

# Irrigation



**Improving your irrigation system is often the simplest and most effective way to ensure you are using water appropriately and minimally on your landscape.** Reducing irrigation inefficiencies through proper design, scheduling, adaptation, and maintenance can save hundreds of thousands to millions of gallons of water over the lifetime of a property.

Optimizing efficiencies include designing for the best distribution method, choosing the appropriate equipment, scheduling irrigation cycles to minimize evaporation and runoff, using smart management routines and technology to adjust watering for current conditions, and regularly adapting and maintaining the system for the most effective performance.

This guide should give you the foundational knowledge you need to understand your irrigation system so that you can make informed decisions about how best to reduce the water waste on your property. **Irrigation is complex—before starting work, always have a plan in place in case of an emergency and know how to turn the water off if something goes wrong.** For many projects, hiring a contractor is the most appropriate solution and can save you from unwelcome surprises.





# Irrigation

## Sections

Sprinkler System Schedules			
Month	Turfgrass	Drought Tolerant Plants	% Option**
Jan	2 days, 2 cycles of 2 minutes	1 day, 2 cycles of 3 min	30%
Feb	2 days, 2 cycles of 3 minutes	1 day, 2 cycles of 3 min	30%
Mar	3 days, 2 cycles of 3 minutes	2 days, 2 cycles of 3 min	50%
Apr	3 days, 2 cycles of 4 minutes	2 days, 2 cycles of 4 min	70%
May	3 days, 3 cycles of 3 minutes	2 days, 3 cycles of 3 min	80%
Jun	3 days, 2 cycles of 5 minutes	2 days, 3 cycles of 3 min	90%
Jul	4 days, 3 cycles of 3 minutes	2 days, 3 cycles of 4 min	100%

**Scheduling**



### Irrigation Basics

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# Important Terms



**Irrigation Zone:** all the plants or area watered together on the same valve.

**Hydrozone:** a portion of a landscape where plants with similar water requirements are grouped within the same irrigation zone to allow for efficient, uniform irrigation that minimizes overwatering or underwatering.

**Infiltration:** the process by which water on the ground's surface enters and moves into the soil. The rate at which water enters the soil is known as the infiltration rate.

**Percolation:** the downward movement of water through the soil after it has infiltrated the surface. It is the process by which water moves through the soil layers and can eventually reach and recharge the groundwater.

**Water Holding or Field Capacity:** the ability of a soil to hold water against the force of gravity. In irrigation, it determines how much water can be stored in the root zone for plants.

**Uptake Capacity:** the ability of plants to absorb and transport essential nutrients and water from their environment to support growth and development. It depends on factors including root traits, plant transporters, and environmental conditions like water availability and soil composition.

**Evaporation:** the process where liquid water in the air, on the surface of the soil, or on plant leaves turns into water vapor and moves into the atmosphere, which is a loss of applied irrigation water.

**Transpiration:** is the process of evaporation of water from plant tissues.

**Evapotranspiration (ET<sub>o</sub>):** the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.

**Exposure:** refers to the amount and duration of sunlight a particular area receives.

**Distribution Uniformity (DU):** measures how evenly water is applied across an entire area, ensuring all plants receive a similar amount of water.

**Precipitation Rate:** How quickly water is applied, usually in inches/hour. Critical for avoiding runoff and calculating run times.

**Inline drip irrigation** is a system where emitters are built directly into the drip tubing or tape during manufacturing, as contrasted from point-source drip irrigation, in which individual emitters with specific flow rates are installed for individual plants.

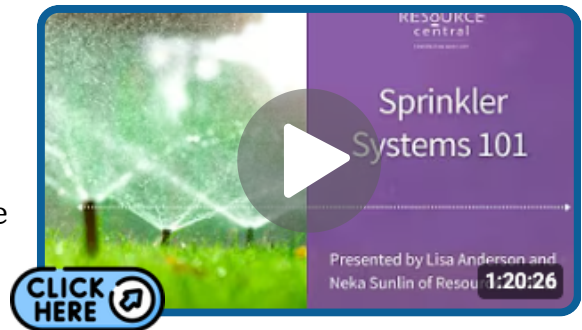
# Irrigation 101



**Getting your irrigation system updated and appropriate for the existing or envisioned landscape is the most effective way to minimize water use and waste.**

Understanding factors like soil type, plant needs, and weather conditions informs adaptation to ever-changing conditions, minimizes over and under-watering, and reduces costs.

**Check out Resource Central's Sprinkler Systems 101 webinar to jumpstart your irrigation education.** Resource Central has many waterwise landscaping educational resources, which will be linked throughout this guide. Click the thumbnails or visit [resourcecentral.org](http://resourcecentral.org) for more info.



## External Variables Influencing Irrigation Efficiency

### Soil

- Infiltration
- Percolation
- Water Holding Capacity
- Mulching

### Plant

- Species Composition
- Uptake Capacity
- Planting Density
- Layering
- Growth Stage
- Transpiration

### Climate

- Exposure
- Topography
- Seasonality
- Evaporation
- Precipitation
- Solar Radiation

Managing an efficient irrigation system is about setting up your system to minimize the impact of controllable variables so that you can adjust the system quickly and easily to account for the variables that we can't control—namely, weather. A well envisioned and executed irrigation system puts as much information and control in your hands as possible.

## Irrigation System Efficiency Variables

### Method

- Application Efficiency
- Control
- Operation

### Design

- Layout
- Hydrozoning
- Hydraulic Design
- Component Quality & Compatibility

### Timing

- Seasonal Adjustment
- Weekly Cycles
- Daily Cycles
- Weather Events
- Frequency & Duration

# Irrigating Efficiently



**Efficient irrigation replenishes water fully and uniformly to the root zone of the plants in that irrigation zone and ensures as little overwatering or underwatering as possible.** Irrigation should be approached like you're filling a reservoir in the landscape—it should be regularly topped up but never left long enough to completely dry out.

Efficiently watering a landscape requires understanding concepts like **field capacity**, or the water in the ground that is available for use by plants, and **distribution uniformity (DU)**, which measures how consistently water is applied over an area. The graphic below explores some of these concepts:



This image shows a scenario where the root zone is receiving enough water, but because of uneven distribution, some water is being lost below the root zone.



Here not only is the root zone not receiving enough water, but the distribution is very uneven, with some plants receiving enough water while most are underwatered.



**This is the optimum scenario**, where the root zone is receiving sufficient and consistent water to fill the root zone between waterings.



Like above, the distribution is even in this scenario, but the sprinklers are running too long leaving water wasted below the root zone.

**There is no such thing as a perfect system**, and there are many factors that influence the efficiency of irrigation application. For example, different soil structures within the same zone may have slightly different infiltration rates, so even if you are watering uniformly, there may be some water loss. Even the most uniform distribution methods will have some variation. **Focus on improving the variables you can control.** Even a little water saved will help!

# Irrigation Inefficiencies



**Recognizing and minimizing irrigation inefficiencies is necessary for effective water use in landscapes.** By identifying areas where water is being wasted—such as overwatering, leakage, or evaporation—we can implement more precise irrigation techniques, ensuring that plants receive the right amount of water. This not only reduces water bills and water waste but mitigates strain on local water supplies and systems.

Check out Resource Central’s webinars on understanding the fundamentals of your sprinkler system and improving your sprinkler system to gain a solid understanding of how to approach reducing inefficiencies and making upgrades to your system.

## Common irrigation inefficiencies:

- Overspray or improper calibration
- Over & underwatering
- Broken sprinkler heads & leaks
- Long cycles causing runoff
- Overlapping programs
- Watering during or after rain
- Cycles that don’t match hydrozones
- Overhead watering of mulch
- No check valves on downgrade heads



## Simple Things We Can All Do



### Step On It

If you step on the lawn and the grass springs back, it doesn't need water.

### Leave it Long

Longer grass protects the soil, uses less water, and suppresses weeds better.

### Take a Sprinkler Break

Some grass goes dormant in peak heat to conserve water—a little brown is OK!

**Reducing water waste in our landscapes can be achieved through mindful routines.** Always water in the early morning or late in the evening to minimize evaporation. Regularly check your plants for signs of needing water, such as wilted leaves or dry soil, and choose to spot water when necessary instead of watering whole areas. Use rain barrels, downspouts, and natural drainages where possible, and remember that all water-efficient landscapes require active management.

# Irrigation Scheduling



**Proper irrigation scheduling is crucial for maintaining plant health while minimizing water waste.** An effective irrigation schedule takes into account various factors such as soil type, weather conditions, plant species, and growth stages, tailoring water application to the specific needs of the plants.



**By providing the right amount of water at the right time, plants can develop strong, resilient root systems.** Moreover, efficient irrigation practices help conserve water resources, reduce runoff, and prevent waterlogging or drought stress.

## Say NO to Set-It-and-Forget-It!



**"Set-it-and-forget-it" is not a smart approach to irrigation scheduling because it fails to account for the dynamic nature of landscape water needs.**

Instead, irrigation equipment should be viewed as tools that aid homeowners and landscape professionals in actively managing water use, ensuring that landscapes receive the precise amount of water needed to thrive while conserving resources and constantly adapting to changing environmental conditions.

## Cycle & Soak Method



**The cycle and soak method of irrigation is a highly effective technique designed to maximize water efficiency and promote healthier plant growth.**

This method involves breaking down the total watering time into shorter cycles with "soaking" intervals in-between, allowing the soil to absorb water more effectively. By doing so, it prevents runoff and minimizes water waste, ensuring that moisture penetrates deeper into the ground, reaching the root zone where it's needed most.

## Seasonal Adjust Function



**The seasonal adjust function on irrigation controllers is a valuable yet frequently overlooked feature that can simplify irrigation schedule management.**

This function allows users to modify the watering schedule by setting an upper limit benchmark for watering that can be adjusted against as water needs increase or decrease. By aligning irrigation schedules with actual environmental conditions, the seasonal adjust function helps prevent overwatering.

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Town	May	Jun	Jul	Aug	Sep
Vail/Minturn	80%	90%	100%	90%	70%
Avon	80%	90%	100%	90%	70%
Edwards	80%	90%	100%	90%	70%
Eagle/Gypsum	80%	100%	100%	90%	70%



Click the video to navigate to seasonal adjust tutorial for the Rainbird ESP controller. For other controllers, look up your model and look it up on YouTube or through the controller's manufacturer.

Most Hunter controllers have the same or very similar ways of programming. Refer to the video to the right for the Hunter Pro-C, or look up your controller online.

