



EXECUTIVE SUMMARY

Guide for Developing Onsite Water Systems to Support Regional Water Resilience

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Across the United States, urban communities face growing water challenges, from water scarcity to flooding, pollution, aging water infrastructure, and more. These challenges present risks, but also an opportunity to rethink how we manage water, including adopting circular approaches in new buildings that reduce their water footprint and improve urban water resilience. Onsite water systems, for example, collect, treat, and reuse water from onsite sources, including wastewater, rainwater, and stormwater, for non-potable water uses like toilet flushing, outdoor irrigation, and cooling.

Onsite water systems have the potential to provide multiple benefits for a site, water and wastewater systems, ecosystems, and communities. They can, for example, help companies mitigate water-related risks, like water shortages that threaten to disrupt business operations, and support corporate water stewardship goals. For communities, onsite water systems can enhance water supply reliability, improve water quality, reduce localized flooding, and increase urban green space. The realization and magnitude of benefits will vary with the type of system, scale of adoption, and other context-specific factors.

This guide helps site developers consider **how onsite water systems can be planned, designed, and operated to provide multiple benefits, and contribute to planning and designing onsite water systems that advance water resilience, support equity, support the environment, and protect public health** at the site, water system, and community scales. For each of these outcomes, the guide provides sample questions to consider, stakeholders to engage, resources to examine, and analyses to perform.

ADVANCE WATER RESILIENCE

Onsite water systems can enhance water resilience for the site, as well as for water systems and the larger community. By diversifying water sources, for example, onsite water systems can reduce vulnerability to drought and other water supply constraints. Likewise, onsite water systems can provide operational flexibility and redundancy for the centralized water system.

What water sources are available for the site?

Most sites in urban areas rely on potable water delivered by local water providers, each of which has a unique mix of water sources. Some sites may also have access now or in the future to non-potable recycled water delivered through a separate “purple pipe” distribution system. What type of water reuse (e.g., onsite water systems or “purple pipe”) makes the most sense for a site depends on a range of factors, such as the quantity and quality of supplies available and the ease of accessing these sources.

How could onsite water systems reduce vulnerability to drought and other water supply constraints?

Water availability is a growing concern in communities across the Western United States and is especially acute during droughts, which are becoming more frequent and severe due to climate change. An onsite water system provides a reliable water source for the site. This could allow the building to avoid mandatory cutbacks imposed during a drought or other water shortage, and can reduce demand on the water system, improving water reliability for the community. In areas or at times when water supplies are limited, an onsite water system could also help improve public opinion or even facilitate approval of a new development.

How could onsite water systems support wastewater management?

Most onsite water systems capture and reuse wastewater generated on the site, reducing the amount of wastewater collected and treated by the centralized wastewater system. When deployed at scale, this can defer capital costs for new wastewater treatment infrastructure but can also concentrate wastewater and water quality constituents. Onsite water systems can also allow buildings to continue operating if the centralized wastewater system is damaged by a storm or other hazard. The effects of onsite systems on municipal wastewater systems are highly site specific.

How could onsite water systems support stormwater management?

By incorporating rainwater and stormwater as water sources, onsite water systems can help developers meet or even exceed local stormwater requirements. By reducing stormwater runoff, an onsite water system can reduce pressure on stormwater infrastructure, reduce localized flooding, and improve water quality in nearby waterways. Stormwater runoff from urban areas is a major source of pollution in waterways and contributes to surface flooding in low-lying areas.

SUPPORT EQUITY

Water challenges disproportionately affect low-income and marginalized communities. Active consideration of equity, social responsibility, and community perception can help onsite water systems support equity outcomes at the site and in surrounding areas and help boost the developer's reputation. However, equity considerations of onsite water systems have not been deeply explored yet.

How can onsite water systems help address equity concerns in nearby communities?

While the nexus between equity and onsite water systems is not well understood, three issues typically arise with respect to water and urban development: water affordability, green space and urban heat, and job opportunities. The equity issues a developer may face are unique to the site and local circumstances, and they should be identified through meaningful and effective community engagement early in the planning process.

