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Green Engineering for Landscape and Agriculture

What is Irrigation and Drainage System

Irrigation systems apply water to land to support vegetation, while drainage systems remove excess water to protect soil and infrastructure. Both systems are critical for regulating soil moisture, improving plant growth, and controlling runoff and erosion.

Automatic and Manual System Solutions

GRELA offers both automatic (sensor/controller based) and manual solutions, enabling precise water delivery and removal for diverse applications. Automatic systems increase efficiency through scheduled and responsive control; manual systems offer adaptability for custom scenarios.

Where Do We Need It

These systems are essential in landscapes, agricultural fields, residential gardens, and commercial properties for maintaining optimal soil and plant conditions, mitigating waterlogging, and ensuring environmental sustainability.

Combining Irrigation and Drainage for Land and Soil Control

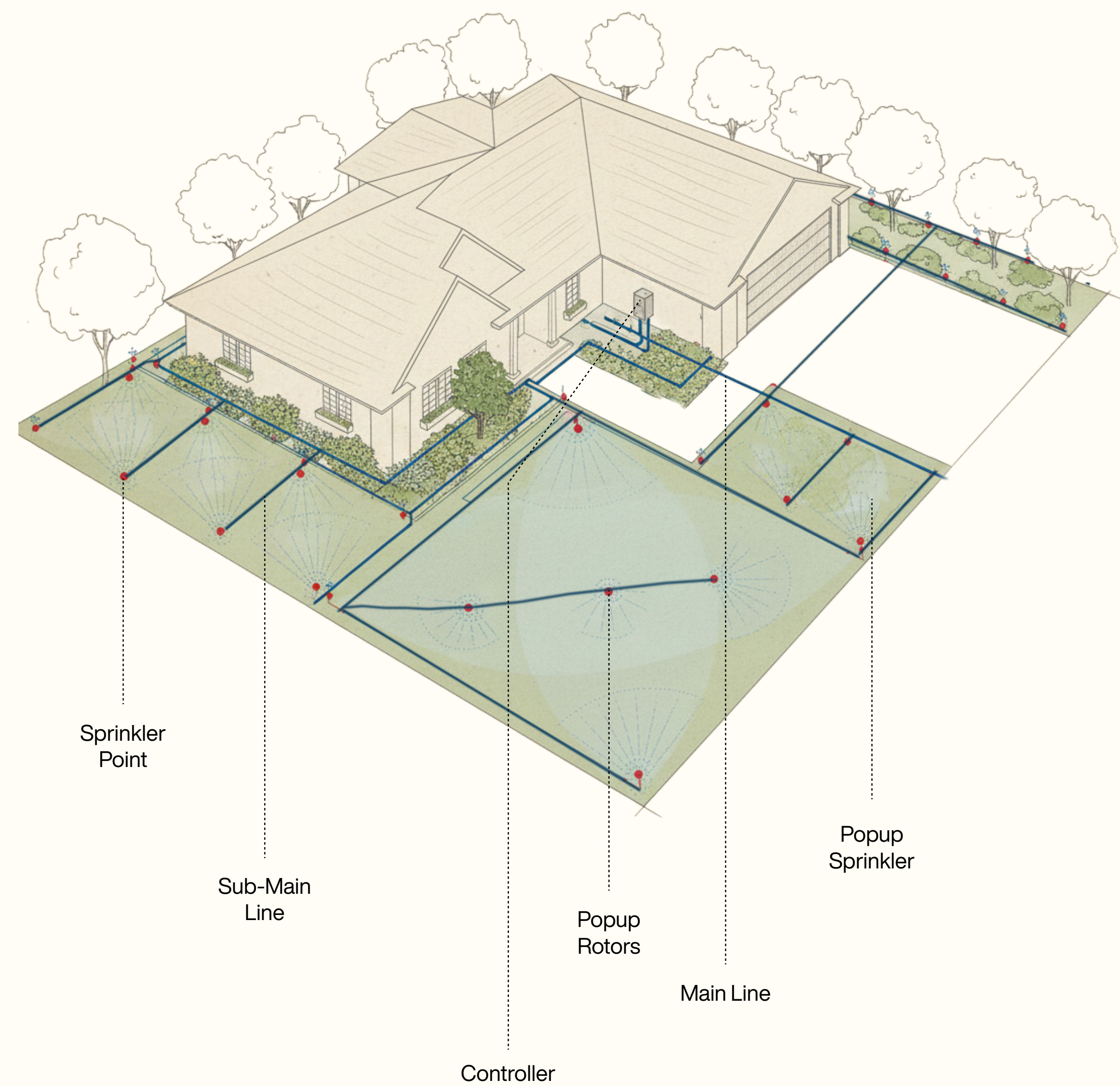
Integrated irrigation and drainage optimize land management by balancing water input and extraction, preventing salinity buildup, erosion, and root diseases while enhancing crop yields and landscape aesthetics.

Types of Systems

Sprinkler Irrigation Systems

Sprinkler systems distribute water through pressurized piping and various dispersal heads, providing uniform coverage for medium to large areas. Ideal for lawns, sports fields, and agriculture, they mimic natural rain.

