). Retrieved from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291669/sch01107bnma-e-e.pdf

[5] https://bit.ly/3e2RJY5

[6] Leaky Loos Phase II - Water Industry Collaborative Fund Project, retrieved from: https://www.waterwise.org.uk/wp-content/uploads/2018/08/Leaky-Loos-Phase-II_Final-report.pdf

The most efficient delivery would be for housing associations to use existing contractors to carry out the installations and so a partnership approach with the housing authority would result in a lower cost to deliver this option.

Option characteristics

The option would involve a home visit by plumber to install water efficient devices such as low flow showerheads, tap inserts, cistern displacement devices and dual flush retrofits where appropriate. The visit would also provide information on behavioural change and its impact on water use.

For increased efficiency / lower costs, the installation of water saving devices could be integrated into existing housing association maintenance / property inspection regimes.

How feasible is the option?

As a focused continuation of water efficiency projects, this option is feasible.

Benefits of the option

Based on national figures for England, it is estimated that 17% of households are social housing[7]. We estimated that approximately a quarter of these would be refurbished in any one AMP period, and that of these, around half would be suitable for water efficiency retrofits. It is estimated this option could yield a saving of 30 l/property/day, based on WRMP19 analysis.

2.1.5 Innovative tariffs (2020-048)

Option summary

This intervention assumes smart metering as a pre-requisite and therefore can only be delivered within Smart Network programme. New tariffs are developed and introduced to encourage water saving behaviours through incentives. Tariffs can be targeted to deliver reductions in consumption based on individual household consumption patterns.

The framework for tariffs for water services are determined by Ofwat. This intervention would therefore also require input from this regulator.

Option characteristics

Where variable tariffs are introduced for all domestic customers in areas where meter penetration is high, the use of tariffs provides a potential tool for managing demand in households.

7 https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/comparingaffordablehousingintheuk/april2008tomarch2018

The definition of 'innovative tariffs' is deliberately loose as there is a wide variety of options with varying levels of research and evidence on smart meter tariffs and their effectiveness.

There are broadly two types of water tariff have historically been considered: rising block, and seasonal. The rising block tariff works by increasing charges when volume consumed exceeds a set threshold. In seasonal tariffs, charges are varied during seasons with high or low consumption.

When combined with smart meter data, variable tariffs could also be introduced based on peak times and seasons. Research could be carried out to investigate how customers would respond to these types of tariffs.

How feasible is the option?

This option is dependent on the installation of smart meters at properties to enable accurate measurement and billing based on innovative tariffs. In addition, the introduction of such tariffs may require regulator or industry consultation.

Benefits of the option

This option incentivises reduced consumption, leading to improvements in PCC. It is estimated that the saving will be around 2% of household consumption.

2.1.6 Home retrofit RWH/GWR (2021-075)

Option summary

This intervention would require a widespread programme to encourage the retrofitting of rainwater or greywater systems to existing housing stock. Rainwater systems are likely to be more successful at present due to the maturity of the technology and lower maintenance requirements. Retrofit options for greywater recycling products are less popular, more complex and require more maintenance.

Option characteristics

Rainwater

In the UK, residential RWH systems typically utilise buried tanks although above ground tanks are also sometimes installed. Pumped flows are delivered via direct-feed or header tank systems. All systems capture rainfall from the roof and store the filtered water in below ground or above ground tanks. Rainwater is then delivered by a submersible pump to non-potable applications either by direct-feed or via a header tank.

Greywater

Grey water generated from baths, showers and washbasins can be considered high volume, low strength wastewater with high potential for reuse. Public perception studies suggest there is general willingness and positivity regarding GWR provided public health is not compromised. GWR systems vary significantly in their complexity and size and their requirements depend upon the application. Design and technologies of the basic systems which involve limited treatment and thus result in limited reuse options have changed little over the last decade. The most significant developments in GWR systems relate to those that

involve membrane-based technology. These systems can treat grey water to a high-level allowing reuse for a wider number of applications.[2]

How feasible is the option?

The recent Waterwise report into RWH and GWR[8] states that for rainwater, "smaller installations are not privately beneficial for the installer and are therefore unlikely to see large scale uptake until they become so, either through falling prices or government backed schemes and interventions.".

