Ensuring One Water Works for All:
OPPORTUNITIES FOR REALIZING WATER REUSE IN AFFORDABLE HOUSING

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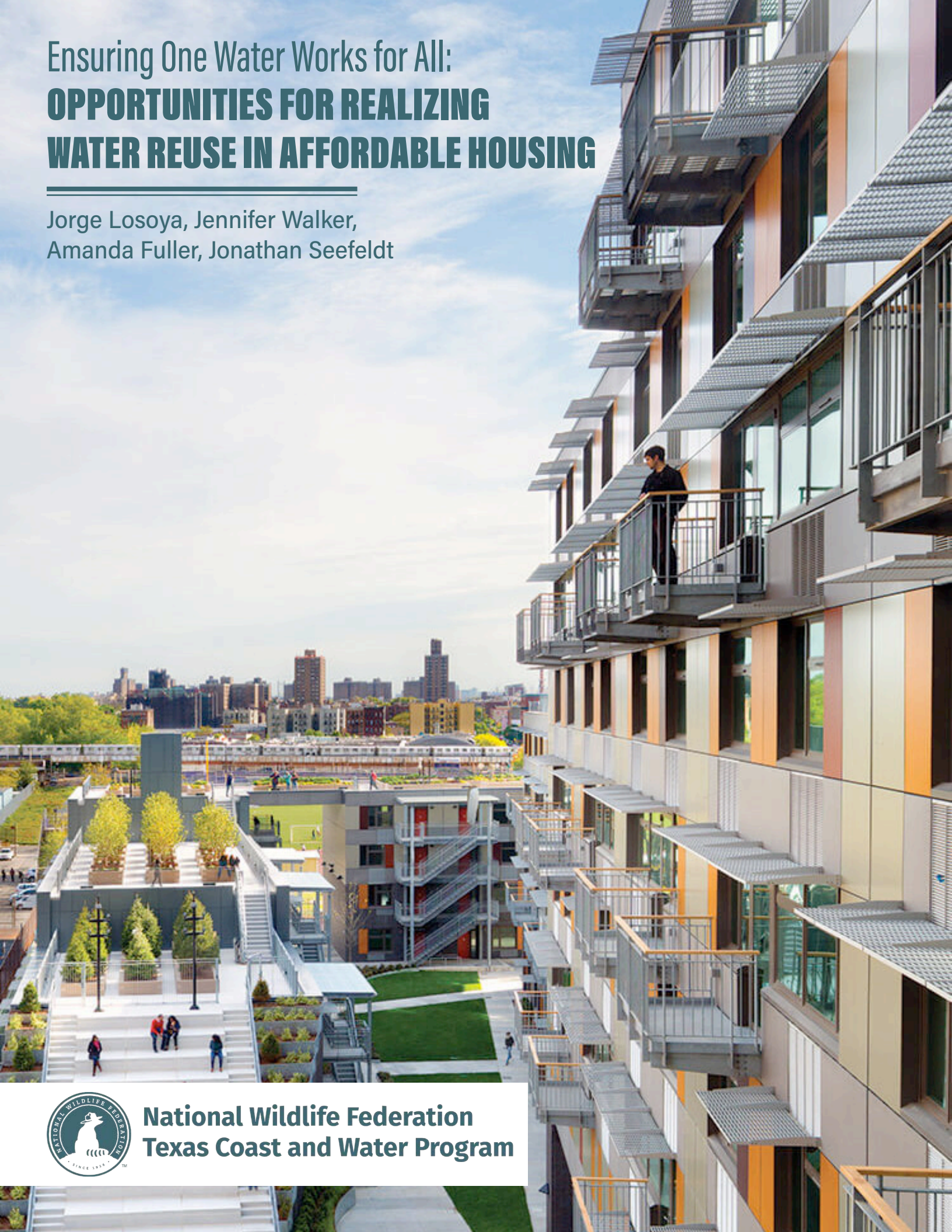

National Wildlife Federation
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Cover photo: The Via Verde affordable housing complex in New York City showcases the multiple benefits of onsite nonpotable water reuse. The roof is multifunctional, harvesting rainwater for irrigating rooftop green spaces and serving as a recreational space with a vegetable garden and trees. *Photo: Grimshaw Architects.*

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Introduction

In response to the broadening impact of climate change on water resources, many U.S. cities have begun to embrace the 'One Water' integrated approach to water planning. Among other goals, One Water promotes the use of alternative onsite sources, such as rainwater and air conditioner condensate, to create an additional water supply. Around the U.S., cities such as San Francisco have deepened their commitment to promoting onsite non-potable water reuse (see p8 for definition) by passing mandatory requirements for certain developments. Although such efforts are critical for diversifying and stretching water supplies, the accelerating movement towards more water-resilient buildings raises under-addressed questions of affordability, access, and displacement.

Specifically, how can onsite reuse* be implemented in a manner that enhances—rather than worsens—housing affordability?

The following exploratory report begins to answer this question by looking at the barriers and opportunities for expanding onsite reuse in affordable housing construction. These barriers, opportunities, and recommendations are informed by case studies from around the United States, conversations with affordable housing builders and advocates, and literature on green building. Our findings offer future points of action and investigation to equitably expand onsite reuse implementation. For water and housing planners, this report offers recommendations for removing barriers for onsite reuse, along with best practices for limiting unintended consequences. For affordable housing advocates and builders, this report provides financing opportunities and policy actions to expand onsite water reuse systems in housing developments.

Typically, onsite reuse is implemented by utilities and communities as an additional water supply to augment supplies provided by centralized water infrastructure. Property owners can customize treatment levels, treating water to standards appropriate for final intended use, such as irrigation or toilet flushing. These systems range in complexity and scale depending on local regulations, water demand and use. Developers across the U.S. are increasingly using onsite reuse systems to increase sustainability and reduce water costs.

DEFINING AFFORDABLE HOUSING

This report's discussion of affordable housing focuses on subsidized affordable housing, however, the benefits of onsite reuse also extend to naturally occurring affordable housing (NOAH). NOAH refers to market-rate housing, housing with no public subsidies, whose housing cost is less than or equal to 30% of the area's median income. Whereas, subsidized affordable housing results from federal, state, or local government programs that reduce housing costs to low- and middle-income households. These programs will typically restrict affordable units to households that meet a specific income range depending on the area median income. For both NOAH and subsidized housing, onsite reuse systems offer opportunities for maintaining housing costs low and provide additional benefits.

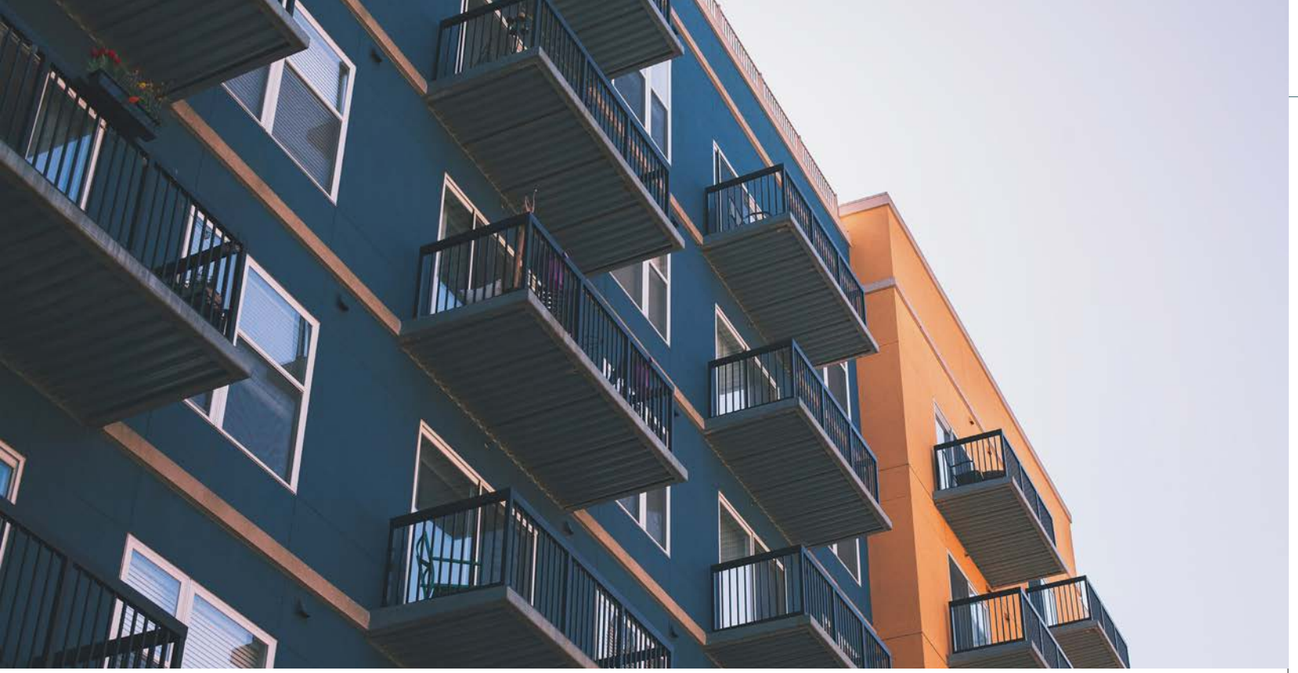
When thoughtfully designed, onsite water reuse systems not only guarantee additional water supply, they can bring financial savings to residents, owners, and municipalities, while also providing wide-ranging quality-of-life benefits. These additional benefits are maximized when pairing onsite reuse with green infrastructure, which can relieve environmental stressors such as urban heat and local flooding. Social benefits can be realized by increasing opportunities for the public to engage in environmental education and stewardship. Integrating onsite reuse in affordable housing is a dual investment for a community by expanding its housing stock and strengthening its water infrastructure as a whole.

