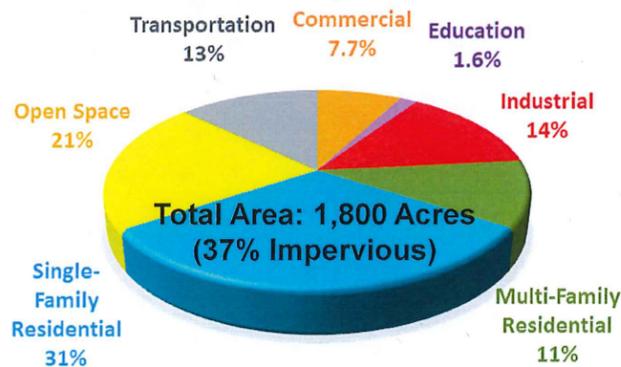


**Legend**

- Waterbody
- Storm Drain
- Project Drainage Area
- Project Footprint
- Parcel Boundary
- City

**Project Drainage Area**



**Project Overview**

Parcel Ownership	City of Redding
APN	116180006000, 117070028000
Soil Type	Hydrologic Soil Group C
Watershed	Churn Creek-Sacramento River
Receiving Water	Boulder Creek
Groundwater Basin	Enterprise

Note: Proposed project is conceptual and subject to change based on future feasibility assessment, funding availability, and/or other information.

**Project Description**

This project plans to revitalize existing infrastructure to allow for water quality treatment, groundwater recharge, and flood management through a series of natural treatment systems, possibly including: infiltration basins, treatment wetlands, bioretention basins, etc. The abandoned sewer ponds are located adjacent to Boulder Creek, which is a salmonid stream and receives significant runoff from areas considered high priority for trash and pollution control. Water will be diverted from Boulder Creek just after it crosses under the I-5 freeway and flow through the treatment system before flowing back into Boulder Creek. The upper basin will be expanded and include a pretreatment area while the lower basin will retain its current footprint. Vegetation, walking paths, and interpretive signage will be incorporated.

**Potential Site Constraints:**

The basin area should be inspected prior to finalizing the project design to confirm no protected species are present. Also necessary ecological instream flows within Boulder Creek along the project location should be confirmed to assist with the design of the project. Numerous permits/agency coordination may be needed to implement the project (RWQCB, CDFW, Army Corps, County Flood Control, Caltrans, etc). A site survey should be conducted to confirm local elevations, infiltration rate, and groundwater elevations.

**Example Natural Treatment System in Construction**



**Former Sewer Ponds  
Natural Treatment System  
Project Concept**  
City of Redding  
Stormwater Resource Plan



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Figure  
**1**



**Legend**

- Waterbody
- Storm Drain
- Flow Diversion
- BMP Footprint
- Parcel Boundary
- Direction of Flow

**Project Design Information**

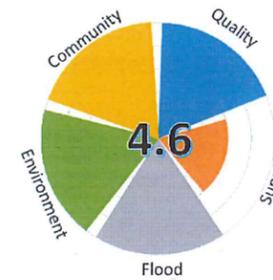
BMP Type	Natural Treatment System
Total Project Footprint	13 acres (includes 3.3 acres pretreatment)
Depth	3-9 ft (includes 1 ft freeboard)
Storage Volume	41 ac-ft
Assumed Infiltration Rate	0.32 in/hr
Stormwater Source	Boulder Creek

Note: Proposed project is conceptual and subject to change based on future feasibility assessment, funding availability, and/or other information.

**Project Benefits**

All benefits are expressed as an average annual estimate based on historical modeling.

**Overall Multi-Benefit Score**  
Highest possible score is a 5



**Water Quality:**

Pollutant load reductions from drainage area

	Reduced	Remaining
TSS (lbs)	280,000	
NO3 (lbs)	2,100	
Dissolved Cu (lbs)	29	
Fecal Coliform (MPN)	1.2E+14	

**Environmental Enhancements:** Restored vegetation will include native species increasing habitat for animals of interest.



**Flood Management:** 920 acre-feet (38%) of the annual runoff volume and 89% of the volume generated from an 85th percentile 24-hr storm will be captured and slowly released back into Boulder Creek, likely reducing the frequency and intensity of flood events downstream.



**Community Enhancements:** This project is located along the proposed Boulder Creek Trail. Signage to educate the public about the project's multiple benefits, and native vegetation and landscaping will improve the aesthetics of the parcel while providing recreational opportunities.