The same report says that greywater "...systems installed in larger buildings such as large tower blocks or multi-house residential developments present an attractive opportunity, both privately and socially. However smaller installations are not privately or socially beneficial for the installer and as such large-scale uptake is unlikely until they become so, either through falling prices or government backed schemes and interventions." [2]

Benefits of the option

The savings from each system will depend on design, storage, and demand patterns, and the amount of rainfall or greywater that is collected. It is likely to be in the region of 20-25% of average potable demand, based on supply to toilets. Costs and savings assumptions are taken from the Waterwise report.

2.1.7 Increased media campaigns and school education (2021-076)

Option summary

This intervention would build on the baseline activity and pilot studies that South Staffs Water is already undertaking, but would be higher profile, more consistent and co-ordinated at a regional level.

The effectiveness of this campaign would vary depending on whether or not it was part of a co-ordinated IDA programme, underpinned by smart metering. There are therefore two variants of this intervention, with and without IDA.

Option characteristics

Many water companies already undertake an array media campaigns and work with schools, in order to provide water efficiency education to children and in turn the wider community.

This option will continue to promote water saving devices and efficiency and combine with educational programmes in schools with a focus on reducing water consumption (both within the school and at home).

[8] Independent review of the costs and benefits of rainwater harvesting and grey water recycling options in the UK (2020). Retrieved from: https://waterwise.org.uk/wp-content/uploads/2020/09/Ricardo_Independent-review-of-costs-and-benefits-of-RWH-and-GWR-Final-Report.pdf

Some of the measures which could be considered for inclusion are:

- Educational resources for schools
- Assemblies/Talks
- Active Class Sessions
- Site Visits
- Enhanced use of media – social/ print/ local radio
- Advertising campaigns – buses, trains, billboards

The savings estimates for this option are taken from the pilot study carried out by South Staffs Water in the St Albans area in 2020[9], which challenges customers to save 10 litres of water per day. The results of this pilot indicate that 61% of households stated they had started to use less water. We have assumed that around one third of the households which self-report a water saving will save the target of 10 litres per household per day.

How feasible is the option?

The results of the St Albans pilot study show that this option is feasible. Further analysis would be helpful to confirm if the reported savings are achieved, and whether this is sustained over time.

Benefits of the option

Direct benefits of this type of option are difficult to quantity as campaigns to change behaviours may be effective to greater or smaller extents in different areas, and so attributing direct savings is complex due to lack of clear evidence. However Waterwise report on efficiency programmes proposed a saving estimate of between 1% and 5% although lack of evidence was cited[10]. The assumed saving of 10 litres per property per day falls within this range, based on an average PHC of 327 l/prop/day[11], and is at the lower end of this range when the 30% uptake adjustment is applied.

2.1.8 New homes standards – voluntary (2021-077)

Option summary

At present, all new homes in England have to meet the mandatory national standard set out in the Building Regulations, of 125 litres/person/day. Where there is a clear local need, local planning authorities can set out Local Plan policies requiring new dwellings to meet the tighter Building Regulations optional requirement of 110 litres/person/day[12]. Further details

[9] Save 10 a Day Campaign. Executive Summary. February 2021

[10] For example, Waterwise (2012) 'Investigating the impact of water efficiency educational programmes in schools: a scoping study' found limited quantitative results on the effectiveness of education programmes. https://www.waterwise.org.uk/wp-content/uploads/2018/02/Investigating-the-impact-of-water-efficiency-educational-programmes-in-schools_final.pdf

[11] This is the average, company level per household consumption for the normal year, with climate change included.

[12] https://www.gov.uk/guidance/housing-optional-technical-standards

of how and when local authorities could require developers to meet these standards is set out in Part G of the Building Regulations[13].

One of the main factors which "may" support the requirement for this lower consumption standard is if a water company supply area is classed as being seriously water stressed. All of South Staffs Water's regions are classed as seriously water stressed, therefore it may be assumed that all new housing development is required to meet the 110 l/h/d standard.

Lower consumption rates are achievable in a range of ways – for example through the use of rainwater harvesting to provide non-potable supplies for toilet flushing, or by using alternative standards, such as developed by the AECB[14]. Therefore this option would be a voluntary scheme for developers to install devices to meet deliver consumption rates lower than forecast for new households in the baseline forecast.

Option characteristics

This option would be applied at a development scale through consultation and agreement with stakeholders, particularly the local authority, developers and main contractors.

