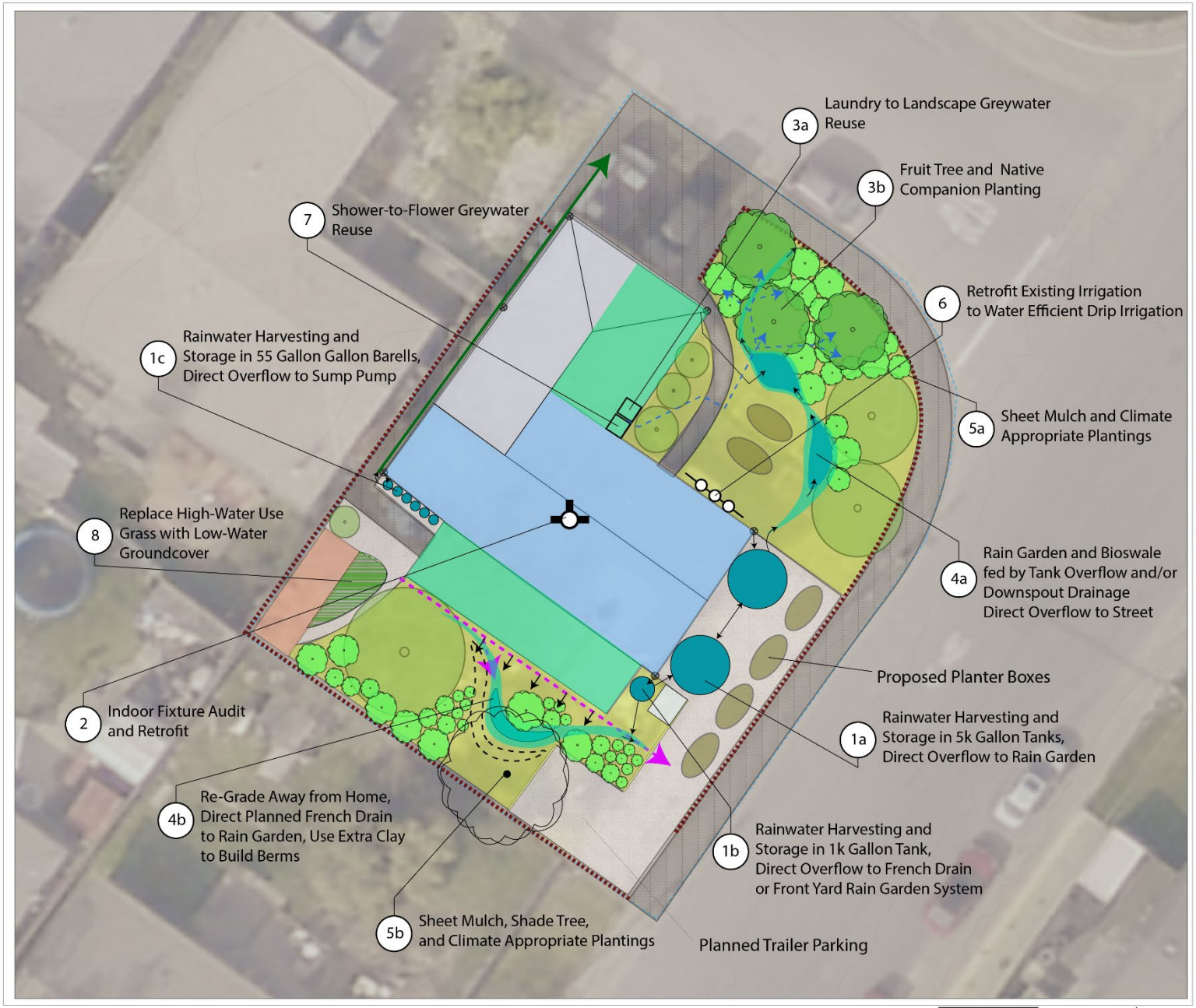
# Petaluma River Watershed - Land Resilience Partnership
# Catalog of Projects

The Land Resilience Partnership (LRP) is helping Petaluma residents build neighborhood climate and drought resilience through the design and/or installation support of water-saving landscape projects. Once installed, these projects will provide many benefits for our city including water use reduction, fire resilience, flood mitigation, carbon sequestration, and the development of habitat and shade for our community.

This program is funded through a grant from the California Department of Water Resources, and executed by Petaluma-based nonprofit Daily Acts with technical support from Watershed Progressive. Through 2025, Daily Acts will complete 125 Site Assessments to help Petaluma residents identify water-saving projects they could install to increase their long term resilience.

As the recipient of a Site Assessment, below you will find your “Catalog of Projects”, a map identifying potential resilience building projects that can be implemented at your site. You will also find a summary report of the highest priority projects you could choose to implement at your site for the greatest water savings. Finally, you will find a table of quantified water savings for all proposed projects.




