Household Water Conservation by the Numbers

Indoor Efficiency, Outdoor Irrigation, Leakage, Rainwater and Stormwater Management, and Local Water Reuse

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Context and Purpose

On August 26, 2026, *TIME* published the article **"We Asked Experts For the Easiest Ways to Shrink Your Home Water Usage,"** which included interviews with the author of this brief and two other university professors on practical approaches to household water conservation [1]. The article discussed indoor water-saving practices, household leaks, and outdoor landscape irrigation within the broader context of water scarcity and drought in the United States.

This technical brief is a follow-up to the *TIME* article. It expands the discussion by taking a more quantitative and systems-oriented look at residential water use—including indoor efficiency, household and water-distribution leakage, outdoor irrigation, rainwater and stormwater management, and opportunities for local nonpotable water reuse.

Household water conservation is often communicated through simple advice: fix leaks, take shorter showers, run full loads, or water lawns less frequently. These recommendations are useful, but the quantities involved can vary substantially with climate, season, household characteristics, technology, infrastructure condition, and even the definitions used by different studies. Wherever possible, current federal sources and the newly released 2026 *Residential End Uses of Water* study are used.

This brief focuses primarily on **direct residential water use**—the water supplied to and used in or around a home. The broader **water footprint**, which also includes indirect water use associated with the goods and services people consume, is noted separately in Section 12.

TIME article:
https://time.com/article/2026/08/26/water-experts-s-habits-to-reduce-their-water-footprint/

Key Quantitative Benchmarks

Quantity	Approximate benchmark	Important qualification
U.S. domestic water use	**82 gal/person/day**	USGS 2015 benchmark still cited by EPA; includes indoor + outdoor residential uses
Current single-family indoor use	**38.5 gal/person/day**	2026 Water Research Foundation study
Change in average single-family indoor use since 1999	**−44.4%**	69.3 → 38.5 gal/person/day
Outdoor household use	**~30% nationally**	Can reach ~70% in hot summer conditions or dry climates
Household leaks	**~9,400 gal/family/year**	EPA average potential waste; individual homes vary widely; includes household plumbing and irrigation leaks
U.S. household leakage	nearly 900 billion gal/year	Current EPA WaterSense national estimate
Loss associated with aging distribution infrastructure	**~2.1 trillion gal/year**	EPA cites an ASCE-derived estimate for treated drinking water lost through aging/leaky infrastructure
U.S. drinking-water infrastructure need	**$625 billion/20 years**	$422.9 billion (~68%) is for distribution/transmission on EPA's current webpage
1 inch of water over 1,000 ft²	**623 gallons**	Basic volume conversion
1 inch of rain on a 2,000-ft² roof	**~1,247 gallons**	Gross rainfall volume before collection losses
WaterSense faucet savings	**~700 gal/family/year**	Replacing old inefficient faucets/aerators
WaterSense showerhead savings	**~2,700 gal/family/year**	Average EPA estimate

Quantity	Approximate benchmark	Important qualification
WaterSense toilet savings	**~13,000 gal/family/year**	When replacing old inefficient toilets
Smart irrigation controller	**up to ~15,000 gal/home/year**	Depends on controller technology and existing overwatering
Southern Nevada turf conversion	**~55.8 gal/ft²/year saved**	Highly climate-specific; should not be transferred directly to humid regions

These values come from different datasets and **should not simply be added, subtracted, or transferred from one climate to another**.

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1. How Much Water Does an American Household Use?

EPA continues to state that the average American uses about **82 gallons per person per day at home** [2,3]. The figure originates in the U.S. Geological Survey's national 2015 water-use assessment rather than a new 2026 measurement. Importantly, USGS defines domestic water use to include both indoor activities—drinking, bathing, toilets, laundry, and dishwashing—and outdoor activities such as lawn and garden irrigation, vehicle washing, and swimming pools.

The **82-gallon figure therefore includes both indoor and outdoor residential water use**.

A major new Water Research Foundation study published in June 2026 provides a much more current measure specifically of **indoor use**. *Residential End Uses of Water, Version 3* included 52 utility partners, billing data from more than 4 million households, single-family end-use data from almost 70,000 households, and multifamily end-use data from 1,000 households across the United States and Canada [4].

The study reports average single-family indoor consumption of only **38.5 gallons per capita per day (gpcd)**.

This compares with **69.3 gpcd in the 1999 study**, a reduction of:

(69.3 − 38.5) / 69.3 × 100 ≈ 44.4%

or:

69.3 gpcd → 38.5 gpcd = 44.4% reduction.

WRF attributes much of this decline to increasingly water-efficient fixtures and appliances. Clothes-washer use declined by 67.6%, approximately 10 gpcd, while average toilet flush volume fell to 1.84 gallons in the 2026 study.

The important point is that **82 and 38.5 gpcd are not directly comparable numbers**. The former is an older national estimate of total residential use, including outdoor use; the latter is a new estimate of indoor single-family use.