However, the implementation of onsite reuse must ensure communities can access these benefits without inducing displacement in neighborhoods. Any form of community investment, without deliberate anti-displacement measures, can be a catalyst for gentrification. This report outlines a number of effective anti-displacement strategies and documents case-studies that demonstrate the collaboration and community work required to ensure water reuse does not accelerate gentrification.

The following report briefly outlines the mounting housing and water affordability challenges cities are facing, ways in which a thoughtful implementation of onsite reuse can mitigate these challenges, how to overcome barriers to onsite reuse in affordable housing, and recommendations for moving forward.

** Note: throughout this report "onsite reuse" refers to onsite non-potable water reuse.*

Around the U.S., cities such as San Francisco have deepened their commitment to promoting onsite non-potable water reuse by passing mandatory requirements for certain developments. ▶



The Needs and Challenges

Increasing water stress from climate impacts is exacerbating existing housing and consumer affordability challenges. Investing in solutions like onsite reuse now helps ensure those pressures are less expensive for all in the long-term.

HOUSING SUPPLY & AFFORDABILITY

Recent studies indicate the United States has a shortage of 6.8 million affordable rental homes for those at or below the poverty line.[1] Existing affordable homes are at risk due to displacement, aging, or environmental risks such as flooding, which is being exacerbated by climate change. To meet these gaps and mitigate against future risks new construction and retrofit should consider the role water plays in achieving housing affordability and climate resiliency.

Texas has amongst the lowest supply of affordable housing for the lowest-income renters. The state has 29 affordable rental homes for every 100 extremely low-income renters.[2] The National Low Income Housing Coalition reports a shortage in Texas of 594,194 affordable and available rental homes for extremely low-income renters.

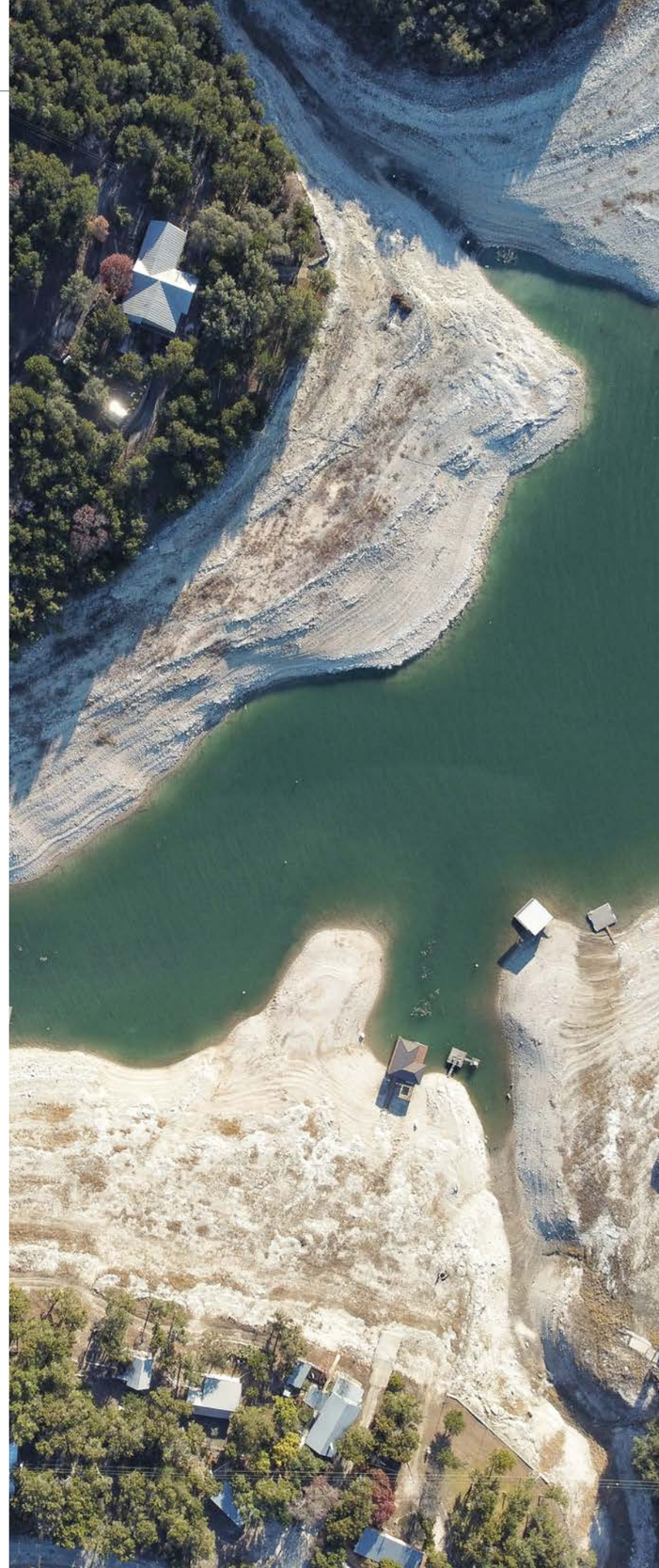
This housing crisis is particularly evident in Austin, one of the nation's fastest-growing cities. Housing reports indicate 45% of renters and 22% of homeowners pay 30% or more of their income towards housing costs.[3] Current trends indicate Austin is behind in meeting its goal of constructing 60,000 affordable units by 2028.[4] Similarly, in Houston's Harris County—composed of 45% renters—half of renters spend more than 30% of their income on housing.[5] This is particularly concerning considering that Black, Indigenous and people of color (BIPOC) and low-income households make-up a significant portion of renters.

In addition to rent, other housing costs and living expenses, such as water and wastewater utility bills, are critical factors in determining housing affordability. Housing affordability is understood in relation to what households go without to pay for housing costs. These other expenses may be critical supportive services or cultural needs. This equitable framing widens our understanding of how steep housing costs impact low- and middle-income households. Expenses such as utility bills and flood damage can become a significant burden for households and are expected to increase as climate change impacts rise. In the context of increasing housing and living expenses, decreasing water-related expenses becomes a key pillar to sustaining housing affordability.

WATER SUPPLY & AFFORDABILITY

Climate impacts on Texas water supplies are predicted to exacerbate existing water stressors such as population growth, urbanization, and aging infrastructure.[6] Days reaching 100 degrees Fahrenheit have been rapidly increasing since 1975 and are projected to become more frequent and severe.[7] In western states, these stressors are already driving communities to focus on water-conscious development by mandating or incentivizing water reuse or alternative water supplies.[8]

Of particular concern is how these stressors may widen existing water access gaps in the United States. The proportion of housing expenses dedicated to water service varies according to regional water prices, household size, and plumbing efficiency, among other factors. However, an increasing number of studies show water expenses disproportionately impact BIPOC communities.[9] In some communities, low-income earners pay from 4 to 19 percent of their monthly income for water and sanitation services.[10] Water rate projections indicate the number of households experiencing unaffordable water bills could triple in the next five years.[11]



ONSITE NON-POTABLE WATER REUSE

Onsite water reuse systems collect greywater, blackwater, and stormwater then treat and store it for reuse at a building, community, or regional scale. Treatment varies depending on the end-use of the collected water. Typical applications for non-potable needs include irrigation, toilet flushing, and cooling. More rigorous systems can also treat greywater and blackwater to higher standards for other end uses. Local water quality regulations and water supply underpin what types of systems are feasible. For multifamily housing, greywater and stormwater are typically used to offset potable water use in toilet flushing, irrigation, vehicle washing, street cleaning, irrigation, wetlands, air conditioning makeup water, laundry, decorative water features, and agriculture.

Water reuse is not entirely novel. Early practices of water reuse date back thousands of years. Civilizations mainly applied recycled water for agricultural purposes such as irrigation and fertilization. More recently, states like California have invested in recycled water for more than 40 years. Today, onsite water reuse systems have become increasingly promoted across the country. From highly technical systems to low-tech practices, utilities like Austin Water are looking to water reuse as a key water supply strategy. As future water supply becomes more dynamic due to climate change-induced extreme weather, investing in these systems now sets the pace for future water use and supply options.

Benefits of Onsite Reuse

In this context of increasing affordability and supply pressures in both housing and water sectors, onsite reuse can assist in keeping water affordable and available for low-income users while also providing additional benefits to communities, municipalities, and water utilities. Understanding these benefits allows for an accurate long-term cost-benefit analysis of onsite reuse systems. This holistic perspective also identifies possible avenues for creative and collaborative funding opportunities based on the benefits and beneficiaries of the onsite reuse system. These benefits fall under three broad categories: financial, environmental, and social. It is important to note benefits of onsite reuse vary depending on the type of onsite reuse system, the scale of application, and if it's paired with nature-based elements.

FINANCIAL

Onsite non-potable reuse can reduce utility costs for end-users, making its use a significant factor for affordable housing developers. The deployment of onsite reuse facilitates access to lower-cost non-potable water for needs such as landscape irrigation and toilet flushing thus reducing water costs for customers. Additionally, onsite reuse can realize financial savings for water utilities from diverting expenses on costly infrastructure upgrading and more expensive water supplies strategies. In turn, these benefits may be reflected in lower water rates. Examples and data for multifamily housing, especially affordable housing, are limited[12]. However, buildings like the Credit Human headquarters in San Antonio, Texas are seeing a reduction in their water bill by over 80% through strategies that include rainwater and A/C condensate capture. In Los Angeles, it was found that onsite water reuse can reduce multifamily potable water demand by 38%[13].