The target would be to achieve a new home standard below the current baseline forecast for new households.

Experience suggests that a reduction of 10 /l/h/d can be achieved using water efficient fittings, compared to standard installations, without the use of rainwater harvesting. Using this target means that this option is not mutually exclusive with option 2020-004 (community RWH).

How feasible is the option?

This option is technically feasible with existing efficient water using devices, based on a voluntary fittings-based standard. Actual consumption will always depend on behaviour, and this is reflected in the estimated saving against the current baseline consumption forecast for new households. 'Fit and forget' technologies that deliver lower consumption rates without compromising user experience are proven to be effective.

Achieving buy-in from stakeholders may be more challenging – a key aim is to demonstrate that the marginal cost of more/most efficient water fittings is minimal or zero.

Benefits of the option

10 l/h/day reduction from the current baseline forecast for new households

[13] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf

[14] https://www.aecb.net/aecb-water-standard/

2.1.9 Targeting properties for leak repairs or efficiency audits – with Smart Network(2020-090)

Option summary

Home water efficiency visits can result in useful reductions in water use through the provision of water saving kits, plumber installed retrofits, and by encouraging behaviour change. Implementing this option after smart meter installation, as part of a Smart Network programme means that specific properties with the highest rates of consumption can be targeted for engagement, to determine the reason for the high water use. Repairs to internal leaks, e.g. from leaky loos can be made and advice given if water use is much higher than it should be.

The savings associated with this option are based on reported losses from leaky loos.

Option characteristics

- Data from smart meters is collected and analysed to identify the highest consuming properties.
- These properties are contacted and invited to take place in a home audit, with a particular focus on identifying internal leaks from leaky loos, primarily.
- Free repairs are provided to leaky loos where this is shown to be the main contributing factor to the high consumption rate.
- Advice is also provided where water use is higher than expected for other reasons.

How feasible is the option?

Thames Water have successfully been targeting high use households following their programme of smart meter rollout, demonstrating that water savings have more than doubled by targeting high use households[15].

Benefits of the option

Evidence from Thames Water[16] and Waterwise/Ricardo AEA[17] suggests that around 5% of households have a leaky loo and that the average daily water loss from this is around 200 litres per day. We have assumed that a reduced of 200 litres per day can be achieved at 50% of properties identified as having high water use, for this option.

2.1.10 Targeting properties for leak repairs or efficiency audits – without Smart Network (2020-91)

Option summary

Home water efficiency visits can result in useful reductions in water use through the provision of water saving kits, plumber installed retrofits, and by encouraging behaviour change. These

[15] 'Smarter' household water efficiency - Waterwise conference 2021 flash talk. Alice Hill, Thames Water
[16] https://bit.ly/3e2RJY5
[17] Leaky Loos Phase II - Water Industry Collaborative Fund Project, retrieved from: https://www.waterwise.org.uk/wp-content/uploads/2018/08/Leaky-Loos-Phase-II_Final-report.pdf

visits can also identify and repair plumbing losses, e.g. resulting from leaky loos and dripping taps.

A pilot study, delivered by Artesia for Southern Water, has shown that it is:

- possible to use water use and household information to identify households which are likely to deliver better than average reductions in water use from such visits, and
- that when visited, consumption at these properties does in fact reduce in line with what is forecast (on average), and so are better candidates for targeting.

Option characteristics

This option has the following characteristics:

- Data is collected on household consumption and other relevant household information, including for example, occupancy and socio-demographics.
- A model is developed based on observations from previous home water efficiency visits which identifies the types of property to target in order to achieve a certain level of water saving.
- The households that fall into this/these categories are contacted and encouraged to participate in home water visits in the normal way.
- The original model used to target the households should be reviewed based on the results of the visits, and improved in an iterative way, to improve its predictive ability. It is likely that new models will be required in areas with different population and household characteristics.

How feasible is the option?

The pilot study conducted by Artesia for Southern Water has shown that this approach is feasible and successful. The effectiveness of this option is improved by more frequent household meter data, therefore if monthly data can be collected from AMR meters in study areas then the option is likely to be more effective.

Benefits of the option

The actual savings from the properties targeted by the model we developed was, on average 31.4 l/prop/d, from the top 20,000 targeted properties from the model. This compared to a modelled saving of 34.9 l/prop/day.

