

## **CHAPTER 5**

### **SWRP Project Evaluations Quantitative Methods, and Project Ranking/Prioritization**

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This chapter includes the following sections:

- Project Descriptions
- SWRP Project Quantitative Evaluations
- Project Ranking/Prioritization

#### **5.1 PROJECT DESCRIPTIONS**

The draft SWRP Project Descriptions were prepared and published on the City’s SWRP web site for public review by March 16, 2018. A two-week public review period was provided, and the comment period was closed on March 30, 2018. Twenty-two comments were received, and the comments and responses are provided in Appendix 5A. The Project Descriptions were revised and finalized based on the comments. The final Project Descriptions are provided in Appendix 5B.

#### **5.2 SWRP PROJECT QUANTITATIVE EVALUATIONS**

The quantitative method for evaluating the SWRP Projects was described in the City of Chico SWRP — Multiple Benefits Evaluation Methodology Technical Memorandum (dated March 16, 2018). This TM is included as Appendix 5C. Using this methodology, the SWRP Project evaluations are summarized in Table 5-1 and discussed below.

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Table 5-1. SWRP Project Evaluations

Evaluation Criteria	Evaluation Result Units or Rating	Maximum Points Possible (from Table 2 of Weighting Values Letter, 9/7/2017)	16 and 68: Channel Stabilization and Hydrologic Floodplains on Streams		33: Mud and Rock Creek Flood Protection Project		40: Parking Lot 4 Rehabilitation #50019		44: 5 Mile and Lindo Channel Diversion Structures Study		59: Routine Community Creek Clean Up Project		65: Laxson South Bioswale		73: Bidwell Avenue/Grape Way Stormwater Protection and Restoration Project		77: Revised LID and Green Infrastructure Implementation Program for Butte County Schools		85: Chapman Mulberry Rain Garden		G: Storm Water Monitoring for compliance with MS4 permit		I: Trash Reduction Master Plan and Specific Implementation Projects		M: Big Chico Creek 21st Century Management and Implementation Projects		N: Little Chico Creek 21st Century Management Plan and Implementation Projects		O: Comanche Creek Management Program and Implementation Projects		P: Updating the City's Stormwater Planning and Implementation Projects		Q: Teichert Ponds Improvement Project		R: Fair Street Detention Basin Improvement Project						
			Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points					
Water Quality Benefit Category (All projects evaluated)	None, Low, Medium, High	8.80	Medium	5.87	High	8.80	Medium	5.87	Low	2.93	Medium	5.87	Medium	5.87	Medium	5.87	High	8.80	Medium	5.87	Medium	5.87	High	8.80	High	8.80	High	8.80	High	8.80	High	8.80	High	8.80	High	8.80	High	8.80	Medium	5.87	
- Improve Aquatic Organism Health (Bioassessment)	None, Low, Medium, High	8.80	0	0	0	0	Low	2.9	0	0	0	0	Low	2.9	0	0	Low	2.9	Medium	5.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Mercury (303(d) List Pollutant)	lbs/year of sediment (TSS) removed	8.80	0	0	0	0	132.2	0.7	0	0	0	0	324.1	1.8	0	0	1554.0	8.8	25.3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Diuron (303(d) List Pollutant)	None, Medium, High	8.80	0	0	0	0	None	0.0	0	0	0	0	None	0.0	0	0	None	0.0	None	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- DDT (303(d) List Pollutant)	lbs/year of sediment (TSS) removed	8.80	0	0	0	0	132.2	0.7	0	0	0	0	324.1	1.8	0	0	1554.0	8.8	25.3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Dieldrin (303(d) List Pollutant)	lbs/year of sediment (TSS) removed	8.80	0	0	0	0	132.2	0.7	0	0	0	0	324.1	1.8	0	0	1554.0	