It would therefore be incorrect to infer current outdoor use simply as:

82 − 38.5 = 43.5 gpcd.

The datasets, years, samples, and methodologies differ.

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2. Indoor Water Efficiency Has Been a Substantial Success

The long-term decline in indoor household water use did not occur accidentally.

National fixture standards established under the Energy Policy Act of 1992 became effective in the 1990s. Federal standards limited new conventional showerheads to 2.5 gallons per minute, faucets to 2.2 gallons per minute, and toilets to 1.6 gallons per flush [5]. EPA subsequently launched **WaterSense in 2006**, encouraging another generation of products that exceed minimum federal efficiency requirements [6].

Current EPA estimates illustrate the scale of potential household savings.

Replacing old, inefficient toilets with WaterSense models can save an average family nearly **13,000 gallons per year**. WaterSense showerheads can save approximately **2,700 gallons per year**, while efficient bathroom faucets and aerators can save approximately **700 gallons per year** [7–9].

Dishwashers have improved as well. Current ENERGY STAR criteria limit a standard certified dishwasher to approximately **3.2 gallons per cycle** [10]. EPA and ENERGY STAR recommend running dishwashers with full loads and scraping dishes rather than extensively prerinsing them. Modern efficient dishwashers can generally use less water than washing an equivalent quantity of dishes by hand.

EPA estimates that running a dishwasher only when full, thereby eliminating about one load per week, can save the average family nearly **320 gallons of water annually** [2].

Clothes washers have also become substantially more efficient. ENERGY STAR states that certified clothes washers use about **30% less water** than regular washers [10].

Thus, conservation does not always require sacrificing service or convenience. A substantial portion of the improvement in indoor water efficiency has come from providing essentially the **same household services with less water**.

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3. Does Indoor Water Use Change Much Between Winter and Summer?

Indoor water use is generally **much less seasonal than total household water use**, although it should not be assumed to be perfectly constant.

The original Residential End Uses study found no significant overall summer-to-winter change in indoor residential consumption. This observation has subsequently been used by water planners to estimate outdoor consumption from differences between winter and summer water use [11].

More recent U.S. measurements provide useful nuance. A study of homes in Logan and Providence, Utah, found summer-versus-winter differences in some indoor end uses at individual homes, but the differences were not generalizable across sites. By contrast, total household use increased dramatically during the irrigation season.

Other end-use research similarly indicates that some behaviors—particularly showering—may vary seasonally, while toilet flushing, faucets, dishwashing, and clothes washing are generally much less temperature-sensitive than outdoor irrigation.

For a temperate climate such as New Jersey, a reasonable first-order assumption is therefore:

Summer indoor demand ≈ winter indoor demand, with modest behavioral variability.

For rigorous analysis, however, this assumption should be tested.

A **December–March baseline** may be cleaner than November–April because outdoor use can begin during April or continue into November. Sensitivity testing at perhaps ±5% or ±10% around the winter baseline can help determine whether conclusions depend materially on assumed seasonal indoor variation.

This distinction is particularly useful for estimating outdoor household demand:

Estimated seasonal outdoor use ≈ summer total household use − estimated indoor baseline

provided the limitations of such an approximation are recognized.

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4. Water Losses Occur in Homes, Service Lines, and Public Systems

Household leakage receives considerable attention because it is immediately actionable.

EPA estimates that the average family can waste about **180 gallons per week, or 9,400 gallons per year**, through household leaks. Nationwide, household leaks waste **nearly 900 billion gallons annually** [2]. The category is not strictly “indoor” leakage: WaterSense addresses leaks in household plumbing as well as irrigation systems [12].

The national average should not be interpreted as meaning that every well-maintained home quietly loses 9,400 gallons each year. EPA reports that **9% of homes have leaks that waste 50 gallons or more per day** [12]. Leakage is therefore unevenly distributed across homes, and small continuous leaks can accumulate to large annual volumes even when they are difficult to hear or see.

Common household leaks include worn toilet flappers, dripping faucets, defective valves, leaking plumbing connections, and irrigation-system leaks. EPA notes that many easily corrected leaks require only a few tools and inexpensive hardware, and fixing them can reduce household water bills by about 10% [12]. Household leak repair is therefore often a comparatively low-cost and immediately actionable conservation opportunity.

Public-system losses and infrastructure renewal

At the public-system scale, water can also be lost before it reaches the customer through water-main breaks, leaking joints and valves, service connections, corrosion, storage losses, and other failures in the distribution system.

EPA notes that aging infrastructure—including leaky pipes and water mains—is associated with the loss of approximately **2.1 trillion gallons of treated drinking water annually** in the United States [13]. EPA cites this figure from ASCE-derived non-revenue-water estimates rather than as an independent EPA measurement. Deteriorating distribution systems can also contribute to main breaks, reduced pressure, service interruptions, and water-quality risks.