For low-income residents, these savings may alleviate financial burdens from their total housing costs. Lower water prices lessen the possibility of falling behind on bills, which can escalate and place households in precarious conditions. In some places, water shut-offs have led to lease violations and evictions. Disasters like the COVID-19 pandemic intensify the financial burden of water bills and further expose inequities in water access. Equitable investment in onsite reuse can mitigate against increasing financial costs of housing and water.

ENVIRONMENTAL

Onsite water reuse systems are commonly paired with green infrastructure, such as bioswales, to maximize environmental benefits[14]. From reduced stormwater runoff to cooler local temperatures, onsite water reuse systems can improve the environmental conditions of a community when leveraging natural elements. These combined systems have the capacity to capture and store rainfall, reduce impervious surfaces, and increase urban greening. Urban wildlife and habit functions also benefit if nature-based solutions become part of onsite reuse systems[15]. Previously, onsite reuse systems have been designed to increase a building's resiliency to environmental disturbances on water infrastructure networks[16]. The *Ensuring One Water Delivers for Healthy Waterways* report details ways to leverage the full potential of water reuse while also mitigating impact on waterway flows, ecological function, and access to downstream communities[17].

SOCIAL

The social benefits from onsite reuse systems are indirect and require intentional programming by the developer, property manager,

The Multiple Benefits of Onsite Water Reuse Systems

Benefit Type	Benefit	Beneficiary
Financial	Reduces a building's need for potable water[C] Reduce potable water consumption for non-potable water needs[AF]	Residents, Developer / Owner
Financial	Provides resilient water source for residents[B]	Residents/Utility
Environmental	Reduce surface flooding. Meet development stormwater requirements[CD]	Developer / Owner
Environmental	Meet water quality requirements[DH]	Developer / Owner / Community
Financial	Reduces the costs of expanding and upgrading water and sewage infrastructure.[C] Prolong the life of existing infrastructure and obviate / postpone costly upgrades to centralized infrastructure and related energy use, treatment, and delivery[CD]	Utility
Environmental	Reducing water and wastewater load on centralized systems by lowering potable water use and wastewater[D]	Utility
Environmental	Fosters resilience in the infrastructure system and project by reducing reliance on municipal water systems, blending decentralized and centralized systems[CD], mitigating drought and water constraints[C] and creating regulatory flexibility and new opportunities[H]	Utility
Financial	Creates workforce development opportunity.[AF] Supports the local community resiliency.[ABC] Economic growth creating new jobs and workforce development.[B]	Community
Financial	Help reduce system burden in peak use times[D] Extends water supply[C]	Utility
Financial	Increases the resiliency of our cities and urban neighborhoods.[BC]	Community
Financial	Energy savings[CH]	Utilities
Environmental	Reduce local heat[DEH]	Community
Social	Generates Community Amenities, recreational space, relaxation spaces[D]	Residents
Socal	Aesthetic Enhancements[A*]	Community
Environmental	Improved air quality[AF*] Reduce Greenhouse Gases[AFH*]	Community
Social	Improved mental health[AF*]	Residents / Community
Social	Create educational opportunities and data collection[AF]	Community
Environmental	Improve Water quality and stream bank stability[AG]	Community
Environmental	Increase biodiversity[*]	Community
Environmental	Improve soil and tree health[AG*]	Community

This table outlines the various benefits for onsite water reuse systems that have been previously documented. Many of these benefits are maximized by using nature-based solutions.[31]

▲ The Via Verde affordable housing development is a showcase for the multiple benefits of onsite reuse.

city, or utility. If paired with nature-based elements, onsite reuse can promote residents' health, safety, and wellness by decreasing environmental stressors, such as local heat[18], and creating green spaces. Educational programming and signage can foster environmental education and stewardship by informing residents about onsite reuse systems and affiliated nature-based solutions. Educational material can build awareness of water consumption and promote conservation.

Furthermore, cultural and aesthetic benefits can be derived through creative place-based design of onsite reuse systems. Stormwater or rainwater components offer opportunities for creative interventions. Cisterns, for example, can be canvases for local art. Captured water can also be used for water features, such as fountains, as place-making elements. Artistic features can be community cornerstones if they reflect the local cultural landscape. These creative measures increase the public's engagement with the water infrastructure[19].

The Via Verde affordable housing complex in New York City showcases how a housing development can leverage these benefits. The roof is multifunctional, harvesting rainwater for irrigating rooftop green spaces and serves as a recreational space with a vegetable garden and trees. Projects like these maximize water reuse systems by integrating them into features that create relaxing green spaces, offer educational opportunities, provide space for programmed activities, and promote wellness.

These multiple benefits should be considered when designing onsite reuse systems, establishing incentive and funding programs, and integrating them into affordable housing developments. Intentional design decisions that leverage the various benefits of onsite reuse systems can alleviate current and prevent future environmental and housing injustices if applied equitably. Affordable housing is a particularly effective avenue for ensuring BIPOC, low-income, and other socially vulnerable households have access to onsite reuse systems and affiliated sustainable building features. These households are a considerable portion of subsidized rental housing and rental housing at large[20]. Therefore, beyond onsite reuse systems, other One Water strategies must acknowledge the importance of including affordable rental housing when considering questions of access and equity. Although not in the scope of this report, similar benefits and equity concerns extend to homeowners.

Even with the documentation of these benefits further research and data collection is needed. This is particularly true for questions and concerns surrounding equity impacts and affordable housing. However, understanding current perspectives and challenges for integrating onsite reuse systems in affordable housing projects reveal opportunities to expand its application and mitigate unintended consequences.

Potential Barriers

Application of green building principles is becoming increasingly common in affordable and market-rate housing construction. However, designs that leverage alternative water sources have yet to become as common and accessible as solar power, energy efficiency, and other practices. The first step in overcoming existing barriers to widespread implementation of onsite reuse requires understanding them. The barriers discussed here are specifically regarding subsidized affordable housing; however, many broadly apply to housing development in general as well.

These findings are informed by discussions with affordable housing advocates, builders, and experts. Their experience and understanding of planning, constructing and managing affordable housing provided deep insights into the role water plays in affordable housing and the intricate nature of embedding green building into subsidized housing projects. A literature review of green affordable housing and onsite reuse provided background on existing challenges for developing sustainable affordable housing and expanding onsite reuse. The existing research on barriers for onsite reuse implementation in California[21] and nationwide[22] aligned with what we heard from our respondents.

It is important to note, while there are many barriers to the implementation of affordable housing in general, this section focuses on the particular challenges pertaining to integrating onsite water reuse in affordable housing. In addition, while de-centralization is a notable trend in affordable housing, this report is focused on multi-family projects.

REGULATORY

The Federal and State funding used for subsidized affordable housing comes with regulatory and administrative guidelines that can hinder the inclusion of onsite reuse. Requirements tied to funding sources such as Low Income Housing Tax Credits (LIHTC) often restrict developers in the design process. Going above and beyond typical construction, such as the inclusion of alternative water systems, becomes difficult due to restrictive timelines and limits on construction costs. LIHTC set strict turnaround periods between construction and leasing, limiting the ability to explore the full costs and benefits of onsite reuse.

Permitting was also identified as a barrier, especially in places with little to no onsite water reuse policies or experience. On top of strict timelines, the time and resources to navigate and manage permitting requirements and funding sources create a difficult environment to pursue non-conventional and sustainable construction. Lastly, conflicts between development requirements, incentive programs, and green building practices can impede the use of onsite reuse in favor of efficient fixtures and energy conservation measures. Disentangling these regulatory and administrative hurdles is important for alleviating the pressures faced by affordable housing providers.

FINANCIAL

Concerns over upfront costs and financing onsite reuse were commonly cited as a barrier. The higher cost of energy, developer familiarity with the inclusion of efficiency features, and various incentive programs have allowed for broader inclusion of energy conservation features in affordable housing. On the other hand, the lower cost of water, additional costs of onsite reuse, unfamiliarity with onsite reuse systems, and low support continue to limit widespread onsite reuse use. Energy conservation measures provide a quicker return on investment than water conservation. These calculations are based on current water prices and not on future water availability and prices, which lacks a long-term and climate-informed perspective on the cost of water.

Short-term and upfront capital costs are important for affordable housing project planning since they tie to funding requirements and appointing rent prices. Developers who build and sell developments have few incentives to consider the long-term and non-financial benefits because they are not immediately captured. For entities that build and retain ownership of housing development, initial costs are less burdensome since they can rely on long-term savings. Investing in these systems during construction is less expensive than retrofitting buildings with onsite reuse systems.[23]

TRAINING AND AWARENESS

A lack of knowledge of onsite reuse systems and technical capacity for both design and operation of these systems further obstructs wider implementation. Affordable housing developers and advocates showed interest in onsite reuse and the benefits they provide to residents. However, limited familiarity with these systems creates uncertainty about functionality and fears of integrating a technology that may end up in failure. For example, in some discussions, the unfamiliarity with typical costs of onsite reuse systems was a deterring factor. Similarly, knowledge of the multiple benefits of onsite reuse systems was limited.

In addition, technical knowledge and capacity for installation, operations, and management of onsite reuse systems were found to be common concerns. Challenges in finding knowledgeable professionals and covering the additional costs to install onsite reuse systems is seen as a possible barrier to completing projects in a timely and affordable manner. Similar concerns over long-term maintenance and operations arose in conversations. Having the technical knowledge and capacity to operate and maintain onsite reuse systems was a potential risk to result in systems failures and possible disuse. Building a workforce equipped to install and operate onsite reuse systems will be critical to overcoming these concerns.

