A Blueprint for Community Rainwater Management

Acknowledgements

Thames Water have lead the delivery of the project, partnered with Anglian Water, South West Water, Our Rainwater, Indepen and Isle Utilities.

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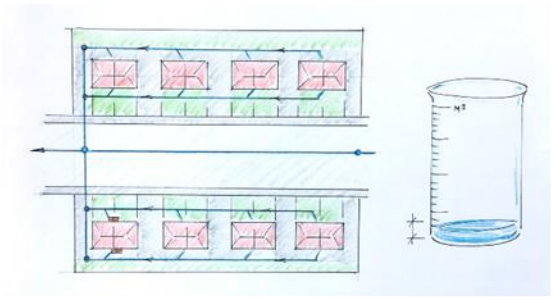
Contents

Introduction

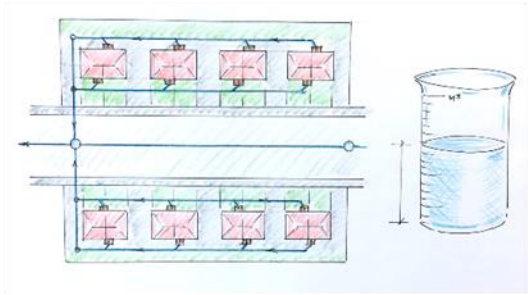
This project, Towards Incentivisation for Community Centric Rainwater Management, was initiated through Ofwat's Water Breakthrough Challenge, an innovation competition which awards funding to projects that will provide innovative water company-led solutions that will bring benefits to water customers, society and the environment.

This pilot project sought to explore ways of encouraging residential communities to adopt rainwater capture tools and solutions, to help 'slow the flow' of rainwater entering sewers. When it rains heavily, excess water runs off roofs and driveways, and drains into the sewers causing sewers and sewage treatment works to become overwhelmed resulting in flooding, pollutions and storm overflows. However, a single rainwater capture device such as a water butt will have little effect on slowing the large volumes of water generated when it rains.

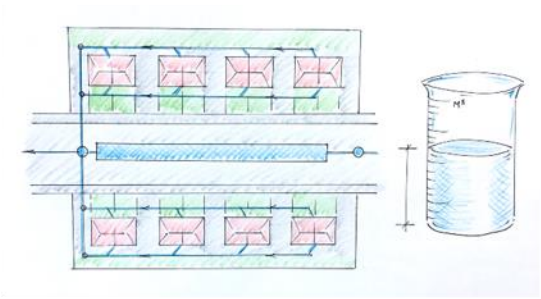
To be effective, rainwater capture must be deployed at scale, installing hundreds and even thousands of devices to create enough 'distributed storage' across a neighbourhood (Figure 1). Distributed storage of rainwater offers many benefits, but deployment at scale within target communities has been a major challenge.



A single planter in a catchment provides minimal storage and impact



Widespread roll out of planters in catchment could provide considerable rainwater storage and impact



Widescale roll out of community rainwater management may be able to provide comparable storage to conventional storage solutions

Photo of Rainplanter
(Photo courtesy of Ben Coles, 2023)

Figure 1 Highlighting opportunity of distributed storage in comparison with single water butt and conventional storage solutions.

Rainwater capture devices require a small amount of space within the curtilage of domestic and commercial properties (Figure 1), therefore engagement with every property owner is required. Engaging with the wider community to build support with property owners and residents alike to adopt rainwater capture devices on their properties is effective, even if they don't see a direct personal benefit to them.

Purpose

This document is the first iteration of a blueprint for how to implement a catchment-scale rainwater management solution. It's intended audience and users include but are not limited to:

- Water utility companies
- Local authorities
- Government departments
- Community groups
- eNGO's

This blueprint sets out the practical steps developed, and lessons learned through this pilot. The scope of the pilot was limited, and areas for further research and trials have been highlighted.

Background and Context

Our climate is changing, extreme weather events such as drought, heatwaves and extreme rainfall are projected to occur with greater frequency. This, coupled with the challenges of population growth and increasing urbanisation, is placing significant pressure on an already overwhelmed sewerage and drainage system leading to flooding from excess surface water, flooding and pollution from overloaded sewers and storm overflows (also referred to as combined sewer overflows (CSOs)). The need for innovative and collaborative approaches to rainwater management has become increasingly evident.

The introduction of Sustainable Drainage Systems (SuDS) can help address many of these challenges through the capture, storage and slow release of rainwater into the environment. This integrated approach to urban water management is being increasingly adopted throughout the country through the development of multi-organisational and collaborative SuDS programmes to reduce flood risk, promote the creation of more environmentally friendly urban spaces, fostering biodiversity and building resilience against the impact of climate change.

Managing stormwater at source is a challenge faced in urban settings across the UK and further afield. Technical solutions to capture and slow the flow of rainwater from our rooftops are emerging, however one facet that links every pilot done to date by UK water service providers, regardless of the chosen technology, is the need to engage local communities and help them select appropriate solutions for their property and their community. The work described in this blueprint centres on the "customer journey" and explores how communities can be engaged to help manage rainwater cost effectively at source.

This project aims to work together in partnership with communities and stakeholders in target locations to encourage the capture, storage and slow release of rainwater. This project also seeks to understand community incentives, motivations and drivers in the use of rainwater for stormwater management and resilience against drought.

Project Scale

Engagement of householders as individuals to seek their agreement to host a rainwater harvesting device is possible, however on an extensive scale it is likely to be:

- *Inefficient*: requires time to negotiate with each individual property owner, convince them of the case for installation and maintain a long-term relationship with them to ensure the rainwater capture device is both retained and maintained.
- *More costly*: the social cost may be considered by the resident/owner in isolation of the wider community benefits and therefore might require a higher personal incentive, particularly if there is no personal benefit to the resident.

This project sought to test the efficacy of a community engagement approach to rainwater harvesting community-based placement in a focused location. This approach involves working with target location-based communities, utilising the benefits of community conformity (the process whereby people align their beliefs, attitudes and actions to those groups to which they belong or associate with) to engage individual householders, with the aim of creating a social norm to provide a societal benefit of attenuating rainwater. In this manner the negotiation with the buyers (those who wish to place the rainwater harvester) with the landowners is one-to-many, rather than one-to-one.

Residents will be members of many different communities; working with geographical communities within a target catchment is essential but those communities might not necessarily be the most effective place to start if the community perceive no particular benefit to them. To increase the chances of adoption at scale the challenge is to find the communities that are most likely to accept rainwater capture devices as early adopters and use *those* communities to normalise harvesting among their geographical or other communities, such as schools or faith-based communities.

