

Lombardo Associates, Inc.
Representative Project Descriptions

Sustainable Water Management

- Roof Runoff Reuse
- Green Roofs

Environmental Engineers/Consultants

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Water Sustainability

Wastewater Reuse, Rain Water Harvesting & Green Roofs

Wastewater Reuse

What is “Wastewater Reuse”? The use of treated gray water or total wastewater effluent for beneficial nonpotable purposes such as toilet flushing, irrigation, cooling tower make-up, industrial processes, dust control, etc.

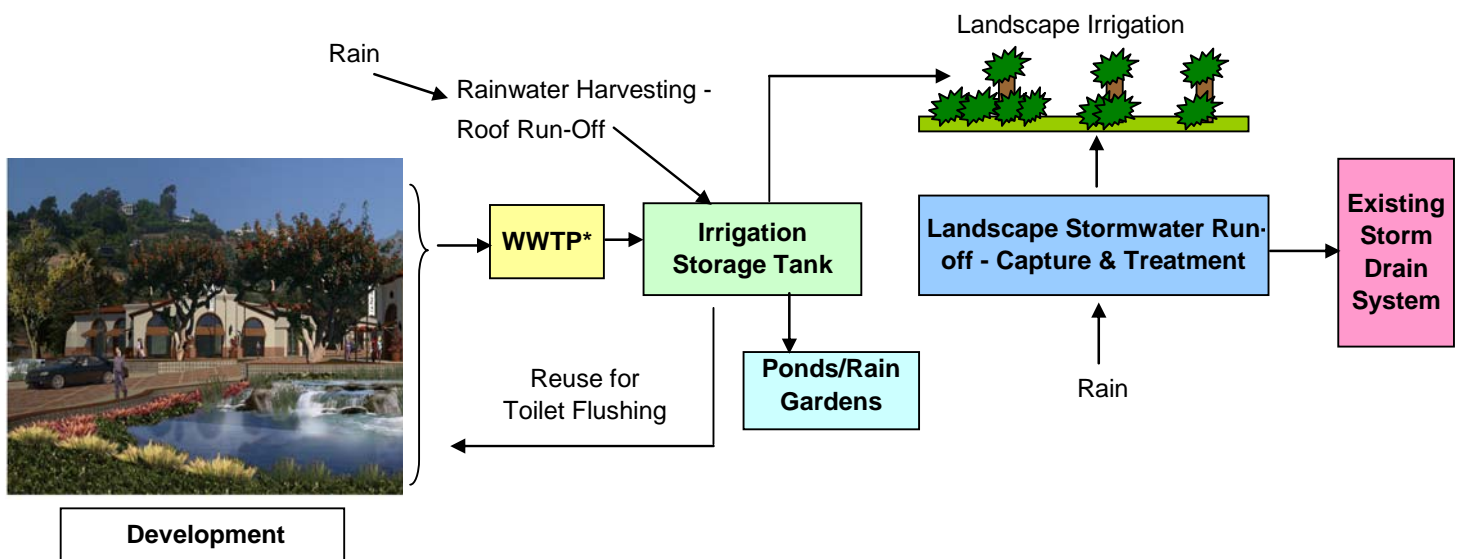
Wastewater reuse can be grouped into the following categories:

- **In-Building**— toilet flushing, cooling tower make-up water and fire protection.
- **Landscape Irrigation**— commercial, residential and public places
- **Industrial reuse**— process or makeup/cooling tower water.
- **Agricultural reuse**— irrigation of nonfood crops, such as fodder and fiber, commercial nurseries, and pasture lands. High-quality reclaimed water is used to irrigate food crops.
- **Recreational impoundments**— such as ponds and lakes.
- **Environmental reuse**— creating artificial wetlands, enhancing natural wetlands, and sustaining stream flows.

BENEFITS OF REUSE

- **Guaranteed water supply—even in times of drought when potable use is restricted;**
- **Treated wastewater has nutrients and will reduce costs of fertilizer;**
- **Will reduce or eliminate effluent discharge**

Sustainable, Integrated Water Process Flow Diagram



*WWTP - Wastewater Treatment Plant

Rain Water Harvesting

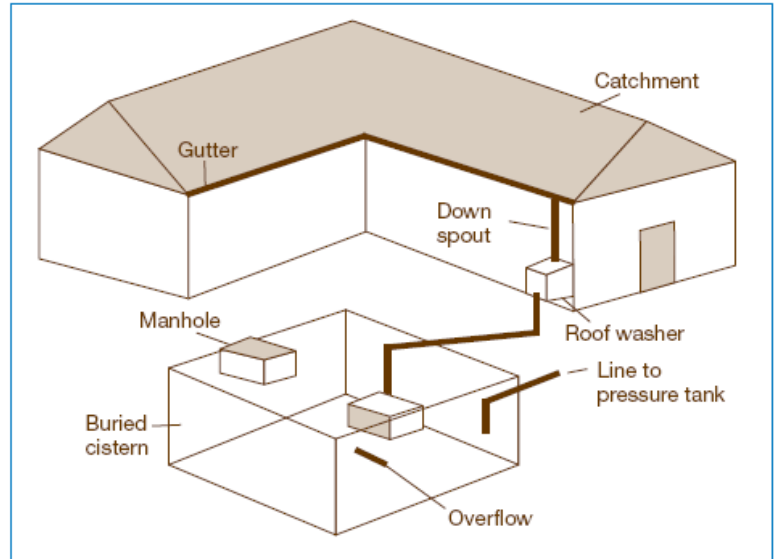
What is “Rainwater Harvesting”? Rainwater harvesting is an innovative alternative water supply which captures and stores rainwater for later use.