8.8	25.3	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- PCBs (303(d) List Pollutant)	lb/year of PCBs removed	8.80	0	0	0	0	4.1E-05	0.7	0	0	0	0	1.0E-04	1.8	0	0	4.8E-04	8.8	7.8E-06	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Chlorpyrifos (MS4 Pollutant)	None, Low, Medium, High	8.80	0	0	0	0	None	0.0	0	0	0	0	None	0.0	0	0	None	0.0	None	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Diazinon (MS4 Pollutant)	None, Low, Medium, High	8.80	0	0	0	0	None	0.0	0	0	0	0	None	0.0	0	0	None	0.0	None	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Trash	lbs/year of trash removed	8.80	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0.0	0	0.0	0	0	1099	1.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Sediment	lbs/year of sediment (TSS) removed	8.30	0	0	0	0	132.24	0.7	0	0	0	0	324.07	1.7	0	0	1554.00	8.3	25.27	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Pathogens and bacteria	MPN/year of fecal coliform removed	8.80	0	0	0	0	6.2E+10	1.2	0	0	0	0	1.5E+11	2.8	0	0	4.6E+11	8.8	1.2E+10	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Heavy Metals (cadmium, copper, lead, and zinc)	lbs/year of heavy metals removed	8.80	0	0	0	0	1.72	0.5	0	0	0	0	4.47	1.2	0	0	31.50	8.8	0.33	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Oils and grease (polyaromatic hydrocarbons)	lb/year of PAHs removed	8.80	0	0	0	0	0.03	0.2	0	0	0	0	0.09	0.6	0	0	1.23	8.8	0.01	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Total Nitrogen	lb/year of Nitrogen removed	8.80	0	0	0	0	1.71	0.2	0	0	0	0	5.49	0.6	0	0	80.60	8.8	0.33	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Total Phosphorus	lb/year of Phosphorus removed	8.80	0	0	0	0	0.41	0.2	0	0	0	0	1.23	0.7	0	0	15.71	8.8	0.08	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Increased Infiltration	acre-feet/year	8.80	0	0	0	0	1.15	4.0	0	0	0	0	2.53	8.8	0	0	0.00	0.0	0.22	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Water quality monitoring and assessment	None, Low, Medium, High	7.60	0	0	0	0	None	0.0	0	0	0	0	Medium	5.1	0	0	Medium	5.1	None	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total Points	156.70		5.87		8.80		18.79		2.93		5.87		37.7		5.87		104.30		13.68		5.87		10.58		8.80		8.80		14.67		8.80		14.74		14.67					
	Normalized Score	100.00		4		6		12		2		4		24		4		67		9		4		7		6		6		9		6		9		9		9			
Water Supply Benefit Category	None, Low, Medium, High	8.30	Medium	5.53	Medium	5.53	Low	2.77	None	0.00	None	0.00	Low	2.77	Low	2.77	Medium	5.53	Low	2.77	None	0.00	None	0.00	Medium	5.53	Medium	5.53	Medium	5.53	High	8.30	None	0.00	None	0.00	None	0.00			
- Water supply reliability	None, Low, Medium, High	8.30	0	0	0	0	Low	2.8	0	0	0	0	Low	2.8	0	0	Low	2.766667	Low	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Conjunctive Use	Not Improved, Improved	8.30	0	0	0	0	Not Improved	0	0	0	0	0	Not Improved	0	0	0	Not Improved	0	Not improved	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Groundwater Recharge	acre-feet/year	8.30	0	0	0	0	1.15	8.3	0	0	0	0	0.46	3.3	0	0	0	0	0.22	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Water Conservation	acre-feet/year	8.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Recycled Water Use	acre-feet/year	8.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Storm Water Runoff Direct Use	Used, not used	8.30	0	0	0	0	Used	8.3	0	0	0	0	Used	8.3	0	0	Used	8.3	Used	8.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Total Score	58.10		5.53		5.53		22.13		0.00		0.00		17.1		2.77		16.60		15.42		0.00		0.00		5.53		5.53		5.53		8.30		0.00		0.00		0.00			
	Normalized Score	100.00		10		10		38		0		0		30		5		29		27		0		0		10		10		10		14		0		0		0			