This projects scale was proportionate to the amount of funding it was awarded, leaving further opportunities to be explored such as utilising a target campaign-based (such as Net Zero) approach which could have generated much higher demand within a community that could not then be fulfilled and which might then lead to negative outcome and dissatisfaction amongst communities. It also meant that testing too many approaches at once would reduce clarity of which approaches were more effective.

This project did enable:

- Deeper community engagement at a hyper local scale, by addressing specific local concerns and their stated preferences for engaging with rainwater harvesting.
- Testing of the process of on-boarding those householders who stated a preference to a community linked scheme, and subsequently revealing the choices they made with regard to the placement of the water butt on their property.
- Testing the process of installing water butts at scale, and the issues and opportunities that arose.
- Survey of enduring attitudes beyond the first wave of engagement to inform future subsequent waves.

Engagement through communities tends to occur in waves, with early adopters engaging with the scheme and then, following additional co-creation, advocating to others with empathisers as the next cohort and so on, until the required level of common cause is achieved, as demonstrated in the figure 2.

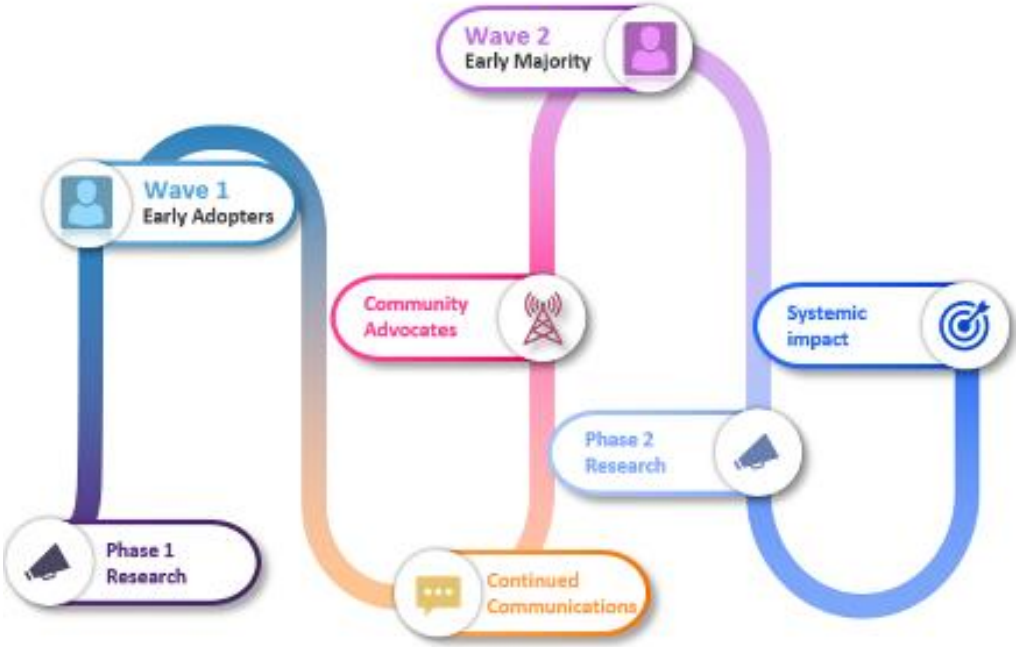


Figure 2 Engagement Wave Effect

This project successfully identified the first wave (including some empathisers) and the learning from this process enabled this blueprint to assist in the design of any future scaling. A full deployment at scale will likely require the early majority cohort to adopt at scale which is likely to require a campaign-based approach.

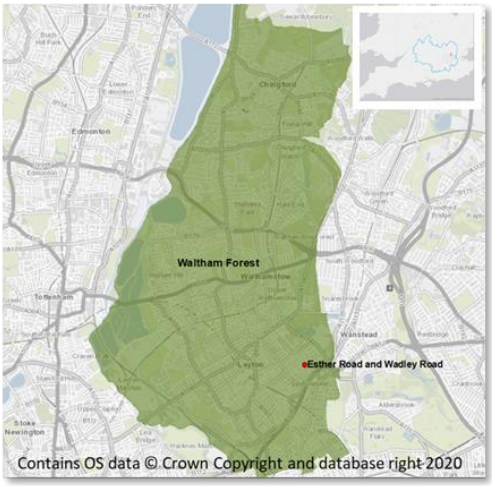
Case Studies

Waltham Forest

Summary of pilot location:

- ***Community Cohorts***: Residents who have experienced flooding in their community and neighbouring empathisers (have not been flooded but are concerned for other members of their community
- ***Target:*** 60 plus 10 (TWL 60, Community partnership 10) passive draining rainwater butts
- ***Partners:*** Waltham Forest Borough Council, Thames 21 Catchment Partnership
- ***Aggregator:*** Local flood forum
- ***Approach***: Concern-based– identified a target community cohort with sufficient concerns to drive action and engage as early adopters.
- ***Incentive:*** Speed of action compared to traditional engineered solution, ability to take some personal action to resolve concern rather than wait for support.

Area Context: Known flooding location with severe surface water flooding during the July and August 2021 extreme rainfall event. Several properties also experienced internal flooding. There are several flood action groups within this location that are supported by the National Flood Forum and the Borough Council. Residents in the area were previously given the opportunity to have rain gardens and a permeable road installed as part of a flood mitigation strategy. However, this did require the loss of parking spaces and for this reason the Wadley Road residents preferred not to have the SuDS installed within their street. The local soil type, London Clay is poor draining limiting the efficacy of natural absorption systems



320 people
140 households

Outer London Borough (City)

66/95% Flats
34/5% House

66/84% rented
34/16% owned

Predominantly 25-40 years old

Approach

Partner engagement, aggregator engagement (local flood forum), leading to engagement of Community Champions (CC): Householder CC digital engagement, door to door follow up.

Engagement with local groups and partnerships such as Thames 21, identified The Local Flood Forum as the community/cohort most likely to adopt water harvesting, with a clear concern that could be addressed by the placement of attenuating water planters.

Focus Groups: low historic adoption of water butts with low levels of interest to have water butts on their properties. Engagement to communicate the benefits of rainwater capture at property level.

On boarding & Engagement: Focus groups were followed up in quick succession with social media invitations, door to door leaflets with installation FAQs and the QR Code to the Our Rainwater platform. Householders were also provided with an email address to respond to share any queries.