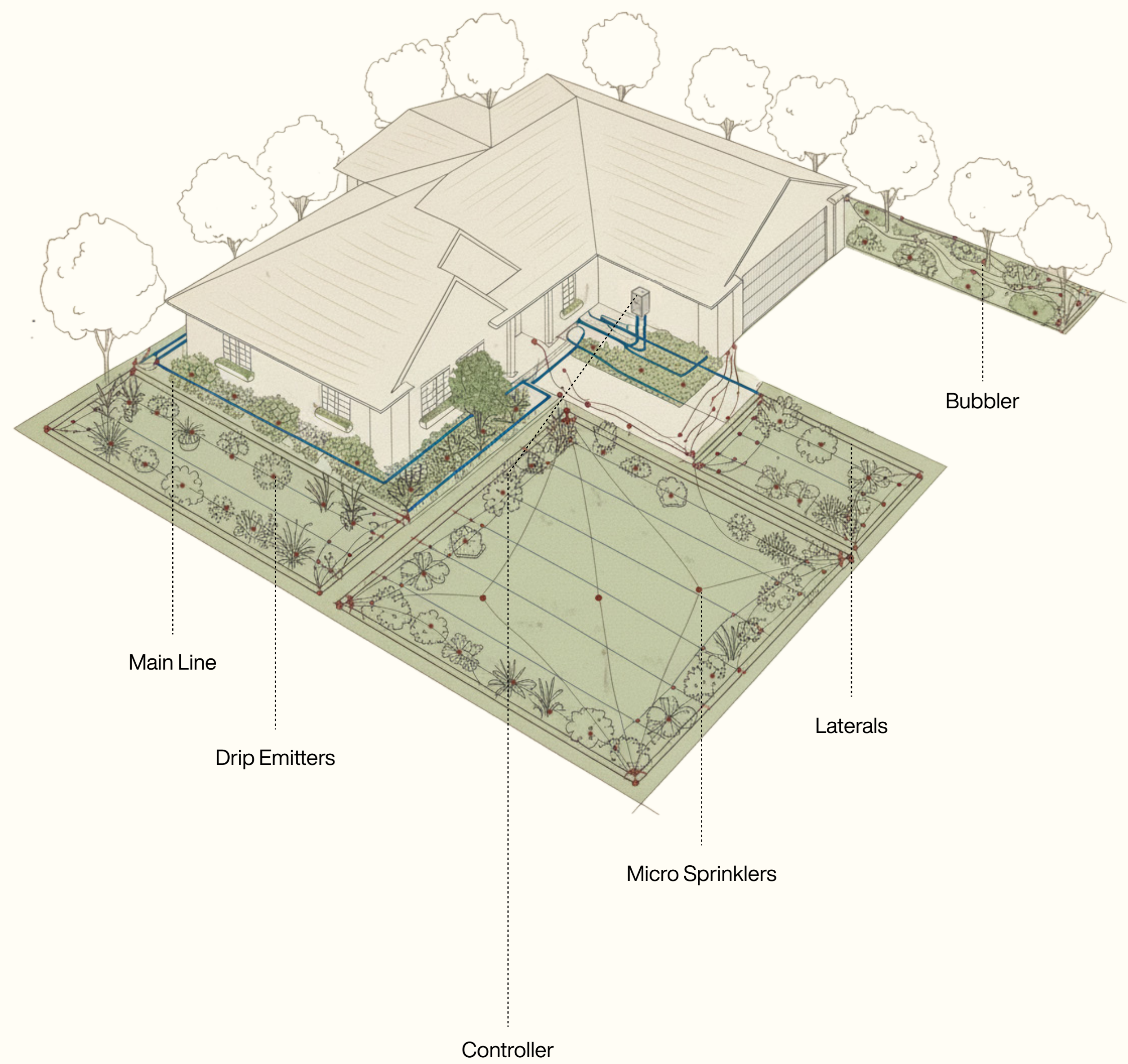
Type	Flow Rate (L/min)	Pressure (bar)	Coverage (m ² /head)	Application	Advantages
Popup spray	2–8	1.5–3	30–100	Lawns Gardens	Even water distribution; low profile
Popup rotors	8–20	2–4	100–300	Parks, Sports fields	Large coverage, adjustable arc
Impact Sprinkler	10–25	2–4	150–400	Agriculture, Lawns	High durability, long throw
Rain Gun	40–120	3–7	500–1800	Crops, Large turf	Massive area, suited for fields



Micro-Irrigation System

Micro-irrigation targets root zones of plants, minimizing wastage and maximizing efficiency. They are most suited for orchards, vegetables, and ornamental landscapes.