**Water Supply:** 260 acre-feet will be recharged annually, which is equivalent to the supply for 640 households.

**Volume Capture Analysis**

	85 <sup>th</sup> Percentile, 24-hr Storm	Average Annual
Precipitation (in)	0.91	37.5
Runoff Volume (ac-ft)	59	2,400
Percent of Runoff Volume Captured (%)	89	38
Total Volume Captured (ac-ft)	53	920

**Former Sewer Ponds  
Natural Treatment System  
Project Concept**

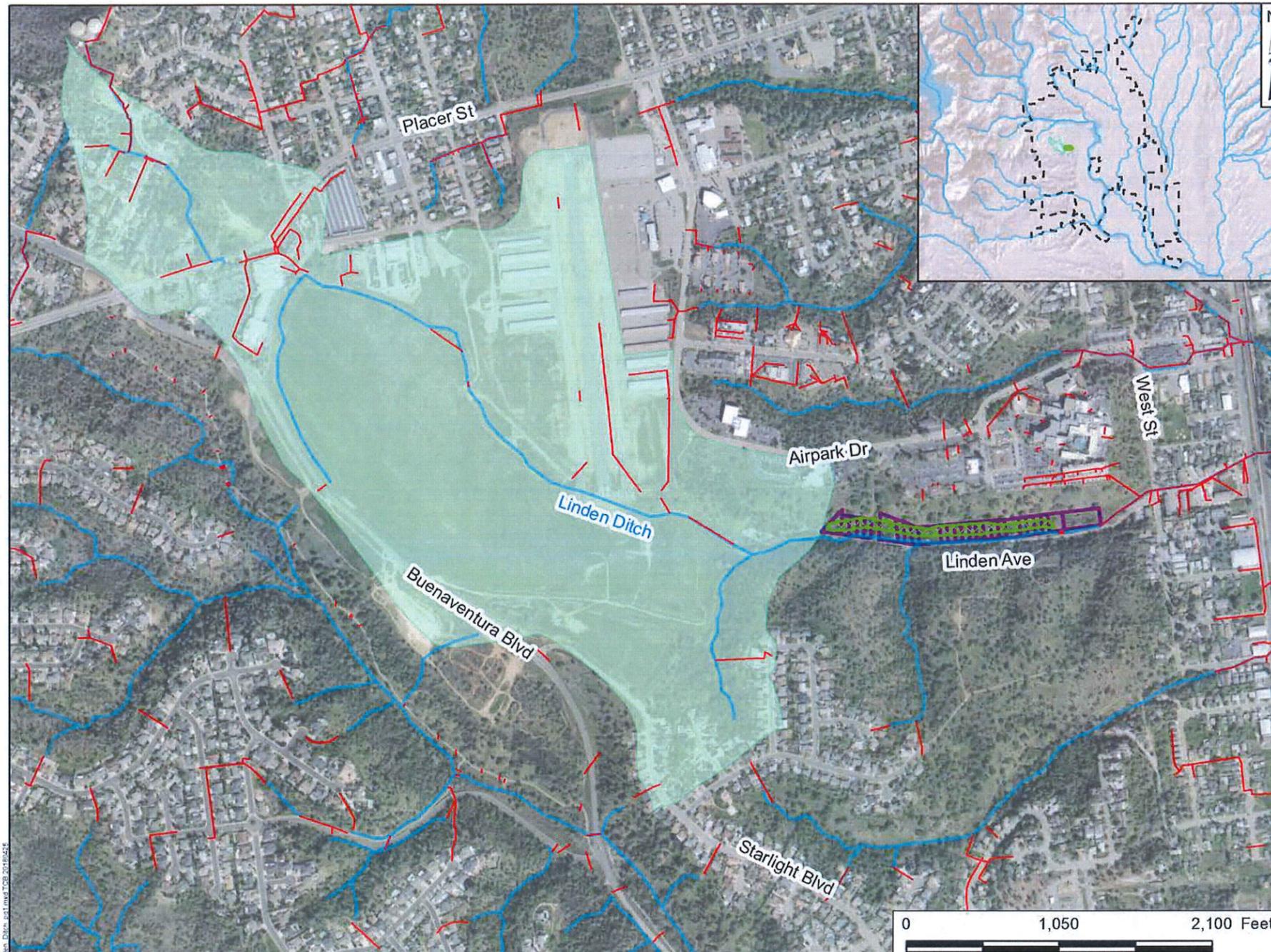
City of Redding  
Stormwater Resource Plan