As a result of this approach, 60 Rainwater planters were offered to the community by Thames Water and a further 10 planters were offered by the Catchment Partnership. A campaign by the Waltham Forest Borough Council has led to the placement of over further 200 leaky butts in the Borough (however these cover a wider area than the target catchment).

Engagement with community cohort for adoption raised awareness/engagement on the importance of rainwater capture for stormwater management and conservation, fostering a sense of community and active participation and promotion of the project. Within 2 weeks over 90% of the available planters had been “committed” through initial engagement with the Our Rainwater platform, presenting a healthy funnel of stated commitment. However, the number of residents who progressed through the platform to installation was disappointingly slow and low, as shown by Figure X

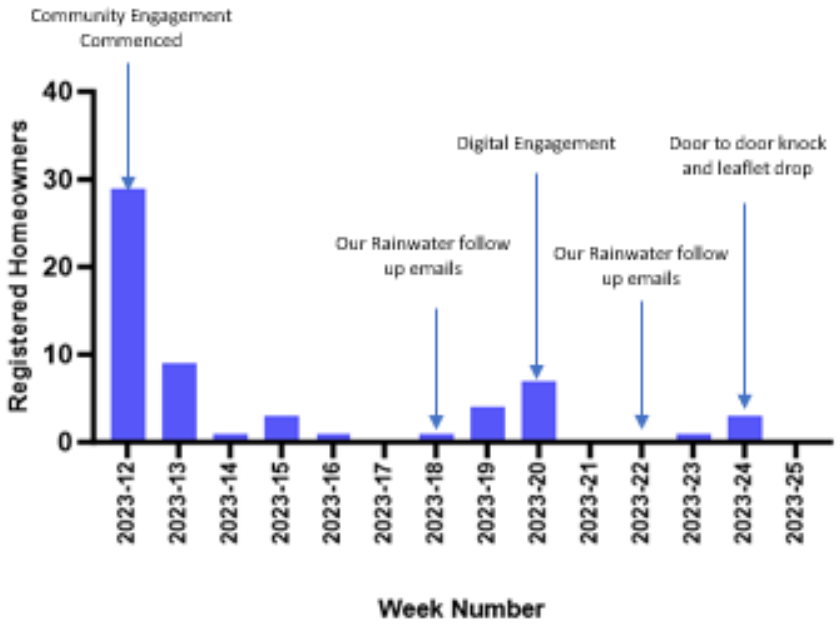


Figure 3 Number of eligible sign ups and engagement activity timeline in Waltham Forest

Challenges and Lessons Learnt

1. *Community Concerns:* The probability of further flooding, time and uncertainty for an engineered hard solutions and the opportunity, cost and ability to act as individuals to protect their properties.
2. *Adoption:* the short timescale, and attenuation similar to network storage or green space was of interest to the community. Adoption of water butts empowered personal responsibility for improving their resilience to flooding. The focus groups concluded their commitment to encouraging other residents within their immediate vicinity to adopt to achieve higher levels of community personal and community resilience was important for adoption.
3. *Engagement:* Co-ordination with other campaign groups and "buyers" within target catchment likely to increase adoption. The positive community response lead directly to interest and co-delivery with other groups such as the Local Authority and the local catchment partnership, including Thames 21 (a further 10 rainplanters, Catchment Partnership; >200 rainplanters, Waltham Forest Borough Council). The stated involvement of these wider community groups would enable further waves of adoption by other cohorts.
4. *Engagement:* Door to door engagement identified community awareness of the project initiative suggesting that advocacy of local champions through social media had a positive effect, resulting in further take up by the flooding concern cohort, and notably, local empathisers (residents who were not unduly concerned about the likelihood of flooding of their own properties but empathised with the plight of neighbours).
5. *Engagement:* Clear research and funnel management and engagement methodology required, including live revealed preference feedback to dynamically improve the engagement process
6. *Adoption:* Over commitment within funnel would counter issues of dropouts and enable more efficient installations
7. *Installation:* Construction ongoing at pilot location as part of the flood mitigation strategy led to logistical difficulties due to distanced parking for installation. Working with Borough Council enabled mitigation by providing parking permits where possible.
8. *Installation:* Properties such as terraced houses that do not have separate downpipes draining their roofs, or households that share a downpipe with neighbours, lead to instances of permissions not granted for rain planter installation.

Lambeth

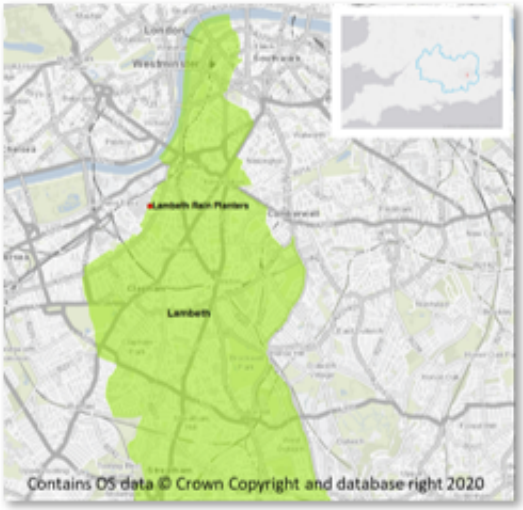
Summary of pilot location:

- ***Community Cohort:*** Inner city residents in a known flooding location with several experiencing internal flooding and neighbouring empathisers (have not been flooded but are concerned for other members of their community.
- ***Target:*** 100 passive draining water butts
- ***Aggregator:*** LLFA, Lambeth Borough Council, Residents Association
- ***Approach:*** Community engagement day and community champions.
- ***Incentive***: Community action and active participation to address rainwater capture for stormwater management and conservation

Area Context: Lambeth has an estimated population of 318,000 and is the "fourth most densely populated of London's 33 local authority areas[2].

Lambeth has a complex history of flooding from several different sources such as fluvial, tidal, groundwater, surface water flooding and sewer surcharging, where "up to 43,740 residential properties are at risk of flooding during a rainfall event that has a 1% chance of occurring in any given year"[3] and is "ranked 3rd out of 32 London Boroughs for the least available sewer capacity"[4].

Surface water flooding is the primary flooding type in this area. The community was aware of the importance of rainwater capture for stormwater management and water conservation. The residents are known to have an interest in gardening.



800 people
370 households

Inner London Borough (City)

79% Flats
21% House

60% rented
40% owned

Predominantly 20-39 years old

Approach

Community engagement day: this raised awareness/engagement on the importance of rainwater capture for stormwater management and conservation, fostering a sense of community and active participation, encouraging householders to sign up to the platform and promoting the work being carried out by collaborating partners on the project.