Lastly, a lack of broader public understanding of water reuse systems and their benefits may also factor in as barriers since concerns over affordability, gentrification, and water safety can result in a lack of support or prompt opposition to water reuse requirements. These concerns are grounded in legitimate past experiences and research on climate injustices[24], where climate mitigation and urban sustainability results in gentrification.[25] Overcoming distrust and perceived risk will require education across the spectrum of stakeholders involved, from households to local government leaders. The following opportunities and recommendations present a few avenues to push past these barriers to realizing more affordable housing with onsite water reuse systems.

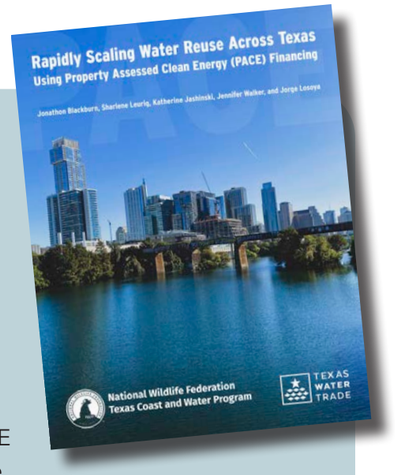
Barriers	Opportunities
Short and strict timelines	Reduce time consuming regulatory and administrative processes
	Prepare multifamily housing models with ONWR systems
	Standardize alternative water supplies in permitting and building codes
Additional upfront costs	Increase incentives, reduce or remove fees, new funding mechanisms, stack existing incentives, PACE financing, CDBG DR and MIT, BRIC, updating and integrate water conservation requirements project funding application criteria, update QAPS to include water conservation requirements
Maintenance and Operations	Workforce Development
	Training Programs
	Third Party operations and managment
Lack of familiarity with ONWR	Public education
	Water stewardship

Opportunities and Recommendations

Despite existing barriers to both affordable housing and onsite water reuse, the plethora of funding opportunities and room to strengthen partnerships means there is a viable pathway to more water-efficient affordable housing. The following opportunities are informed from case studies, interviews with affordable housing advocates and experts, and existing literature.[26] Advocacy and action at all scales is necessary to removing regulatory, financial, and education barriers and establishing foundational change. Embedding equity and justice at the onset of this work sets the pace to seeing an equitable implementation of onsite reuse systems in affordable housing development. Surpassing these challenges will take efficient incentives, creative funding, community-based work, strong partnerships, sustainability leaders, and rethinking cost and benefits.

Financing Opportunities

PACE



Property Assessed Clean Energy (PACE) financing was recently explored as a financing mechanism for onsite water reuse systems in Texas. PACE is a long-term financing mechanism that can cover 100% of energy and water efficiency project costs. PACE eligible projects must demonstrate that energy and water savings gained from the project exceed the project's cost. Property owners are not tied to repayment since the assessment is instead tied to the property. PACE is an opportunity to remove the hurdles of upfront capital costs of onsite reuse for affordable housing.

A report by National Wildlife Federation and Texas Water Trade found that high rise and mixed-use development with various reuse strategies can be eligible for PACE financing.[32] The report found that utility incentives or added energy efficiency measures assist developments with onsite reuse meet PACE eligibility. Another report found PACE to be a feasible mechanism for financing affordable housing in Texas.[33] For developers PACE is, therefore, a viable option to financing green affordable housing and equip onsite reuse systems. Currently, PACE is only applicable for redevelopment projects, therefore is an ideal option for revitalizing affordable housing and providing One Water strategies.

- Onsite water reuse projects should be coupled with energy efficiency strategies to ensure PACE eligibility is met.
- Legislators should amend the Texas PACE ACT to allow financing greenfield development eligible.

HUD

The United States Department of Housing and Urban Development provides a variety of grant and assistance programs for affordable housing. HUD programs are an important opportunity for integrating water resilient and climate adaptation requirements into housing-related funding and projects. Community Development Block Grants for Disaster Recovery, for example, are an opportunity to rebuild or rehabilitate affordable housing with resilient water infrastructure. The CDBG-DR grants are aimed at rebuilding and recovery efforts for areas affected by a Presidentially declared disaster. HUD outlines any requirements tied to the grants in the Federal Register. In Texas, the General Land Office receives the allocation for distribution, detailed through the State Action Plan. CDBG allocations have been directed to affordable housing reconstruction, rehabilitation, and new construction. Thus, CDBG offers an opportunity to inscribe water resiliency into recovery and mitigation projects addressed towards affordable housing and neighborhoods. Promoting the funding of onsite water reuse through CDBG ensures that climate-resilient and forward-looking infrastructure is invested in areas continually struck by disasters. In Puerto Rico, CDBG-DR is being leveraged to fund a Community Energy and Water Resilience Installations Program, which includes funding onsite reuse infrastructure.

- The U.S. Department of Housing and Urban Development should require federally subsidized housing projects to integrate efficient and resilient water infrastructure, such as onsite water reuse systems. HUD can require CDBG-DR funded projects to address water-related climate impacts to push projects to consider future water cost, demand, and supply.
- The Texas General Land Office should promote housing and infrastructure projects that include One Water elements such as onsite water reuse. Prioritization can integrate through Actions Plans, scoring systems, Methods of Distribution, and outreach materials.
- CDBG should be permanently authorized to speed up the recovery process.

FEMA

The Building Resilient Infrastructure and Communities (BRIC) program supports hazard mitigation projects and planning at the state and local levels. These funds support proactive pre-disaster mitigation support for communities to build innovative projects that reduce risk and increase capacity. These funds offer states and local governments opportunities to develop programs and projects that incentivize mitigation measures such as onsite water reuse strategies that reduce flooding risk. Affordable housing with One Water strategies (includes onsite reuse) aligns with FEMA's interests in protecting community lifeline (water, shelter, and energy), expanding nature-based solutions, promoting equity, and realizing multiple benefits. Apart from financing projects, BRIC is also applicable for capacity-building activities and management costs. The following recommendations ensure state and local agencies are poised to fully take advantage of BRIC funding.

- Collaboration between housing, water, and hazard mitigation planning agencies is needed to identify where affordable housing needs and risks can be integrated into local and state Hazard Mitigation Plans (HMP). BRIC prioritizes those projects that align with HMP.

- State and local governments should adopt the latest published editions of building codes (2015, 2018, or 2021 version of International Building Code and International Residential Code). Adopting these codes ensures maximum points and consideration is given to applications.

Anti-Displacement Strategies

COMMUNITY-BASED WORK

Just outcomes hinge on community-based work. As exemplified in the Paseo Verde case, partnering with community-based organizations is a key step to instill community values into projects. Involving community organizations can produce additional support services for residents. At a larger scale, they can also support anti-displacement activities and promote community-wide wellbeing and sustainability. Supportive services like environmental and legal education equip communities with broader needs and resources which may be overlooked. Community organizations hold invaluable information about housing, water, and non-water issues through their lived experiences. Coupling water resiliency with social justice efforts is key to alleviating displacement forces and center equity.

- Affordable housing developers should partner with local organizations, such as neighborhood groups, to build meaningful relationships and understand local needs. Local concerns should be acknowledged and transparently integrated into the project design and operation.

- All relevant city departments should collaborate in identifying anti-displacement approaches that overlap or pair well with alternative water supply strategies. Be expansive when determining which departments can identify and participate in developing solutions.

- Water and affordable housing-related funding or incentives, such as Low-Income Housing Tax Credits or CDBG - DR, should require innovative and meaningful community engagement strategies throughout the planning and design phases of projects. Stronger requirements and reporting for community participation should be enforced as projects are developed.

ANTI-DISPLACEMENT POLICIES

Passing anti-displacement policies provide additional layers of protection against displacement, gentrification, or reduction of affordable housing from requiring or incentivizing onsite reuse. These strategies aim to manage neighborhood change caused by development and ensure residents have the right and ability to stay in their communities. Various cities have implemented anti-displacement strategies. For example, in 2020, Austin, Tx voters approved a transit plan that included $300 million for an anti-displacement fund. The goal of this investment is to prevent displacement in vulnerable areas near new transit lines through helping affordable areas remain affordable to the people who want to stay. Proactive measures such as these should follow best practices and center the needs and concerns of vulnerable communities. The following policies and recommendations are just a few possible solutions.

- Renter protections such as Landlord anti-harassment protection, just cause for evictions ordinances, Rent Regulation and Stabilization, Right to Return Policies, Source of income anti-discrimination legislation

- Anti - Displacement Plans and funds that proactively address possible displacement and involve community engagement.