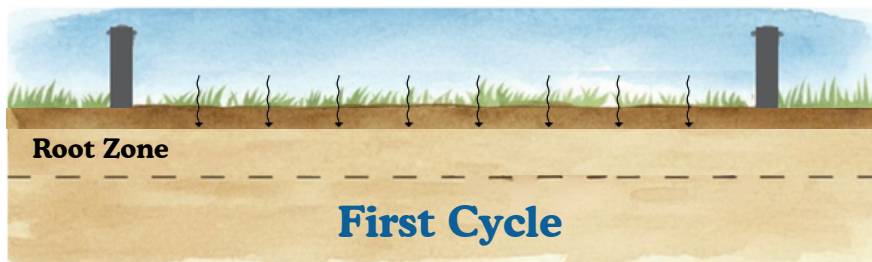


# Cycle & Soak Method



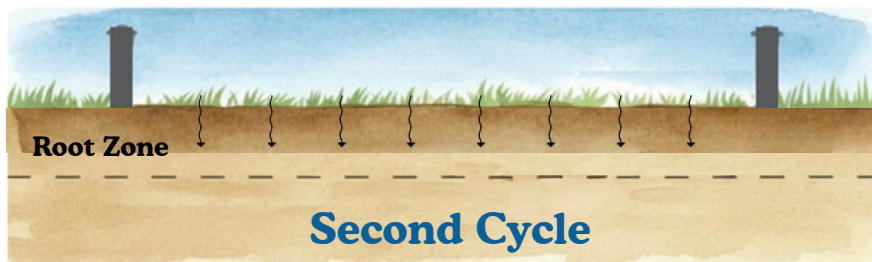
**Cycle and soak is an irrigation method designed to optimize water absorption and minimize runoff by applying water in multiple short cycles rather than one long session.** Most overhead sprinkler systems, even the most efficient, have precipitation rates higher than soil infiltration rates, leading to runoff. **Cycle and soak allows for both the soil and for plants to gradually absorb and retain water.** Paired with other scheduling management strategies, it can significantly reduce water wasted on the landscape.

## Cycle & Soak Irrigation



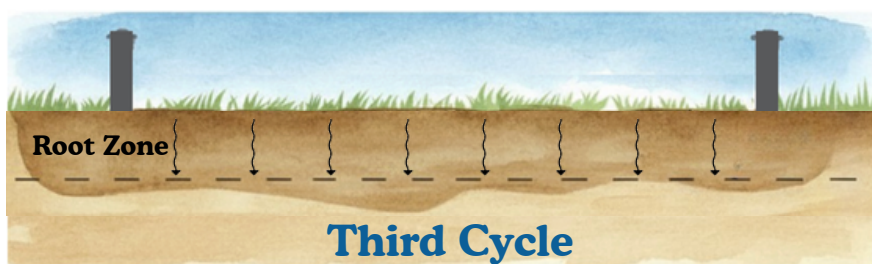
### First Cycle

**Breaks surface tension, allowing water to penetrate**



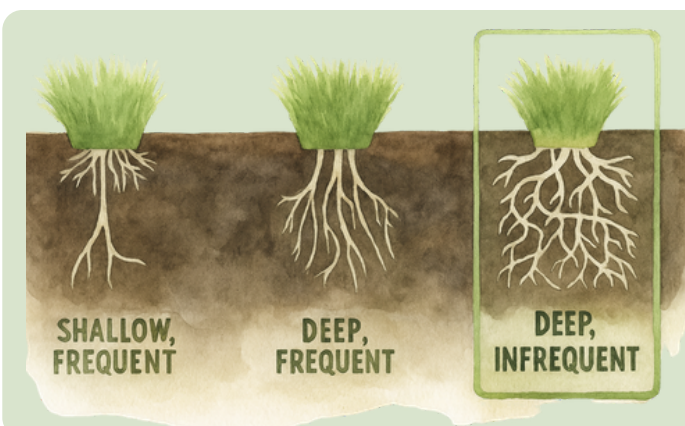
### Second Cycle

**Water can reach the roots and be absorbed by plants**



### Third Cycle

**Plants have drawn water into their tissues, and water is stored in the soil**



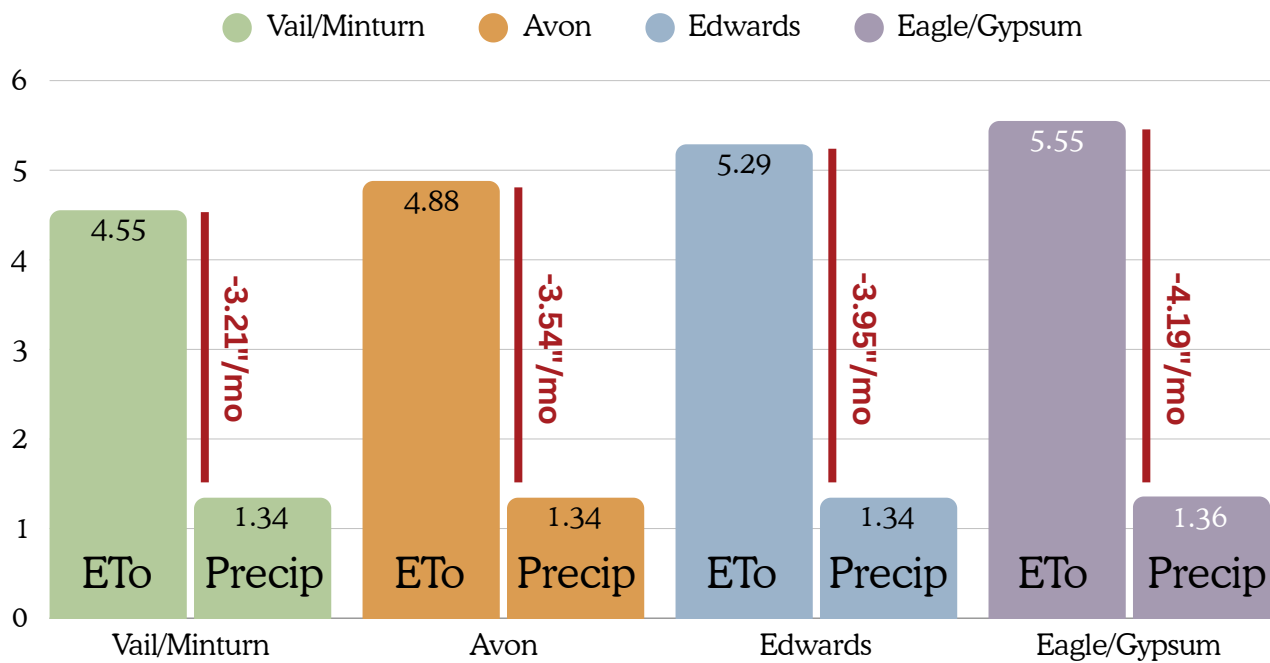
## Encouraging Robust Roots

Deep, infrequent watering creates just the right amount of stress to signal plants to embed deeper and spread wider into the soil, protecting them from fluctuations in resource availability and contributing to their overall health and resilience.

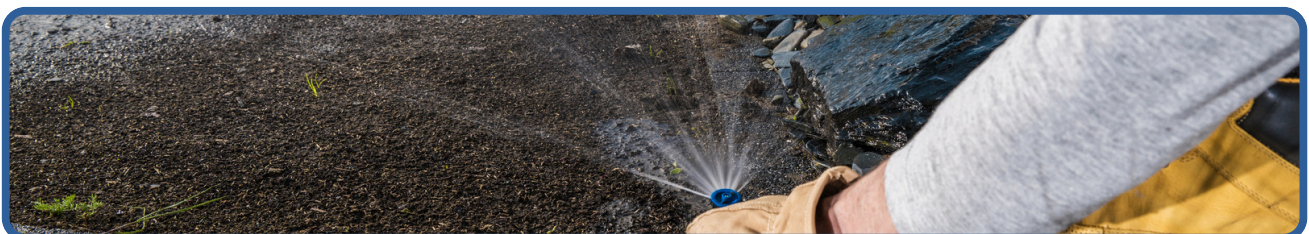
# Eagle County Water Deficit

**In Eagle County, the gap between precipitation and evapotranspiration rates often poses a challenge for maintaining healthy landscapes.** The region experiences a semi-arid climate, where precipitation is usually insufficient to meet the water demands of lawns and gardens. As a result, irrigation becomes essential to compensate for this shortfall, ensuring that plants receive the necessary moisture to survive. The graph below demonstrates the average monthly water deficit by location in the valley, where the larger column is the water needed and the shorter column is the water received through precipitation. Irrigation must account for the difference.

Average Monthly Precipitation (May-Sep) Vs ETo (in/month)



**Evapotranspiration (ETo) is a valuable metric that helps determine the precise amount of water required for a landscape by accounting for the combined effects of evaporation and plant transpiration.** By subtracting the water the landscape receives through precipitation, the total amount of water needed to replace the water lost can be calculated as a reference for programming the irrigation system. ETo rises as temperatures, wind, and solar radiation increase.



# Upvalley Run Times



The values below are benchmark watering times to help you understand how long to run each sprinkler type (per watering day, 3x per week) over a full sun area to water sufficiently. These values assume an upvalley evapotranspiration of 27", They also assume uniform distribution and sprinkler output rates. **Your actual times will vary widely.**



Irrigation Type	May	Jun	Jul	Aug	Sep	Oct
<b>Drip/Micros*</b>	20/wk	45/wk	55/wk	50/wk	45/wk	30/wk
<b>Inline Emitter Drip*</b>	20/wk	45/wk	55/wk	50/wk	45/wk	30/wk
<b>Rotary Nozzle</b>	30	43	45	34	28	22
<b>Rotor</b>	30	43	45	34	28	22
<b>Impact</b>	30	43	45	34	28	22
<b>High Efficiency Fixed Spray</b>	10	15	16	12	10	7
<b>Traditional Fixed Spray</b>	12	17	18	14	11	8
<b>Manual Sprinkler</b>	18	26	27	20	17	12

\*Drip system times are minutes per week, not per watering day.