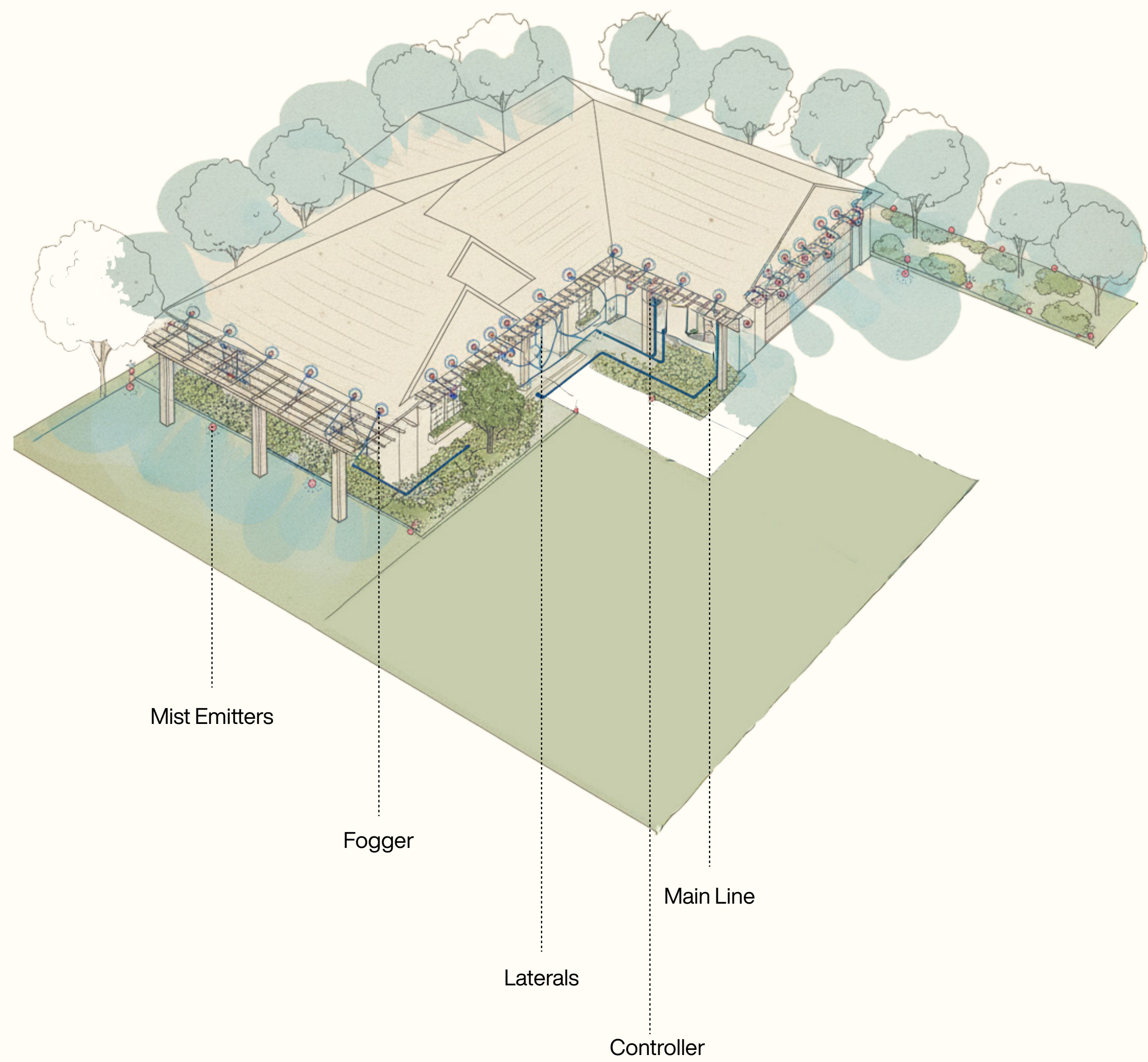
Type	Flow Rate (L/min)	Pressure (bar)	Coverage (m ² /emitter)	Application	Advantages
Drip Irrigation	2–8 emitter	0.8–2	0.2–1	Row crops, Greenhouses	Water saving, minimal runoff
Micro sprinklers	10–40	1–2.5	2–5	Gardens, Orchards	Low pressure, wide spacing
Fertigation compatible	2–30	1–3	As above	Crop nutrition	Uniform nutrient delivery



Humidity Control System

Humidity Control system supports microclimate management for sensitive crops, nurseries, and greenhouses. This system is apt to create artificial humidity for dry climates.