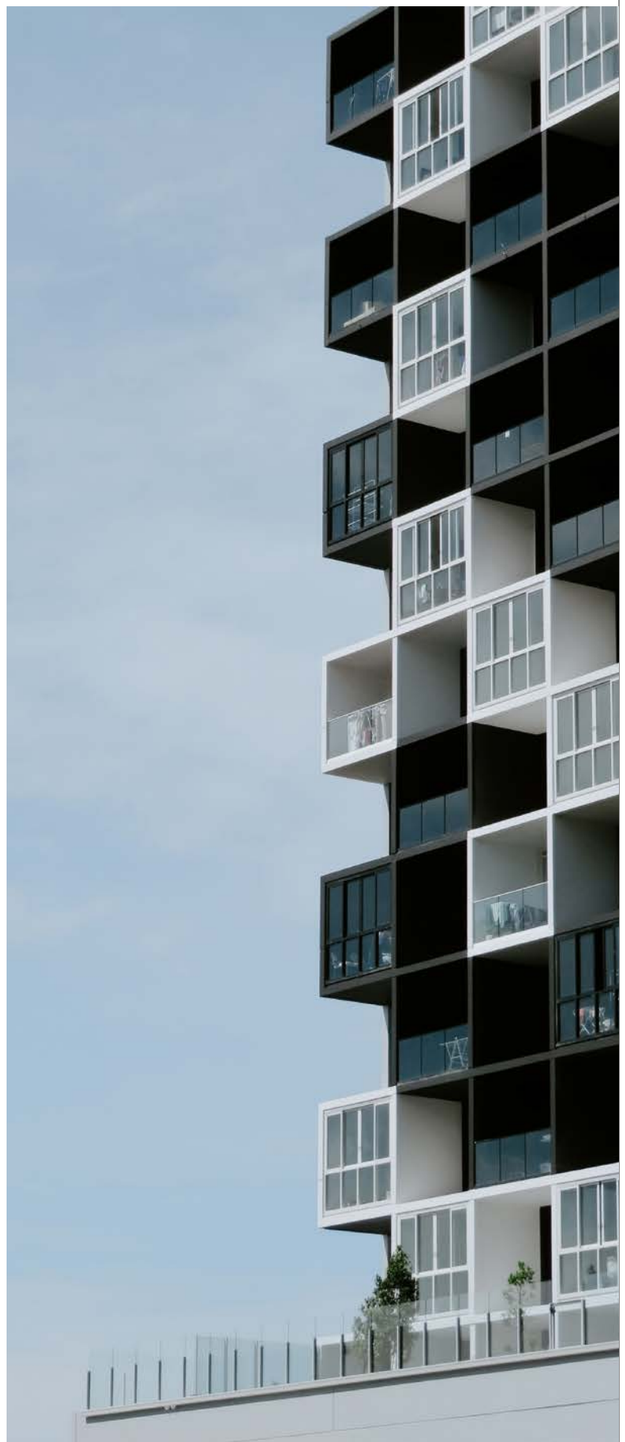
- State legislatures should allow and promote local jurisdictions to amend local fair housing ordinances and pass inclusionary housing ordinances to prevent discriminatory practices and promote affordable housing units.

BUILDING KNOWLEDGE, CAPACITY, AND WORKFORCE

Conversations with affordable housing builders and advocates illuminated the need for knowledge and capability building around onsite water reuse strategies. Unlike solar power panels, onsite reuse systems are not as widespread or visible to the public. As a result, there is little public knowledge around the long-term benefits, true costs, technical know-how, and best practices of onsite water reuse systems. Strengthening education around the value of water, future water supplies, and the multiple benefits of equipping housing with onsite reuse can set a path for broader acceptance and interest in these systems.

Workforce development around onsite water reuse systems and One Water practices can build a workforce prepared to install, operate, and manage onsite reuse systems. Prioritizing BIPOC and low–income communities in workforce development supports an equitable approach to One Water that provides economic development to local communities. The Northeast Ohio Regional Sewer District, for example, is pursuing this type of work by providing training, capacity building, networking, and certifications to unemployed and underemployed individuals. Equity-centered workforce development provides employment opportunities, skill-building, and upward mobility for BIPOC and low-income individuals. Practices like these ensure households receive material and long–term benefits.

- Water utilities should lead and/or collaborate on workforce development initiatives focused on onsite water reuse and other resilient water infrastructure to increase local capacity and expertise around onsite reuse.
- Water utilities should lead an education and outreach campaign around the benefits and importance of water reuse strategies. Programming should be directed at affordable multifamily housing residents, advocates, and developers.



Reducing Regulatory Barriers

STRONG PARTNERSHIPS

Partnerships with design, engineering, and affordable housing experts lay the groundwork for successful projects and reduce technical roadblocks. Following an integrated design process can facilitate a smooth process by identifying opportunities and removing obstacles early on in the project development phase. This approach brings together various stakeholders from project design to building throughout the project's process to ensure various experts can provide key input early on. Subject-matter experts with previous experience on affordable housing or alternative water supplies are key.

As seen in the case studies, many affordable housing projects with onsite reuse are supported by nationally active investors, such as Enterprise Green Communities, who are well versed in affordable housing, green building, and onsite water reuse systems. Institutions like the International Living Future are strategic partners for affordable housing projects that want to meet high sustainability standards, including onsite reuse. Additionally, engaging with water, housing, and equity-related city departments can promote a smooth process for the development and approval of a housing project that steers away from typical construction. Local partners can inform developers about incentives or funding provided by the city, or foster creative solutions to local regulatory barriers.

- Cities should create a space for co-learning among local affordable housing developers, green building experts, and onsite water reuse professionals to encourage partnership formation across these fields.
- Water utilities should engage across departments to identify areas where housing and water-related plans and policy conflict. Changes should foster mutual support across plans and policies to support water resiliency r and affordable housing goals.

SIMPLIFYING PROCESSES

As discussed, administrative and regulatory processes can present impediments for affordable housing developers pursuing onsite reuse as a result due to the additional time and costs for incorporating non-traditional elements into their design. Making the development process for onsite reuse and affordable housing as transparent as possible will be beneficial to affordable housing developers. Similarly, flexible and simplified funding opportunities and limited fees alleviate some cost burdens for affordable housing developers working on strict budgets. These efforts address many builders' and designers' concerns over minimizing the additional time and costs associated with planning and meeting permitting requirements for onsite reuse since federal and local subsidies already carry complex requirements. For example, Portland passed policies to streamline processes for affordable housing meeting high energy, water, and indoor air quality standards using narrow requirements that maximize benefits.[27]

- Waiving development, processing, and permitting fees should be considered as appropriate to lessen the costs faced by affordable housing projects. For example, water-related fees, such as connection fees, can be waived for those using onsite reuse or other One Water strategies.
- Permitting processes and codes for onsite reuse systems should be clear and straight-forward. Utilities should provide technical assistance to encourage and facilitate the uptake of onsite reuse.

Integrating One Water in Funding Criteria

Guidelines, point systems, and other criteria established for allocating affordable housing funds or other funding sources are critical points for influencing project design. Establishing onsite reuse as a requirement or criterion in applications can influence developers to consider these systems in their designs. Doing so also increases familiarity among developers with onsite reuse systems. Low-Income Housing Tax Credit (LIHTC) competitions, for example, are major funding sources for affordable housing that currently lack attention to water conservation strategies[28]. From the federal to local funding mechanism, One Water requirements can enable broader familiarity, interest, and development of water-resilient affordable housing.

In Low-Income Housing Tax Credits (LIHTC) competitions the project selection process is guided by Qualified Allocation Plans (QAP) which list criteria and points values to rank proposed housing projects. QAPs have a significant influence on the type of housing that gets built using LIHTC. Water conservation is, in fact, the least included green building strategy in QAPs. Only 15 states address water conservation through simple measures such as low-flow fixtures and water-efficient landscape, however, water reuse strategies are not mentioned.[29]

Austin's use of its green building rating system and S.M.A.R.T housing program exemplify how municipalities can push developers through incentives to build with water resiliency in mind. However, better integration of incentives, AEGB ratings, and development incentives is necessary to streamline processes and achieve higher levels of water resiliency. For example, increasing the required AEGB star rating or changing the point system for water features can position alternative water supply strategies as valuable investments. Moreover, updating rating systems and requirements to align with financial costs and characteristics of onsite water reuse systems may be needed.

- Water utilities should work with the appropriate city department to promote onsite water reuse strategies in affordable housing projects by increasing points and incentives for onsite reuse that acknowledge the long-term benefits of water reuse. An example of this would be the City of Austin's S.M.A.R.T. Housing program and Austin Energy Green Building program

- The Texas Department of Housing and Community Affairs should update QAPs to prioritize alternative water supplies like onsite reuse.

- A national framework for green building requirements should be established that requires all states to target various green building strategies in federal and state funds. In particular, water conservation and related measures should highlight alternative water supplies as solutions.

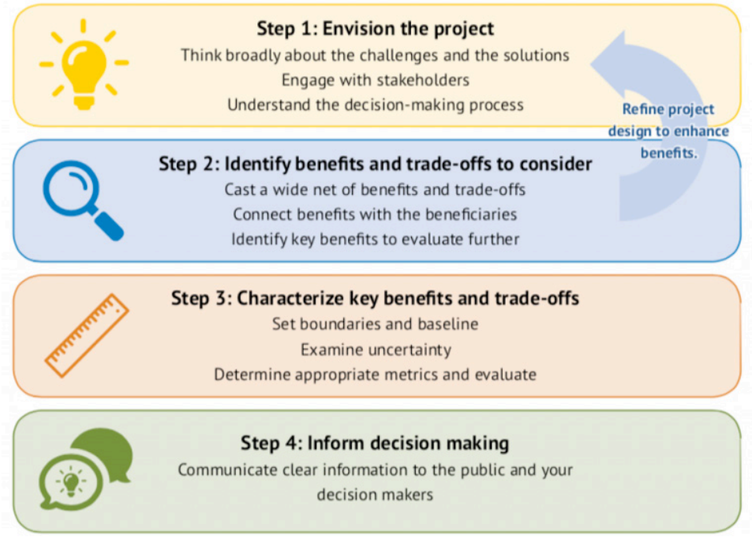
The City of Austin's affordable housing and sustainability programs show possibilities for integrating One Water practices in affordable housing through their funding and green building applications. In Austin, LIHTC are typically used to fund one or two housing developments per year. In their application, developers must integrate S.M.A.R.T (Safe, Mixed-Income, Accessible, Reasonably Priced, and Transit-Oriented) building principles which require meeting at least a 1-star rating of Austin Energy Green Building (AEGB). The AEGB rating system's water section assigns points for water reuse. The S.M.A.R.T. Housing program is also embedded in other local affordable housing programs. S.M.A.R.T. Housing is thus designed to encourage developers to provide both affordable units and water conservation features through the AEGB rating requirements. S.M.A.R.T. gives developers incentives such as development fee waivers. A part of LIHTC, AEGB and S.M.A.R.T are also requirements for Rental Housing Development Assistance (RHDA), and Ownership Housing Development Assistance Program (OHDA).