2.1.11 Community Water Efficiency Scheme with IDA (2021-093)

Option summary

This option is based on the results of the St Albans pilot study of the 'Save 10 a Day' campaign, focusing on the benefits estimated from the households engaged most with the programme, by ordering water saving devices through the GetWaterFit app. It is assumed that the programme delivered in St Albans will be rolled out to other communities across the company's supply area, and that there will continue to be similar savings from the deeper engagement from this smaller proportion of customers.

Option characteristics

This would be a water company-led intervention.

Companies would deliver campaigns to encourage households to adjust their water use behaviours and practices. it is assumed that more engaged customers will request water savings devices, retrofit advice and other tips, after being contacted as part of a community-wide education and engagement programme. Customers will fit devices themselves, where appropriate.

The incentives could be either individual or community based. Individual schemes could be incentivised with a loyalty scheme where customers receive a reward if they achieve a certain percentage reduction in consumption. Community schemes could provide towns, villages or neighbourhoods with a community level reward based on consumption reduction across that area.

How feasible is the option?

This type of scheme is being tested by South Staffs Water at the moment and is considered totally feasible.

Benefits of the option

The St Albans trial of the 'Save 10 a Day' campaign resulted in around 17% of properties engaging through the GetWaterFit app and subsequently ordering water saving devices. For this version of the option, which would be part of the IDA process, we have estimated twice this proportion of properties would take part, encouraged by having a clearer view of their water use from smart meter data. We have assumed that the saving per property is the same as for the plumber led retrofit – i.e. 31.4 l/prop/day, given a) the likely competence of the 'keener' households to deliver these retrofits themselves and b) the lack of evidence on self-install savings.

2.1.12 Community Water Efficiency Scheme non-IDA (2020-095)

This option is the same as the version with IDA (2020-065) except for the uptake rate of devices, which is based on the results of the St Albans trial, and is 17%

2.2 Non-Household Options

2.2.1 Metering of leftover Commercials (2020-061)

Option summary

This option is to install meters at unmetered non-household properties.

Option characteristics

It is estimated at the end of AMP7 there will be approximately 8,000 non households that pay via an unmetered bill. This option assumes that 80% of these 8,000 can be metered, with the rest being infeasible due to shared supplies and difficulties in metering some properties.

External installation costs are used for all installation. Due to the nature of the left over commercial a higher installation cost of £1,000 is assumed.

This option includes an estimate of savings from supply pipe repairs that occur as a result of an increased metering rate.

This option is mutually exclusive with installation of Enhanced Meter Technology (2021-116)

How feasible is the option?

The remaining unmetered commercial properties are believed to be a mix of small, mixed use and potentially "difficult to meter" properties. On this basis, an estimation that 80% of this remainder will be able to be metered.

Benefits of the option

A saving of 10% is assumed based on previous metering studies.

2.2.2 Water Audits Retail – Non Process Smart Network (2020-063)

Option summary

This is a company -led intervention to carry out audits on Non household properties, based on water use and business type. South Staffs Water can recommend appropriate options for reducing consumption.

Option characteristics

An analysis of business and water use would be undertaken. Then depending on business type and volume of water used per annum, a range of options could be promoted. This option could be extended to provide further analysis on replacing devices/appliances and estimated payback periods so businesses may understand the benefit of further investment. This programme initially proposes provision of cistern displacement device or dual flush retrofit devices and taps inserts and provision of saving your business water use information and is installed by plumber or contractor

How feasible is the option?

Water audits are already in operation and this would be an extension and continuation of this work. This option could be carried out using existing teams and processes.

Benefits of the option

Benefits are reduction in non-household demand estimated at 1250 l/prop/day.

2.2.3 Water Audits Retail – Non Process Non -IDA (2020-163)

This option is the same as the version with IDA (2020-063), but with a reduced uptake rate of 15% retailer Incentive Mechanism (2020-052)

2.2.4 Retailer Incentive Mechanism (2020-114)

Option summary

This option encourages retailers to promote water efficiency for non-household customers.

Option characteristics

An analysis of non-household use would be undertaken. Retailers are incentivised to encourage with payments relating to volume saved. Retailers are in effect compensated for their loss in revenue due to the reduction in consumption.

How feasible is the option?

The majority of Non-household customers are metered, particularly those with higher consumption so the option is feasible but would require agreement from retailers.