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Table 5-1. SWRP Project Evaluations

Evaluation Criteria	Evaluation Result Units or Rating	Maximum Points Possible (from Table 2 of Weighting Values Letter, 9/7/2017)	16 and 68: Channel Stabilization and Hydrologic Floodplains on Streams		33: Mud and Rock Creek Flood Protection Project		40: Parking Lot 4 Rehabilitation #50019		44: 5 Mile and Lindo Channel Diversion Structures Study		59: Routine Community Creek Clean Up Project		65: Laxson South Bioswale		73: Bidwell Avenue/Grape Way Stormwater Protection and Restoration Project		77: Revised LID and Green Infrastructure Implementation Program for Butte County Schools		85: Chapman Mulberry Rain Garden		G: Storm Water Monitoring for compliance with MS4 permit		I: Trash Reduction Master Plan and Specific Implementation Projects		M: Big Chico Creek 21st Century Management and Implementation Projects		N: Little Chico Creek 21st Century Management Plan and Implementation Projects		O: Comanche Creek Management Program and Implementation Projects		P: Updating the City's Stormwater Planning and Policies and Implementation Projects		Q: Teichert Ponds Improvement Project		R: Fair Street Detention Basin Improvement Project			
			Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points	Evaluation Result	Evaluation Points		
Flood Management Benefit Category	None, Low Medium, High	7.80	Low	2.60	High	7.80	Low	2.60	High	7.80	Low	2.60	Medium	5.20	Medium	5.20	Medium	5.20	Medium	5.20	None	0.00	None	0.00	High	7.80	High	7.80	High	7.80	High	7.80	Medium	5.20	Medium	5.20		
- Improved flood protection	number of houses/businesses protected	7.80	0	0	0	0	1	2.60	0	0	0	0	3	7.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Reduction of flood risk-life and safety	None, Low, Medium, High	7.80	0	0	0	0	Medium	5.20	0	0	0	0	High	7.8	0	0	Medium	5.2	Medium	5.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Sanitary sewer overflow reduction	acres of urban floodplain reduction	7.80	0	0	0	0	0	0.00	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Enhance natural floodplain for improved conveyance	Degraded, no change, enhanced	7.80	0	0	0	0	No change	3.90	0	0	0	0	No change	3.9	0	0	No change	3.9	No change	3.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Total Score	39.00		2.60		7.80		14.30		7.80		2.60		24.7		5.20		14.30		14.30		0.00		0.00		7.80		7.80		7.80		7.80		5.20		5.20		
	Normalized Score	100.00		7		20		37		20		7		63		13		37		37		0		0		20		20		20		20		13		13		
Environmental Benefit Category	None, Low Medium, High	8.00	Medium	5.33	Medium	5.33	Medium	5.33	Medium	5.33	Medium	5.33	Medium	5.33	Medium	5.33	Medium	5.33	Medium	5.33	Low	2.67	High	8.00	High	8.00	High	8.00	High	8.00	High	8.00	Medium	5.33	High	8.00	Medium	5.33
- Created wetland/riparian habitat	acres	7.70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Improved wetland/riparian habitat	acres	7.70	0	0	0	0	0.005	0.0016	0	0	0	0	0.03	0.01	0	0	22.5	7.7	0.25	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Environmental flow (Instream Flow)	Degrade, no change, enhance	8.00	0	0	0	0	Enhanced	8	0	0	0	0	Enhanced	8	0	0	Enhanced	8	Enhanced	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Energy use	Increase, no change, decrease	8.00	0	0	0	