Captured rainwater is used for toilet flushing, landscaping, and other non-potable purposes. Although rainwater is relatively clean and the quality is usually acceptable for many purposes, filtration and disinfection is usually appropriate.

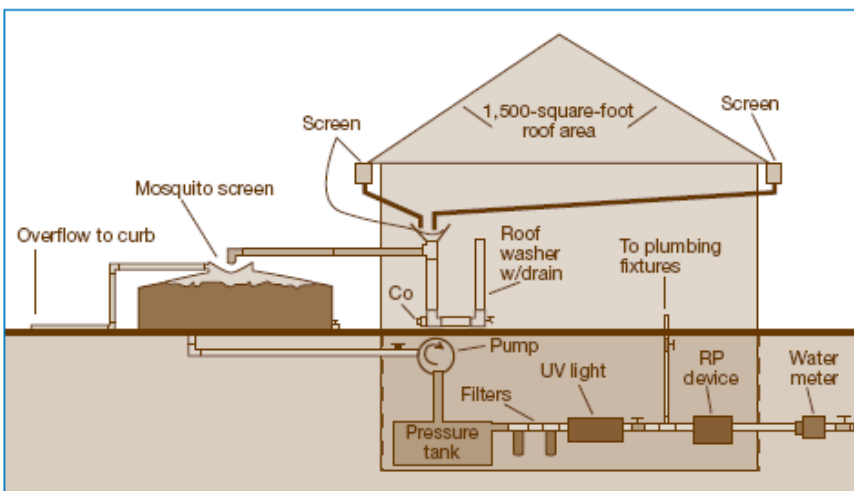
Implementing rainwater harvesting techniques provides direct benefits by reducing:

- demand on the water supply
- run-off, erosion
- contamination of surface water

Rainwater may also be filtered and dispersed for groundwater recharge.



Rainwater Harvesting with an Underground Storage Tank



Example of a Small Home using Rainwater for Reuse

- Rainwater harvesting systems can provide water at or near the point where water is needed or used.
- Sizing of system dependent on rainfall patterns and non-potable water demand



Rainwater Treatment Equipment

Rainwater harvesting in urban areas can have multiple reasons:

- Provides supplemental water for the building requirement
- Mitigates flooding and Combined Sewer Overflows (CSOs)

Green Roofs

What is a “Green Roof”? A Green Roof is the roof of a building that is either partially or completely covered in vegetation and/or soil. They can either be:

- Extensive—Lightweight roofs, utilizing soil depths of 2-6 inches, with small vegetation
- Intensive—Heavy roofs, designed with increased soil depths and larger vegetation



Why Green Roofs? Green roof technologies not only provide the owners of buildings with a proven return on investment, but also represent opportunities for significant social, economic and environmental benefits for the general public.

Public Benefits

- **Improved Air Quality & Temperature Regulation-** A green roof will not only absorb heat, decreasing the tendency towards thermal air movement, but will also filter the air moving across it.
- **Stormwater Retention & Water Filtration-** Green roofs not only retain the rainwater, but also moderate the temperature of the water and act as natural filters for any of the water that happens to run off

Private Benefits

- **Cost savings opportunities for the building owner**
 - Protection of roof membrane resulting in a longer material lifespan
 - Savings on energy heating and cooling costs-potential to reduce the size of HVAC equipment on new or retrofitted buildings (capital and operational savings).
 - Potential to reduce the amount of standard insulation used and incorporate cooling and/or water treatment functions.
 - Potential to meet regulatory requirements for stormwater management & reduce/eliminate roof drains.
- **Sound Insulation-** Soil, plants and the trapped layer of air can be used for sound insulation.
- **Public Policy benefits/incentives-** Green roofs can facilitate a significant improvement in the LEED™ rating of a building, contributing as many as 15 credits under the system, depending on design and level of integration with other building systems



Examples of Sustainable Water Projects

La Paz Development, Malibu, CA Water Reuse – No Discharge System

Design Flow: 28,000 gpd

- 11 Commercial Buildings
- 2 Restaurants (175 seats/each)
- New City Hall

No Wastewater Discharge is achieved by:

- In-Building Reuse – Toilet Flushing
- Landscape Irrigation

Water use reduction of 60% will be achieved.



With Water Reuse & Rainwater Harvesting:
Potable Water Demand reduced **60%** for La Paz
and **63%** for Sycamore Village.

Sycamore Villages, Malibu, CA Rainwater Harvest & Water Reuse – No Discharge System

The development consists of a combination of 65,000 square feet of office and retail space and restaurants with 300 seats.

The system will use roof runoff and treated wastewater for toilet flushing and landscape irrigation. Water use will be reduced by 63%.



Malibu Sycamore Village

MIT, Cambridge, MA Rainfall Harvest Campus-Wide Water Reuse & Conservation Plan

- Water conservation and reuse projects were developed to reduce up to 80% of MIT's non-potable water demand, including cooling tower make-up for on-site power plant.
- A result of these projects would be to reduce the demand on the Cambridge, MA water supply system and have a simple payback of <10 years.

Water reuse of approximately 110,000 gpd was readily feasible, resulting in an annual water/sewer savings of \$ 340,000

Kentucky Horse Farm Rainwater Harvesting

- Covered arena with roof area of 112,500 sf.
- Reuse for the April – Oct period for irrigation & dust control
- 40,000 gallon storage tank
- Filtration and UV disinfection with pumps for pressure discharge to tanker truck and irrigation system

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