Benefits of the option

Benefits are reduction in non-household demand estimated at 344ol/prop/d and are applicable to 15% of non-household properties

2.2.5 Enhanced Meter Technology (EMT)(2020-116)

Option summary

This intervention is based on upgrading or replacing selected non-household customers' meters, particularly the largest customers and/or where businesses are in close proximity. The enhanced metering technology is rolled out in either AMP 8 or AMP9, dependant on the Smart Network scenario.

Option characteristics

Artesia's recent study as part of MOSL's Strategic Metering Review found a strong benefit case for water companies rolling out enhanced metering technology to non-household customers. Based on AMR for meters <25mm and AMI for meters25mm.

Water companies planning to upgrade or roll out 'smart' meters for domestic customers could include non-household customers at the same time.

The data provided with provide retailers, wholesalers and customers with a means to identify leaks and highlight opportunities to improve water efficiency or reduce consumption at non-household customers.

How feasible is the option?

This option would require collaboration with retailers and wholesalers, so this creates some uncertainty. However, OFWAT is keen to drive innovation in NHH and this is an enabler for water efficiency in the retail market with demonstrable benefits for Wholesaler, Retailer and customers, beyond reducing consumption.

Benefits of the option

Timely, accurate and granular data from meters is vital not only to ensure customers' bills are based on actual consumption, but also in providing data to help reduce leakage and improve water efficiency.

2.2.6 RWH for new NHH properties (2020-075)

Using estimates of costs and water savings for rainwater harvesting in new builds from the Waterwise report[18] for small and medium collection areas and low demand the saving is 592 l/prop/day (equivalent to 216 m^3 per property per year).

Assume South Staffs Water provide £5k grant to encourage this for 10 new non-households per WRZ per year (CAPEX). All other costs will be met by the developer/owner of the property.

2.3 Leakage Options

2.3.1 Proactive trunk mains leakage reduction (2021-001)

Option summary

This option builds on the trunk mains option from WRMP19. New best practice has been developed by UKWIR on applying flow monitoring zones to trunk mains, as a tool for monitoring leakage break out. This option would look at how to apply this, or alternatives (pressure, satellites, acoustics) to provide a continuous monitoring network across the trunk main network (including service reservoirs). This allows more traditional awareness, localisation and repair approaches to then be applied.

Option characteristics

The characteristics of this option are as follows:

- A review of the Trunk Mains system to determine what flow monitoring zones (FMZs) can be set up with the flow-metering that exists already.
- Identify what technologies (Pressure, acoustic, satellite, etc) can be applied to augment the FMZs for detecting the breakout of leakage on trunk main segments.
- Set up the data collection and develop algorithms to track the data and flag breakout.
- Establish a proactive ALC team for trunk main leakage, including service reservoirs. Develop ALC cost curves for the FMZs over time as data becomes available and also update the background and burst models (previously updated in 2012).

How feasible is the option?

This should all be feasible by 2025

Benefits of the option

[18] https://www.susdrain.org/files/resources/evidence/Ricardo_Independent-review-of-costs-and-benefits-of-RWH-and-GWR-Final-Report.pdf - see figures in the spreadsheet *RWH option figures from Ricardo report.xlsx*

This option contributes to the following UKWIR Zero leakage by 2050 outcomes:

All new pipework is leak-free	New leaks on existing networks are minimised	We can confidently quantify leakage and demonstrate when it is zero
All new leaks are found quickly after they break out	Repairs are quick, economic with minimum disruption	Background leakage is eliminated

2.3.2 Advanced pressure management (2021-003)

Option summary

In WRMP19 the use of pressure management was included as an option. However since then the development and application of advanced pressure management has evolved to include pressure transient detection. Bringing advanced pressure management and pressure transient monitoring to the existing pressure management hardware, will allow pressures to be further optimised to reduce leakage and reduce bursts.