Reconceptualizing Costs and Benefits

Current methods of calculating costs and benefits do not fully capture all the social, economic, and environmental benefits achieved through green building features such as alternative water sources. Changing how we account for the costs and benefits of onsite reuse, particularly in affordable housing, can open new avenues for funding and balance upfront costs. A life-cycle cost analysis and a multiple benefit framework show promise for rethinking the benefits of onsite reuse.

A life-cycle cost perspective considers both the capital and operating costs over the expected life of a building, enabling us to measure the savings from water efficiency and reuse measures beyond the first costs of development. This long - term approach is critical when considering the future impact of climate change on the demand, availability, and cost of water supplies. As a water supply and climate resiliency strategy, onsite water reuse systems provide long-term benefits as adaptive strategies to future water costs and availability.

A second approach to reconceptualizing benefits involves utilizing Pacific Institute's Multibenefit Framework. The framework considers the broad range of benefits and beneficiaries that come with implementing certain water management strategies through stakeholder engagement. A recent study used the framework to demonstrate the multiple benefits for a rainwater capture system in Austin, Texas[30]. The framework can identify multiple benefits and trade-offs that are then negotiated to develop partnerships between city departments, NGOs, and residents. Economic, environmental, and social benefits are all considered in the framework. Findings from the rainwater catchment case study found that creating stronger relationships between stakeholders to develop co-funding agreements makes water management projects easier to implement and scale.



▲ The Pacific Institute's Multi-Benefit Framework provides an effective method for reconceptualizing the costs and benefits associated with incorporating onsite reuse.

With onsite water reuse systems, a Multi-Benefit Framework can lead to new partnerships and funding streams that meet the housing authorities, urban development departments, watershed departments, and utility departments' goals.

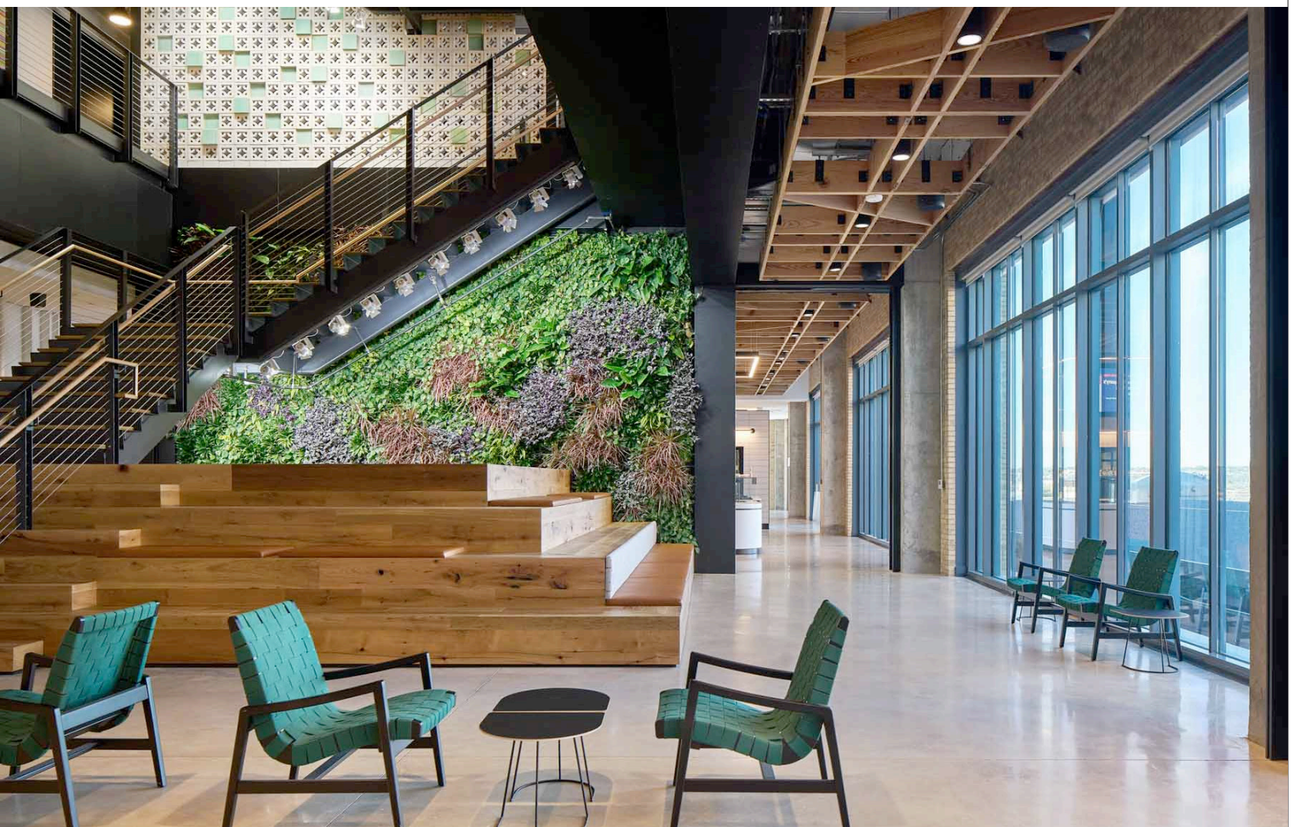
Connecting affordable housing and water stakeholders, along with community engagement, can lead to an evaluation of alternative water

strategies that provide co-benefits to all stakeholders and lead to co-funding mechanisms.

The results from a Multi-Benefit Framework may identify opportunities for incentive stacking. Incentive stacking combines rebates and incentives from different programs to create bigger opportunities for funding water management projects than would have otherwise been available. This is accomplished through intentional coordination and careful consideration and quantification of multiple benefits. The City of Austin's Rain Catcher pilot program incorporates rebates, discounts, and funding from 3 city departments, Watershed Protection, Urban Forestry and Austin Water. Pairing their resources together enables them to meet goals from both departments. Further work should consider opportunities for incentive stacking to fund affordable housing projects with resilient water management strategies.

- Water utilities should conduct a multi-benefits analysis to identify areas of collaboration across city departments, gain stakeholder feedback, and collaborate in creating funding and incentives for integrating onsite water reuse systems in affordable housing projects.
- Affordable impact statements, such as those conducted by the City of Austin when considering new ordinances, should consider the long-term benefits of having an onsite water reuse system, taking account of future climate impacts to water supply and demand.
- LIHTC and other financing mechanisms should balance the long-term savings of onsite reuseS with additional upfront costs when considering the level of financing provided.

The Credit Human headquarters in San Antonio showcases a plethora of water reuse strategies that could be adopted by affordable housing developers. See texaslivingwaters.org/credithuman for details.



Case Studies

Paseo Verde

PHILADELPHIA, PA

Size: 220,000 sq ft, 2 acres, 120 units
Cost: $47.4 million
Actors: Asociación de Puertorriqueños en Marcha (APM) a Latino-based community development corporation. Jonathan Rose Companies

Philadelphia's Paseo Verde uses a combination of green roofs, rain gardens, pavement, and sidewalk gardens to hold and slow rainwater.

Paseo Verde is a mixed-use and mixed-income development in Philadelphia that features a number of sustainable water initiatives. The project was a partnership between a Latino-based Philadelphia community organization, Asociación de Puertorriqueños en Marcha (APM), and affordable housing experts Jonathan Rose Companies. The complex is located in a demographically diverse and low-income neighborhood where displacement pressure from new development was a concern. To mitigate displacement, the project required special attention to local conditions and needs. Paseo Verde highlights the importance of community engagement and partnerships when planning and building resilient housing.

Paseo Verde manages its impact on stormwater by capturing and slowing water flow. A combination of blue roofs, green roofs, rain gardens, impervious pavement, and sidewalk gardens work in tandem to hold and slow rainwater while also providing aesthetic benefits. The blue roof is designed to hold water and gradually release it over time. Green roofs offer the same functionality while also creating a green outdoor space that residents can enjoy. An infiltration basin beneath the parking deck functions as a large storage space for the water collected on-site.

Additional features to manage the building's water footprint include low-flow plumbing fixtures, the use of native species, and green streets—a design standard that requires landscaped areas along the sidewalks to divert runoff from storm sewers into the ground. Paseo Verde is LEED-certified and an example of transit-oriented development in conjunction with water efficiency and management features.

The challenges experienced from the financing mechanism Paseo Verde used are common for other green affordable housing

projects. Although it did not stop construction, it did result in additional time, planning, and coordination of funding. The developers organized a combination of public financing sources running from federal, state, and city sources. These include Philadelphia HFA Low Income Housing Tax Credits, the Federal Home Loan Bank AHP program, the Office of Housing and Community Development (OHCD) Housing Trust Fund Program, and New Market Tax Credits. Apart from managing these various sources, developers had to balance the number of affordable and market-rate units according to local conditions and funding requirements.

Paseo Verde exemplifies the importance of solid partnerships. The partnership between Asociación de Puertorriqueños en Marcha (APM) and Jonathan Rose Companies allowed each to bring their strengths and experiences to the project's development. APM facilitated the community engagement central to guiding the project, while Jonathan Rose Companies provided the affordable housing expertise needed. APM took on the role of maintaining the green infrastructure at Paseo Verde and providing additional community services. These services promote community building and education in a holistic manner that balances social and economic needs. Paseo Verde demonstrates the level of care and intentionality needed for successful water-secure and resilient affordable housing.