EPA's current 7th Drinking Water Infrastructure Needs Survey and Assessment webpage reports a national 20-year need of approximately **$625 billion**, of which **$422.9 billion—about 68%—is for distribution and transmission infrastructure** [14]. This $422.9 billion figure is **not the cost of fixing leaks alone**; it covers broader rehabilitation and replacement needs that also address reliability, pressure, water quality, capacity, and resilience.

For scale, EPA's current household-leak estimate of nearly 900 billion gallons per year is about **43% of the 2.1-trillion-gallon public-infrastructure loss estimate**. The two figures are not directly comparable and should not be added together: they come from different analyses and definitions, the household category includes some outdoor leakage, and utility water-loss accounting also includes service-connection losses up to the meter.

Service lines form an important transition zone

Public water main → service connection/service line → customer meter → household plumbing

For drinking-water systems, the pipe connecting the public main to a building is generally called a service line or service connection. Meter location and ownership responsibility vary among utilities, so the physical and financial boundary between "utility" and "customer" leakage is not always the same as the property line.

Under the AWWA/IWA water-audit approach described by EPA, **real losses include leakage from service connections up to and including the customer meter** [15]. Leakage downstream of the meter is generally recorded as customer use even when the leaking pipe is buried outside the building; repair responsibility can also vary by utility.

This distinction has practical consequences for leak detection. A buried service-line leak upstream of the meter may not appear as increased household metered use, whereas a leak downstream of the meter generally will. Service-connection leaks can also be difficult to identify because underground water may not produce visible wet spots at the surface [15].

The repair challenge therefore forms a continuum. A worn toilet flapper or dripping faucet can often be corrected quickly and inexpensively; a customer service-line repair is more involved; and rehabilitation or replacement of public mains is the most capital-intensive. The less expensive household opportunities should be pursued aggressively, but they cannot substitute for renewal of aging public infrastructure.

This leads to an important engineering principle:

Household leak repair, service-line management, and public-infrastructure renewal are complementary—not competing—water-conservation strategies.

Household leak repair can often save water at relatively low cost. Service-line leak detection and repair occupy an intermediate scale. Public-system renewal requires much larger capital investment, but it also protects reliability, pressure, water quality, and system resilience while reducing the loss of water that has already been captured, treated, pumped, and conveyed.

5. Outdoor Water Use Is Where Residential Demand Becomes Highly Variable

EPA estimates that approximately **30% of household water use nationally occurs outdoors**, primarily for landscape irrigation [16].

Current EPA webpages place total U.S. residential outdoor use at roughly **8–9 billion gallons per day**, with some variation among EPA webpages and underlying datasets.

In hot summer months or dry climates, however, outdoor use can rise to **as much as about 70% of an individual household's total water consumption**.

That distinction is important:

~30% = broad national average

whereas

up to ~70% = some hot/dry seasonal or geographic conditions.

The dramatic summer increase seen on many household water bills is therefore primarily an **outdoor-use phenomenon**, rather than evidence that indoor demand doubles during the summer.

New Jersey provides a useful humid-climate contrast.

Rutgers NJAES notes that established lawns in New Jersey generally require supplemental watering to maintain vigorous growth primarily during **June, July, and August**, with occasional need during May or September. Rutgers also notes that lawns can survive relatively short New Jersey droughts without irrigation by entering dormancy [17].

This distinction matters because turf that is allowed to become temporarily dormant may appear brown but can recover when cooler or wetter conditions return. Keeping turf continuously lush and green therefore represents a landscape preference rather than always a plant-survival requirement.

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6. Lawn Irrigation Involves Larger Volumes Than May Be Apparent

A useful hydrologic conversion is:

1 inch of water × 1,000 ft² = approximately 623 gallons.

This follows directly from volume conversion:

$1{,}000\ \text{ft}^2 \times (1/12\ \text{ft}) \times 7.4805\ \text{gal/ft}^3 \approx 623$ gallons.

Thus, applying one inch of supplemental irrigation to a modest **1,000-ft² lawn once per week for 20 weeks** would represent approximately:

$623 \times 20 \approx 12{,}500$ gallons

if rainfall supplied none of the requirement.

This is **not** a recommendation or an estimate of actual annual lawn demand in New Jersey. Natural rainfall can provide much of the required water in a humid climate. The calculation simply illustrates the scale involved.

Rutgers guidance indicates that landscapes may require on the order of **one inch of water per week during periods of greatest summer need**, with irrigation intended to supplement natural rainfall rather than replace it [17].

Dry climates demonstrate the other extreme.

University of Nevada, Reno Extension reports that a typical lawn can consume approximately **10,000 gallons of water over a summer** in northern Nevada [18].

Southern Nevada has particularly extensive field data on turf conversion. The Southern Nevada Water Authority reports that water-smart landscaping uses approximately **55.8 gallons less water per square foot annually than turfgrass** under Southern Nevada conditions [19].

The underlying comparison measured approximately:

- **73.0 gal/ft²/year** for turfgrass, versus
- **17.2 gal/ft²/year** for xeric landscaping.