Initial engagement with Lambeth Borough Council to understand the study area provided insight into the experience and activities carried out in this area and included a community engagement day to communicate flood risk assessments following an extreme flooding event in the last 2 years. Through the initial engagement, it was suggested that a similar approach was carried out and community champions were suggested (Crimsworth and Thorparch Residents Association (CTRA) that may be able to assist with the sign up process. The community engagement day created a 'buzz' in the community and offered an opportunity to find out how the rainplanter worked and how they could sign-up for a free rainplanter and the opportunity for installation on the day. Door to door engagement was carried out to promote the engagement day and to encourage residents to sign up to the scheme.

Community Champions: Residents Association engaged as Community Champions, carrying out engagement activities via social media, community notice board and door-to-door visits.

The Lambeth BC supported the initial engagement with the CTRA and they were provided with a timeline to delivery and installation of rainplanters in the community. CTRA engaged with residents through email, WhatsApp and on the community board and was supported by Our Rainwater, leading to sign-ups on the Our Rainwater Platform (Figure X).

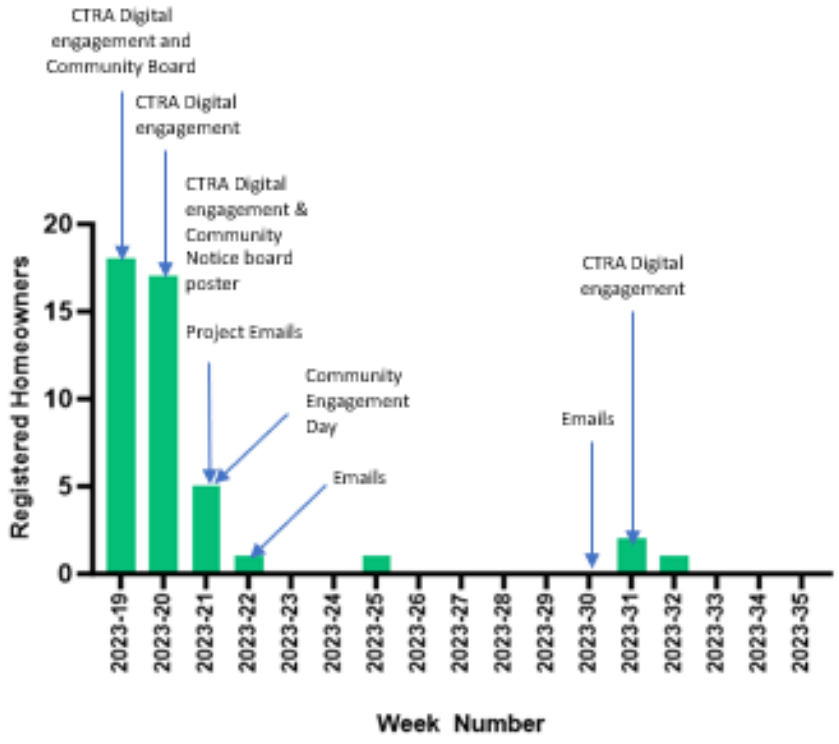


Figure 4 Number of eligible sign ups and engagement activity timeline in Lambeth

56 Eligible Sign Ups

34 Installed

Challenges and Lessons Learnt

1.Timescale: Findings from the installer conversations highlighted a need to reduce the timescale between community engagement, the sign-up process and installation to ensure a seamless transition for householders

2.Communication: Clear, consistent terminology when communication with householders is needed to reduce confusion (i.e. water butt vs rainwater planter), emphasising the planter function in slowing water flow into drainage systems.

3.Engagement: Community engagement day was very positive, aligning different organisations and promoting rainwater planter installation and creating a "buzz" in the community. This had positive feedback from householders.

4.Installation: The rainwater planter used was very adaptable to different property installation requirements, however more time for installation training is required before installation at properties.

5.Installation: Time at each property visited from homeowner engagement to fitting of the planter took 65 minutes equating to a maximum of 5 installations per day possible.

6.Withdrawals & Ineligibility: This was predominantly due to a lack of space available and permissions required to install.

7.Rain planters: Positive feedback for the rainwater planters installed. There was householder interest in traditional water tanks and increased storage for dry periods with consideration to provide traditional tanks alongside rain planters. Each rainplanter was planted with a selection of annual plants and householder feedback was very positive with comments such as '... the plants were the icing on the cake and presents something impactful and visual.'

8.Several householders mentioned how useful it was to meet the person scheduling their installations, and to ask further questions about the sign-up process. They were also pleasantly surprised that it was a 'real person'.

Cirencester

Summary of pilot location:

- ***Community Cohort:*** Market town with complex history of flooding.
- ***Target:*** 33 passive draining rainwater butts
- **Aggregator**: Farming and Wildlife Advisory Group (FWAG), Churn Catchment Flood Prevention group
- **Approach**: Digital engagement
- ***Incentive:*** Community action and active participation to address rainwater capture for stormwater management and conservation

Area Context: Cirencester is a market town in Gloucestershire on the western edge of the Thames Valley wastewater region and has long term and complex issues with flooding. Groundwater infiltration into the sewer network, surface water runoff, fluvial flooding and downpipe misconnections of surface water into the foul sewerage network are contributing factors to sewer flooding within the town.
In June 2021 the Farming and Wildlife Advisor Group (FWAG) engaged with homeowners to address the problem of roof misconnections into the foul sewerage by encouraging homeowners to have rain planters installed. 250 properties were engaged with limited sign up of 33 properties agreeing to installations.

6100 people
3000 households

Market Town

35% Flats
65% House

48% rented
52% owned

Predominantly 50-54 years old

Approach
A specific target in Cirencester was to endeavor to prioritise installations for properties that had their downpipes incorrectly connected to the foul network. Engagement in Cirencester had already been found to be a challenge due to factors such as a lack of space in a previous downpipe disconnection scheme that was delivered by the Farming and Wildlife Advisory Group (FWAG). This engagement sought to address the problem of roof misconnections into the foul sewerage network by encouraging homeowners to have a rain planter installed, however there was limited sign up by residents. Cirencester was chosen as a case study to gain a greater understanding of resident's motivations regarding the adoption of rainplanters and to quantify the holistic value of 'downpipe disconnections'.

Door knocking: The initial approach used in Cirencester was targeted letter and leaflet dropping as part of a door knocking engagement strategy. This approach was intended to allow for direct communication and engagement with the residents in an effort to understand the perspectives and opinions of the local residents.