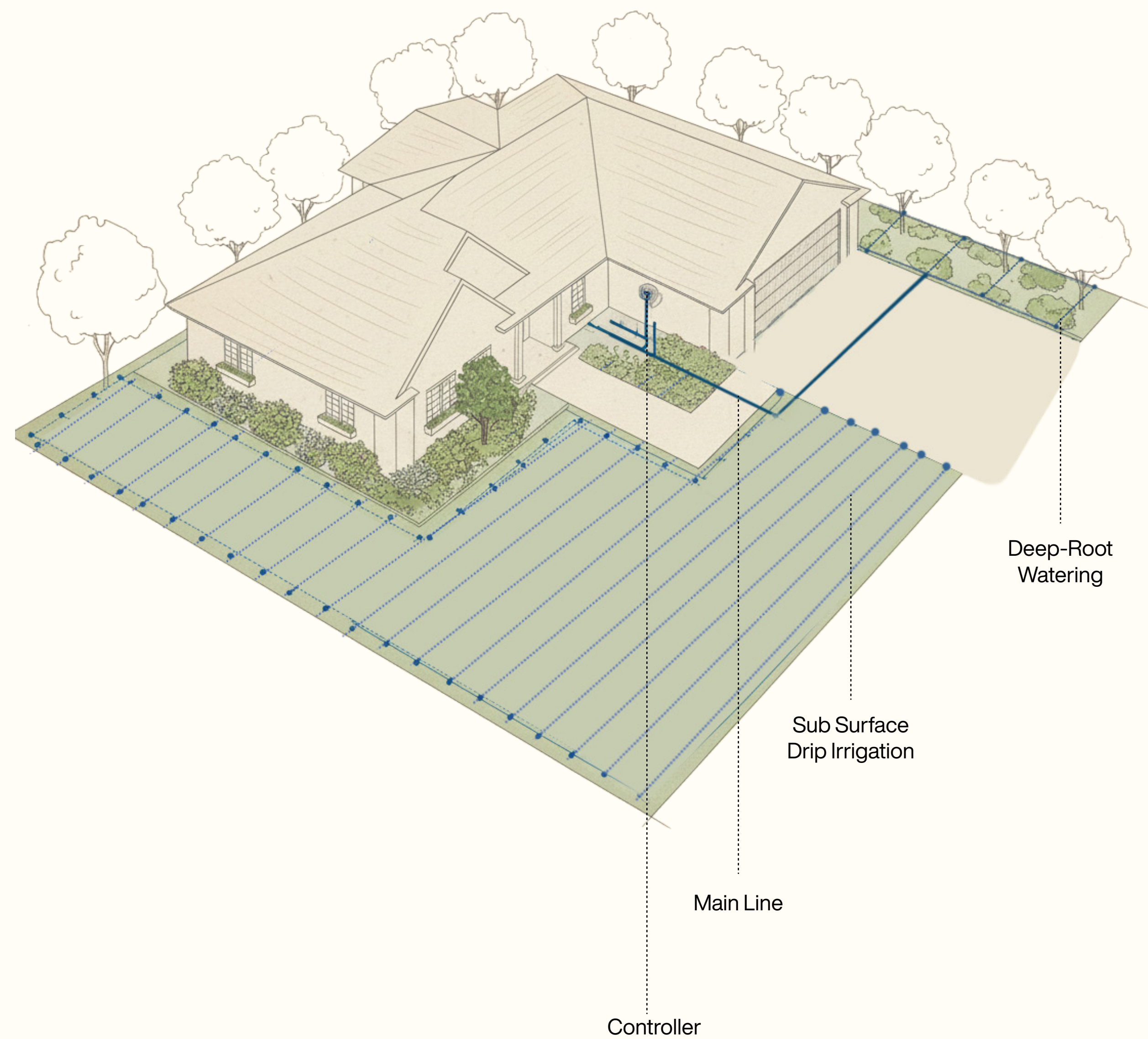
Type	Flow Rate (L/hr)	Pressure (bar)	Coverage (m ²)	Application	Advantages
Mist irrigation	5–15/nozzle	3–4	2–10	Greenhouses, Cooling	Increases humidity, fine droplets
Foggers	2–8/nozzle	3–6	3–8	Propagation, Orchids	Reduces leaf scorching



Sub Surface Irrigation Systems

Sub-surface irrigation system delivers water below the surface to enhance deep root growth and water efficiency. Water delivery to root keeps the growth of plants healthy and prevents unexpected soil conditions

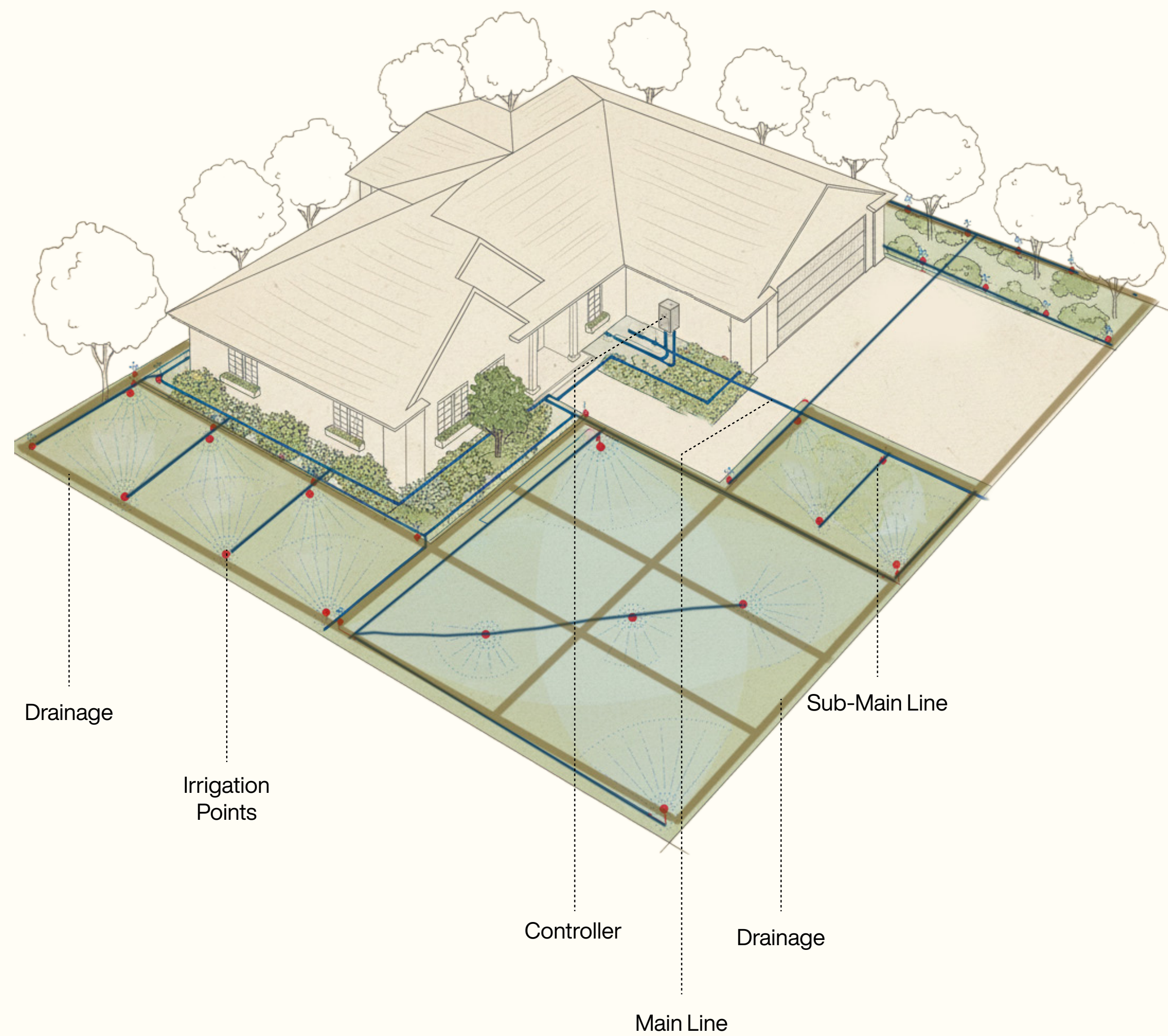
Type	Flow Rate (L/hr)	Pressure (bar)	Depth (cm)	Application	Advantages
SDI system	2–6/emitter	0.8–2	20–40	Crops, Turf beds	Reduces evaporation, deep roots
Deep Root watering	10–20/device	1.5–3	30–60	Trees, Shrubs	Promotes healthy roots