# Downvalley Run Times



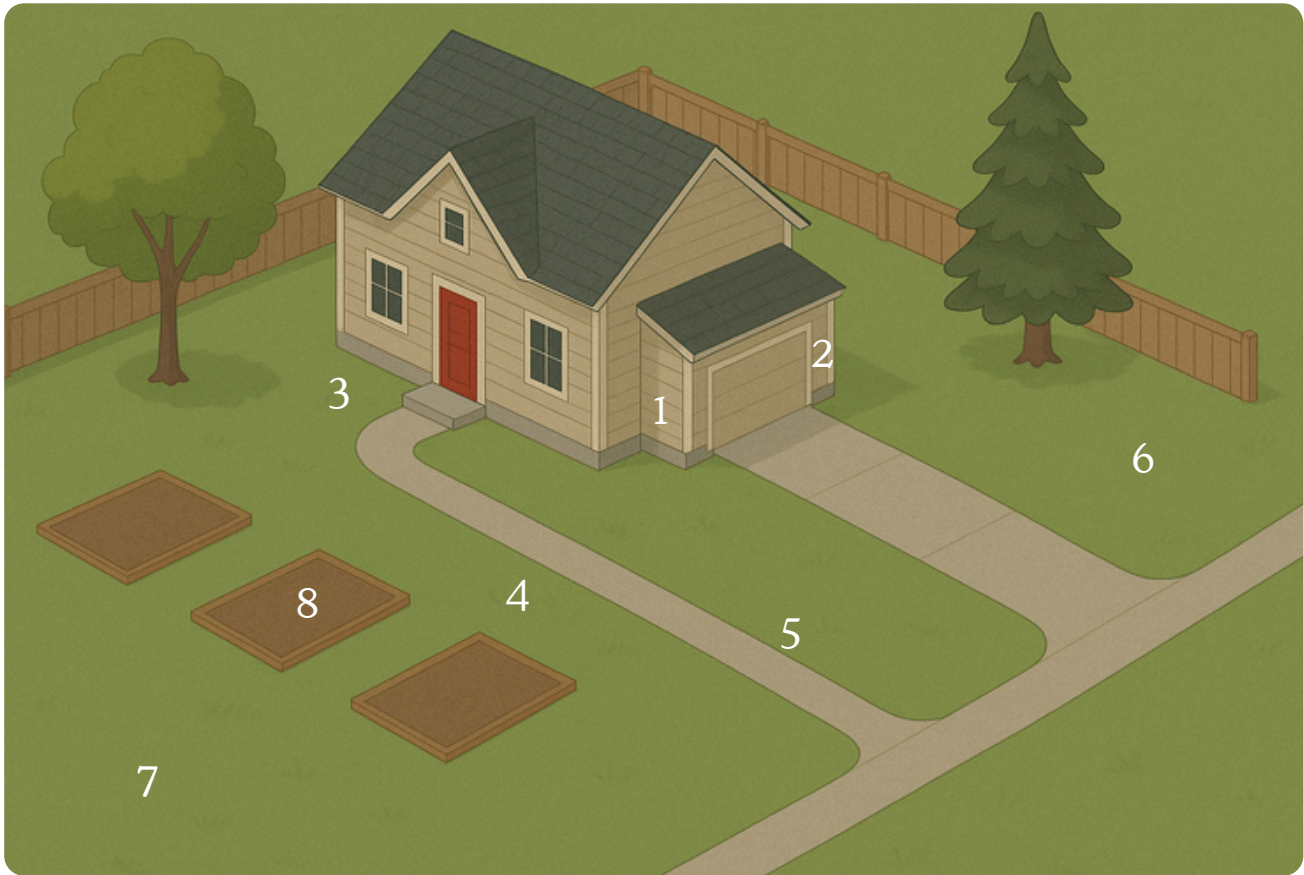
The values below are benchmark watering times to help you understand how long to run each sprinkler type (per watering day, 3x per week) over a full sun area to water sufficiently. These values assume an upvalley evapotranspiration of 27", They also assume uniform distribution and sprinkler output rates. **Your actual times will vary widely.**



Irrigation Type	May	Jun	Jul	Aug	Sep	Oct
<b>Drip/Micros</b>	30/wk	50/wk	60/wk	55/wk	50/wk	30/wk
<b>Inline Emitter Drip</b>	30/wk	50/wk	60/wk	55/wk	50/wk	30/wk
<b>Rotary Nozzle</b>	30	43	45	34	28	22
<b>Rotor</b>	30	43	45	34	28	22
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<b>High Efficiency Fixed Spray</b>	10	15	16	12	10	7
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\*Drip system minutes per week, not per watering day. .

# Home Irrigation Anatomy



The **backflow preventer** can be inside or outside. It connects you to the street's supply.



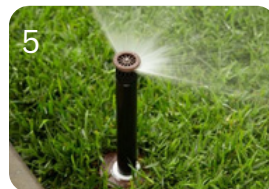
The **controller** may be housed indoors or outdoors. It **controls your watering schedule** via valves.



**Valve boxes** house the **zone valves** controlled by the controller.



**Poly lines** distribute the water from the valves to each zone.



**Fixed-spray heads** provide an even distribution of water over a **medium sized area** (max 20'), usually turf or planted beds



**Rotors** are also fairly uniform and are used for **larger areas** (max 50') like turf and native



**Impact sprinklers**, also used for **larger areas**, are less uniform but more wind resistant



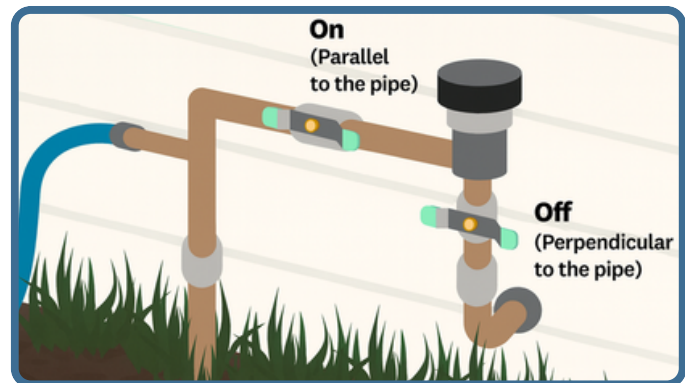
**Micro emitters** are used for **small areas, oddly-shaped areas, or supplemental to drip**

# The Backflow Assembly

**The backflow assembly is a critical component in plumbing and irrigation systems that prevents contaminated water from flowing back into clean water supplies.** It ensures that drinking water remains safe and free from pollutants. Ensuring your backflow assembly is functioning properly is essential for protecting public health and maintaining the integrity of your water system. Regular maintenance and inspections help prevent potential hazards and ensure safe water supply.

**It is important to know where the backflow shutoffs valves are and how they function in the event of an emergency.** Valves turned parallel to the pipe are on, while valves perpendicular to the pipe are off. Both valves must be parallel for the water to flow. Always open valves slowly at first and wait until you hear the water stop flowing before opening them fully to prevent damage.

## Backflow Shut-Off Valves



## The Backflow Pressure Reducing Valve

**The backflow pressure reducing valve** Works by creating a reduced pressure zone, ensuring the water pressure on the outlet side is lower than the inlet side, even if there's a pressure drop or siphonage event. This prevents contaminated water from siphoning back into the clean water supply.

## The Backflow Pressure Vacuum Breaker

**A pressure vacuum breaker (PVB)** is a crucial component in a backflow prevention assembly, designed to protect potable water supplies from contamination. It works by maintaining a one-way flow, preventing any reversal of water that could carry pollutants back into the clean water system. The device includes a check valve and an air inlet valve that opens to break the vacuum in the event of negative pressure, ensuring contaminants cannot siphon back into the water supply.



# Pressure Regulators



**Pressure regulators are useful tools in irrigation systems to maintain optimal and consistent system conditions, preventing damage to pipes and components and ensuring predictable water distribution.** They achieve this by reducing the incoming water pressure to a desired level and evening out pressure fluctuations, which helps in extending the lifespan of the entire system.

## Drip



**Drip zone pressure regulators** are essential for maintaining consistent water pressure in drip irrigation systems. They also prevent maintenance issues and premature system wear by reducing the risk of pressure fluctuations that can lead to leaks and damage.

## Head



**In-head pressure regulators** ensure consistent pressure where water is emitted. Most heads today have pressure-regulating ability, which is denoted on the top of the sprinkler head. In the head above, PRS-30 means the head regulates the pressure to 30psi.

## In-line



**In-line pressure regulators** reduce pressure for all downstream components in a system or zone. They are best when the supply line's pressure is higher than what the downstream components can handle without damage or improper function.

## Managing Residential Irrigation Pressure

**Different types of pressure regulators are used for different needs or applications within a system.** In a residential irrigation system, pressure regulators are most important in drip zones and in the sprinkler heads, to standardize output. In larger systems, pressure regulators are more important for reducing wear and tear and controlling for variables.



# Automatic Hose Bib Setups



**Hose bib irrigation setups offer a convenient and cost-effective way to water gardens and lawns, particularly in areas where installing a full irrigation system might not be feasible.** The benefits include ease of installation, as they can be connected directly to an outdoor faucet, and flexibility, allowing gardeners to move hoses and adjust watering patterns as needed. **Proper setup is essential, as these configurations are especially prone to problems.**

The **timer** actuates the valve, which allows the flow of water at specified periods.

## Backflow Preventer

The **backflow preventer** ensures that water does not flow back into the system. This is especially important if the outlet is higher than the spigot.

## Filter

The **filter** removes sediment and contaminants. If drip emitters or micro nozzles are used, the filter ensures they operate smoothly, as they are prone to clogging.

## Check Valves

The **check valve** also works like a backflow preventer, making sure water only flows in one direction. On a hose bib setup, one or the other is usually sufficient.

## Coupler

The **coupler** connects the timer and other components to the poly line or hose, depending on what is used.

## Poly Line

The **poly line** conducts water to the emission points, like sprinklers, drip lines, or emitters. Hoses are also used to deliver water in hose bib setups.










## Smart Timers

Nowadays, hose bib timers can come in many forms, including Wifi or Bluetooth-connected options, depending on your needs. Some are even compatible with other irrigation controller systems and apps. **Do you research when choosing a timer to optimize convenience and flexibility!**

# Sprinkler Output Rates



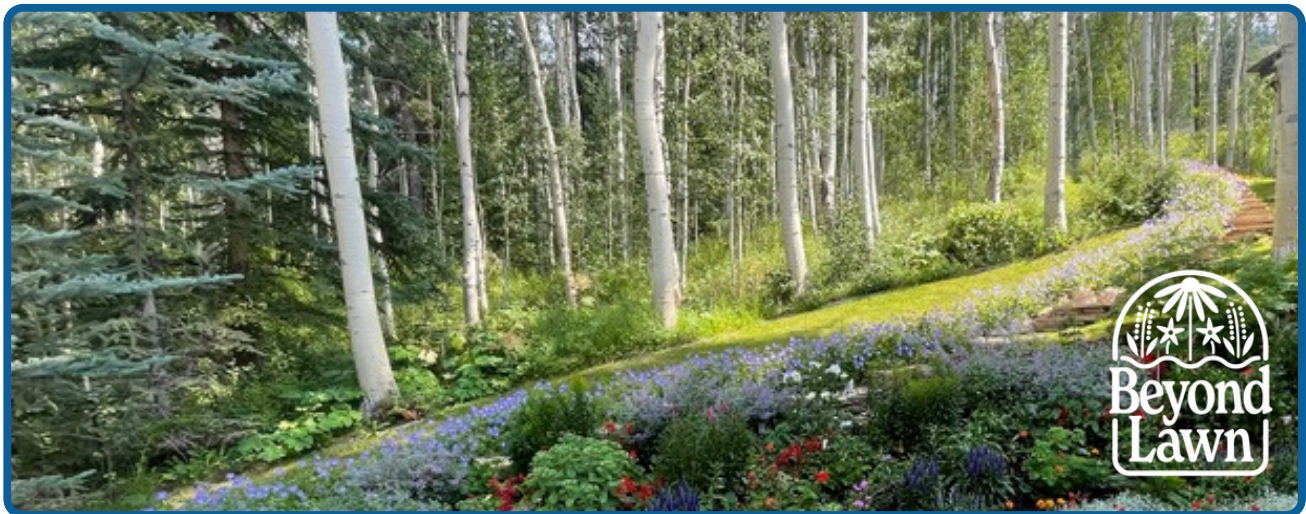
Irrigation systems vary in their output rates based on system pressure, head types, nozzle types, and number of heads per or emitters per zone. For a zone to work effectively, system pressure must always exceed the combined output rate. Drip irrigation systems typically have the lowest flow rates and are the most efficient, while traditional fixed spray systems typically have the highest output rate and are the least efficient. Output rates, however, vary widely based on operating pressure and a number of other factors.