Digital engagement: A digital engagement strategy was utilised allowing for a very scalable and agile approach to drive interest and sign-ups in the community. This approach provides a far less resource-intense strategy that allowed users to be directed to the online sign-up page straight from any content that they engaged with. This digital approach also allowed for the messaging to be shared by members of the community to other online spaces, expanding the reach and impact of the strategy.

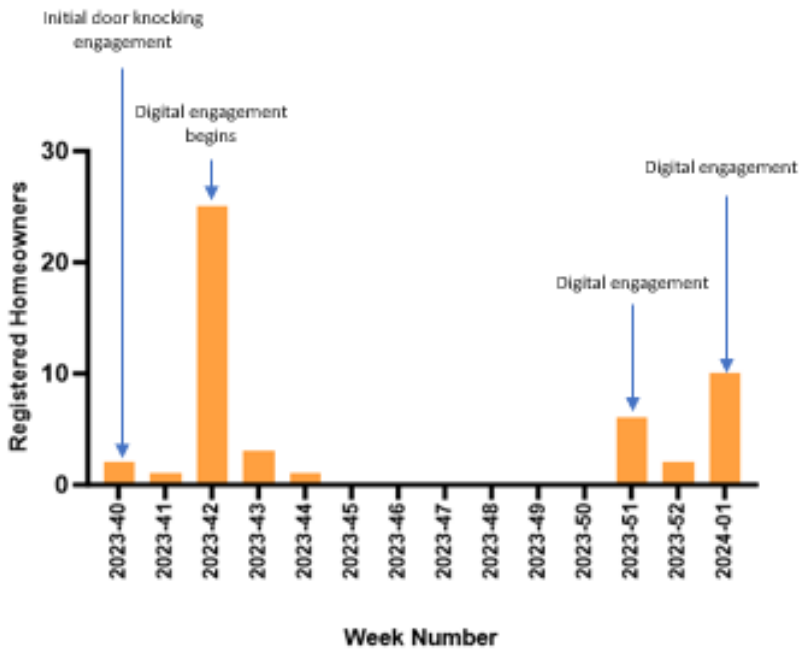


Figure 5 Number of eligible sign ups and engagement activity timeline in Cirencester

50 Eligible Sign Ups

16 Installed

Challenges and Lessons Learnt

1.Timescale: The installation team mentioned that having as much notice as possible as to when and where they would be required to complete installations was important. They also expressed that getting as much detail as possible regarding the requirements in terms of materials for the installation was important so that time was not wasted getting new materials after they had arrived on site.

2.Communication: There was a tradeoff observed between whether to outline the specific roads included in the scheme in engagement materials and on the website. When the exact roads were mentioned in engagement materials, this stopped people from signing up even though they may be eligible for future schemes. On the other hand, not clearly detailing the exact roads that were eligible seemed to result in an increase in negative responses from people who had signed up but found that they were not eligible for the scheme.

3.Engagement: Initially relying on door knocking and leaflet drops was far more time-consuming and resource intensive than the subsequent digital approach that was prioritised.

4.Installation: Installations were largely successful, however, finding an available parking space was often a challenge for the installation team. There also seemed to be more variety in the pipework than in other locations which led to extra complications in some cases.

5.Withdrawals & Ineligibility: This was mostly due to a lack of space, however it was not uncommon for properties to already have water butts installed which limited the potential for installations at some properties. Further to this, issues with asbestos pipework, particularly on City Bank View was a significant obstacle at affected properties.

6.Rain planters: Properties having sufficient available space was a challenge faced in Cirencester. In cases where the gardens were not spacious enough to install a rain planter an installation option that required less floor space would have been beneficial.

Not covered in this Blueprint

The work was centred on the "non-technical" challenges associated with delivering rainwater management in urban settings. Sustainable drainage systems (such as rainwater butts, planters swales, green roofs and infiltration features) are increasingly well monitored and other project teams [2,3,4] continue to make progress on the technical operation of a range of rainwater management features. Therefore, within this project the team undertook to concentrated effort towards gathering data and intelligence relating to citizen science elements. Although some hydraulic model based outputs have been executed to explore how the rainwater butts can have benefits at scale, it is outside the scope of this blueprint to evaluate the technical performance of the installations executed to date.

The project team recognise a growing trend of innovation with multiple new market entrants emerging over the course of the project with new "downpipe" innovations emerging from existing and new suppliers. The work is not intended to consider maintenance, return on investment or demonstrate the true long term costs of future schemes. Further work for catchment wide benefits can be explored in future iterations of such projects.

The Blueprint: How to deliver a community rainwater management campaign

Broadly there are four key stages to take from concept to completion of a campaign, these are:

1. Engagement
2. Onboarding
3. Installation
4. Monitoring

The following sections set out how to implement each stage.

Engagement

Means of Engagement

Engagement is the process of moving a target audience from awareness of an issue towards a behaviour resulting in an expected outcome. In this case, to educate and raise awareness among residents in a target area of the impermeable areas which increase runoff and contribute to flooding and/or CSO operation with potential environmental harm, and that rainwater capture and storage can compensate and contribute to increase the areas resilience to heavy rainfall.

Engagement ranges from extensive campaigns, such as the Net Zero approach which can raise awareness but is difficult to target to specific areas, through to localised, simple to propagate social media campaigns among local groups such as Facebook, WhatsApp, Nextdoor and even 1-2-1 approaches such as door to door engagement or in-person community events.

Effective engagement takes into account factors such as target audience, the message, the medium and the context.