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consultants

Figure  
2

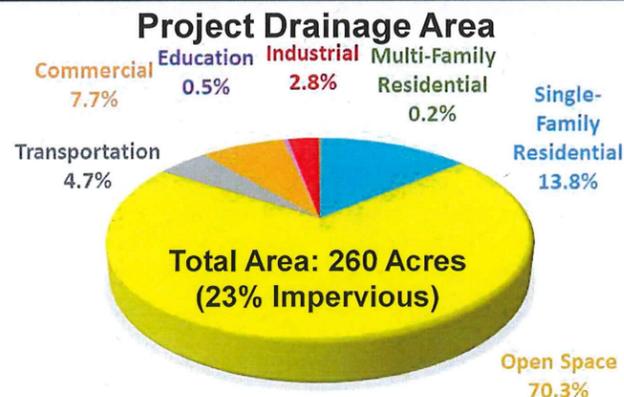
Santa Barbara

April 2018



**Legend**

- Waterbody
- Storm Drain
- Project Drainage Area
- Project Footprint
- Parcel Boundary
- City



**Project Overview**

Parcel Ownership	City of Redding
APN	26 city owned parcels
Soil Type	Hydrologic Soil Group A
Watershed	Churn Creek-Sacramento River
Receiving Water	Linden Ditch
Groundwater Basin	Anderson

**Project Description**

This project plans to improve water quality, reduce flows in Linden Ditch, and recharge groundwater by building an offline infiltration system adjacent to the current flow path. Water will be diverted from Linden Ditch approximately where it meets Linden Avenue and directed into the elongated infiltration basin before flowing back into Linden Ditch upstream of West Street. The basin will be located exclusively on city owned parcels and include a pretreatment area. Vegetation, walking paths, and interpretive signage will be incorporated.

**Potential Site Constraints:**

Vegetation and animals in the basin area should be assessed by a qualified biologist prior to finalizing the project design to confirm no protected species are present. Additional permitting may be required for vegetation removal and constructing a diversion from the creek (RWQCB, CDFW, Army Corps, County Flood Control, etc). A site survey should be conducted to confirm local elevations and infiltration rate.

**Location of Proposed Infiltration System**



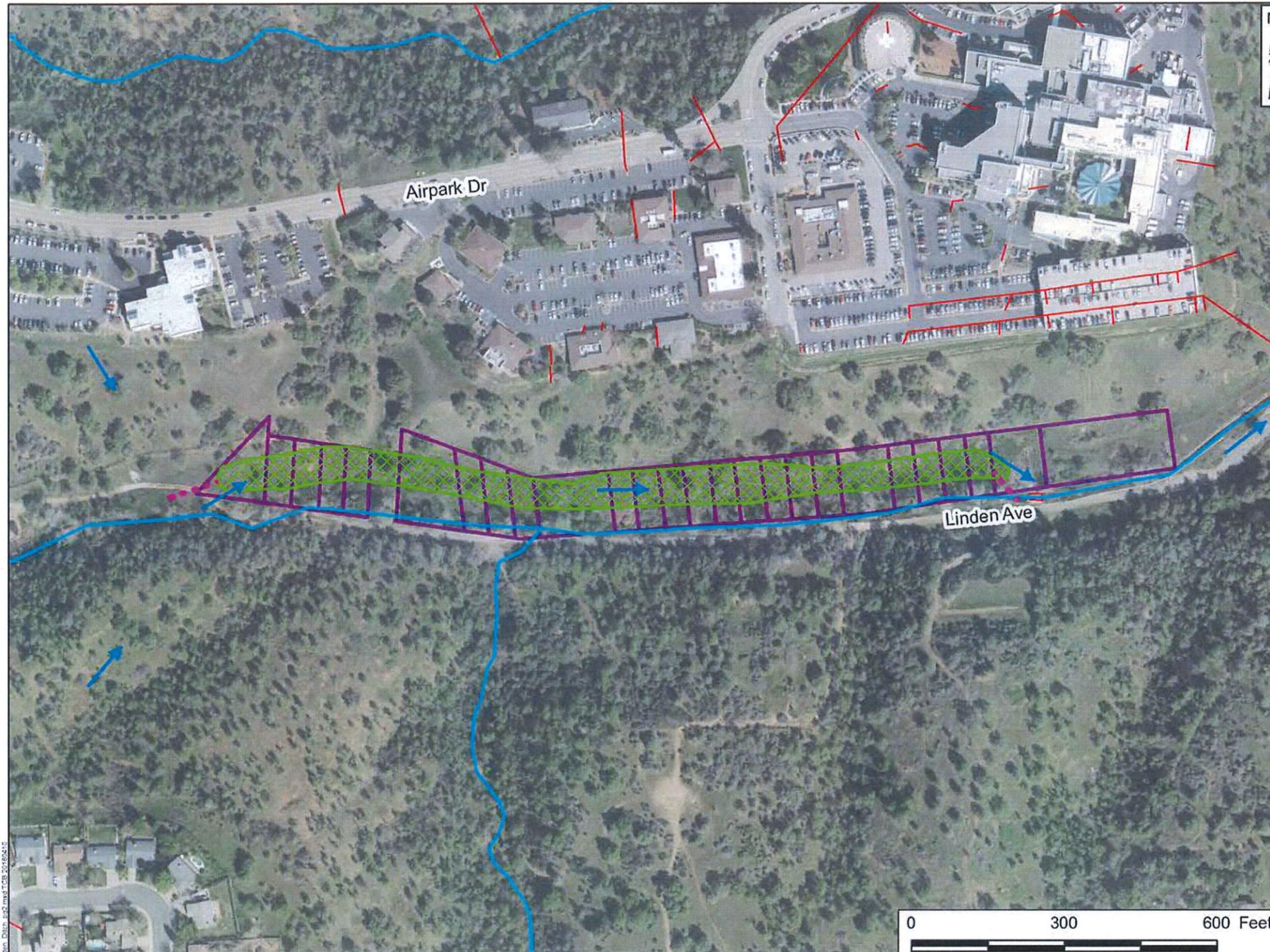
**Linden Ditch Infiltration System Project Concept**