Thus, replacing **1,000 ft² of irrigated turf** under Southern Nevada conditions can represent water savings on the order of:

$55.8 \times 1{,}000 \approx 55{,}800$ gallons/year.

This number should **not be transferred directly to New Jersey or other humid climates**.

Its value is to demonstrate how profoundly climate changes the scale of outdoor residential water use.

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7. Irrigation Timing and Controls Also Matter

Watering during the hottest, sunniest, and often windiest portion of the day increases evaporation, wind drift, and other application losses.

EPA therefore recommends avoiding midday irrigation and generally favors watering during cooler periods [16].

EPA estimates that when inefficient system design and operation, wind, evaporation, runoff, overspray, leaks, and overwatering are considered together, **as much as approximately 50% of outdoor irrigation water may be wasted**.

For New Jersey specifically, Rutgers NJAES states that the most efficient irrigation period is generally **late evening through early morning, approximately 10 p.m. to 8 a.m.**, when temperatures and wind speeds tend to be lower and relative humidity is higher, reducing evaporative losses [17].

For a simple household recommendation, **early morning is particularly attractive** because evaporation is relatively low, winds are often lighter, and foliage can subsequently dry during the day.

One subtle point is important:

Changing irrigation from noon to nighttime does not automatically reduce the gallons measured by the water meter.

If a sprinkler operates for exactly 30 minutes in either case, approximately the same nominal volume may be applied.

The conservation benefit occurs when lower evaporative and wind losses allow the required soil moisture to be achieved with **less total applied water**.

Other irrigation-efficiency measures can be equally or more important:

- Water only when plants actually need it.
- Account for recent rainfall.

- Adjust irrigation schedules seasonally.
- Repair leaking or broken sprinkler heads.
- Prevent overspray onto sidewalks and pavement.
- Use shorter “cycle-and-soak” applications where runoff occurs.
- Use drip or microirrigation where appropriate.
- Use weather- or soil-moisture-based controls.

Smart irrigation controllers can produce substantial savings. EPA estimates that replacing a standard clock-based controller with a WaterSense-labeled weather-based irrigation controller can save an average home **nearly 7,600 gallons of water annually**, while installing a WaterSense-labeled soil-moisture-based controller can save an average home with an automatic landscape irrigation system **more than 15,000 gallons annually** [20].

These are potential savings relative to less efficient irrigation practices, not guaranteed savings for every household. Actual savings depend on climate, landscape characteristics, irrigation demand, system condition, and existing watering practices.

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8. Landscape Design Can Reduce Irrigation Demand While Maintaining Function and Ecological Value

Reducing outdoor water demand can involve reducing the area of intensively irrigated turf and replacing portions with native or climate-adapted vegetation.

Rutgers recommends native plants as part of sustainable residential landscapes and notes that unused lawn areas can be converted to native planting beds, rain gardens, or reforested areas [17].

Newly planted native vegetation still requires irrigation during establishment and sometimes during prolonged heat or drought.

Therefore:

“Native” should not be confused with maintenance-free or water-free.

Native and adapted landscapes may still require:

- initial establishment watering,
- weed and invasive-species control,
- periodic pruning or cutting,
- maintaining sight distances and walkways,

- controlling unwanted spread, and
- other forms of landscape stewardship.

A practical hierarchy is to retain turf where it serves an actual function—such as recreation, play, gathering, or erosion protection—and use lower-water landscape types where turf is primarily ornamental.

The potential water savings depend greatly on climate.

Southern Nevada's approximately 55.8-gal/ft²/year turf-conversion saving is dramatic because evapotranspiration demand is high and rainfall is very low.

In New Jersey, annual precipitation is much greater and more evenly distributed. The absolute potable-water savings from turf conversion will therefore ordinarily be much smaller.

Water-efficient landscaping should consequently be evaluated in its **local climatic, ecological, regulatory, and social context**, rather than treated as a universal one-size-fits-all prescription.

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9. Rainfall Itself Is a Substantial Household-Scale Water Source

The same basic hydrology provides another useful number:

1 inch of rain on 1,000 ft² of roof ≈ 623 gallons

and therefore:

1 inch of rain on 2,000 ft² of roof ≈ 1,247 gallons.

These are gross rainfall volumes before accounting for gutter losses, first-flush diversion, leakage, storage limitations, roof geometry, and overflow.

For simple volume estimates, roof catchment area refers to the horizontal projected area draining to the gutters, not the larger sloping roof-surface area.

A conventional 55-gallon rain barrel provides a useful unit of comparison, but a household need not be limited to one barrel. A residence may have several downspouts serving different portions of the roof, allowing barrels to be installed at multiple locations or connected together for greater storage. Detached garages, sheds, and other roofed structures can provide additional collection areas where gutters and downspouts are available. The practical number and placement of barrels depend on roof-drainage configuration, available space, irrigation demand, and the ability to empty storage between storms [17].

On a 1,000-ft² roof:

55 gallons / 623 gallons per inch ≈ 0.088 inch

Thus, only approximately **0.09 inch of rainfall** would theoretically generate enough roof runoff to fill a 55-gallon barrel.