Community-based distributed rainwater capture is a form of **community-based resource management** based on long-term social relationships, trust, informal conversations, informal social rules and conventions, and community organisation. It mobilises mechanisms of:

- Community-facilitated information exchange
- Community-based action
- Community-based monitoring

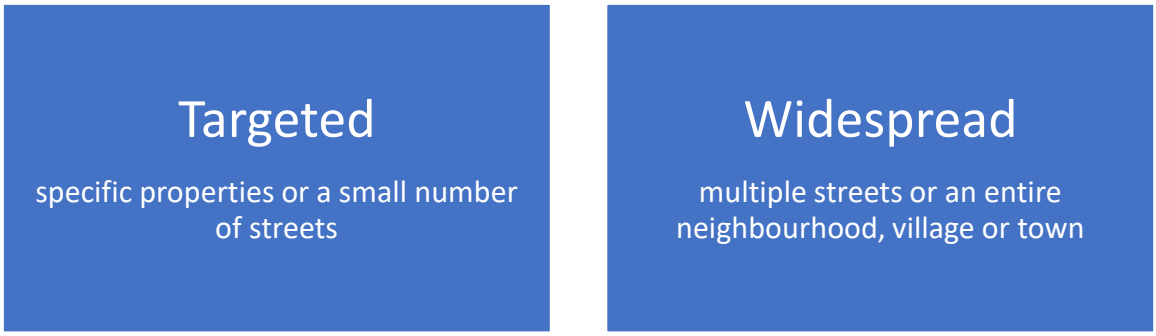
Co-production is where the consumer has an active role in the process of delivering a service; in this case, tackling CSO's and localised flooding. Co-production can be effective where "common-pool resources" are being over utilised (such as permeable land, i.e. a natural or human-made resource that is difficult to exclude beneficiaries from utilising). In the context of flooding and CSOs, this means that individuals cannot immediately be prevented from behaving in ways that cause these phenomena and that everyone will share in the outcome.

In the case of community management of rainwater, the objective is to address the "tragedy of the commons" effect of residents enjoying unfettered access to a finite valuable resource – in this case the consumption of permeable land for the absorption and attenuation of rainwater, contributing to increased risk to public and environmental health.

Managing common-pool resources is a complex and challenging task. Elinor Ostrom, a Nobel laureate in economics, suggested several principles for managing common-pool resources[1]. In the context of rainwater capture these might be interpreted as

- Defining clear boundaries of target hotspots to give communities a clearer sense of common purpose.
- Match the rules or guidelines of managing rainwater to local needs and conditions, for example the type of harvesting solutions on offer.
- Allow the community to participate in the co-production of the guidelines.
- Make sure those guidelines are respected by outside authorities, for example through Local Authority policy.
- Develop a system, carried out by community members, for monitoring behaviours or adoption within the target area to encourage community conformity and thus perpetuating the wave effect of adoption.

Before commencing any form of engagement, the first step is to determine the size of the area intended to be engaged with, as this will dictate your engagement approach. An area can be defined into two broad categories;



For a targeted area, finding a community partner to socialise the project can be as effective as any other approach to build community interest to get involved and take action. In this approach, the below steps can be simplified to local engagement sessions and door to door approaches. In widespread target areas where scale is the ambition, the desire is to create a 'wave effect' as rapidly as possible to build and maintain momentum to acquire householder sign ups and convert these in to installs on the ground. In these cases, it is desirable to identify and co-create with as many "aggregator" communities as possible to increase the number of early adopter cohorts to work with.

The steps to develop the engagement approach is to:

1) Identify a partner who is already integrated in the community who shares the common purpose for action and might co-invest in its instigation; these will typically include Local Authorities, Catchment Partnerships, Flood Action groups, wildlife, or health trusts who have publicly acknowledged the issue.
2) With these groups, and through understanding local concerns or drivers that will encourage communities to act, identify the cohorts that are most likely to adopt co-produced harvesting solutions first, such as those that are directly impacted by the issue to a significant degree. In the case of our trials these were communities that had or were very concerned about the risk of being flooded.
3) Co-develop the narrative with those groups to enable them to communicate and propagate action within their community. This approach will help to identify the communication that leads to the most preferential intent to adopt (stated preference).
4) Actively assist the early adopters to install harvesting solutions to encourage "good experiences" that are more likely to encourage the next wave (generally empathisers) to adopt. ***This "funnel management" is fundamental as poor experiences can actively work against the aims by discouraging promotion. A positive onboarding process is more likely to encourage those who have stated an intent to adopt, to fulfil their intent.***
5) This process reveals the choices that community residents make based on the engagement they have had to date. ***To maintain a wave effect, it is important to dynamically act on these revealed preferences to improve the engagement.***
6) Enable the community to monitor the results of adoption to help them encourage community conformity.
7) Encourage outside authorities such as Local Authorities to support normalisation of the action through development of local policy.

An aggregator community is a group of people who come together to share information and resources on a particular topic or interest. The community members contribute content, which is then curated and organised by the community moderators. The content can be in the form of articles, blog posts, videos, podcasts, or any other type of media. The goal of an aggregator community is to provide a platform for people to share their knowledge and expertise, and to create a space where people can connect with others who share similar interests.

This approach will reduce the risk of the project losing momentum because of poor community buy-in from any cohort.

For widespread target areas encompassing many community types, it is unlikely that a systemic effect will be achieved through early adopter and empathiser cohorts alone, at which point engagement of the "majority" cohorts will be necessary (diagram below).

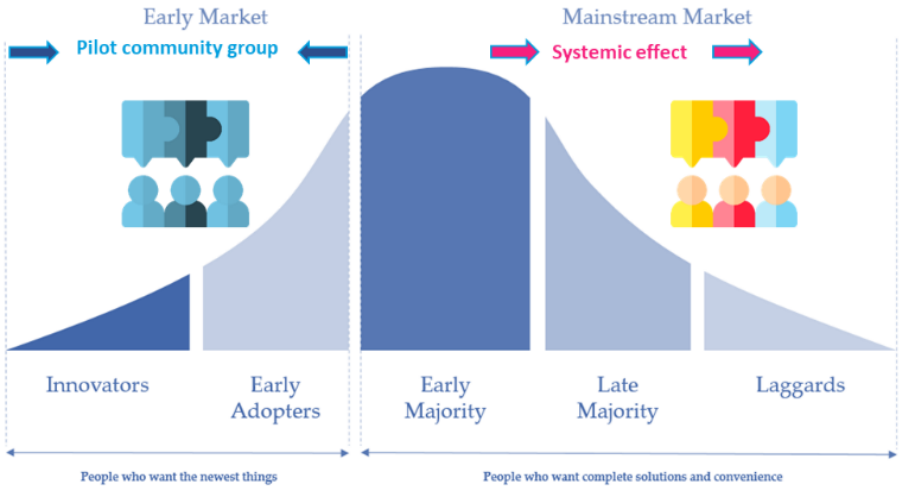


Figure 6 Cohort Engagement to achieve systemic impact

This is where normalisation techniques such as local policy adoption may be necessary to reduce the frictions that will become present where there is no compelling concern by many to act.