0	No change	4	0	0	0	0	No change	4	0	0	No change	4	No change	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Greenhouse Gas	Increase, no change, decrease	8.00	0	0	0	0	No change	4	0	0	0	0	No change	4	0	0	No change	4	No change	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Restore natural hydrograph	degrade, no change, restore	8.00	0	0	0	0	Restore	8	0	0	0	0	Restore	8	0	0	Restore	8	Restore	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Water temperature	Enhanced, no change, Degraded	8.00	0	0	0	0	Enhanced	8	0	0	0	0	Enhanced	8	0	0	Enhanced	8	Enhanced	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total Score	63.40		5.33		5.33		37.33		5.33		5.33		37.3		5.33		45.03		37.42		2.67		8.00		8.00		8.00		8.00		5.33		8.00		5.33		
	Normalized Score	100.00		8		8		59		8		8		59		8		71		59		4		13		13		13		13		8		13		8		
Community Benefit Category	None, Low Medium, High	6.70	Low	2.23	High	6.70	Low	2.23	None	0.00	Medium	4.47	Low	2.23	Low	2.23	High	6.70	High	6.70	Low	2.23	High	6.70	High	6.70	High	6.70	High	6.70	Medium	4.47	High	6.70	Low	2.23		
- Public use / recreation	None, low, medium, high	6.70	0	0	0	0	None	0	0	0	0	0	None	0.0	0	0	None	0	High	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Community involvement	None, low, medium, high	6.70	0	0	0	0	Low	2.2333	0	0	0	0	Low	2.2	0	0	Medium	4.47	High	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Employment opportunities	Decrease, no change, increase	6.70	0	0	0	0	No change	3.35	0	0	0	0	No change	3.4	0	0	No change	3.35	No change	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Mosquitoes and vectors	Increase, no change, decrease	5.50	0	0	0	0	Increase	5.5	0	0	0	0	Increase	5.5	0	0	No change	2.75	No change	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Environmental justice	Impacted, no change, improved	6.70	0	0	0	0	Improved	6.7	0	0	0	0	Improved	6.7	0	0	Improved	6.7	Improved	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Disadvantaged communities	Impacted, no change, improved	6.70	0	0	0	0	Improved	6.7	0	0	0	0	Improved	6.7	0	0	Improved	6.7	Improved	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
- Public health	Impacted, no change, improved	6.70	0	0	0	0	No change	3.35	0	0	0	0	No change	3.4	0	0	No change	3.35	No change	3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Public education, outreach, and involvement	None, Low, Medium, High	7.70	0	0	0	0	Low	2.5667	0	0	0	0	Low	2.6	0	0	High	7.7	Medium	5.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Housing homeless	Impacted, no change, improved	5.60	0	0	0	0	No change	2.8	0	0	0	0	No change	2.8	0	0	No change	2.8	No change	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
- Neighborhood beautification	Decrease, no change, increase	6.70	0	0	0	0	Increase	6.7	0	0	0	0	Increase	6.7	0	0	Increase	6.7	Increase	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Total Score	72.40		2.23		6.70		42.13		0.00		4.47		42.1		2.23		51.22		57.58		2.23		6.70		6.70		6.70		6.70		4.47		6.70		2.23		
	Normalized Score	100.00		3.08		9.25		58.20		0.00		6.17		58.20		3.08		70.74		79.53		3.08		9.25		9.25		9.25		9.25		6.17		9.25		3.08		
	Total Normalized Score	500		31.4		52.8		204		30.3		25.0		234.0		33.34		273.57		210.5		11.03		28.63		57.01		57.01		60.76		54.48		44.61		34.19		