	Irrigation Type	Output Rate	Operating Pressure	Efficiency
	<b>Drip/Micros</b>	Very Low	~25PSI	90%
	<b>Inline Emitter Drip</b>	Very Low	~20PSI	90%
	<b>Rotary Nozzle</b>	Low	~40PSI	85%
	<b>Rotor Head</b>	Medium	~45PSI	70%
	<b>Impact Head</b>	Medium	~40PSI	70%
	<b>High Efficiency Fixed Spray</b>	Medium	~30PSI	65%
	<b>Traditional Fixed Spray</b>	High	~30PSI	55%

# Watering Native Areas



**Watering native areas is generally unnecessary because these landscapes are adapted to local climate conditions and have always existed without additional irrigation. In fact, watering can inadvertently increase fire risk by increasing vegetative growth and the potential fuel stock for wildfires.** Established native plants are well-suited to withstand natural weather patterns, including drought. By allowing these ecosystems to function as intended, we can help preserve their resilience and reduce potentially worsening wildfire risk.



**Native grasses and forbs do not have the woody material that poses significant wildfire risk when managed.** To manage native landscapes, the best strategies are to have strategic fire breaks around the property, to remove ladder fuels, to limb the lowest branches on trees, and to reduce crown spread risk. **Except for in situations of exceptionally prolonged drought periods, native areas do not need supplemental water.**

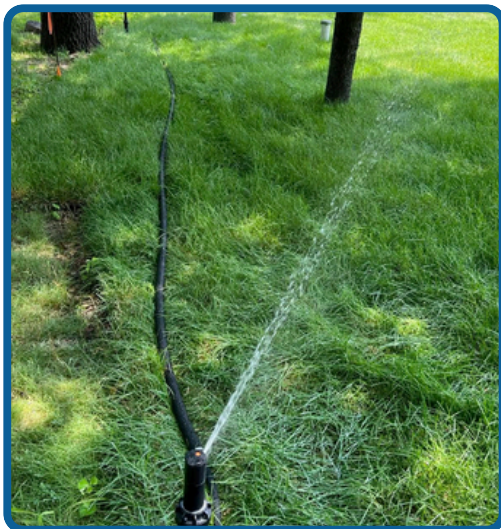
Fire plays a necessary role in maintaining the health of many landscapes, acting as an ecological renewal catalyst that helps recycle nutrients, control pests, and encourage the growth of native plant species. **Native grasses, when managed properly, do not pose a significant fire risk.** By ensuring these grasses are kept at a distance of at least five to ten feet from structures and are not growing under shrubs or trees where they could ignite ladder fuels, the potential for fire to spread can be minimized. This careful management allows native grasses to thrive without compromising the safety of surrounding areas, supporting biodiversity and ecosystem resilience.



# Above-Ground Zones



**Adding aboveground sprinkler zones can be very beneficial for establishing or revegetating an area, as they provide enough water for initial plant growth and establishment.** However, they are not recommended as a long-term solution because aboveground systems are more susceptible to breakages and leaks, which can lead to increased maintenance and water waste. In the mountains, our intense UV radiation breaks down poly lines, and the longer a line is exposed, the more susceptible it is to degradation.



**Aboveground poly lines can be quite unappealing, interrupting the natural beauty of the landscape.** These exposed lines are also more susceptible to damage from weather events, accidents, and vandalism, leading to potential leaks and increased maintenance. Burying lines and heads offers a more aesthetically pleasing and reliable solution, preserving the visual appeal of the area while protecting the infrastructure. Properly burying lines not only enhances the safety and longevity of the systems but also contributes to a cleaner and more organized appearance.

**Creating a meadowscape requires about a three-year commitment to watering regularly for the establishment of the native grasses and wildflowers.** Setting up an irrigation system ensures that your meadow receives moisture it needs. For temporary zones, aboveground irrigation systems offer a cost-effective solution, especially for large areas. These systems are easy to install and adjust, providing flexibility and affordability for homeowners who are looking to create their meadowscape without the commitment of permanent underground infrastructure.



**Always secure aboveground lines with staples and stakes to minimize movement.** Rebar and tie-wire are helpful to ensure that heads are firmly staked and not prone to tilting or falling over. As always, a bi-weekly or monthly check while the zone is operational will minimize issues, especially in trafficked areas.

# Watering Annuals



**Annuals are beautiful, colorful additions to the landscape, but they have substantial environmental costs associated with their production, transportation, upkeep, and longevity, and so they should be used strategically and sparingly!** Most of the water used for annuals never reaches the landscape and is lost to evaporation or transpiration.



Avoid midday watering to minimize water loss and leaf burn



Annuals often need to be watered more frequently than other plants



Water at the base of the plants unless using a foliar fertilizer.



However, the duration of the watering cycle is usually less



Keep potting soil fairly moist so it doesn't become hydrophobic.



Cover soil completely with foliage to minimize evaporative loss.



Use larger, deeper containers to water less frequently.



Choose heat and drought-tolerant plant species when possible



Use a drip saucer or built-in reservoir to prolong times between watering.



Drip irrigation systems with dedicated annual zones are the best way to water.



## Using Perennials and Houseplants as Annuals

**Use perennials or houseplants in annual containers for a budget-friendly approach.** Perennials used in annual containers can be planted in beds at the end of the season (must have some time to root in before the ground freezes), while houseplants can be repotted and taken back indoors for the winter. The container to the left uses foliage interest for a pop of color and incorporates both perennials and houseplants in its design.

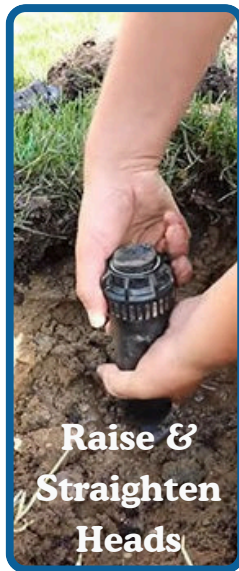
# Irrigation Upgrades



**Upgrade Controller**



**Install Rotary Nozzles**



**Raise & Straighten Heads**



**Install Check Valves**



**Upgrade to Drip**

## Irrigation Efficiency Upgrades

- Install a Smart Controller
- Use Flow Management Tools
- Convert to Drip
- Fix Leaks & Broken Heads
- Ensure Distribution Uniformity
- Same Zone, Same Sprinkler
- Matching Precipitation Rates
- Install Check Valves
- Install Rotary Nozzles
- Raise and Straighten Heads
- Correct Overspray
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- Install a Rain Sensor
- Fix High or Low Pressure

# WBIC Smart Controllers



**Smart controllers offer significant advantages by providing tools for optimizing irrigation efficiencies.** When programmed properly, these devices can automatically adjust watering schedules based on weather conditions or soil moisture levels, reducing water waste and lowering utility bills. They also provide convenience and peace of mind by enabling remote and collaborative management capabilities through smartphone apps.



With today's newest technologies, **you can measure exactly how much water you need per day** and set your system in sync with those requirements.



Visit your local **CoAgMet (weather) Station** website, which measures evapotranspiration rates, **to inform daily watering recommendations.**



Many new controllers have mobile compatibility, so you can adjust on-the-go!



## Recommended Controllers

All EPA Watersense controllers are equipped to help manage water wisely, but selection will depend on the size of the system, and some are more user-friendly than others. We prefer:

- [Rachio 3](#)
- [Rainbird ESP ME3 with Wifi Module](#)

# Flow Management Tools



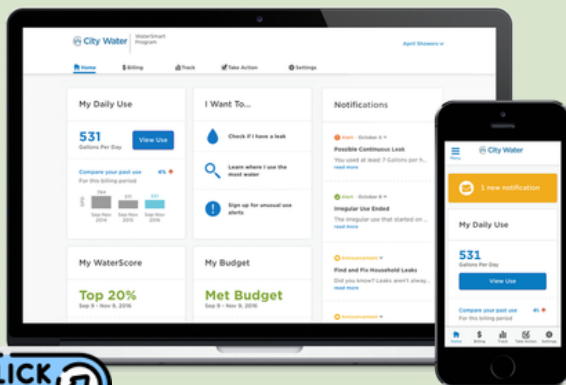
## Flow Sensors

Flow sensors can be instrumental in tracking residential water consumption patterns, detecting leaks early, and effectively managing overall water use by providing real-time data and insights.

These devices monitor the volume and rate of water flow through pipes, allowing homeowners to identify leaks, track consumption, and optimize water use. By integrating flow sensors with smart home systems, residents can receive alerts and detailed reports, empowering them to make informed decisions about their water habits, conserving water and reducing utility bills.



**EAGLE RIVER**  
WATER & SANITATION  
DISTRICT



## ERWSD MyWater Portal

MyWater is a platform that allows our customers to access their water use information and history, pay bills and view billing history, set leak alerts and high use notifications, and more.

Once enrolled, from the main page, navigate to Usage Insight > Understand Usage. You will be shown your hourly water use for the selected timeframe.

[Click here to enroll or  
access your account](#)

# Convert to Drip



**Drip irrigation is a highly efficient watering method that delivers water directly to the root zone of plants, minimizing water loss through evaporation and runoff.**



## Benefits of a Drip Irrigation System:

- **Water Efficiency:** Drip irrigation systems deliver water precisely where it's needed – at the root zone of plants.
- **Healthy Plants:** By supplying water directly to the roots, drip irrigation promotes healthier plant growth.
- **Weed Control:** Unlike overhead sprinklers that can inadvertently water surrounding areas where weeds can establish, drip irrigation systems focus water on the intended plant beds, minimizing weed growth.
- **Soil Conservation:** Drip irrigation reduces soil erosion by gently delivering water at a controlled rate, which is why it is especially suited for use on slopes.
- **Customization:** Drip irrigation systems offer flexibility in watering schedules, allowing you to tailor irrigation to the specific needs of different plant types.