Onboarding

This project utilised a digital platform enabling householders to sign up for a free rainwater capture device. The intention was to provide a seamless onboarding experience for householders and facilitate the streamlining of the registration and installation process across three distinct case study areas. The use of a digital platform contributes to a streamlined process by leveraging technology to simplify and enhance the onboarding experience for householders and offered the following benefits:

- **Streamlined process:** A digital approach eliminates the need for manual paperwork or physical sign-up sheets. Household members can easily sign up for the free rainwater butt by entering their details electronically, reducing time and effort compared to traditional methods.
- **Data security management:** A digital platform employs efficient data management systems, allowing for secure storage, retrieval, and analysis of householder information. This prevents data errors, enhances accuracy, and facilitates a more streamlined approach to managing participant data.
- **Communication hub:** There is a central and primary channel for interactive communication and support.
- **Monitoring and improvement:** The ability to continuously monitor the onboarding process's effectiveness by collecting feedback, analysing user engagement metrics, and conducting periodic evaluations.
- **Scaling:** The ability to document the successful onboarding process as a blueprint for future initiatives. Identify key learnings and best practices that can be replicated in similar projects targeting different householders or regions.

Though the project primarily utilised a digital platform, alternative approaches, including the use of Google Forms, are available. However, these alternatives present limitations concerning data security and insights. The project also acknowledged the digital divide, recognising that not everyone can leverage digital solutions. In response to this challenge and to ensure inclusivity, the project actively

sought Community Champions within the community. Their role was instrumental in assisting non-digital householders with the sign-up process.

Onboarding householders onto a scheme without a digital platform involves a more traditional approach that focuses on direct interaction and manual processes to capture householder information and schedule installations. This could include:

- **Community engagement and education:** Organising community meetings, workshops or informational sessions to introduce the scheme and its benefits. These forums can be used to explain the process, advantages of rainwater butts for stormwater management and how householders can participate.
- **Manual registration:** The creation of a physical sign-up sheet or form for interested householders to provide their details, such as name, address, contact information, and their interest in participating in the scheme. These could be made available at community centres, local libraries or other accessible public places.
- **Door-to-Door campaigns:** The deployment of teams to visit households in the target areas, explaining the scheme and assisting interested residents with the registration process. The collection of necessary information would be conducted manually, ensuring proper documentation of each householder's interest.
- **Collaboration with local organisations:** Developing partnerships with other organisations is also useful to leverage their existing communication channels to inform householders about the scheme.
- **Data collection and management:** A secure manual data collection system to store and manage householder information.
- **Documentation and follow up:** It is useful to maintain detailed records of registrations, installations, and follow up visits. This could be through manual logs or spreadsheets to track progress and ensure that every registered householder receives their rainwater tank and installation as promised.

Installation

Selecting the product(s) to be offered/installed

- The product selected for this trial is an existing product that TW have developed. This product is chosen for a number of reasons, it has a small footprint allowing installation in small urban front gardens, the TW planter has previously been tested in other trials so there is confidence in the product, and that it works in the number of areas a planter is required.
- The scale of this trial was conducive to a single product offering a single product to ensure there are cost efficiencies in the procurement and installation of the product and also investigation into resident incentives. It is recognised that wider trials may need to investigate offerings of more combinations of products.
- The outlet throttle on the planter is configurable to accept different throttle configurations to provide more or less attenuation as required. The outlet tap can also be positioned in different positions to allow a better fit of the planter against a building if required.

Ordering the product(s) to be deployed

- A purchase order needs to be raised against the project budget/code and then the products purchased from supplier (Freeflush) with approximately a 4-6 week lead in time.

Logistics (delivery, storage, pickup)

- The delivery locations that should be chosen to allow for the delivery by articulated lorries and provided secure storage. Various sites such as sewage treatment works and pumping stations in the local vicinity of the installation sites can be used as drop off points for bulk deliveries of planters, this reduces the delivery costs and time over multiple smaller deliveries.
- The installation contractor will collect small batches from the storage site, to allow for a few days of installations to be carried out.

Selecting and contracting an installer (types of installer)

- A contractor needs to be selected that has experience in installing rainwater capture devices, has the required insurance and health safety policies and training.
- A data protection assessment is also required to ensure that the installation contractor has a robust process in place for handling householders personal data.
- The installation contractor should be supplied with an installation guide for the product to ensure they have the correct tools and to familiarise themselves with installation process. A training session can be held with the installation team where several units are assembled, and any questions answered.

A typical installation process:

There is a wide variety of rainwater down pipes materials, site layouts and configurations for potential planter installations. The installation contractor maybe required to adapt the arrangement to sure the planter can be installed.

The installation process includes the following steps.

1) Assess the site for installation and consider the position of the planter tank, rainwater feed pipe, throttle and tap, level the planter.
2) Assemble the outlet and throttle components.
3) Install the inner tank and tap.
4) Fit the trays and install and tray liners and the leaf catcher.
5) Measure the downpipe and cut, install pipework to feed rainwater through the leaf catcher to the planter, fit the outlet pipework back to the drain.
6) Install the overflow pipework.
7) Fill the trays with soil and plants if required.

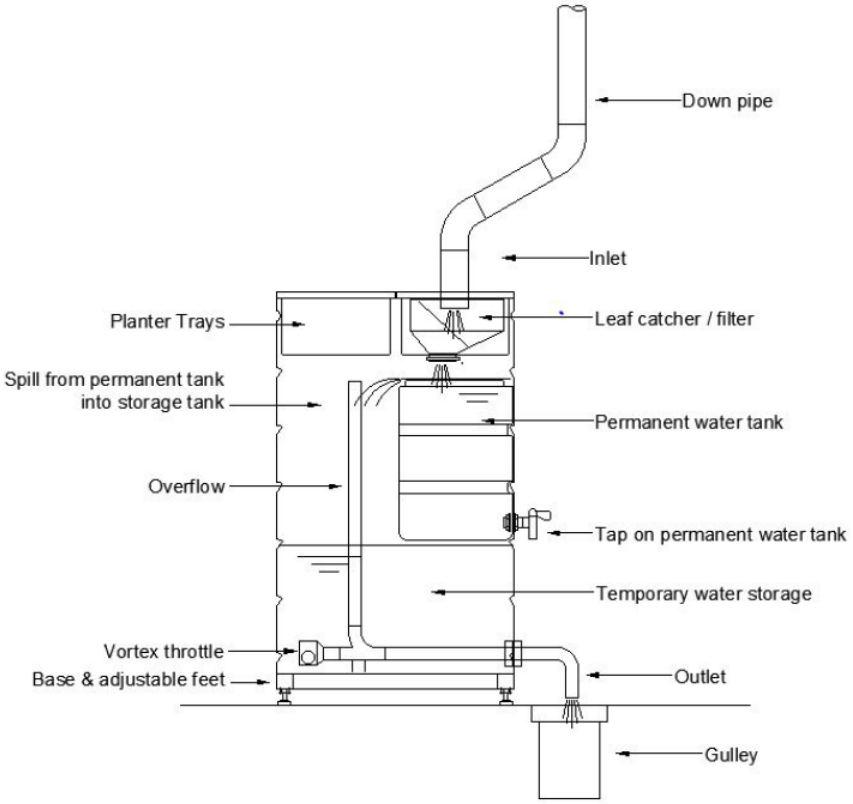


Figure 7 Planter configuration and operation with leaf catcher inlet and vortex throttle outlet