City of Redding  
Stormwater Resource Plan



Figure 3

Note: Proposed project is conceptual and subject to change based on future feasibility assessment, funding availability, and/or other information.



**Legend**

- Waterbody
- Storm Drain
- Flow Diversion
- BMP Footprint
- Parcel Boundary
- Direction of Flow

**Project Design Information**

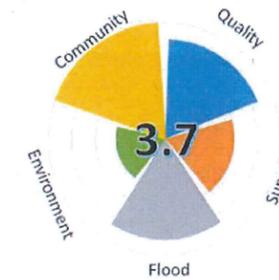
BMP Type	Infiltration System
Total Project Footprint	1.7 acres (includes 0.43 acre pretreatment)
Depth	7 ft (including 1 ft freeboard)
Storage Volume	7.6 ac-ft
Assumed Infiltration Rate	1.5 in/hr
Stormwater Source	Linden Ditch

Note: Proposed project is conceptual and subject to change based on future feasibility assessment, funding availability, and/or other information.

## Project Benefits

All benefits are expressed as an average annual estimate based on historical long-term modeling.

**Overall Multi-Benefit Score**  
Highest possible score is a 5

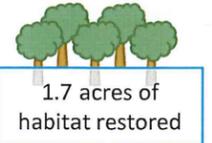


### Water Quality:

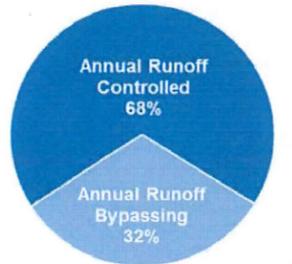
Pollutant load reductions from drainage area

	Reduced	Remaining
TSS (lbs)	77,000	
NO3 (lbs)	440	
Dissolved Cu (lbs)	2.9	
Fecal Coliform (MPN)	9.4E+12	

**Environmental Enhancements:** Infiltrated water will enhance the greenspace and promote nearby vegetation, increasing the habitat value. Existing invasive species will be removed.



**Flood Management:** 170 acre-feet (68%) of the average annual runoff volume will be removed from flowing through the concrete channelized portion of Linden Ditch which runs through the city. All of the volume generated from an 85th percentile 24-hr storm will be captured and infiltrated.



**Community Enhancements:** Signage to educate the public about the project's multiple benefits, and native vegetation and landscaping will improve the aesthetics of the parcel.