Legend

- (E) Structures
- (E) Non-Permeable Hardscape
- (E) Permeable Hardscape
- (E) Downspouts
- (E and Proposed) Planter Boxes
- (E) Trees
- (E) Fence
- (E) Chicken Coop
- (E) Sump Pump
- Sheet Mulch and Climate Appropriate Plantings
- Rainwater Harvesting Catchment Area
- Rain Garden Catchment Area
- Fruit Tree
- Native Perennial Planting
- Shade Tree
- Greywater Reuse
- Rainwater Catchment & Overflow
- Rain Garden and Bioswale
- Berm
- Low Water Use Lawn
- Drip Irrigation Retrofit
- Planned French Drain
- Fixture Audit and Retrofit

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BASEMAP

Not for Construction

## Summary of Catalog Of Projects

The home is positioned near the convergence of Washington and Lynch creek. The large and flat landscape presents abundant opportunity to grow more food, shade, and pollinator habitat while decreasing municipal water demand. This Catalog of Projects (COP) suggests various resilience building opportunities with the highest priority based-upon water conservation and property resilience benefits. The following is a description of the various suggested projects for the site based on our site assessment. More information about designing and implementing the suggested projects can be found in the attached "design templates."

**Priority 1 - Rainwater Harvesting:** Rainwater storage tanks capture rainwater from rooftops for irrigation or other non-potable uses like toilet flushing. Tanks are sited on a level pad and collect water that drains from downspouts directly . Water can be be conveyed via buried pipe if tanks are located away from a downspout. Multiple adjacent tanks can be interconnected, or "Daisy-Chained," so they fill as an interconnected system. All tanks must have a planned overflow route. The COP recommends multiple opportunities for harvesting and storing rainwater:

- 1a: Two 5,000 gallon tanks can be placed in the gravel side yard to harvest rainwater that drains from the two south-east downspouts. The roof area that drains to these two downspouts, or catchment area, drains 11,700 gallons of rainwater annually. While the total storage capacity proposed is 10,000 gallons, a tank in Petaluma may fill and empty 1.5 times thoughout a year. Therefore, we can assume that all 11,700 gallons may be captured and reused to offset water use. When the tank is full, overflow should be directed to the front yard rain garden system discussed in Priority 4.
- 1b: As a lower-cost and more discrete alternative to 1a, a 1,000 gallon tank can be placed in the back-yard to harvest rainwater from the south-east backyard downspout. The catchment area drains about 6,000 gallons of rainwater annually. Considering the tank fills and empties 1.5 times annually, water use can be offset by 1,500 gallon. Overflow for a tank in this location should be directed to the planned french drain.
- 1c: Six 55 gallon blue barrels can be sited and daisy-chained near the house in the backyard to harvest rainwater from the south-west downspout. The roof area drains about 4,800 gallons of water annually. Six barrels that are filled and emptied 1.5 times annually can offset almost 500 gallons of water use. Overflow should be directed to the existing sump pump.

Increased on-site water storage can be used to offset 100% of the irrigation demand associated with new perennial plantings and garden boxes, although rainwater should not be used on leafy greens. See the attached *Rainwater Harvesting Design Template* for more information.

**Priority 2 – Indoor Fixture Audit and Retrofit:** To maximize water savings, retrofits to low-flow indoor fixtures are recommended. The City of Petaluma offers free shower heads, faucet aerators, hose nozzles, toilet leak detection tabs, and pre-rinse spray valves to reduce indoor water usage. Furthermore, the City of Petaluma offers up to $150 for high-efficiency toilet upgrades and $75 for high-efficiency clothes washers. Reducing indoor water usage has the potential to save about 18,000 gallons per year. Learn more at https://cityofpetaluma.org/water-conservation/.

**Priority 3 – Laundry to Landscape Greywater Reuse:** Water used in the laundry machine can be reused in the frontyard to establish and irrigate new fruit trees and companion plants. PVC will bring water from the washing machine to the landscape and must be buried below the concrete pathway to convey water to mulch basins near new plantings. Water from the laundry machine has the potential to offset irrigation demand by up to 1,900 gallons/year which is 15% of the total outdoor water demand of all proposed projects. Furthermore, the City of Petaluma offers a $125 rebate for material associated with a laundry to landcape systems. Learn more at https://cityofpetaluma.org/greywater-system-rebate/. See the *Laundry to Landscape Design Template* for more information.

**Priority 4 – Rain Gardens:** Rain gardens are a strategy of rainwater harvesting that stores water in the landscape to provide passive irrigation. Rain gardens are intentional basins or depression in the landscape where water slows and sinks into the landscape. Backfilled with well-draining soil, rain gardens are planted with water-loving plants that help water seep to the groundwater. All rain gardens must have a planned overflow at its lowest point.