A 1-inch storm generates more than **eleven times** that volume.

Multiple barrels can materially increase household-scale storage. Illustrative capacities for standard 55-gallon barrels are:

Storage configuration	Total storage	Equivalent runoff depth on 1,000-ft² roof	Equivalent runoff depth on 2,000-ft² roof
2 × 55-gal barrels	110 gal	~0.18 in	~0.09 in
4 × 55-gal barrels	220 gal	~0.35 in	~0.18 in
6 × 55-gal barrels	330 gal	~0.53 in	~0.26 in

These values are gross runoff equivalents before collection losses. If barrels are placed at separate downspouts, actual capture depends on the roof area draining to each location and runoff need not be divided evenly among downspouts. Even several barrels may capture only part of the runoff from a larger storm. Storage must also be used or emptied between events; a full barrel has no capacity for the next storm. Rutgers NJAES recommends connecting multiple barrels when greater storage is desired [17].

A **single rain barrel** is therefore useful, but it represents only a small storage element relative to the runoff generated by a residential roof during a substantial storm.

Larger cisterns can capture considerably more water.

EPA recognizes rainwater harvesting, downspout disconnection, and rain gardens as established green-infrastructure practices [21].

Downspout disconnection can route roof drainage toward:

- rain barrels,
- cisterns,
- lawns,
- landscaped areas,
- rain gardens, or
- other suitable permeable surfaces

instead of directing runoff immediately to pavement or storm drains.

Rain gardens provide temporary storage and support infiltration, plant uptake, evapotranspiration, and potentially water-quality improvement.

These practices are best viewed as complementary:

Capture and reuse what is practical → safely route overflow → infiltrate or retain additional water where site conditions permit.

Their objectives are not identical.

A rain barrel or cistern can directly substitute captured rainwater for potable irrigation water.

A rain garden's principal benefits are generally stormwater retention, infiltration, evapotranspiration, water-quality improvement, and runoff reduction. Potable-water savings are an additional rather than automatic benefit. However, Rutgers NJAES notes that replacing irrigated turf with a bioretention practice such as a rain garden can reduce irrigation needs once plants are established, thereby lowering potable-water use [17].

Downspouts should never simply be redirected without considering:

- building foundations,
- site grading,
- neighboring properties,
- soil infiltration capacity,
- utilities,
- erosion,
- easements, and
- local ordinances.

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10. Could Basement Sump Water Also Become a Resource?

Foundation drainage introduces a less frequently discussed household water source.

Many homes collect shallow groundwater or infiltrated water around the foundation and pump it away through a sump system.

The U.S. Department of Energy explicitly identifies **foundation water, or "sump-pump water," as an alternative water source** and lists irrigation, toilet flushing, cooling-tower makeup, and vehicle washing among possible nonpotable applications [22].

The U.S. General Services Administration similarly recognizes foundation/sump water as a potential alternative source, with appropriate treatment depending on water quality and intended use.

Foundation-drainage water, however, differs hydrologically from conventional roof runoff.

Characteristic	Roof runoff	Foundation/sump drainage
Source	Rainfall intercepted by roof	Groundwater/soil drainage reaching foundation
Response	Immediate during rainfall	May be delayed and prolonged
Yield estimation	Relatively straightforward from rainfall and roof area	Highly site-specific
Seasonal control	Rainfall pattern	Rainfall + antecedent moisture + soils + groundwater
Water-quality concerns	Roof material, atmospheric deposition, debris, wildlife	Groundwater chemistry, iron/manganese, salts, possible local contamination
Storage need	Often substantial because rainfall and irrigation demand do not coincide	Also potentially substantial; timing may differ
Research/practice base	Extensively documented	**Less extensively documented for residential beneficial reuse**

The timing difference may be particularly interesting.

Roof runoff reaches storage immediately during a storm—precisely when landscape irrigation demand is generally low.

Foundation drainage may continue **after rainfall** as infiltration raises shallow groundwater levels and water moves through soil toward the foundation.

Whether that delayed response improves the match between **water availability and subsequent irrigation demand** is an empirical question.

Compared with roof-rainwater harvesting, the federal sources reviewed here recognize foundation-water reuse, but residential-scale quantification appears much more limited with respect to:

- annual yield,
- seasonal reliability,
- source-water quality,
- storage sizing,
- irrigation-demand matching,
- potable-water offset,

- pumping energy, and
- economic feasibility.

This suggests a potentially useful research question:

Under what hydrogeologic, climatic, and household conditions does residential foundation-drainage reuse provide meaningful value relative to—or in combination with—conventional roof-runoff harvesting?

A rigorous study could measure sump-pump flow, rainfall, shallow groundwater conditions, and irrigation demand; evaluate water quality; simulate alternative storage capacities; and compare:

1. no reuse,
2. roof-runoff reuse only,
3. foundation-drainage reuse only, and
4. combined roof + foundation-drainage reuse.