## Ideal Locations for Drip Irrigation:

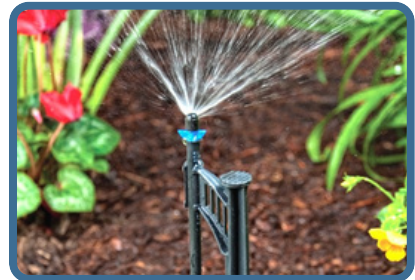
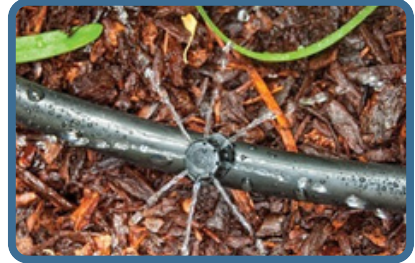
- Plant beds with perennials, shrubs, and trees
- Sloped or uneven terrain
- Narrow planting strips
- Container gardens and hanging baskets
- For watering in newly planted areas
- For watering in high-wind areas



# Common Drip Systems



- **Inline Emitter Irrigation:** Surface drip irrigation involves laying drip tubing or tape along the soil surface, directly above the root zone of the plants. Ideal for garden beds, scrub borders, and tree installations where plants are spaced apart and have consistent watering needs.
- **Drip Emitter Systems:** Drip emitter systems consist of individual emitters attached to drip tubing, delivering water directly to the base of each plant. These are suitable for landscapes with varying plant spacing and water requirements, allowing precise customization for each plant.
- **Micro-Sprinkler System:** Micro-sprinkler systems utilize small sprinkler heads or micro-sprayers to emit water in a fine mist or spray pattern. These are ideal for watering groundcovers, flower beds, and container gardens, providing gentle and uniform coverage over a wider area.



## Drip Irrigation and Hydrozones

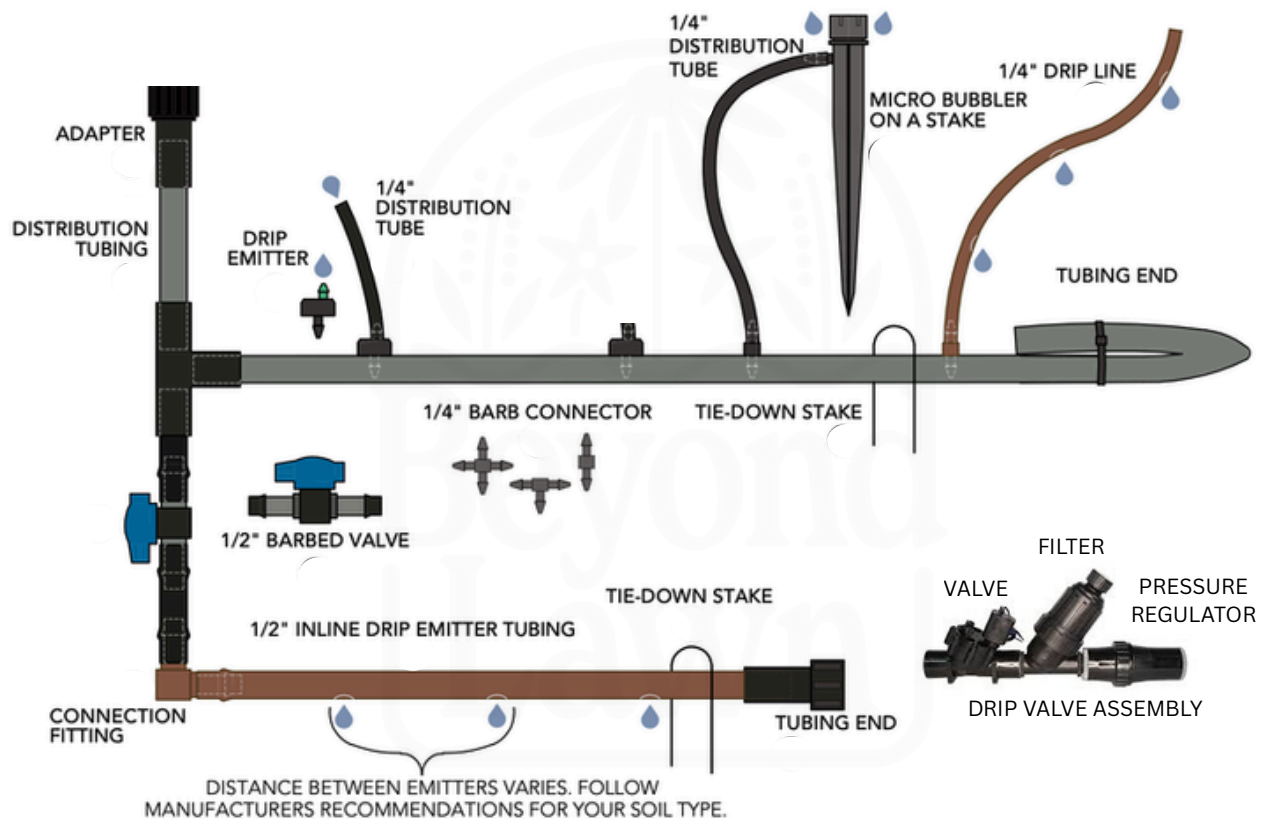
As with other forms of irrigation, each drip irrigation zone should correspond with its own hydrozone of plants of a similar water need. **Trees should always be in a zone of their own, as they have distinct watering needs from other plants, even if they are of a similar water requirement.** Annual containers and vegetable plots should also each be in their own zone, as their needs are also different than those of perennials, trees, turf, or shrubs.

## Additional Resources:



- [Drip Irrigation for Home Gardens - 4.702 - Extension](#)
- [Installing a Drip Irrigation System](#)
- [How to Install Drip Irrigation - The Home Depot](#)
- [Step By Step Drip Irrigation System Installation Guide | Sprinkler School](#)
- [Micro Sprays Planning and Installation Guide](#)

# Drip Irrigation Basics



1. **The drip zone** is connected to the system via an **adaptor** or a **drip valve assembly**.  
Drip assemblies usually have a **filter** and/or **pressure regulator**.
2. **Poly distribution tubing** conducts the water through the system, usually 3/4"-1".
3. **Barbed valves** can be used to shut off specific lines or areas when not in use.
4. **Connection fittings** couple poly tubing to drip emitter tubing.
5. **Inline drip emitter tubing** has equally-spaced emitters to distribute water uniformly over a distance, usually a 1/2" brown poly commonly called **netafim**.
6. **Drip emitters** are punched into poly tubing at intervals for non-uniform distribution.  
Drip emitters come in a variety of outputs (from .5-4 gph).
7. **Spaghetti, or 1/4" distribution tubing** allows for more precise placement of drip.
8. **Barbed connections** allow for wider flexibility with 1/4" distribution tubing.
9. **Micro bubblers** are often used for increased flow in containers or raised beds.
10. **1/4" drip line** is another option for use in small areas, like containers.
11. **Tie-down stakes** ensure the poly and drip lines stay in their intended places.
12. **Tubing ends** can be folded as shown, but **cap and clamp** is a better method.
13. **The flush cap** goes on the low point of the system and allows for it to be purged.

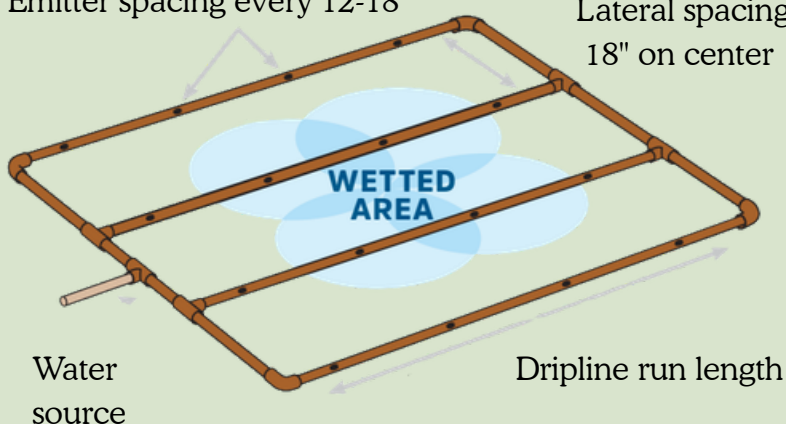
# Inline Emitter Drip Systems

**Inline drip emitter systems offer a highly efficient and uniform method of irrigation.** By delivering water directly to the plant roots, they minimize evaporation and runoff, ensuring moisture levels are maintained. This precision not only conserves water but also promotes healthier plant growth by reducing the risk of diseases related to overhead watering. Inline drip systems also offer more flexibility to suit various soil types and topographies, making them versatile and adaptable for varied needs.

## Inline Emitter Grid Layout Spacing

Emitter spacing every 12-18"

Lateral spacing  
18" on center



Inline drip emitter systems can be used for areas big or small. Coverage depends on spacing, but recommended spacing for most systems is 18" on center, and 12" or 18" emitter spacing, depending on plant composition. Plants can be planted anywhere in the area, as the diffusion carries the water through the soil profile.



This image shows a project in-process. The sod was stripped, and the inline drip was laid in rows, tapped into the lateral irrigation line where the previous irrigation heads were. Next, the waterwise and native perennials and shrubs were planted, and 1/3" chipped rock was applied in a 4" layer to suppress weeds, insulate the roots, and stop the evaporation of water. This method is extremely efficient.



## Eagle County Building Demonstration Garden



**Use sod staples to secure your lines!** Sod staples are especially important to use in inline emitter drip systems to ensure distribution works as it was originally intended. Without staples, lines are prone to moving around, being tripped over, or working their way up to the surface.

# Converting Spray to Drip

**Converting a spray zone into a drip zone is a relatively simple conversion, if done correctly.**

First, begin by shutting off the water supply to the area you plan to convert. This ensures a safe working environment and prevents any potential waste. Next, remove the existing spray heads at the base of the head and cap off any unnecessary outlets to prevent leaks.

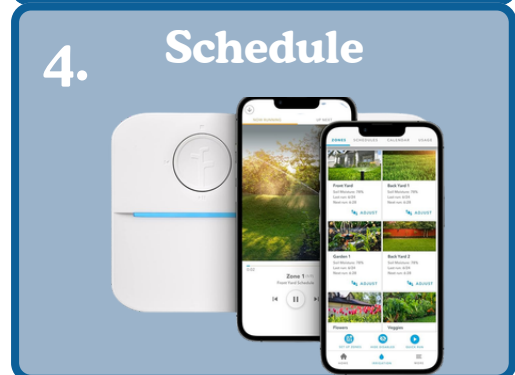
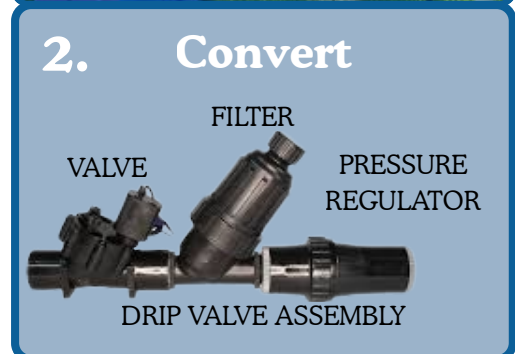
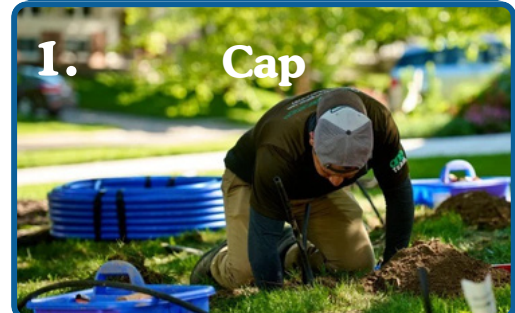
**Install a filter** to protect the drip emitters from debris and sediment, which can cause clogs. Following the filter, attach a pressure regulator to maintain an optimal pressure level for the drip system, ensuring efficient water delivery without damaging the components.