- 4a: A multi-tiered rain garden system can capture water that drains from two front-yard downspouts. In a high intensity storm (85% percentile design storm), these two downspouts will drain 427 gallons of stormwater. The middle downspout must be diverted under the concrete pathway to be held by the landscape. The drawn rain gardens are large enough to hold over 1000 gallons of stormwater before overflowing to the street. Adjacent plantings will benefit from increased soil saturation.
- 4b: The backyard rain garden and bioswale system is designed to harvest sheet flow and decrease inputs to the french drain. By re-grading the landscape to slightly slope away from the house (at least 1/8$^{th}$ inch per foot), water will be directed to a bioswale and rain garden system planted with water-loving riparian plants. A berm can be built with excess clay to hold and direct collected water back toward the french drain.

water-loving riparian plants. A berm can be built with excess clay to hold and direct collected water back toward the french drain.

Directing run-off to rain gardens keeps stormwater on-site which benefits overall watershed health. Stormwater run-off impairs watersheds by transporting pollutants from roads to waterways. Rain gardens not only reduce run-off and filter water before it overflows to stormdrains, but also increase water conservation by maintaining soil moisture for longer. Supplemental drip irrigation is recommended during the dry season. See the *Rain Garden Design Template* for more information.

**Priority 5 – Sheet Mulch and Climate Appropriate Planting:** Currently much of the landscape is exposed soil with seasonal non-native weeds. Sheet mulching is a weed suppression and soil health technique that composts weeds in place, while building soil and an optimal environment to plant perennials. By covering the soil and planting native climate appropriate plants, habitat for local birds and insects are supported while enhancing aesthetic beauty. Additionally, water retention in soil is greatly increased through mulching; up to 30% more stormwater can be held through the application of 4-6" of mulch on the landscape. Enhanced water retention and decreased erosion builds soil health and increases the soil carbon sponge. Refer to the *Mulching* and *Climate Appropriate Planting Design Templates* for more information.

**Priority 6 – Drip Irrigation Retrofit:** Currently, there exists a defunct irrigation manifold at the front of the house with valves attatched to retired sprinklers. This system should be retrofitted to install drip irrigation for garden beds, low-water use plantings, and trees. Drip irrigation systems are controlled by an irrigation timer that can be programmed to deliver each zone exactly the amount of water needed seasonally. The Model Water Efficient Landscaping Ordinance (MWELO) recommends the use of inline drip tubing placed in a grid throughout a planting area to maximize efficient distribution.

**Priority 7 – Shower to Flower Greywater Reuse:** Shower water is considered greywater that can be re-used to irrigate plants in the landscapes. By intercepting draining water and diverting it to an outlet in the landscape, water loving plants can be well nourished. A shower to flower system has the potential to reuse 24,000 gallons of water to irrigate fruit trees and other plantings. Shower to flower systems are legal in Petaluma, but unlike Laundry to Landscape, require a permit since alterations to plumbing are involved.

**Priority 8 – Low Water Use Lawn:** The Catalog of Projects recommends replacing the small patch of backyard lawn with a low-water use ground cover alternative. Drought tolerant groundcovers that can withstand foot traffic to be used in place of conventional high water use grasses include Dwarf Pink Yarrow, Dwarf Carpet of Stars, Dwarf White Clover, Wooly Yarrow, and Creeping Thyme. Each of the species listed can be used to replace the small backyard lawn while preserving a walkable space and conserving water.

By harvesting rainwater, reusing greywater, and increasing landscape stormwater retention, outdoor municipal water demand can be completely offset while increasing food production and pollinator habitat. For further questions about the designs and projects please email morgan@dailyacts.org and be sure to check out the resources provided for more technical information about installation of the water-wise practices proposed.

## Existing Conditions vs Proposed Conditions

Approximated using GeoDesign by Watershed Progressive

| | Total Site Water Demand (Gal/Yr) | Indoor Water Demand (Gal/Yr) | Outdoor Water Demand (Gal/Yr) |
|---|---|---|---|
| Existing Conditions | 54,710 | 51,202 | 3,510 |
| Proposed Conditions | 45,390 | 33,275 | 12,110 |
| | Rainwater Harvesting Potential (Gal/Yr) | Rainwater Harvesting Storage Capacity (Gal) | Laundry to Landscape Greywater Reuse (Gal/Yr) |
| Existing Conditions | 11,490 | 0 | 0 |
| Proposed Conditions | 11,490 | 11,330 | 1,900 |
| | Shower to Flower Greywater Reuse (Gal/Yr) | Municipal Water Demand for Outdoor Use (Gal/Yr) | Stormwater Infiltration (Gal/Year) |
| Existing Conditions | 0 | 3,510 | 0 |
| Proposed Conditions | 24,00 | 0 | 3,030 |

**Thank you for your interest in the Land Resilience Partnership and water conservation. Together we can create a beautiful and climate resilient Petaluma by implementing practices and solutions throughout our community. Our relationship to the land matters, and by shifting our spaces to better align with nature and environmental needs, we can take steps towards health and resilience in the community in the midst of climate change.**