The most useful result may not be choosing one source over the other.

A combined system could potentially operate as:

Roof runoff + foundation drainage → shared storage → landscape irrigation → safe overflow to a rain garden or other appropriate discharge location.

Such a concept should be evaluated carefully rather than assumed to be advantageous. In many homes, sump flow may be small or highly intermittent; in others, it may occur primarily during wet periods when irrigation is unnecessary. Water quality can also vary substantially from site to site.

Foundation-drainage reuse should therefore be viewed at present as a **promising research and site-specific design question**, rather than a universally established residential conservation practice.

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11. The Value of Conserving a Gallon Depends on Where It Is Conserved

Water conservation also has an economic dimension.

For an **indoor gallon**, reducing consumption can often avoid:

1. the cost of potable water supply,
2. the cost of wastewater conveyance and treatment, and

3. where hot water is involved, the energy required for water heating.

Most indoor water eventually enters the sanitary sewer.

For **outdoor irrigation**, however, the relationship between water use and sewer cost varies by utility.

Some municipalities charge wastewater fees based directly on metered water consumption. Others estimate wastewater production from winter consumption, use separate irrigation meters, or apply seasonal adjustments.

In those systems, reducing outdoor irrigation may lower the **water bill** but may not reduce the **sewer bill**.

A simplified expression for household financial savings is therefore:

Annual savings ≈
(avoided water volume × applicable water rate)
+ (avoided sewer volume × applicable sewer rate)
+ avoided water-heating energy cost, where applicable

This explains why identical gallon savings can have very different economic values in different communities.

Two neighboring communities can even have substantially different incentives because one may charge a flat residential sewer fee while another charges volumetrically.

Appendix A provides a detailed 2026 comparison for two New Jersey communities. It shows how fixed and volumetric water and sewer charges affect annual household costs and why identical reductions in indoor and outdoor water use can produce different financial savings.

Water-rate structures may also include:

- fixed monthly service charges,
- increasing block rates,
- seasonal rates,
- minimum charges,
- separate irrigation rates, or
- affordability programs.

Therefore, the household economic value of conservation cannot be inferred from gallons alone.

Efficiency of hot-water fixtures can provide particularly strong combined benefits because it saves both water and energy. EPA notes, for example, that WaterSense showerheads reduce not only water consumption but also the energy needed to heat shower water.

Stormwater utilities add a third household cost signal

Another emerging development is the stormwater utility—a dedicated funding mechanism for stormwater services and infrastructure. New Jersey's Clean Stormwater and Flood Reduction Act (P.L. 2019, c.42) authorized municipalities, counties, and certain authorities to establish stormwater utilities. Fees must be based on a fair and equitable approximation of runoff generated by a property, commonly using impervious area, and the law requires partial fee credits for qualifying onsite measures that reduce, retain, or treat stormwater, including approved green infrastructure [23]. Unlike potable-water charges, stormwater utility fees generally are not based on gallons of water delivered to the property.

New Brunswick became the first municipality in New Jersey to establish a stormwater utility in May 2024, about five years after the State's enabling legislation. Its ordinance defined one Equivalent Residential Unit (ERU) as 2,102 ft^2 of impervious area and set an annual fee of $77 per ERU. The City subsequently adopted a Stormwater Management Fee Credit & Adjustment Policy Manual, and in 2026 initiated development of a Municipal Stormwater Utility Master Plan to guide stormwater infrastructure, regulatory compliance, and long-term resilience [23].

Rain gardens can provide dual household cost benefits

Rain gardens illustrate how water-conservation and stormwater economics can intersect. NJDEP identifies rain gardens as the most widely used green-infrastructure stormwater best management practice [21]. Rutgers NJAES notes that replacing turf with a bioretention system such as a rain garden reduces the need for irrigation once plants are established, which can lower potable-water use and the outdoor water bill [17].

Where a stormwater utility offers credits, a properly designed, approved, and maintained rain garden that reduces, retains, or treats runoff onsite may also qualify for a partial stormwater-fee credit [23]. The two savings mechanisms are distinct: one comes from using fewer metered gallons for irrigation; the other from managing stormwater runoff onsite. Newly installed rain-garden vegetation still requires establishment watering, and actual water savings and stormwater credits depend on site conditions, design, maintenance, and local program requirements.

12. From Individual Conservation to Water-System Resilience

The numerical picture suggests several levels of water conservation rather than a single solution.

Inside the home

Efficient fixtures and appliances have already produced a major national decline in per-capita indoor demand.

Remaining opportunities include:

- avoiding unnecessary faucet use,
- running full appliance loads,
- using efficient fixtures and appliances, and
- finding and repairing leaks.

Outside the home

The opportunity is more geographically variable but can be much larger.

Useful approaches include:

- irrigating according to actual plant need,
- accounting for recent rainfall,
- watering when evaporative and wind losses are relatively low,
- maintaining irrigation equipment,
- reducing unnecessary turf,
- using native or climate-adapted vegetation,
- improving irrigation controls, and
- allowing turf dormancy where appropriate.