Once the pressure is regulated, **connect a valve or a drip valve assembly** to control the water flow to your new drip system. This will allow you to easily turn the system on and off as needed. For most systems, the existing valve and wiring can be used after the addition of the filter and pressure regulator.

Next, **lay out the drip tubing** along your planting beds, secure it with stakes, and attach individual emitters to deliver water directly to the root zones of your plants if using a point-source system.

Finally, **adjust your irrigation schedule** to account for the new irrigation method. Use the water budget calculator and scheduling section earlier in this guide to help inform proper scheduling.

By following these steps, you'll have successfully transformed your spray zone into a more efficient drip irrigation system, promoting water conservation and healthier plant growth.



# Fix Leaks & Broken Heads

**Identifying and fixing broken heads and other leaks is crucial for maintaining an efficient irrigation system.** Begin by visually inspecting your system while it's running and shortly after it has finished, looking for clear ruptures, pooling water, or areas that aren't being adequately covered. Once identified, repairs typically involve replacing damaged components or tightening connections, ensuring your irrigation system operates smoothly and uses water effectively.

- **Visible Surface Leaks:** Water pooling on the surface, damp spots, or soggy areas around pipes, valves, or sprinkler heads.
- **Underground Leaks:** Areas of excessively wet or mushy soil, unexpected vegetation growth, or a noticeable increase in water usage without a corresponding increase in irrigation activity.
- **Valve Leaks:** Water seepage or dripping from the valve box. Check for signs of moisture, corrosion, or water accumulation inside the valve box.
- **Pipe Leaks:** Water seepage, dampness, or staining along the length of the pipes, especially at joints or connection points.
- **Sprinkler Head Leaks:** Leaks around the base, nozzle, or casing, leading to dripping, spraying in the wrong direction, or irregular water flow.
- **Fittings and Connections Leaks:** Water dripping, seepage, or staining.



## How to Fix a Broken Head



## How to Fix a Lateral Line Leak



# Ensure Distribution Uniformity

**Distribution uniformity (DU) is crucial in home irrigation systems as it ensures that water is applied evenly across the landscape, promoting healthier plant growth and preventing water waste.** High DU minimizes dry spots and overwatered areas, reducing the risk of plant stress and disease. Discrepancies in distribution can arise from various factors, such as using different head or nozzle types, improper spacing, or tilted or improperly spaced heads. Regular system checks and adjustments are essential to maintain optimal irrigation efficiency.

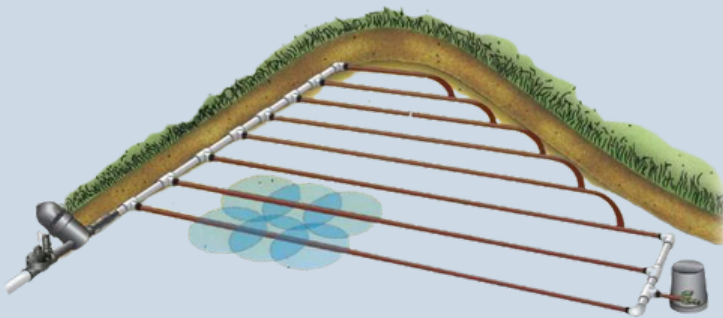
## Sprinkler Distribution Uniformity

TFS Rotary (MP) Impact Rotor



More Uniform

## Drip Coverage Uniformity



**Properly spacing drip tubing lines ensures uniform distribution of water.** Effective spacing depends on output rate, soil conditions, plant composition, and distance between emitters. Notice the drip is connected into the lateral line (white) in multiple places and connected into itself on the other end to ensure the whole system is uniformly pressurized. Use sod staples to secure drip tubing to minimize movement.

## Irrigation Auditing



**Irrigation auditing** is the process of evaluating the efficiency and effectiveness of an irrigation system, typically completed by assessing water distribution patterns, measuring flow rates, and identifying any areas of inefficiency or malfunction to ensure optimal water use.

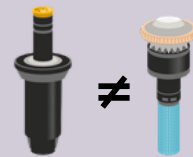
## Head-to-Head Coverage



**Head to-head spacing**, where the spray from one head reaches all the way to the next, is the gold standard for irrigation zone design and spacing.

# Same Zone, Same Sprinkler

**Mixing different irrigation heads within the same zone is an inefficient irrigation strategy due to the varying output rates of each type of head.** When different heads operate together, they deliver water at inconsistent rates, leading to uneven water distribution across the area. This lack of uniformity can result in overwatering in some sections while leaving others inadequately watered. **To achieve optimal distribution uniformity (DU), use the same type of irrigation heads within a single zone to ensure consistent watering.**

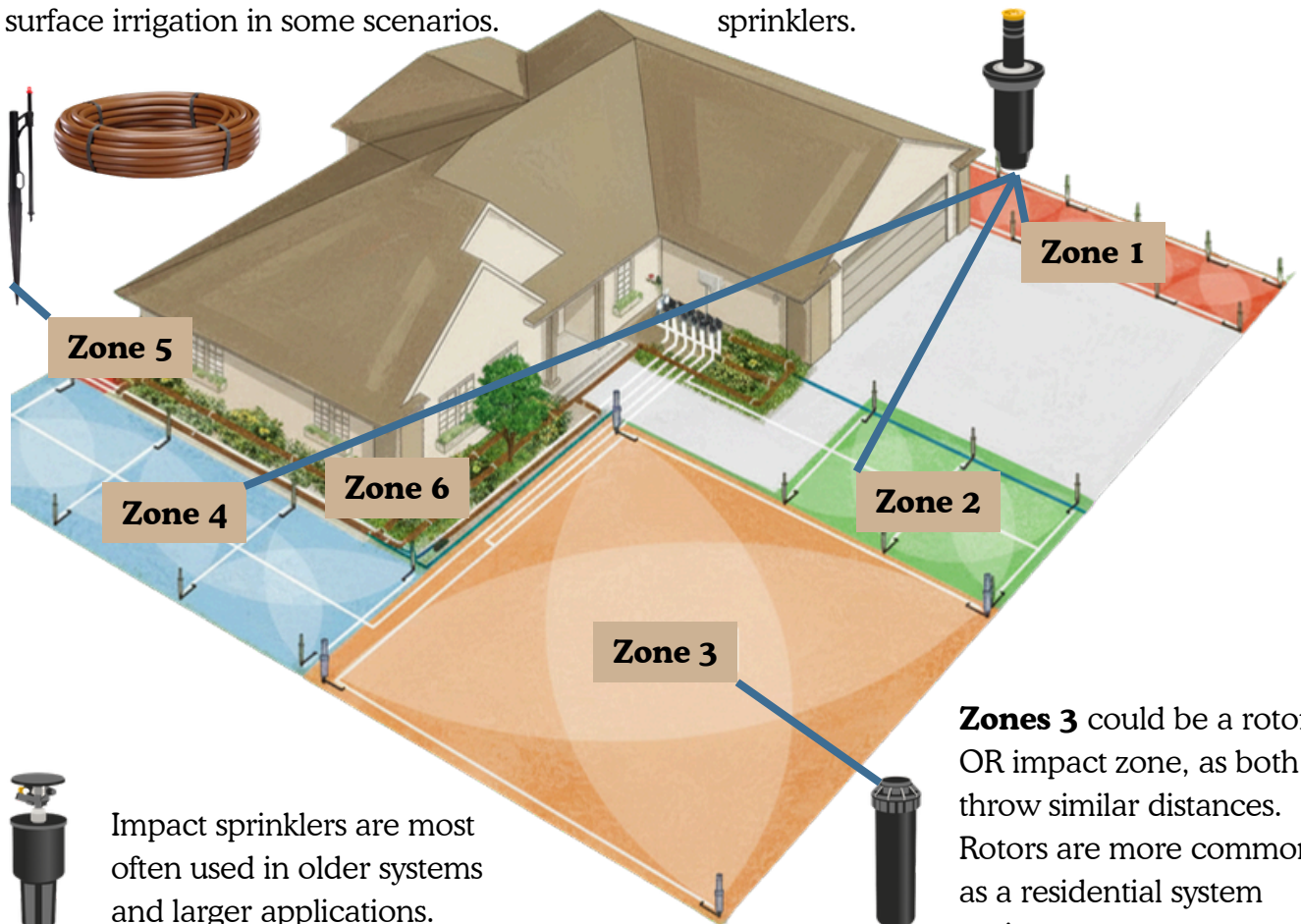


Even if the heads are the same, the nozzle precipitation rates should also be matched.

## Avoid Using the Different Sprinkler Heads in the Same Zone

**Zones 5 (behind house) and 6** are on a drip zone. Drip zone may sometimes have micros attached for surface irrigation in some scenarios.

**Zones 1, 2, and 4** are all appropriate zone sizes for pop-up sprinkler heads, which do not throw as far as rotors or impact sprinklers.



Impact sprinklers are most often used in older systems and larger applications.



**Zones 3** could be a rotor OR impact zone, as both throw similar distances. Rotors are more common as a residential system option.

# Match Precipitation Rates



**Unmatched precipitation rates in a zone or system is one of the most frequent errors in irrigation, even among professionals.**

Matching precipitation rates will ensure all areas of a hydrozone or irrigation zone are watered similarly and not wastefully. [Learn how to match precipitation rates here.](#)

## Precipitation Rate Ranges

	Irrigation Type	Precipitation Rate (In/Hr)
	Drip/Micros	Depends on emitter
	Inline Emitter Drip	.1-2.0
	Rotary Nozzle	.4-.9
	Rotor Head	.25-1.0
	Impact Head	.25-1.25
	High Efficiency Fixed Spray	1.0-2.0
	Traditional Fixed Spray	1.0-2.0

## Matching Precipitation Rates

Arc	Flow (GPM)	Precip. Rate (In/Hr)
90°	.21	.41
180°	.42	.41
270°	.63	.41
360°	.84	.41

**Matched precipitation rates** ensure that the flow is adjusted for the angle, so a 90° nozzle has half the water coming out of it than a 180° nozzle because it is watering half of the area of a 180° nozzle.