Monitoring

The project is agnostic of the solutions installed, however, t the opportunity was taken to collect some further testing data from some of the installations, testing the hydraulic performance of the planters installed. Our rainwater installed 2 Level monitors in planters, 1 had the vortex outlet throttle arrangement (15mm equivalent to a 10mm orifice) and 1 had a more restrictive throttle arrangement (5mm orifice) that will provide more attenuation of the rainfall entering the planter. The data provided confirmation that the rainwater butts monitored are draining and successfully achieve attenuation without formation of blockages during the monitoring period.

As part of the project will have a list of the addresses where installations took place was collected, which will allow the possibility for follow-up studies to determine the long term success and durability of property scale solutions. This will allow future projects to have a better understanding of the long term performance of the property scale solutions, for example if the monitoring were to determine that 1% of the planters are damaged per year either a budget for replacement units would be required or extra units could be installed at the start of the project to ensure that the hydraulic performance is maintained over the lifespan of the units.

Lessons Learnt

Installation of rainwater capture devices on residential properties as a means to address flooding and CSO issues is still in its infancy compared to conventional storage solutions. Waterbutts and other devices (e.g. rainwater butts) have the potential, if installed at scale, to reduce flooding and other hydraulic capacity issues. In addition, they can be installed quickly compared to solutions requiring extensive civil engineering. To ensure residential rainwater management devices can be installed cost effectively and at pace with residents engaged, further projects need to build on the lessons learnt. Here we include lessons learnt from the project case studies under categories: general, engagement, on-boarding, practical and community insights.

General

- Scale of delivery is essential, to benefit from scales of economy in terms of costs (i.e. through bulk purchasing and installation) and benefits (distributed storage), but care to be taken not to overcommit and underdeliver.
- There are often lead times on some items and deliveries can take some time to co-ordinate, so a project should have a stock of equipment ordered or in stock from the start of engagement. This will ensure the installation process is not slowed waiting for long lead items.
- Pace of delivery is also essential to ensure momentum and interest in the community is maintained and capitalised on. “Strike while the iron is hot” before residents forget or lose interest. Work hard to keep the timeframe from first contact to install as short as feasibly possible.

Engagement

- The pilot limited engagement to early adopters and as such represents the start of a targeted water harvesting program. Future projects are needed to explore the next waves of engagement.
- Different engagement methods have varying levels of effectiveness, predominantly influenced by:
    - how conscious and aligned the target community are to the need to address the issue, which can be enhanced through effective messaging,
    - the availability of community resource to propagate the message and influence the adoption, such as active social media groups or community meetings,
    - the context of the solution – the available space for water harvesting and the competing demands on that space, and the scale of adoption required to have a perceived benefit (health, social, environmental, financial).
- A degree of education is required, helping homeowners to understand why they are being offered devices and why they are being asked to manage rainwater.
- Trust in the motives of the “buyer”. Water Company reputation may be a factor here, however that can be managed by co-delivery with a trusted partner such as the local authority or community group.
- The messaging will need to be adapted to suit different communities based on identifying the reason which they are most likely to act on.
- Do not wait or hope residents will promote the scheme on your behalf: ask them. Actively seek out and ask residents to be ‘community champions’ who are willing to promote the scheme with their neighbours. They have direct access to engagement channels that may not be

available otherwise (e.g. WhatsApp groups), and residents are more likely to trust their neighbours.

- Feedback from funnel management is essential to reduce likelihood of dropouts; poor experience will be communicated throughout the community adding more friction (the reasons why people may choose not to adopt).

On boarding

- When working together with communities, it is essential to eliminate any potential sources of confusion and to ensure that all communication is clear and consistent.
- Residents are most likely to 'drop out' between registering interest and sign up.
- Working together in collaboration with the local community is key to the success of these schemes.
- Providing residents with a printed and/or digital guide (e.g. using a QR code) explaining how to sign up can help to maintain the number of residents through the on boarding process.
- Enhancing engagement becomes more impactful with community involvement. Instead of directly reaching out to residents who haven't signed up via email, a more effective strategy involves utilising community champions for an indirect and more influential approach.

Installation/Practical

- Every property is unique, but an experienced/well trained installer can easily overcome the bespoke needs for installations.
- Arranging the logistics of deliveries, stock control of the components, and resolving issues post-installation need to be carefully planned and managed. For large scale programmes, it is recommended that there is a dedicated resource to manage the logistics. For example, an issue with the delivery of waterbutts can have a knock-on impact on the installation programme.
- There may not be a suitable storage site close to the installation site. It is essential when working with partner organisations such as local authorities that they make their sites available, which would improve the efficiency of the installation process.

Community Insight

- Residents affected by flooding highly value the shorter timeframe associated with implementing a community rainwater management scheme which can be installed in days or weeks, compared to a traditional engineered scheme which can take months or years to secure funding and planning permission.
- Common reasons why residents can't participate in a scheme:
    - Their property has cast iron downpipes
    - Not enough space or conflict with other space usage such as bin store or bicycle parking
- Common reasons why residents won't participate in a scheme:
    - They already have their own water butt installed
    - Does not meet their needs, such as retaining enough water for outdoor use

The reasons listed above for why the planters could not be installed will differ by location, property type and age. There is opportunity for future projects to investigate if these issues are easily resolvable, such developing methods to cut cast iron downpipes safely and effectively, and potentially providing the contractor specialist components to complete installation on cast iron downpipes. Once effective and safe cutting methods have been

identified, and the components required identified, a cost benefit analysis of whether to include properties with cast iron downpipes would need to take place as it is likely to increase the installation cost and time but may increase the number of houses that can have rainwater management products installed.

- Future projects could include products that include bin stores or bicycle parking as part of the rainwater management products offered. These products are likely to have a higher cost so might require a contribution from the homeowner. The viability of this approach would need to be tested.
- The majority of residents are receptive and positively engage with the scheme, even if they don't have a device installed.

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