At the property scale

Roof water can be captured or infiltrated through:

- rain barrels,
- cisterns,
- downspout disconnection,
- landscaped infiltration areas, and
- rain gardens.

Foundation-drainage water may provide another local nonpotable source under suitable conditions, although its residential potential deserves considerably more quantitative evaluation.

At the community scale

Household conservation alone cannot solve water loss.

Renewal of aging water infrastructure remains equally important. This includes not only public mains and distribution facilities but also attention to leaking service connections, whose accounting and repair responsibilities depend in part on meter location and utility ownership rules. EPA estimates that enormous quantities of treated drinking water are lost through deteriorating distribution systems, while more than $400 billion in distribution/transmission investment will be needed over the coming two decades.

Stormwater utilities can complement these investments by providing dedicated funding for drainage-system operation and maintenance, capital improvements, regulatory compliance, flood reduction, and green infrastructure. Credit programs can also create property-scale incentives for onsite runoff reduction and green infrastructure [23].

A broader water-footprint perspective

The water discussed in this brief is primarily direct household water use—the water delivered to and used in or around the home. A consumer's broader water footprint also includes indirect water use associated with producing the goods and services that the consumer uses. The Water Footprint Assessment Manual defines a consumer's water footprint as the combination of direct water use at home or in the garden and indirect water use associated with products and services such as food, clothing, paper, energy, and industrial goods [24].

Accordingly, the EPA/USGS benchmark of **82 gallons per person per day** is a measure of direct residential water use, **not a person's total water footprint**. Reducing food waste and improving water efficiency throughout agricultural, energy, and industrial supply chains can complement conservation at the household tap, but a detailed water-footprint assessment is beyond the scope of this brief.

The broader engineering principle is therefore:

Use potable water efficiently. Eliminate avoidable losses. Choose landscapes suited to local climate and need. Match water quality to the intended use. Retain and reuse local water where practical. And maintain the infrastructure that delivers the water in the first place.

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Appendix A. Household Water and Sewer Costs and Conservation Savings

Illustrative Comparison for Piscataway and Montgomery, New Jersey

2026 Rates — Updated September 7, 2026

Purpose. This appendix illustrates how local water and sewer rate structures affect the household financial value of water conservation. Costs are modeled for a four-person, single-family household receiving New Jersey American Water service through a 5/8-inch meter. The comparison applies only to homes connected to the public water and sewer systems. Optional service-line protection insurance is excluded. Water rates reflect charges in effect in summer 2026 and were cross-checked against an August 2026 residential bill; the service address is not reproduced here.

A.1 Service Providers and Billing Structure

The two communities use the same New Jersey American Water general metered water-rate structure for the modeled public-water household, but their municipal sewer charges differ fundamentally. That difference determines whether conservation can reduce the sewer bill.

Service	Piscataway	Montgomery
Water	New Jersey American Water — fixed monthly charges plus volumetric usage charges and surcharges	New Jersey American Water — same modeled tariff structure
Sewer	Township of Piscataway — $360/year for a single-family residence, independent of water use	Township of Montgomery — $288 base fee plus $15.96/1,000 gal of billable water use; lesser of annual or winter formula
Outdoor-use effect on sewer bill	None; residential sewer charge is flat	None in the modeled case when the winter formula controls; May–October irrigation does not change the winter basis

A.2 Current Water-Rate Components

For the modeled household, the current New Jersey American Water bill separates fixed monthly charges from consumption-related charges. The following rates are confirmed by the current tariff and by an August 2026 residential bill.

Component	Current rate	Cost behavior
Water Service Charge	$22.65/month	Fixed
Distribution System Improvement Charge (DSIC)	$3.89/month	Fixed
RESIC — Water	$1.69/month	Fixed
Fixed subtotal	$28.23/month = $338.76/year	Does not decline with conservation
Base Water Usage Charge	$8.8724/1,000 gal	Volumetric
Purchased Water Adjustment Clause (PWAC)	$0.5330/1,000 gal	Volumetric
Lead Service Line Replacement Charge (LSLRC)	$0.5561/1,000 gal	Volumetric
Special Program Charge (SPC)	$0.0636/1,000 gal	Volumetric
Marginal water subtotal	$10.0251/1,000 gal ≈ $10.03/1,000 gal	Amount currently avoided when 1,000 gal is conserved

Check against an actual bill. For 5,000 gallons of use, the consumption-related charges are 5 × $10.0251 = $50.13. Adding the $28.23 fixed charges gives $78.36, exactly matching the water-service-related total on the August 2026 bill. The separate optional protection-program charge is excluded from this appendix.

A.3 Sewer Rates and Conservation Response

Piscataway. The municipal code specifies a $360 annual sewer service charge for a single-family residence. Because the charge is flat, reducing either indoor or outdoor water use does not reduce the sewer bill.