Integrated Irrigation and Drainage

A properly designed irrigation and suitable drainage manages both excess and supply, enhancing land stability. It is not only controls moisture level, but also put check on soil health.

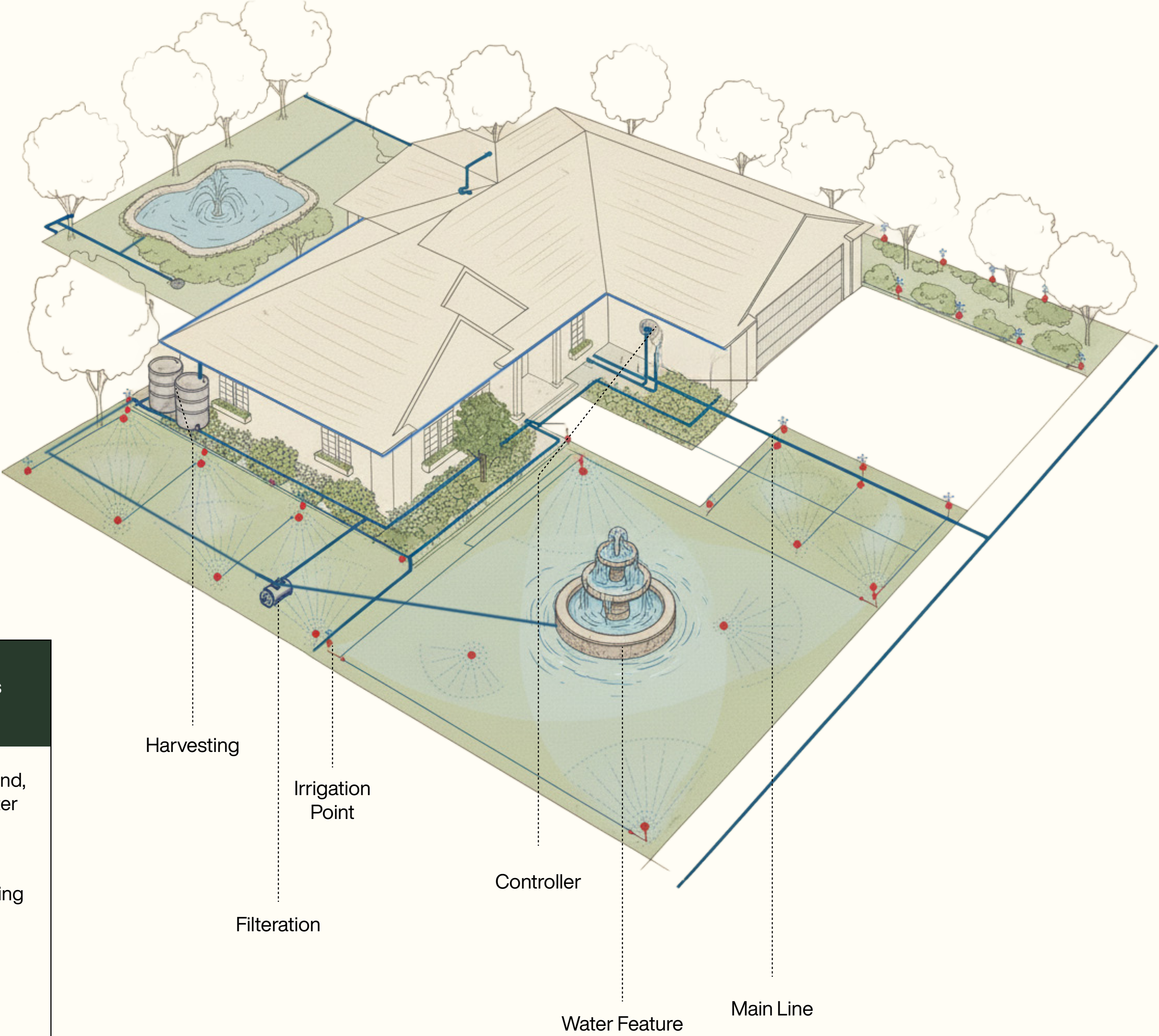
Type	Specification Details	Application	Advantages
French drain	Pipe size: 50–150mm, gravel filled	Sloped sites, lawns	Prevents waterlogging
Sub-surface water level control	Valves, monitoring sensors	Foundations, farms	Automated water table control



Water Features

Water features in a landscape enhance landscape aesthetics and provide water management. They act as both water management system as well helps to control the utility of water.