**Water Supply:** 110 acre-feet will be recharged annually, which is equivalent to the supply for 270 households.

## Volume Capture Analysis

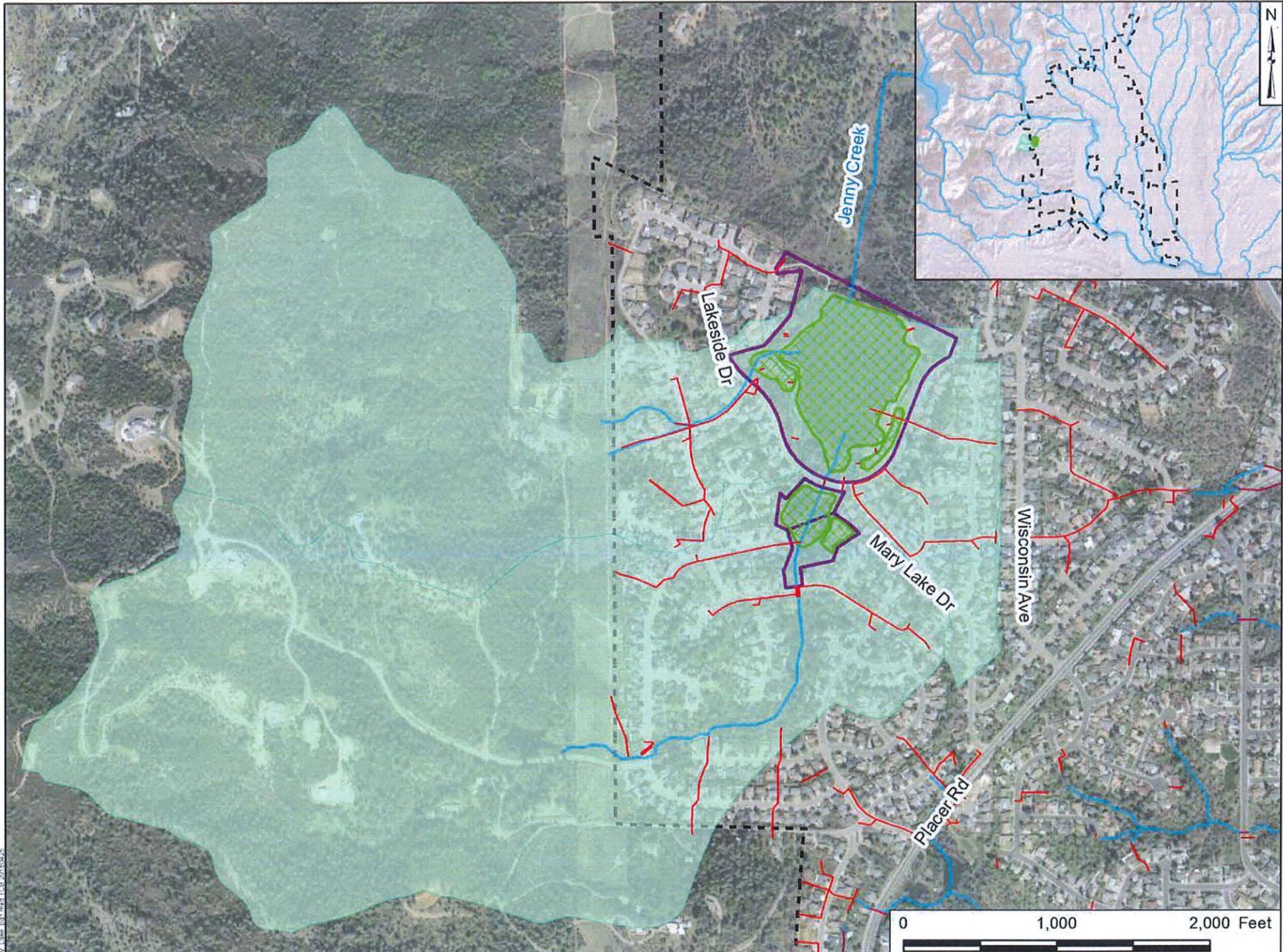
	85 <sup>th</sup> Percentile, 24-hr Storm	Long-Term Average Annual
Precipitation (in)	0.91	37.5
Runoff Volume (ac-ft)	5.9	250
Percent of Runoff Volume Captured (%)	100	68
Total Volume Captured (ac-ft)	5.9	170

**Linden Ditch  
Infiltration System Project Concept**

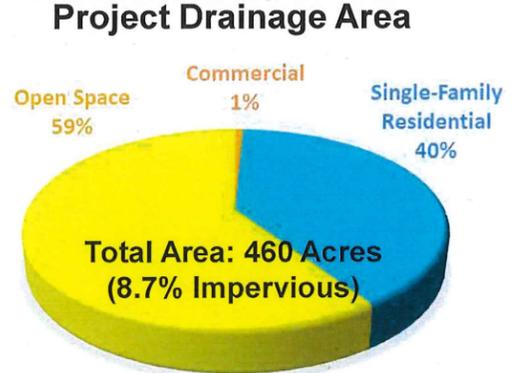
City of Redding  
Stormwater Resource Plan

Figure 4

Santa Barbara	April 2018
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- Legend**
- Waterbody
  - Storm Drain
  - Project Drainage Area
  - Project Footprint
  - Parcel Boundary
  - City



**Project Overview**

Parcel Ownership	City of Redding
APN	204350040000, 204560040000, 204330030000
Soil Type	Hydrologic Soil Group C
Watershed	Churn Creek-Sacramento River
Receiving Water	Jenny Creek
Groundwater Basin	Outside of Anderson

Note: Proposed project is conceptual and subject to change based on future feasibility assessment, funding availability, and/or other information.