Option characteristics

The characteristics of this option are as follows:

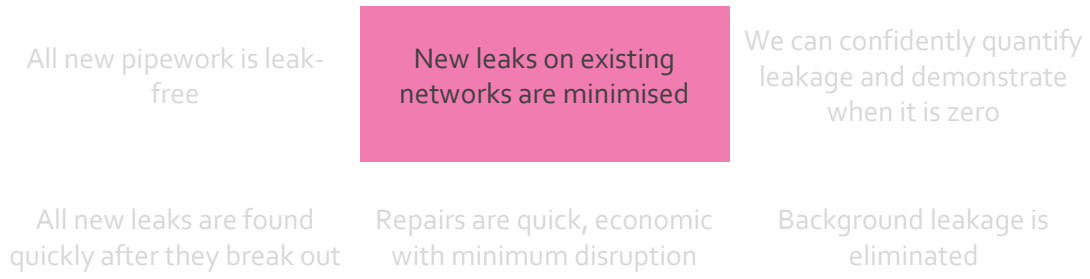
- A deep dive review of all pressure management areas to quantify their current performance and identify opportunities for optimising pressures using advanced pressure management.
- Installation of pressure loggers (in conjunction with advanced pressure management upgrades, or on a lift and shift basis) to monitor pressure transients. This would allow a pressure transient map to be developed across the DMA estate in time.
- Use the pressure transient information, along with advanced pressure management to optimise pressure profiles and deliver lower leak flows, reduced bursts and lower leakage rate of rise (NRR).
- Optimise the active leakage control parameters for each DMA that is pressure managed.

How feasible is the option?

The technology exists and it is feasible to implement.

Benefits of the option

This option contributes to the following UKWIR Zero leakage by 2050 outcomes:



2.3.3 Customer supply pipe repair or replacement (2020-031)

Option summary

Using the IDA, all customer supply pipes in a DMA are graded based on hourly smart meter data, and other information collected from leakage surveys and customer data. WSP leak alarm data can be used initially until smart meters are in place. This data could be augmented with data from acoustic logging or temperature logging. The data is used to build a background and burst component model for each supply pipe. Clustering techniques are then used to up a risk grade for each customer supply pipe and identify specific DMAs that can be targeted for cost effective CSP repair or replacement.

Option characteristics

The characteristics of this option are as follows:

- Using the IDA to collate all data relevant to customer supply pipes.
- All customer supply pipes in a DMA are graded based on hourly smart meter data, and other information collected from leakage surveys and customer data.
- WSP leak alarm data can be used initially until smart meters are in place.
- This data could be augmented with data from acoustic logging or temperature logging.
- The aim would be to build up a risk grade for each customer supply pipe, which can be improved over time.
- CSP repairs are targeted at DMA level for maximum impact on leakage.
- As new technologies evolve for minimal disruption CSP repair techniques, these will improve the cost effectiveness.

How feasible is the option?

It is feasible to implement this option straight away. The efficiency may be less until the IDA is in place.

Benefits of the option

This option contributes to the following UKWIR Zero leakage by 2050 outcomes:

All new pipework is leak-free	New leaks on existing networks are minimised	We can confidently quantify leakage and demonstrate when it is zero
All new leaks are found quickly after they break out	Repairs are quick, economic with minimum disruption	Background leakage is eliminated

2.3.4 DMA ALC plus (2020-108)

Option summary

The "**DMA ALC plus**" option introduces a step change in DMA data analytics to make efficiency gains in targeting DMAs and allocating ALC resources. The aim of this option is to deliver the company leakage target each year in the most cost effective and consistent way.

Option characteristics

The characteristics of this option are as follows:

- Gather all the DMA information and data together, for example: NRR, MNF, NU, properties, CLU, mains materials and length, geography, geology, ALC timesheet data, repair data, entry/exit levels, MAL, MaBL, pressure ranges, pressure transients, household consumption, non-household consumption, fixed site acoustic data, satellite data, weather, etc.
- Develop ALC KPIs for each DMA.
- Classify the DMAs into cohorts.
- Build baseline leakage predictions for each cohort based on specific DMA characteristics
- Use this information to allocate the company leakage target across each DMA through economic optimisation.
- Develop a weekly prediction of the leakage profile across the year taking into account the overall target.
- Each week target the ALC activity and priorities based on the above, using traditional and new technology and data as it is developed.
- Each week assess the outcome of previous ALC activities and external factors (such as weather), use this information to adjust the future targets and leakage profile of each DMA.
- Continue in this way through the year constantly adjusting the targeting through the year, until the target is achieved.

The approach should be to allow the data analytics to do the targeting without human intervention where possible. This will ensure a consistent approach across the DMA estate, and where improvements are identified these are rolled out across all DMAs. There will be a proportion of DMAs that are challenging "Problem DMAs" and the leakage technician/analyst time that is freed up is used in these DMAs to determine why they are in this category and develop a plan to move them out of this category.