Montgomery. For 2026, the sewer charge is $288 per unit plus $15.96 per 1,000 gallons of billable use. Billable use is the lesser of total annual water use or twice the sum of January, February, March, April, November, and December water use. When the winter formula controls, summer outdoor irrigation is effectively excluded from the sewer bill. Indoor conservation that persists through the winter period can reduce both the water bill and the sewer bill.

Important qualification. Montgomery bills from actual prior-year meter readings. In the illustrative calculations below, annual indoor use is used as a proxy for the annualized winter-basis volume. This is a simplifying modeling assumption, not the Township's billing method for an individual account.

A.4 Illustrative Four-Person Household

The 2026 Water Research Foundation single-family indoor benchmark of 38.5 gallons per person per day (gpcd) is used as the indoor baseline. For four persons:

38.5 gpcd × 4 persons × 365 days = 56,210 gallons/year of indoor use.

Outdoor demand is more climate- and season-sensitive than indoor use, so three outdoor shares are used as sensitivity cases rather than as forecasts for a specific household.

Outdoor share	Indoor use (gallon)	Outdoor use (gallon)	Total use (gallon/year)	Total use (gallons per capita per day)
30% — national-average sensitivity case	56,210	24,090	80,300	~55
20% — illustrative moderate outdoor use	56,210	14,053	70,263	~48
10% — illustrative low outdoor use	56,210	6,246	62,456	~43

Water-cost equation: Annual water cost ≈ \$338.76 + (\$10.0251/1,000 gal × annual metered use).

Modeled Montgomery sewer cost: Using 56,210 gallons/year as the proxy winter-basis volume gives \$288 + 56.21 × \$15.96 ≈ \$1,185/year. Piscataway remains \$360/year in all scenarios.

Outdoor-use sensitivity case	Annual water cost — either town	Piscataway: water + sewer	Montgomery: water + sewer
30% — 80,300 gal/year	$1,144	$1,504	$2,329
20% — 70,263 gal/year	$1,043	$1,403	$2,228
10% — 62,456 gal/year	$965	$1,325	$2,150

These totals are illustrative rather than predictions of what a particular household will pay. Actual bills depend on measured use, meter size, the tariff components in effect during the billing period, and—especially in Montgomery—the prior-year monthly usage pattern used in the sewer formula.

A.5 Financial Value of Conservation

At current summer-2026 water rates, every 1,000 gallons of reduced metered use avoids about $10.03 in consumption-related water charges. Fixed water charges remain unchanged.

Conservation case	Water saving per 1,000 gal	Sewer saving per 1,000 gal	Combined saving per 1,000 gal
Piscataway — indoor or outdoor	$10.03	$0	$10.03
Montgomery — indoor reduction that lowers winter basis	$10.03	$15.96	$25.99
Montgomery — summer outdoor reduction when winter formula controls	$10.03	$0	$10.03
Annual reduction	**Piscataway — indoor or outdoor**	**Montgomery — qualifying indoor**	**Montgomery — summer outdoor**
5,000 gal	$50	$130	$50
10,000 gal	$100	$260	$100
20,000 gal	$201	$520	$201

For perspective, 10,000 gallons is roughly comparable to EPA's average-family estimate of about 9,400 gallons per year lost through household leaks, although leakage varies widely among homes. A qualifying 10,000-gallon indoor reduction therefore has an estimated direct water-and-sewer value of about $260/year in the modeled Montgomery case, compared with about $100/year in Piscataway. The difference arises from sewer billing, not from a difference in the physical quantity of water conserved.

A.6 Key Findings

1. **Water conservation lowers the water bill in both communities.** At current rates, 10,000 gallons of reduced metered use saves about $100 in consumption-related water charges.
2. **Piscataway's flat residential sewer fee does not respond to conservation.** Indoor and outdoor conservation therefore have approximately the same direct utility-bill value there, aside from possible energy savings associated with hot water.
3. **Montgomery can provide an additional sewer-bill benefit for indoor conservation.** If the reduction lowers the winter-basis volume, 10,000 gallons of indoor conservation saves about $160 in sewer charges in addition to about $100 in water charges.
4. **Summer outdoor conservation generally lowers only the water bill in the modeled Montgomery case.** When the winter formula controls, May–October irrigation does not increase the sewer-billing basis.
5. **Rate structure can make the same indoor conservation volume worth about 2.6 times as much on the utility bill.** The modeled 10,000-gallon indoor reduction is worth about $260 in Montgomery versus about $100 in Piscataway.

6. **Fixed charges set a floor on the bill.** The modeled NJAW fixed water charges total $338.76/year, while Montgomery also has a $288 sewer base fee and Piscataway has a $360 flat sewer charge. These amounts are not reduced by household conservation.

A.7 Notes and Sources

All costs are rounded to the nearest dollar in the annual-cost tables and to the nearest dollar in conservation examples. Rates and surcharges can change; future applications should use the tariff and municipal sewer rates in effect at that time. The calculations exclude optional service-line protection insurance and do not include household water-heating energy savings.

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