Arc	Flow (GPM)	Precip. Rate (In/Hr)
90°	.21	1.64
180°	.21	1.23
270°	.21	.82
360°	.21	.41

**Unmatched precipitation rates** output the same amount of water regardless of the nozzle angle. This means an area covered by a 90° nozzle with the same flow as a 360° nozzle receives 4x as much water.

# Install Check Valves



Check valves are helpful tools for water conservation in home landscapes as they prevent low-head drainage. This is particularly relevant in the mountains, where most irrigation zones are sloped, with some heads lower in the landscape than others. **Without check valves, each time an irrigation cycle is finished, the water left in the line drains out of the lowest head in the zone, effectively wasted.** Heads with check valves may be more expensive up front, but the water savings quickly make up the difference and then some!



Without SAM



With SAM



## Built-In Check Valves

Every major irrigation parts brand makes spray heads with check valves built in.

- In RainBird sprinkler heads, SAM stands for Seal-A-Matic, which identifies that the head has a check valve.
- In Hunter sprinkler heads, the head itself says “check valve”, so you know you’re good-to-go!

## Inline Check Valves

**Inline check valves** are another type of check valve. They are mainly used to prevent backflow rather than for low-head drainage.



**Low head drainage is often a non-apparent water loss**, as most of the time the water dribbles out of the head and saturates the surrounding area. If the area immediately around your irrigation heads is growing faster or appears greener, then you might have a low head drainage issue!

# Install Rotary (MP) Nozzles



**High-efficiency sprinkler nozzles, also commonly called MP or rotary nozzles, deliver multiple rotating streams of water at a lower precipitation rate** (amount of water sprayed in inches per hour) requiring them to run longer, but the way in which water is applied is more efficient and reduces water loss. **Paired with cycle-and-soak scheduling, they are one of the most efficient ways to overhead water.**



Like fixed spray, rotary nozzles come in many angle and spray distance configurations.

## Rotary Nozzle Benefits

- **Reduced Runoff:** Minimizes runoff on slopes and clay soils due to the slower distribution of water, helping prevent runoff and erosion.
- **Wind Resistance:** Larger water droplets are less susceptible to wind disruption, optimizing water usage.
- **Increased Coverage:** Delivers water more evenly, promoting healthier landscapes.
- **Easy Installation:** Simple retrofit onto existing pop-up irrigation systems, making this a cost-effective solution.

## How to install a rotary nozzles



1. Raise the head and remove old nozzle
2. Select an appropriate rotary nozzle
3. Screw in rotary nozzle
4. Repeat for other heads
5. Test the zone and troubleshoot as necessary



## COMMON MODELS

- [Hunter MP Rotator®](#)
- [Rain Bird® Rotary Nozzles](#)
- [Toro® Precision™ Nozzles](#)
- [K-Rain® Rotary Nozzles](#)

**Rotary nozzles have a lower output rate**, so they will need to run longer than traditional nozzles to water the same amount. **Adjust your scheduling accordingly.**

**Rotary nozzles mechanisms sometimes stop rotating due to clogging or calcification of components.** Most of the time, they just need to be "booped" by pressing the nozzle down like a button to start functioning again. **Check each zone once a month to ensure proper function.**

# Raise & Straighten Heads



Over time, soil settling, lawn compaction, or landscaping changes may cause sprinkler heads to sink below the soil surface or become tilted, resulting in uneven watering and potential damage to the irrigation system. Raising and leveling sprinkler heads ensures efficient water distribution, reducing water loss and promoting conservation efforts.

## When to Raise or Realign Sprinkler Heads

- If you notice that sprinkler heads are submerged below the soil surface or are obstructed by grass or other landscaping features, raise them to grade.
- Realign any tilted heads that are spraying too high in the air, or are tilted downwards and are hitting nearby vegetation.



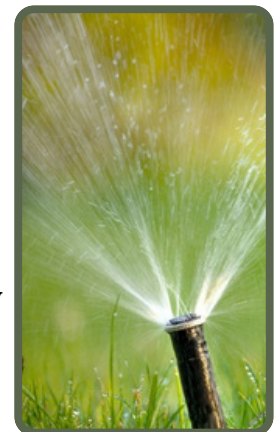
## Fixing Low or Sunken Sprinkler Heads



- **Turn Off Water Supply:** Shut off the water supply at the main valve.
- **Dig Around Sprinkler Head:** Carefully excavate soil around the head.
- **Detach Sprinkler Head:** Unscrew the head from the riser or pop-up assembly.
- **Add Riser Extension:** Use an extension to raise the head to the desired height.
- **Reattach Sprinkler Head:** Screw the head back onto the riser, using Teflon tape to prevent leaks.
- **Test Sprinkler Operation:** Turn on water supply and adjust the spray pattern if needed.
- **Backfill and Compact Soil:** Fill the area around the head with soil and compact gently.

## Fixing Tilted Sprinkler Heads

- **Turn Off Water Supply:** Shut off water flow at the main valve.
- **Dig Around Sprinkler Head:** Excavate soil around the tilted head.
- **Adjust Sprinkler Head:** Use hands or a wrench to level the head.
- **Check Alignment:** Verify alignment and adjust if necessary.
- **Secure Head:** Tighten adjustment screws to secure the head.
- **Test Sprinkler Operation:** Turn on water supply and observe spray pattern.
- **Backfill and Compact Soil:** Fill the area around the head with soil and compact gently.



# Correct Overspray



**Overspray in an irrigation system occurs when water extends beyond the intended target area, leading to water waste and uneven watering.**

## Recognizing Overspray

- Water pooling or runoff in non-targeted areas.
- Visible misting or fogging during operation.
- Uneven coverage patterns and oversaturation.
- Wet surfaces on adjacent buildings, sidewalks, or driveways.

## Causes of Overspray

- Incorrect nozzle selection or adjustment.
- Improper positioning or alignment of sprinkler heads.
- Excessive system water pressure.
- Wind or environmental conditions.
- System design flaws or inadequate coverage planning.



## CORRECTING OVERSPRAY

- **Adjust Sprinkler Heads:** Ensure proper adjustment to deliver water only to the desired area without overspray. Modify arc, angle, and distance of spray.
- **Replace Nozzles:** Consider low-pressure, high-efficiency nozzles to minimize overspray and misting. These produce larger water droplets for more even distribution and less disturbance from wind.
- **Reduce Water Pressure:** Install pressure regulators or PRVs to maintain optimal pressure levels and prevent misting or excessive flow rates.
- **Implement Windbreaks:** Install barriers like fences or shrubs to reduce wind impact on water distribution and minimize overspray.
- **Monitor Weather Conditions:** Adjust irrigation schedules based on wind speed, humidity, and temperature to minimize water loss due to environmental factors.

# Adjust Spray Pattern



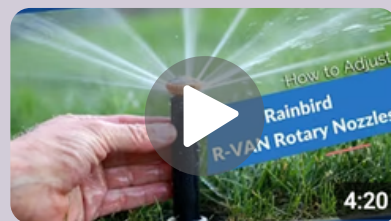
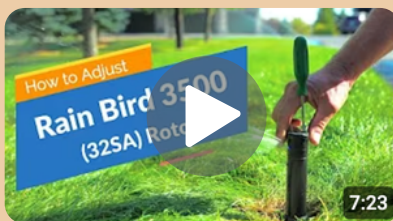
**Adjusting the spray pattern of overhead sprinklers is a fairly simple but effective way to reduce water waste.** By ensuring that the sprinklers are set to target only the areas that need watering without unnecessary overlap, you can prevent overspray onto sidewalks and driveways and redundant watering of turf or flower beds. Properly adjusting the spray arc and rotation angles can help distribute water evenly, reducing runoff and ensuring that each section of your landscape receives the right amount of moisture.



**Radius (or throw distance) and arc (or angle) are the two ways that most sprinkler heads can be adjusted.** Different heads have varying attributes and limitations on how much they can be adjusted. A 25' rotor cannot be effectively adjusted to throw 5', for instance, so knowing those limitations is important when attempting any adjustment.

## Traditional Fixed

### RainBird



### Hunter



## Head & Nozzle Selection, & Tools

**Selecting the most appropriate sprinkler head and nozzles for the space is the best way to ensure proper throw distance and arc,** but calibration after install and regular adjustments throughout the season, especially after startup in the spring, are necessary to have an optimally functioning irrigation system. Using the adjustment tools made for your brand of sprinkler head will minimize frustration—they are very specific!



# Remove Obstructions



**Obstructions in an irrigation system can impede water distribution, leading to uneven watering, reduced efficiency, and potential damage to both plants and system components.**

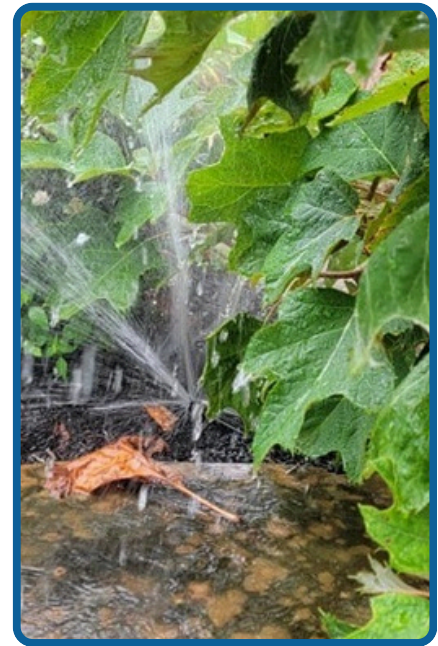


## Common Types of Obstructions

- **Overgrown Vegetation:** Tall grass, shrubs, trees, or ground cover obstruct water flow from sprinkler heads.
- **Placement of Boulders or Lawn Ornaments**
- **Plant Roots:** Tree or shrub roots infiltrate irrigation lines, leading to blockages and disruptions.
- **Debris:** Fallen leaves, branches, mulch, or organic matter accumulate around sprinkler heads or in lines.

## Addressing Plant Obstructions

- **Prune Vegetation:** Regularly trim and prune overgrown vegetation to prevent obstruction of sprinkler heads. Maintain clearance around components for proper operation.
- **Clear Debris:** Remove accumulated debris from around sprinkler heads and along lines to prevent blockages. Use tools like rakes, brooms, or blowers for clearing.
- **Inspect and Clean:** Regularly inspect components for signs of blockages caused by plant roots or debris. Clean or unclog obstructed parts to restore water flow.
- **Adjust Irrigation Layout:** Consider repositioning sprinkler heads to avoid direct obstruction by tall plants. Install risers to elevate heads above foliage.