**Project Description**

This project plans to improve water quality in Mary lake by enhancing the existing wet detention basin above Mary Lake to allow for increased water quality treatment and storage capacity. The enhancements may include reconfiguration of the flow path, increased berm height at the downstream end, sediment removal, and native habitat restoration. Flow into Mary Lake will be controlled by adding an adjustable weir or orifice at the low point of the upper basin. A storage tank is also proposed adjacent to the upper basin to capture peak flows from winter storms for release during the dry months to maintain lake levels and reduce eutrophication. Natural treatment systems will be constructed at the western and eastern sides of Mary Lake to treat additional runoff from the surrounding community. Dredging of Mary Lake will support increased capacity and removal of legacy nutrient-rich sediments.

**Potential Site Constraints:**

Vegetation and animals in the basin area should be assessed by a qualified biologist prior to finalizing the project design to confirm whether protected species are present. A site survey should be conducted to confirm local elevations. Additionally, numerous permits may be needed to implement this project (RWQCB, CDFW, Army Corps, County Flood Control, etc).

**Location of Existing Wet Detention Basin**



**Mary Lake Lake Restoration Project Concept**

City of Redding  
Stormwater Resource Plan

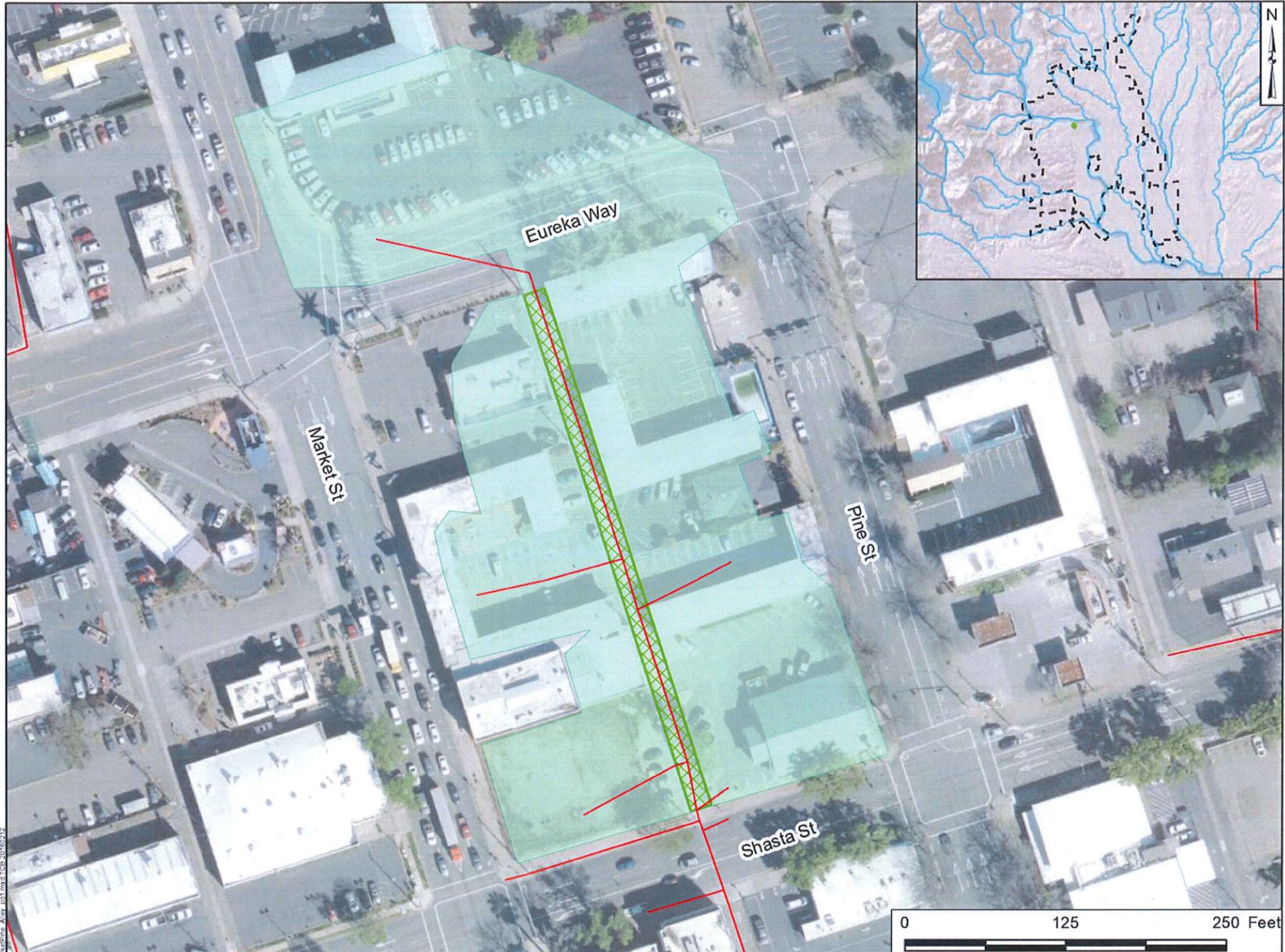


Santa Barbara

April 2018

Figure 5