How feasible is the option?

This approach is being developed through a collaboration between Artesia and the University of Exeter with support from Innovate UK with a project completing in 2021. There are also a range of smart network trials being carried out through a number of companies with systems that do part of this approach. With the IDA option in place the measurement, datacoms, analytic and insight layers should be in place to allow this approach to be implemented.

However sufficient investment will be needed develop and optimise the approach, so we could limit the full impact of this option to 2030, allowing it to be optimised over the period 2025 to 2030.

Benefits of the option

The options is based on everything that has been learnt about how the industry has applied active leakage control over the last 25 years. It brings a data driven approach to ALC, and is flexible enough to allow new developments to be introduced (e.g. new location, measurement or data technologies).

This option contributes to the following UKWIR Zero leakage by 2050 outcomes:

All new pipework is leak-free	New leaks on existing networks are minimised	We can confidently quantify leakage and demonstrate when it is zero
All new leaks are found quickly after they break out	Repairs are quick, economic with minimum disruption	Background leakage is eliminated

2.3.5 DMA ALC plus (2020-119)

Option summary

This option is based on option 2021-108, but is less efficient as the targeting of ALC resources is less successful without Smart Network Data

2.3.6 DMA MOT (2020-107)

Option summary

This option brings together leakage-driven asset renewal (LDAR), an option included in the WRMP19 process, and the concept of a "DMA MOT", which resulted from a leakage data "hack" driven by South Staffs Water's leakage strategy team. Using LDAR, a DMA is targeted for mains replacement or rehabilitation (including in-pipe repair methods). Whilst the LDAR is carried out, a "DMA MOT" is also carried out on the DMA. Therefore in addition to doing the repair or replacement, the DMA is subjected to a full STEP test or alternative sub-DMA leak localisation method. The result will be that the leakage within each pipe-length can be quantified and recorded. Appropriate ALC methods can then be applied to this DMA and a new minimum level of leakage achieved, and the DMA should be able to be held at this new level.

Option characteristics

The characteristics of this option are as follows:

- The renewal of network infrastructure e.g. distribution mains and (in some cases) associated communication pipes, is prioritised on the basis of serviceability i.e. burst rates and not necessarily on levels of leakage. However, leakage-driven asset renewal (LDAR) can be an economic alternative to ALC in some DMAs where a high proportion of DMA leakage is concentrated in 'hotspots'.
- Artesia have undertaken studies into the economics of LDAR. This has involved the development of cost savings relationships for leakage-driven asset renewal (LDAR) using the DMA data as the building blocks. A generic Artesia worksheet is available for this and has proved useful in establishing renewal policy e.g. whether mains renewal alone or mains and/or comm pipe renewal is more cost effective, the rank order of DMAs and the cost savings relationship.

- This can be used for targeting mains replacement or in-pipe repair techniques (such as 'Curapipe').
- Once selected, the DMA will also be subjected to a DMA MOT. This will use a combination of STEP testing and other sub-DMA leak localisation methods. The result being that each length of pipe is assigned a leakage value. This is recorded as a DMA specific "MOT" or fingerprint.
- Using this information, suitable ALC methods are applied to each part of the DMA to reduce leakage to a new minimum level.
- At the same time, any new monitoring infrastructure can be installed (e.g. access points or fixed acoustic logging points), to ensure that leakage can be monitored in each length of pipe and maintained at the new low level of leakage.

How feasible is the option?

This option is bringing together existing methods and practices (step testing, in-pipe repair techniques, mains replacement targeting, asset deterioration models). The disruption to the DMA will happen anyway as the mains are replaced or repaired, so all that is needed is some co-ordination to gain maximum leakage reduction benefit at the same time. So the option should be feasible.

Benefits of the option

This option contributes to the following UKWIR Zero leakage by 2050 outcomes:

All new pipework is leak-free	New leaks on existing networks are minimised	We can confidently quantify leakage and demonstrate when it is zero
All new leaks are found quickly after they break out	Repairs are quick, economic with minimum disruption	Background leakage is eliminated

2.3.7 DMA MOT (non-Smart Network)(2020-118)

Option summary

This option is based on option 2021-107, but is less efficient as the targeting is less successful without Smart Network Data