## Head Extenders



## Preventing Plant Obstructions

- **Proper Plant Selection:** Choose landscaping plants with consideration for mature size and proximity to irrigation components.
- **Use Extenders:** Add head extenders as plants grow.
- **Regular Maintenance:** Implement a schedule to prevent debris accumulation around sprinkler heads and lines.
- **Mulch Application:** Apply mulch to landscape beds to suppress weed growth and reduce debris accumulation.

# Install a Rain Sensor



**Installing a rain sensor to your irrigation system is a simple yet effective way to conserve water, save money on utility bills, and promote waterwise irrigation practices.** A rain sensor automatically shuts off your irrigation system when it detects rainfall, preventing unnecessary watering during wet weather conditions. Installing a rain sensor is an easy water savings retrofit that can be done to most modern irrigation systems.

## Benefits of Installing a Rain Sensor

- **Prevents overwatering:** By automatically interrupting irrigation cycles during rain events, a rain sensor helps prevent overwatering and reduces water waste.
- **Saves money:** By conserving water and reducing irrigation usage, a rain sensor can lead to significant savings on water bills over time.
- **Promotes healthy landscapes:** Avoiding excessive moisture from overwatering helps maintain healthy soil conditions and prevents issues such as root rot, fungal diseases, and weed growth.

## Choosing a Rain Sensor

- Select a rain sensor model that is compatible with your irrigation controller or system. Consider factors such as sensor type (wired or wireless), installation method, and sensitivity settings.
- Look for features such as adjustable rainfall settings, override options, and battery backup for reliable operation.



## Rain Sensors & Annual Containers

**Annual containers offer a particular challenge when installing rain sensors, as they require frequent (sometimes daily) watering and are often located under eaves, decks, or other cover.** Unfortunately, even the most advanced controllers don't have the option to leave a zone or zones on if the rain delay is triggered. To circumvent this, a small, separate controller can be installed without a rain sensor. This simplifies programming and can save thousands of gallons of water when rain is plentiful.



## Additional Resources:

- [How to Install a Rain Sensor - Video](#)
- [How to Install a Rain Sensor For Your Sprinkler System](#)
- [How to Install an Automatic Rain Sensor](#)
- [How to Install a Wireless Rain Sensor](#)

# Fix Low or High Pressure



Operating a sprinkler system at pressure levels higher or lower than recommended (typically between 30-45 psi for most spray sprinklers) can result in significant water waste, misting, fogging, uneven coverage, and damage to pipes, valves, and sprinkler heads.

## Signs of Low Pressure

- Uneven or inconsistent/variable water distribution
- Reduced sprinkler head height/ not fully popping up
- Weak or dribbling water flow
- Delayed system start-up
- Inconsistent spray patterns

## Signs of High Pressure

- Soil erosion around sprinkler heads.
- Misting or fine droplets indicating overspray.
- Uneven coverage patterns and oversaturation.
- Noises like banging or rattling pipes.
- Premature wear or damage to system components.

## Options for Reducing High or Low Pressure

- **Install Pressure Regulating Valves:** Place in the main water line to automatically adjust pressure.
- **Adjust Main Shut-off Valve:** Partially close to reduce flow and pressure.
- **Use Flow Control Valves:** Regulate flow in specific zones to control pressure.
- **Switch Nozzles:** Use pressure-reducing spray nozzles designed for lower pressures.
- **Add Pressure Regulating Devices:** Install inline regulators for consistent pressure.
- **Check for Leaks and Blockages:** Regularly inspect and repair leaks or obstructions.



## Additional Resources

- [Checking Irrigation System Pressure](#)
- [Relieve Pressure and Reduce Water Waste From Spray Sprinklers](#)
- [Water Pressure Regulators Simplified for Homeowners](#)

# Irrigation Best Practices

## Plan & Design

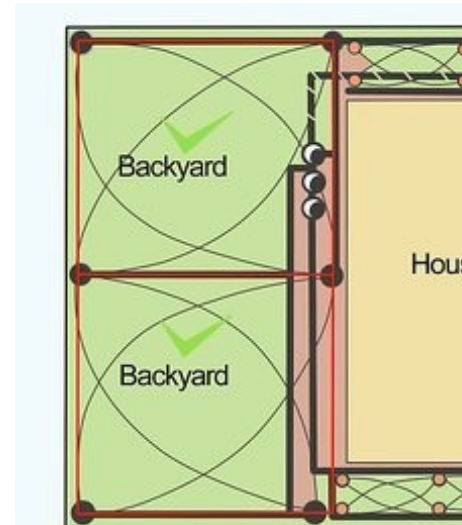
**Match water to plants:** Group plants by water need and put each group on its own zone.

**Use the right method:** Drip for beds and trees; high-efficiency nozzles or rotors for lawn areas.

**Design for coverage:** Avoid overspray onto pavement; ensure head-to-head coverage where possible.

**Eliminate obstructions:** Ensure spray paths aren't blocked by rocks, plants, or grade changes.

**Account for slope:** Use cycle-and-soak or low-precipitation heads on slopes to prevent runoff.



## Hardware & Components

**High-efficiency nozzles:** use MP rotators or matched-precipitation nozzles for uniform watering.

**Pressure regulation:** At the valve or head ensures the system runs at optimal performance.

**Filter & flush:** Use filters on drip zones and flush caps at line ends to prevent clogging.

**Quality emitters:** Use pressure-compensating emitters for even flow.

**Check valves:** Prevent low-point drainage and puddling.



## Scheduling & Timing

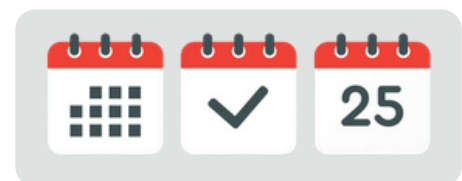
**Water early:** Irrigate between 10 p.m.–6 a.m. when wind and evaporation are low.

**Water deeply, less often:** Encourage deeper roots and reduce shallow, thirsty growth for plants (excepting turf).

**Cycle and soak:** Break run times into multiple short cycles to avoid runoff.

**Seasonal adjustment:** Increase in midsummer; reduce dramatically in spring/fall.

**Pause for rain:** Use rain sensors or a smart controller's weather-based skip to skip cycles during rain.



## Smart Controls

**Use a smart controller:** With weather-based or seasonal adjust features for convenience and savings.

**Set up zones correctly:** Verify hydrozone and head/nozzle type, use water budget to inform scheduling.

**WiFi alerts:** Get notifications for leaks, freezes, or skipped cycles.



## Maintenance & Monitoring

**Monthly walkthroughs:** Check for clogged nozzles, leaks, tilted heads, and broken drip lines or leaking emitters.

**Adjust heads as plants grow:** Prevent blocked spray patterns and reduce misting, add extenders as necessary.

**Flush drip annually:** To remove sediment in the line.

**Monitor pressure:** High pressure causes misting; low pressure causes poor coverage.

**Check for runoff:** Soil saturation, pooling, or water on pavement = over-watering or poor design.



## Efficiency & Water Conservation

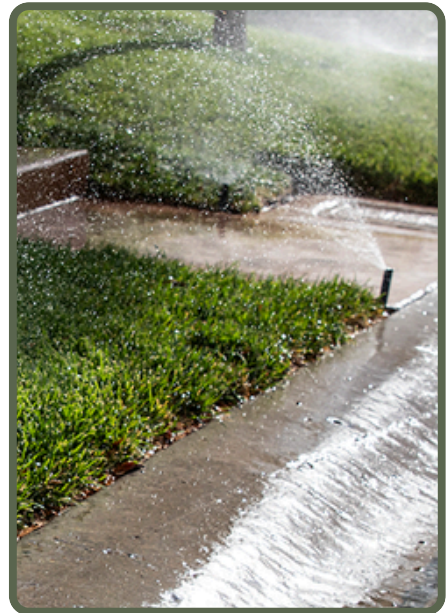
**Mulch drip zones:** Reduces evaporation, insulates roots, and protects drip lines.

**Choose climate-appropriate plants:** Reduces overall irrigation demand.

**Reduce turf:** Lawn is the thirstiest part of any landscape; replace unused turf areas.

**Fix leaks fast:** Even a small drip can waste hundreds of gallons.

**Educate yourself and others:** Stay informed about local water restrictions and best practices for water conservation. Share knowledge with neighbors and community members to encourage wider adoption of efficient irrigation practices.



# Drip Best Practices

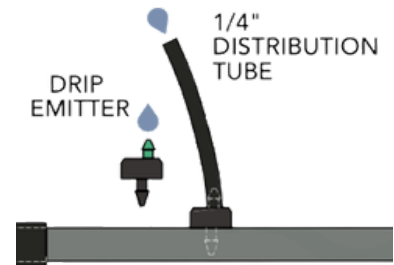
## Installation Basics

**Emitters go into poly tubing:** Attach 1/4" spaghetti tubing directly to the emitter, not the other way around.

**Keep spaghetti tubing short:** Do not exceed 2–3 feet to maintain consistent flow.

**Do not T-off after emitters:** Each emitter should serve a single outlet only.

**Always clamp connections:** Secure all barbed fittings to prevent leaks and blowouts.



## Flow & Components

**Choose emitters for plant type:** Emitter colors indicate different gallons-per-hour (GPH); different plants require different amount of water on point-source irrigation

**Use pressure regulation:** All drip zones must include a pressure regulator or drip manifold.

**Cap unused lines properly:** Folded poly tubing can still leak; always cap and clamp ends.



## Zoning & Control

**Use shutoff valves where needed:** Install barbed valves on vegetable beds and annual containers so zones can be turned off when not in use.

**Separate drip from spray:** Drip zones should never be mixed with overhead irrigation.



## Placement & Securing

**Drip goes on top of soil and under mulch:** Lay poly tubing on the soil surface and cover with mulch.

**Secure lines in place:** Use sod staples to prevent movement during watering, mulching, or maintenance.



## Long-Term Performance

**Design for access:** Drip systems should remain visible and adjustable.

**Check connections seasonally:** Inspect emitters, clamps, and caps for leaks or clogging.

# Irrigation Checklist



Do you have broken or leaking lines/components?



Are you watering at a time that minimizes loss?



Have you upgraded to a smart watersense clock?



Do your heads have check valves?



Are there broken or leaking heads to replace?



Are you complying with watering restrictions?



Are you keeping distinct hydrozones?



Are your valve boxes maintained & accessible?



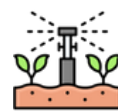
Are you using the right sprinkler for the zone?



Do you have a rain sensor, or is it bypassed?



Are you adjusting monthly as plants grow?



Are you using high efficiency heads/nozzles?



Is your schedule updated regularly?



Do you have any runoff or overspray?



Are you adjusting for seasonal variation?



Are your spacing/angles properly calibrated?



Do mature trees and shrubs still need water?



Are there any clogged or stuck heads?



Is there a winterizing routine in place?



Are you overhead watering mulched areas?