Who are the communities around the site, and what are their primary concerns?

Meaningfully engaging with local communities and understanding their concerns can help build goodwill and support for a project. It may also generate new ideas for ways that an onsite water system could be designed and operated to provide additional benefits to the surrounding area.

What equity or social responsibility goals does the company have, and how might onsite water systems help achieve them?

Corporate social responsibility is increasingly important for both investors and consumers, and many companies are adopting social responsibility goals and targets. Engaging with surrounding communities and exploring local equity issues associated with onsite water systems may contribute to a company's social responsibility goals.

SUPPORT THE ENVIRONMENT

Local ecosystems in urbanized areas are suffering from habitat loss and fragmentation, air and water pollution, and dramatic losses in biodiversity. In addition, the watersheds from which many communities draw water supplies—sometimes from hundreds of miles away—are over-tapped. Those ecosystems, too, are in decline. As climate change increases extreme weather events, ecosystems will face even greater challenges.

How could onsite water systems support local ecosystems?

Many waterways, wetlands, open spaces, and other habitats have been destroyed or degraded due to urbanization. Onsite water systems could help restore ecosystem and environmental health in the communities where they are built by reducing wastewater discharges to oceans and bays and providing water for urban green space and local wetlands.

How could onsite water systems support source watersheds?

In arid regions like much of the Western United States, watersheds are suffering from unsustainable withdrawals to meet water demands. Onsite water systems provide a local, circular water source that can reduce reliance on stressed source watersheds, which provides benefits for the freshwater ecosystems that depend on them.

How could onsite water systems support resource recovery?

The concept of a circular economy—recovering and reusing resources—has emerged as a popular paradigm for companies to reduce their environmental impacts, operational waste, and costs through more efficient use of expensive resources. An onsite water system represents a circular approach by recovering water from wastewater, but there are additional opportunities to recover other resources, including heat and nutrients, to increase the environmental benefits and cost effectiveness of onsite water systems.

PROTECT PUBLIC HEALTH

Public health is of utmost importance in the provision of water and wastewater services, including for onsite water systems. Developers and operators of onsite water systems must keep everyone on and around the site safe and demonstrate good stewardship of water resources. Developers can meet the public health imperative through achieving and exceeding regulatory compliance, supporting public education about onsite water systems, and planning for the long term.

What is the regulatory context for onsite water systems at the site?

Any developer considering an onsite water system must understand all relevant requirements for the design, construction, and operation of the system, including how those requirements may be changing. Long-term operations, maintenance, monitoring, and reporting plans should meet or exceed local requirements.

How can the site support data sharing about onsite water systems?

Given the relative novelty of onsite water systems and ongoing regulatory transitions, developers can be leaders in data management and sharing for onsite water systems. Collecting and sharing

accessible, usable data on onsite water systems' water volumes and water quality can help ensure that public health is protected, support responsible management of water and wastewater flows, increase data transparency, and help inform other developers considering onsite water systems.

What is the plan for ongoing operation and ownership of the onsite water system?

One of the major concerns about private development and ownership of onsite water systems is the question of who assumes responsible for its long-term operations and maintenance. Government agencies charged with protecting public health must be confident that onsite water systems will be operated safely, and the general public must share this confidence for developers to have social license to operate them. To this end, it is critical that onsite water systems have long-term operations and ownership plans. There are several different possible arrangements for onsite water systems project delivery, many involving partnership with various companies, organizations, and/or agencies.

This guide aims to support the development of onsite water systems that provide benefits to the site, water and wastewater systems, and the surrounding community. Additional effort is needed to increase uptake of multi-benefit onsite water systems. Developers can support greater implementation and integration of onsite water systems in the following ways:

- Creating case studies about onsite water systems that other developers can learn from.
- Collecting and sharing data and information from onsite water systems with water and wastewater providers, onsite water systems practitioners, and academic researchers.
- Supporting regional, statewide, and national policies that enable and/or incentivize implementation of onsite water systems.





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