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The Rose

MINNEAPOLIS, MN

Size: 145,000 sq ft, 1.65 acres
Cost: $22.7 Million, $156 per sq ft
Actors: Aeon - nonprofit developer, owner, and manager of affordable housing | Hope Community - nonprofit organization with community connections | MSR Architects

The Rose is a 90-unit mixed-income apartment building in Minneapolis that features onsite water reuse strategies and other green building approaches. The complex is located at a major intersection and surrounded by other Hope Community projects. Through a strong partnership with a housing developer and a commitment to community values, Hope constructed affordable housing that provides water efficiency and conservation measures.

The apartment complex has 47 units offered at subsidized rates for qualifying residents. 15 of the units are classified as Section 8 apartments. Additionally, 7 units are for residents experiencing long-term homelessness. The remaining units are rented at market rate. Because the project uses a mix of financing sources, affordability restrictions vary. Some restrictions ended in 2020, and others will remain until 2054. However, the building still maintains its mixed-income development ratios.

Hope Community developed the Rose in partnership with Aeon. As a community development organization, they led the engagement and community support, while Aeon brought affordable housing construction expertise. The idea for the Rose stemmed from Hope's commitment to building quality housing and public spaces in the 1990s.

The first step involved community engagement to understand local concerns and interests. From this process, sustainability and gentrification surfaced as guiding themes for Hope. These themes materialized as the Rose, an affordable housing project designed to meet high sustainable

▲ The Rose's onsite reuse features include a stormwater treatment system, rain gardens, and cisterns.

design by following the Living Building Challenge guidance. More specifically, the community's interest in gardening resulted in the inclusion of garden space that can also act as a learning space.

To meet Living Building Challenge goals, Hope considered various onsite water reuse options by balancing available water sources and financial capacity. Their analysis resulted in including a stormwater treatment system, rain gardens, and cisterns. The rain gardens collect about 75 percent of the rainwater on the property. Captured water is stored in the cistern and reused in the 5,000 sq. ft. community garden. An underground retention system captures stormwater runoff from roofs. This system collects up to 48,800 gallons. Before runoff reaches the Mississippi River, oil, trash, and sediments are removed from stormwater runoff onsite.

Water-efficient fixtures are present in the units. About one-third of the space is dedicated green space. Together, these measures decrease potable water use by 47%.

Hope's efforts to conserve and filter water were also paired with various sustainable design features. Although they could not achieve net-zero energy due to local conditions, Hope was able to cut down energy use by 75%. The solar photovoltaic cells on the rooftop assist in lowering the energy intensity of water use in the building and lowering energy-related utility costs. In addition, solar thermal panels on the building meet 53 percent of the building's hot water needs. These investments exemplify the integrated nature of water and energy to lower housing costs.

Financing for The Rose was leveraged from various sources, including low-income housing tax credits, energy rebates, and fundraising. Private capital and funding from state and local sources were essential for financing the project. Hope also benefited from a supportive governmental environment for affordable housing. Additionally, partnerships between design and construction teams were central during development by enabling the team to forecast and mitigate costs at the onset of the project. Although these multiple funding sources and sustainable design features created planning and timing challenges, Hope achieved the community's vision.

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▲ Via Verde's rainwater reclamation system provides most of the water needed for irrigating the complex's green spaces.

Via Verde

NEW YORK, NY

Size: 290,000 sq ft
Cost: $98 Million
Actors: Phipps Houses, Jonathan Rose Companies, Dattner Architects, Grimshaw

Located in New York City, Via Verde provides sustainable, affordable housing for low- to middle-income households. The overall complex consists of a 20-story tower and a mid-rise building with duplex apartments and townhouses. The dynamic and sustainable complex provides diverse housing types, including single-family townhomes, duplex units, and live-work units. Via Verde integrates housing with retail, community space, and innovative water management. The project began from an international design competition of the New Housing New York Legacy Project.

The project contains 151 rental apartments at an affordable rate to qualifying low-income households. These units are available to those earning 30% to 80% of the average median income. In addition, there are also 71 co-ownership units affordable to middle-income households who earn 70% to 175% of the average median income. Tax bonds and various subsidies were used to finance the project.

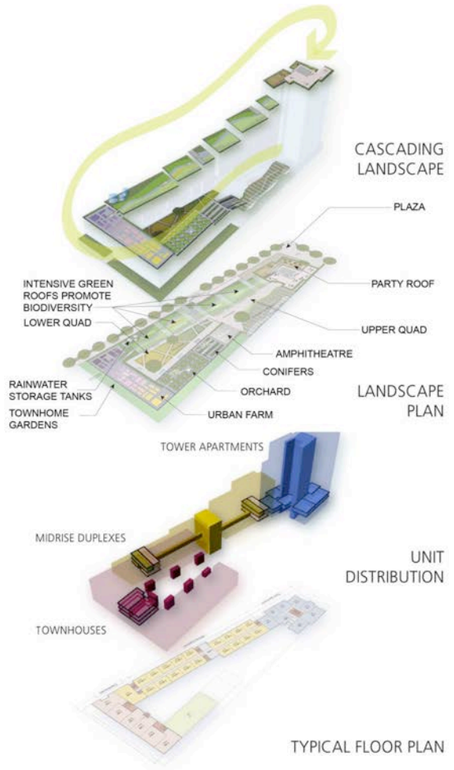
Via Verde meets many sustainable building goals. One Water practices seamlessly integrate themselves into the building's various amenities. A rainwater reclamation system provides most of the water needed for irrigating the complex's green spaces. A significant portion of the green space consists of the building's 40,000 sq ft green roof. This space activates the roof as functional green infrastructure that harvests rainwater and acts as an amenity for residents. The collected rainwater is channeled to barrels and then used to irrigate various plantings throughout the site. This meets most irrigation demands except for the vegetable garden, which is required to use the city's water. The roof also features evergreen trees, a community vegetable garden, and an apple orchard.

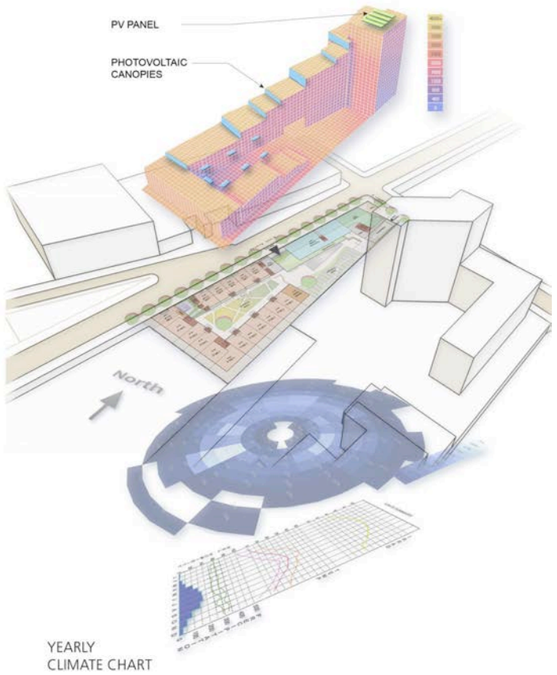
In conjunction with water efficiency and management features, Via Verde contains low volatile organic compound finishes and energy-efficient fixtures. The complex includes a 66 kW photovoltaic system, resulting in over 30% more energy-efficiency than a standard building. Each apartment is equipped with energy-efficient lighting, high-efficiency windows, and super-sealed insulation.

Via Verde showcases how investing in water conservation and efficiency features results in multiple benefits. The expansive green roof provides residents with a space for relaxation, community space for social gatherings, and opportunities to connect with nature. These benefits target residents' physical and mental health by providing green walking space, fresh fruit and lowering local heat island effects. In their efforts to ensure wellness, the building also contains a ground-floor health clinic. In Via Verde, One Water practices are vital in supporting revitalization, healthy living, and sustainable design.

Contact: info@grimshaw.global

Via Verde's cascading roofs provide multi-functional green infrastructure that drives its onsite reuse features.
▼ *Source: Dattner*





Silver Star

LOS ANGELES, CA

Size: 49 units
Cost: $19.9 Million
Actors: A Community of Friends, FSY Architects, Sustainability Consultant Green Dinosaur, Inc.

Silver Star is a Los Angeles multi-family affordable housing project that immerses its residents in various sustainable design features and community amenities. These amenities provide critical services to its target residents, veterans with disabilities, or people experiencing homelessness. The mid-rise building contains a total of 48 one-bedroom units and one three-bedroom unit. Its modern design, sustainable features, and amenities create an environment that promotes sustainability and well-being.

Silver Star Apartments received their funding through Low Income Housing Tax Credits. To be eligible for the affordable units, applicants must make 60% of the area median income to qualify.

Silver Star's One Water features focus on water conservation and onsite reuse. High-efficiency water fixtures are incorporated to decrease the building's water demand. Stormwater is captured and filtered onsite. Water is also allowed to infiltrate into the ground, reducing high stormwater runoff. The greywater reuse system is the main water conservation measure. The system collects and recycles indoor water and reuses it for 100% of its non-potable demand. This water is used for irrigation and toilets. A total of 700,000 gallons of water per year is estimated to be saved by reducing potable water demand by 25%.