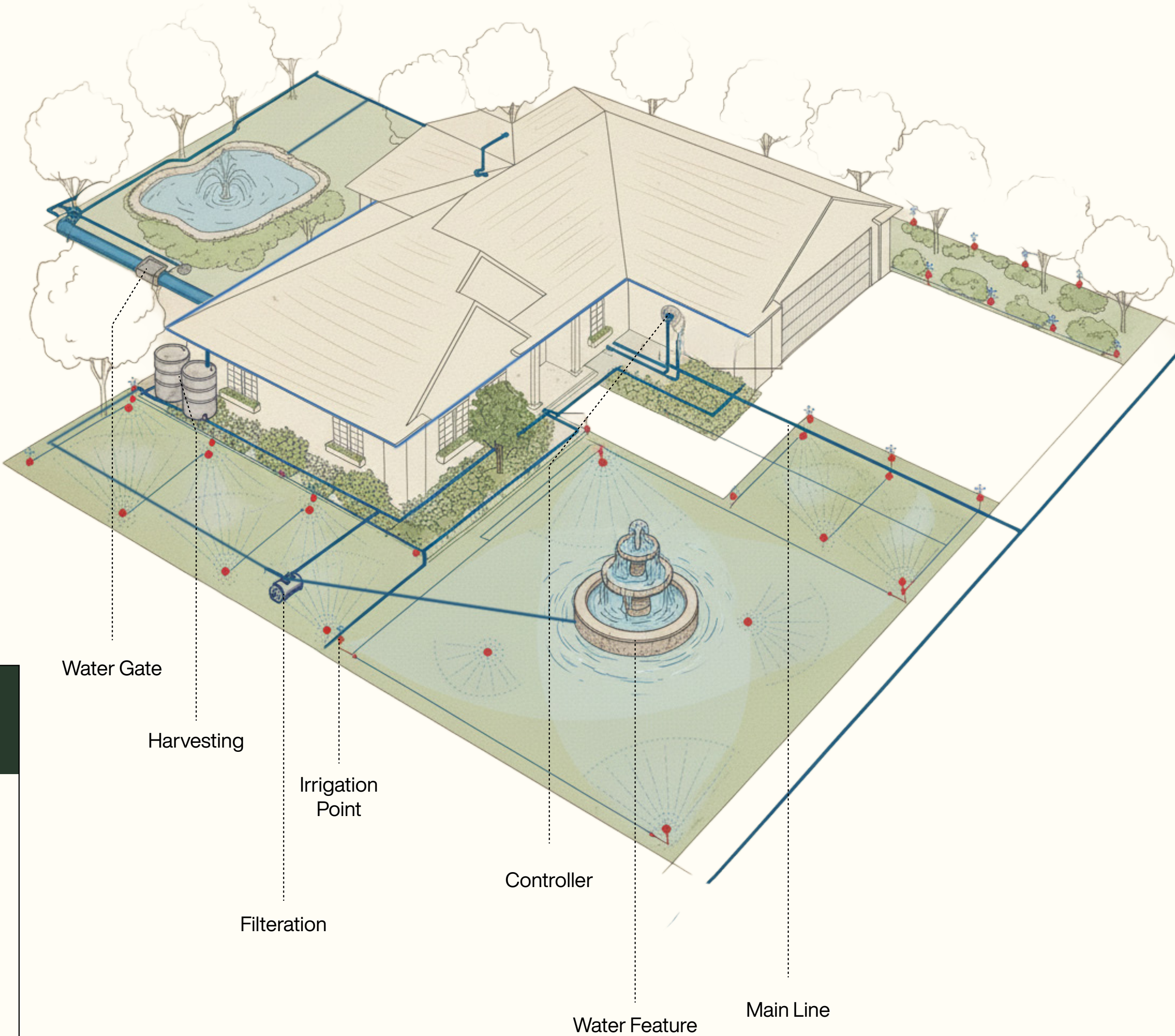
Type	Specification Details	Application	Advantages
Water harvesting	Storage: 1000–50,000 liters	Roof, surface catchment	Reduces demand, reuses rainwater
Fountains	Pump: 50–200 L/minv	Gardens, Commercial	Aesthetic, cooling