### Project Description

This project plans to turn the alley between Market and Pine Street in downtown Redding into a green pedestrian corridor by replacing the existing surface with permeable pavement and rain gardens with an underdrain system. The stormwater will be collected from the busy area near Eureka Way via the existing storm drains and surface runoff. Permeable pavement and rain gardens will reduce the amount of ponding in the alley and provide water quality treatment by allowing the stormwater runoff to percolate into the underdrain system. Community enhancements may also include murals, design of pavers/ground treatments, wayfinding, etc.

### Potential Site Constraints:

Business owners on either side of the alley should be coordinated with during planning and construction stages since they alley provides access to some parking areas. Percolation testing should be conducted to confirm assumed infiltration rates and a site survey to confirm elevations and evaluate subsurface utilities that may need to be relocated.

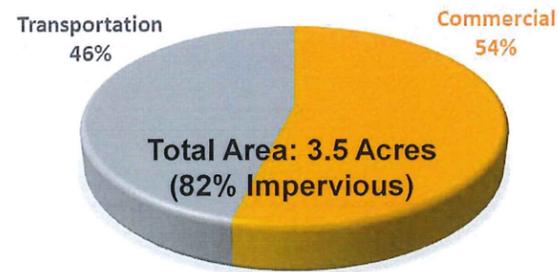
### Location of Proposed Green Street



### Legend

- Waterbody
- Storm Drain
- Project Drainage Area
- Project Footprint
- Parcel Boundary
- City

### Project Drainage Area



### Project Overview

Parcel Ownership	City of Redding
APN	N/A
Soil Type	Hydrologic Soil Group C
Watershed	Churn Creek-Sacramento River
Receiving Water	Sacramento River
Groundwater Basin	Anderson

Note: Proposed project is conceptual and subject to change based on future feasibility assessment, funding availability, and/or other information.