The project's commitment to A Community of Friends standard of healthy and sustainable living is captured in its various green certifications. Silver Star is the first Zero Net Energy in Los Angeles. The building is carbon neutral, uses sustainable materials, has a solar thermal system, and uses a photovoltaic system to offset 100% of energy use. A herb garden and edible landscaping are also available at the complex. In addition, the apartment complex makes space for critical support services provided by the U.S. VETS, Los Angeles County Department of Mental Health, and the VA Greater Los Angeles Healthcare Systems. These green building components further decrease housing costs for its residents.

▼ Silver Star features a graywater reuse system that collects and recycles indoor water to supply 100% of its non-potable demand.

Silver Star apartments holistically address resiliency by supporting both environmental and social wellbeing. Although mental and physical health services aren't central to water management, they are deeply connected with people's relationship with water. The onsite water reuse at Silver Star ensures residents have access to an essential component of hygiene and health. As drought projections continue to worsen for California, onsite reuse also benefits the wider community in securing access to water.

Find out more:
acof.org/properties/silver-star-apartments
living-future.org/affordable-housing-silver-star

▲ Casa Dominguez captures graywater from laundry machines and filters it for irrigation use. It is the first commercial graywater irrigation system in Los Angeles County.

Casa Dominguez

LOS ANGELES, CA

Size: 102,000 sq ft
Cost: $28 Million
Actors: Adobe Communities

Casa Dominguez is an affordable multi-family and service-oriented development located in East Rancho Dominguez, California. The complex is located in a lower-income and unincorporated Los Angeles county area. Casa Dominguez features various amenities and sustainable design elements. In total, the two buildings contain 70 units—all of them at affordable rates. Adobe Communities provided comprehensive services for the development of Casa Dominguez. They have extensive experience with sustainable, affordable housing.

Casa Dominguez provides housing for families earning at or below 50 percent of the area's median income. The array of amenities for residents includes a childcare center, healthcare clinic, community spaces, and parent resource center. The Family Development center next door also provides essential resources and services to residents. Financing Casa Dominguez required a diverse mix of funding. Adobe Communities leveraged funding from the Community Development Commission of the County of Los Angeles, Housing Authority of the County of Los Angeles, Federal Home Loan Bank of San Francisco, Enterprise Green Communities, and other sources.

Casa Dominguez obtained the first commercial graywater irrigation

system in Los Angeles County. Their reuse system captures graywater from laundry machines and pumps water through a sand filter. Once filtered, the water is adequate for irrigation use. The complex has two storage tanks, one for collecting greywater and the other for filtered water. This system has offset about 85% of the total irrigation water demand. In addition, drought-resistant landscaping further lowers water consumption.

The LEED platinum building features energy-efficient and green building practices. Common areas are 100% powered through solar energy. Each unit has ENERGY STAR® appliances and fixtures. Only sustainable materials were used for construction. Its sustainable design makes use of natural lighting and ventilated corridors to lower energy consumption. Paired with onsite water reuse, these green building practices lower the total housing costs for residents and increase their resilience to future climate impacts on water and energy.

Casa Dominguez's laundry greywater systems demonstrate one of the many ways onsite water reuse systems can be integrated into affordable housing and community revitalization efforts.

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Cedar Springs

LA VERNE, CA

Size: 102,000 sq ft
Cost: $21 Million
Actors: A Community of Friends, David & Margaret Youth and Family Services

Developed and managed by A Community of Friends, Cedar Springs is a multifamily complex that provides housing for transition-age youths, individuals with a mental health diagnosis, and low-income households. Cedar Springs is located east of Los Angeles in La Verne, California. The complex contains 36 rental units, community space, and retail space. There are a total of four residential buildings that offer one-bedrooms units, two-bedroom units, and three-bedroom units. In addition, Cedar Springs has earned LEED for Homes Platinum Certification.

The onsite water reuse features were designed and permitted by Biohabitats. Cedar Springs reuse system collects greywater from the building's sinks, showers, and laundry machines. It is then treated to meet 100% of the non-potable demand. This goes toward toilet flushing and irrigation. Water treatment includes using a textile filter, microfiltration, and disinfection. Water reuse is projected to save 605,000 gallons of potable water annually or about 12.1 million gallons over a 20 year period.

Cedar Springs has a separate community building where residents can access a kitchen, computers, a media room, and laundry facilities. Residents are also provided with an outdoor dining terrace, play area, and edible garden.

Encore

TAMPA, FL

Size: 28 acres
Cost: $425 Million
Actors: Tampa Housing Authority, Bank of America Community Development Corporation, Baker Barrios Architect, Cardno TBE

Encore is a mixed-use and mixed-income master-planned community in Tampa, Florida. This master-planned district provides its residents with multiple amenities while also implementing some One Water practices. The 28-acre project is a public-private partnership between the Bank of America Community Development Corporation and the Tampa Housing Authority. Encore features multiple buildings for housing, commercial, educational, and gardening use. Being surrounded by water, investing in infrastructure was essential for the district.

Being a district-scale project, Encore is structured to provide various affordable housing opportunities. Most of the buildings at Encore are mixed-income multi-family housing. The Ella, for example, is a 160 unit, seven stories tall affordable senior housing. The Reed is another affordable housing complex for senior living. The combination of mixed-income housing and senior living forms a dynamic multigenerational community that is affordable to many.

▲ Encore features a large underground stormwater detention vault used to meet the irrigation demands of the entire district.

Financing the project leveraged grants and financial partnerships. A $28 million stimulus grant was used for the site's district-scale infrastructure. Encore secured two grants from HUD, a $38 million Neighborhood Stabilization Program grant and a $30 million Choice Neighborhood Implementation grant. Community and financial partnerships were also central to the project.

Encore's main investment in stormwater infrastructure focuses on holding and reusing captured water. The underground stormwater detention vault accommodates

33,000 cubic feet of water. All stormwater on site is collected and channeled to the vault, where it goes through a treating system. Baffle boxes and sediment chambers capture any pollutants to prepare water for irrigation. When at capacity, water from the vault is filtered through sand and released into Tampa Bay. The captured water meets all the irrigation demand for the district. Permeable pavers and native plants are other water quality and conservation features at Encore.

Additionally, the district is equipped with solar panels and various amenities, making it LEED certified for Neighborhood Development. Encore provides a community center, job training, and education building, and an early childhood education center. Green spaces are also present throughout the districts. One of the many parks is the Technology Park that contains educational programming and public art where people can learn about the stormwater system and other green features at Encore.

Health and wellness are prioritized in conjunction with Encore's green features. The urban design promotes an active lifestyle through walkable and bike-friendly design. A two-acre urban farm provides access to fresh produce to the community, as well as educational opportunities. A pool and fitness center are available in the buildings. Residents have weekly access to medical services at an onsite doctor's office and examining room.

Encore is an example of what a large-scale investment in water reuse and affordable housing can look like. The project leverages educational and wellness opportunities throughout the site. A district-scale project like Encore may provide additional opportunities to find creative funding options and partnerships. Additionally, integrating One Water features in a large-scale project like this one can have considerable positive impacts on water supply and quality for the broader municipality.

Contact: encoretampa.com/contact

Conclusion

The case studies presented here are a testament to what is achievable by affordable housing developers and community organizations. From our interviews and literature review, we found common barriers for developing affordable housing but not impossible ones. Our exploration found that collaboration across silos is crucial for creative solutions that pave the way for resilient affordable housing. City leaders, affordable housing advocates, planners, utilities, and community organizations are all essential parts of the solution. Drawing on existing and new funding mechanisms, as well as integrating alternative water supplies into funding opportunities assist in financing onsite reuse systems. Anti-displacement policies and community voices are invaluable for informing equitable solutions that uplift and preserve communities in the face of urban displacement pressures.

The compounding effects of climate change on our water supplies are leading communities to leverage alternative water supplies and resilient building practices to maximize water conservation and supplies. Ensuring One Water is accessible to all requires intentional and equitable policies and regulations in place. Onsite water reuse systems are one of many One Water opportunities to alleviate disproportional water and housing burdens exacerbated by climate change. However, structural and institutional change in our housing and water planning processes will be necessary to produce long-term sustainable solutions.

Resources

GREEN AFFORDABLE HOUSING

The International Living Future Institute has developed resources for expanding the Living Building Challenge philosophy to affordable housing. Their Framework for Affordable Housing provides an overview of barriers and solutions to achieving their certification. They have also developed a Guide for Greener QAPs and financial case studies for onsite water reuse systems for various building types. Apart from clarifying certification options, these resources further develop some of the opportunities and recommendations outlined here.

Enterprise Green Communities provides various resources for affordable housing developers looking to integrate water conservation features and other green building strategies into their projects. Their Green Communities Certification Criteria include criteria for onsite reuse.

The Texas Anti-Displacement Toolkit offers a guide for combating displacement. The guide includes case studies and strategies with a focus on the Texas context.

ONE WATER

The William J Worthen Foundation developed a practice guide for expanding onsite non - potable water reuse. The guide provides background information on ONWR and discussion on best practices for permitting, designing, operating, and other key information. Onsite Non-Potable Water Reuse Practice Guide

Ensuring One Water Delivers for Healthy Waterways: A Framework for Incorporating Healthy Waterways into One Water Plans and Projects

The National Blue Ribbon Commission for Onsite Non-potable Water Systems has developed various resources and guides to support implementation of ONWR programs at the local level. Their work is based on research and collaborations across the water sector.

A Guide for Developing and Implementing Regulations for Onsite Non-potable Water Systems

Model State Regulations and Program Rules for Onsite Non-potable Water Programs

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Notes

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NWF has more than two decades of experience working on Texas water issues. Its Texas Coast and Water Program promotes integrated urban water management and nature-based flood mitigation solutions to improve climate resilience in the state.

To learn more about the authors visit:
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