Soil Management

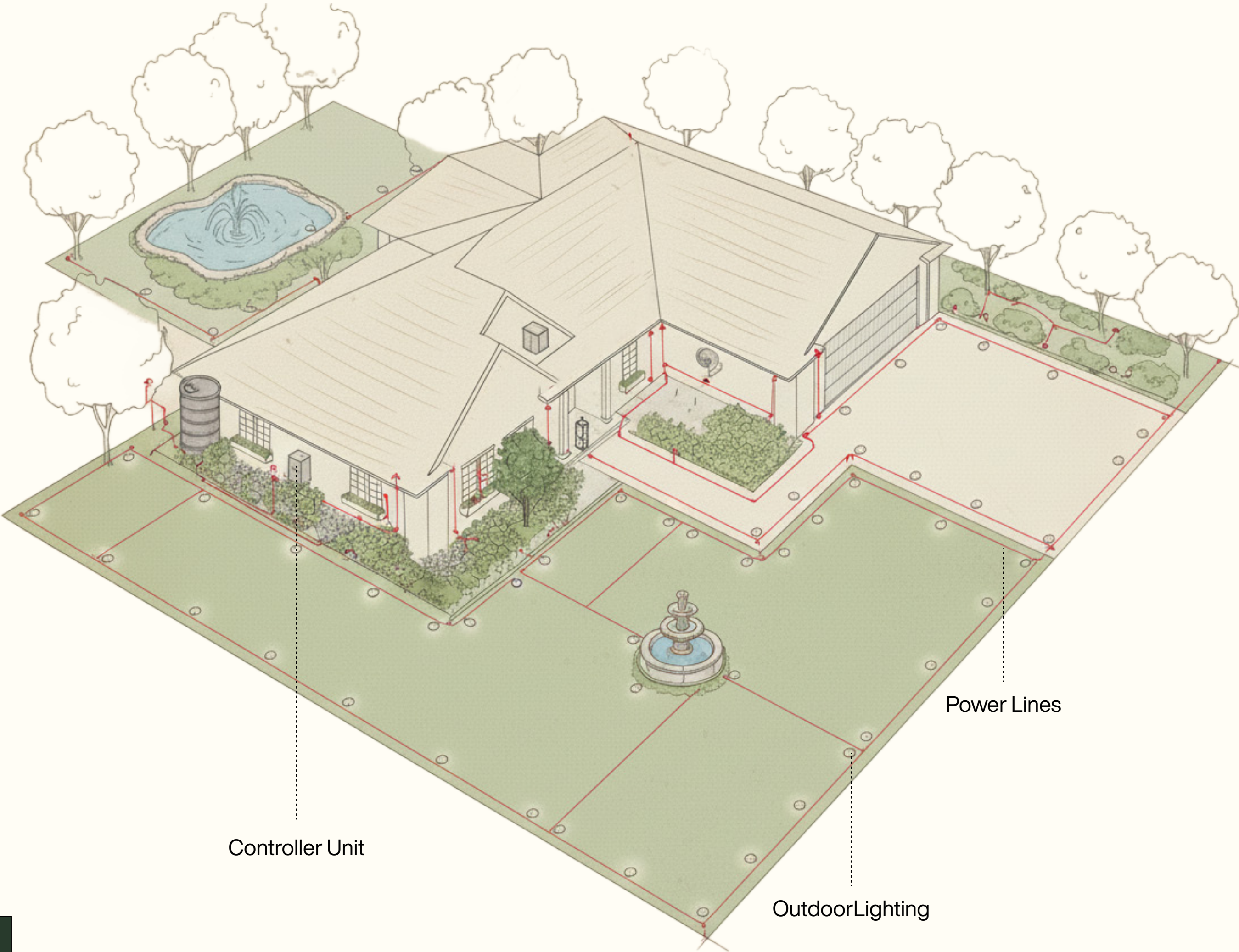
With advanced technology, it is possible to control the moisture capacity of any terrain to improves substrate handling and vegetation establishment.

Type	Specification Details	Application	Advantages
Water gate	Flow control: manual/auto, 20–150mm	Drainage channels	Prevents erosion, controls runoff
Hydroseeding	Tank: 1000–5000L, spray pressure 2–4 bar	Large lawns, slopes	Rapid turf establishment



Others

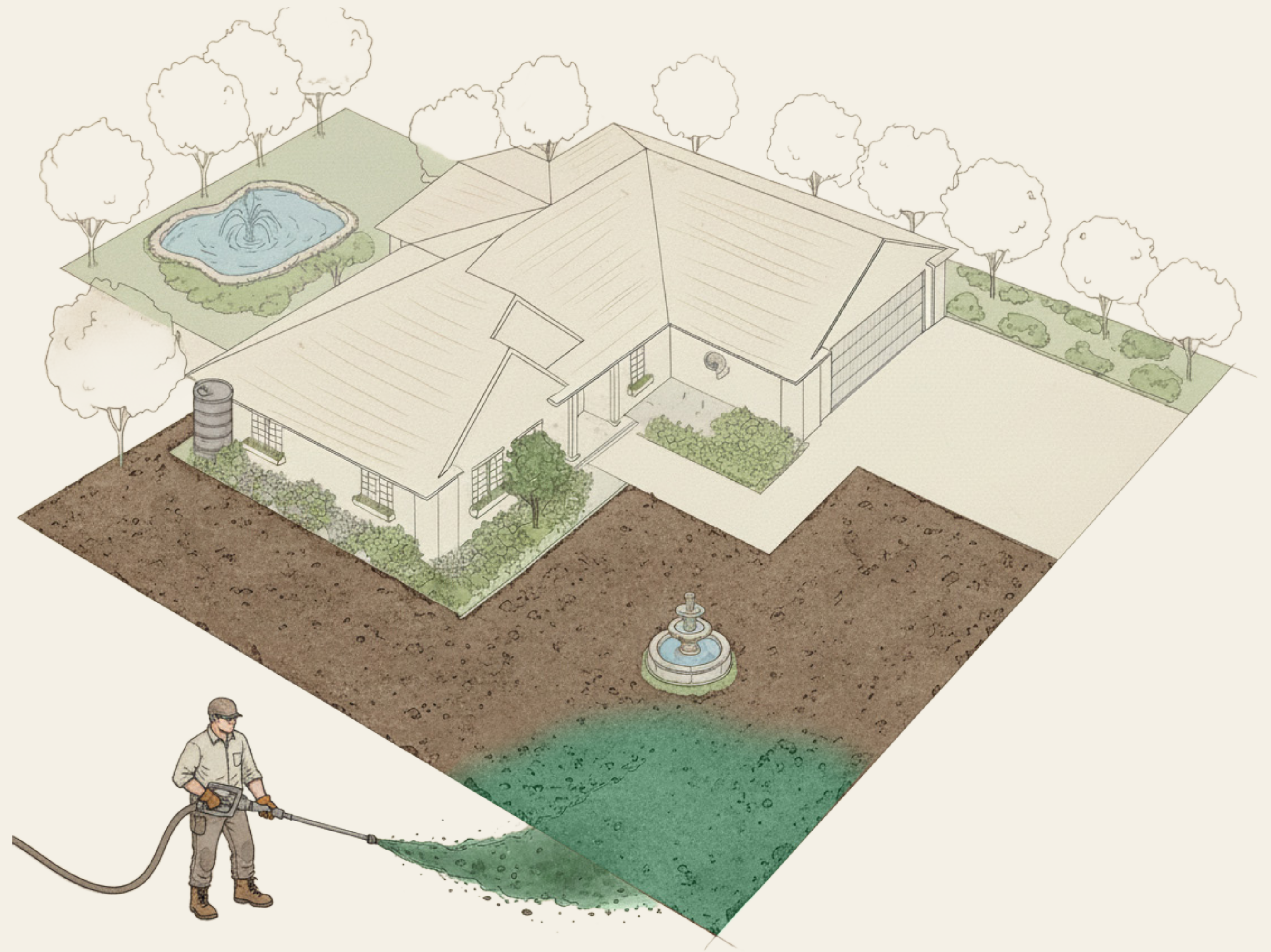
Outdoor electrical supply in landscapes is tedious and is exposed to unexpected danger. One can easily solve this without compromising the landscape ornamentation through outdoor electrical solutions for system integration.