## Market-Pine Alley Green Street Project Concept

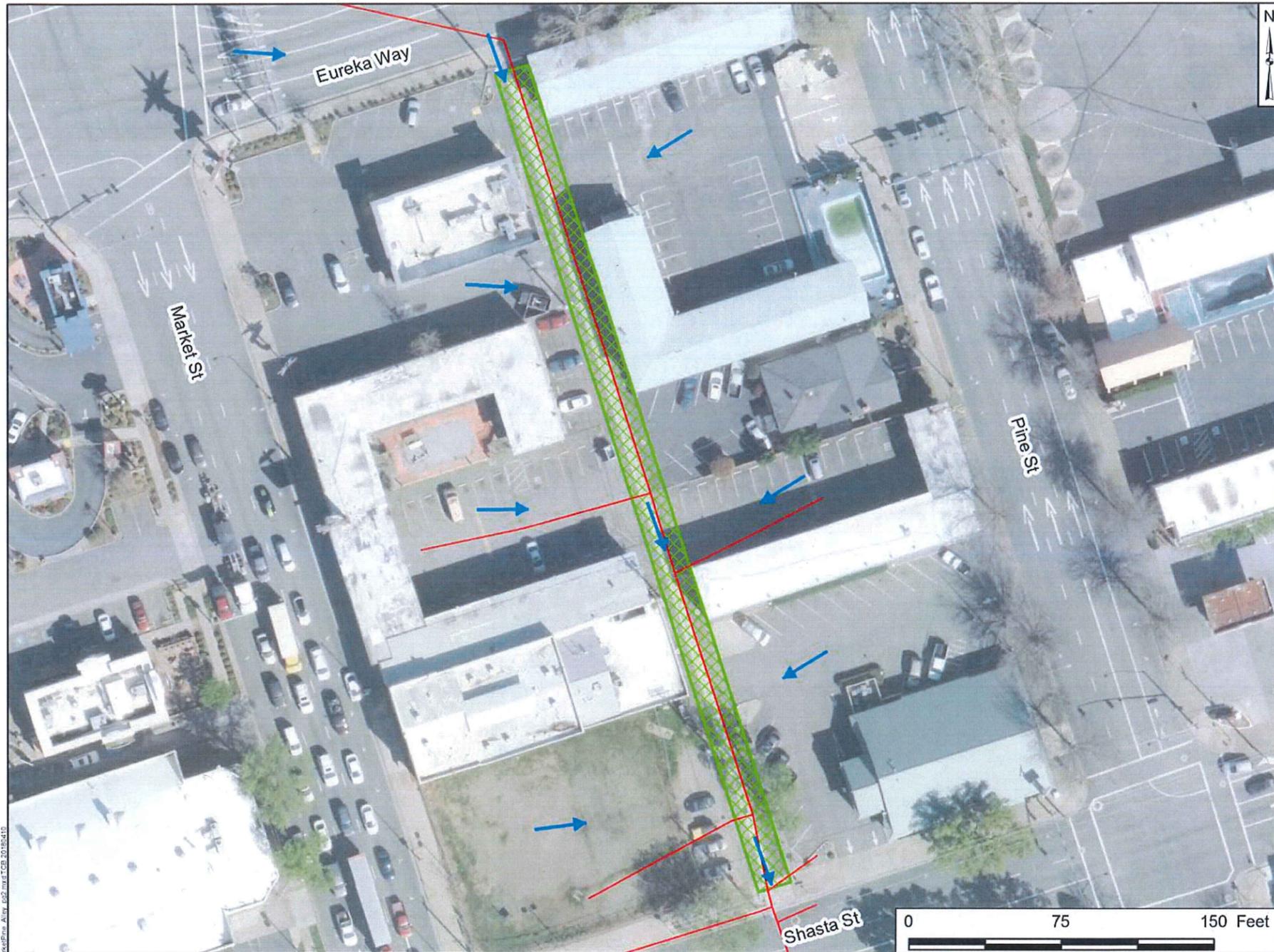
City of Redding  
Stormwater Resource Plan



Figure 7

Santa Barbara

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**Legend**

- Waterbody
- BMP Footprint
- Storm Drain
- Parcel Boundary
- Flow Diversion
- Direction of Flow

**Project Design Information**

BMP Type	Green Street
Total Project Footprint	0.16 acres (includes 0.041 acre pretreatment)
Depth	2.3 ft
Storage Volume	0.14 ac-ft
Assumed Infiltration Rate	0.32 in/hr
Stormwater Source	Surface Runoff

Note: Proposed project is conceptual and subject to change based on future feasibility assessment, funding availability, and/or other information.

**Project Benefits**

All benefits are expressed as an average annual estimate based on historical modeling.

**Overall Multi-Benefit Score**  
Highest possible score is a 5

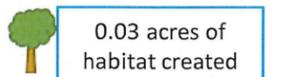


**Water Quality:**

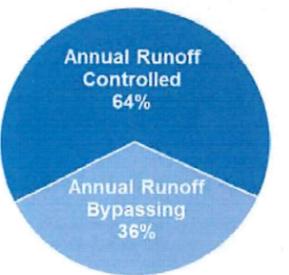
Pollutant load reductions from drainage area

	Reduced	Remaining
TSS (lbs)	1,300	
NO3 (lbs)	9.0	
Dissolved Cu (lbs)	0.30	
Fecal Coliform (MPN)	2.8E+11	

**Environmental Enhancements:** The urban greening will create opportunities for the planting of native vegetation and habitat for pollinators and other species of interest.



**Flood Management:** 5.6 acre-feet (64%) of the average annual runoff volume will be removed annually from the stormdrain system. About half of the volume generated from an 85th percentile 24-hr storm will be captured and infiltrated.



**Community Enhancements:** Signage to educate the public about the project's multiple benefits, and native vegetation and landscaping will improve the aesthetics of the alley.

**Water Supply:** 2.1 acre-feet will be recharged annually, which is equivalent to the supply for 5 households.

**Volume Capture Analysis**

	85 <sup>th</sup> Percentile, 24-hr Storm	Long-Term Average Annual
Precipitation (in)	0.91	37.5
Runoff Volume (ac-ft)	0.21	8.7
Percent of Runoff Volume Captured (%)	48	64
Total Volume Captured (ac-ft)	0.10	5.6

**Market-Pine Alley  
Green Street Project Concept**

City of Redding  
Stormwater Resource Plan

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Figure  
8

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