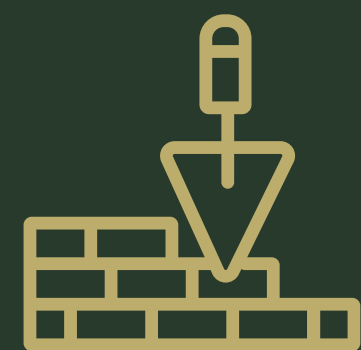
Type	Specification Details	Application	Advantages
12/24V DC lighting	Low voltage, waterproof	Pathways, Gardens	Safety, energy-efficient

Hydroseeding

Hydroseeding is a planting process that sprays a slurry of seed, water, mulch, and fertilizer onto the soil. This method is used for erosion control, large-scale landscaping, and reclamation projects because it establishes vegetation quickly and effectively on bare or disturbed surfaces.



Major Application Areas



Construction

Irrigation and drainage support erosion control and site stabilization, essential for reducing risk of waterlogging around foundations and roads.



Landscape

Systems preserve turf health, ornamental plantings, and soil structure, supporting both public and private landscape projects for year-round aesthetic performance.



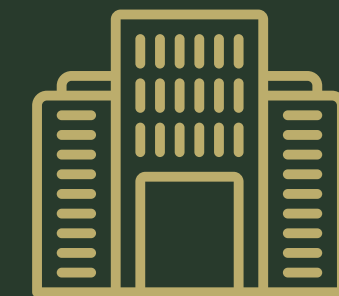
Agriculture

Precise irrigation and drainage are vital for maximizing crop yields, preventing root disease, and sustaining long-term soil productivity on farms.



Residential

Home landscapes and gardens benefit from customizable irrigation and drainage systems, ensuring optimal plant health and water conservation.



Commercial

Commercial facilities use integrated solutions for grounds maintenance, water features, and microclimate control, supporting branding, sustainability, and property value.

Systems as Solution



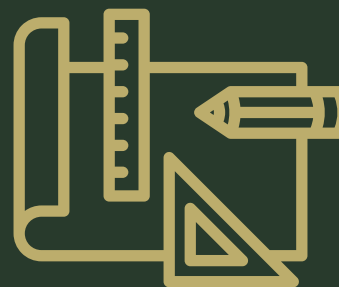
Inspection

Thorough analysis of soil properties, water source quality, and landscape layout is conducted to determine system capacity, configuration, and special site constraints.



Selection

GRELA recommends products based on flow, pressure, material durability, and compatibility with site requirements. Devices and controllers are matched to technical needs and user preferences.



Design

Experts collaborate with clients to develop comprehensive plans, CAD drawings, and control strategies, ensuring seamless integration with architectural elements.



Implementation

Professional installation ensures optimal system performance with proper layout, pressure regulation, and routine maintenance, securing efficiency and longevity.

Maintenance Practices



What Is Maintenance?

Maintenance in irrigation and drainage systems involves routine inspection, cleaning, testing, and calibration to ensure proper water distribution and drainage performance. It keeps components such as sprinklers, drippers, pumps, valves, and drains functioning efficiently.

Why It Is Compulsory?

Continuous exposure to pressure, soil, debris, and water impurities causes clogging, wear, and reduced efficiency. Maintenance prevents breakdowns, water waste, uneven irrigation, and drainage failure.

Risks of No Maintenance

Neglect leads to pressure loss, blocked drains, waterlogging, plant stress, equipment damage, higher operating costs, and potential structural issues in landscapes and buildings.

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