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## Chapter 5

### SWRP Project Evaluations, Quantitative Methods, and Project Ranking



#### 5.2.1 Projects 16 and 68: Channel Stabilization and Create Hydrologic Floodplains on Streams (Plan)

The qualitative and quantitative evaluation of this planning project is presented in Table 5–1 and discussed below:

- **Water Quality** – This project was assigned a Medium water quality benefit rating because implementing the projects included in this plan will:
  - Identify opportunities for implementing various types of LID techniques at multiple locations throughout the City of Chico.
  - Evaluate structural techniques to reduce or eliminate erosion and sedimentation at outfalls, bridges, major bends in waterways, and other identified areas of concern
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.
- **Water Supply** – This project was assigned a Medium water supply benefit rating because implementing the projects included in this plan will:
  - Expand the floodplain, which will help increase infiltration and contribute to ground water recharge.
  - Identify LID opportunities, many of which will increase groundwater recharge.
- **Flood Management** – This project was assigned a Low flood management benefit rating because implementing the projects included in this plan will:
  - Evaluate the creation of hydrologic floodplains to attenuate flood flows.
  - Evaluate the use of LID techniques to help reduce flood flows.
- **Environmental Benefit** – This project was assigned a Medium environmental benefit rating because implementing the projects included in this plan will:
  - Evaluate the creation or expansion of hydrologic floodplain units within the City’s waterways.
  - Evaluate the health of floodplain habitats and protection of endangered species.
  - Remove invasive vegetation and install appropriate, native California vegetation.
  - Develop and implement a comprehensive gravel, erosion, and sediment management plan to protect and improve the quality of the stream-side habitat within the City’s waterways.
  - Areas of erosion and sediment deposition along the banks and bed of the City’s waterways will be mapped. Solutions to reduce the erosion and resulting sediment deposition will be identified.
  - Identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.

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### SWRP Project Evaluations, Quantitative Methods, and Project Ranking



- **Community Benefit** – This project was assigned a Low community benefit rating because implementing the projects included in this plan will:
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
- **Initial Costs** – The level of effort and cost of preparing this plan is provided in Table 5-2. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- **Permit Requirements** – No permits will be required for the preparation of Project 16/68: Channel Stabilization and Creation of Hydrologic Floodplains on Streams. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include a California Department of Fish and Wildlife Streambed Alteration Agreement, a Regional Water Quality Control Board Clean Water Act (CWA) Section 401 water quality certification, a U.S. Army Corps of Engineers (USACE) CWA Section 404 permit, a Central Valley Flood Protection Board encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities. Additionally, coordination with the USACE will be required.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction related impacts to the City’s waterways.

**Table 5-2. Estimated Cost for Preparing Project 16/68: Channel Stabilization/Create Hydrologic Floodplains on Streams**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Water Quality	520	102,800
Water Supply	300	60,000
Flood Management	500	100,000
Environmental Benefits	750	160,700
Community Benefits	340	76,500
<b>Total</b>	<b>2410</b>	<b>\$500,000</b>



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#### 5.2.2 Project 33: Mud and Rock Creek Flood Protection Project (Plan)

The qualitative and quantitative evaluation of this planning project is presented in Table 5–1 and discussed below:

- **Water Quality** – This project was assigned a High water quality benefit rating because implementing the projects included in this plan will:
  - Identify opportunities for implementing various types of LID techniques at multiple locations along Rock and Mud Creeks.
  - Evaluate nonstructural techniques to improve water quality through public education, providing water quality public education workshops and implementation of citizen water monitoring.
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.
  - Include water quality treatment facilities in the bottoms of any flood control detention basins identified in this project.
  - Evaluate water quality impacts from illegal camping (such as disposal of human waste, sharps, and other biohazards) along waterways and identify approaches to reduce this waste.
- **Water Supply** – This project was assigned a Medium water supply benefit rating because implementing the projects included in this plan will:
  - Identify LID opportunities, many of which will increase groundwater recharge.
  - Evaluate open space areas for increasing infiltration and groundwater recharge.
  - Identify and evaluate storm water capture and reuse projects, which could reduce demands on the potable water system. If flood control detention basins are needed, they will be designed to also optimize infiltration.
- **Flood Management** – This project was assigned a High flood management benefit rating because implementing the projects included in this plan will:
  - Assess existing and future (at buildout of the City of Chico) flooding through the City and downstream to at least the confluence with Big Chico Creek.
  - Identify the causes of the flooding.
  - Develop solutions to reduce or eliminate the flooding.
  - Develop a system of stream stage and flow gages with telemetry that will provide data for “real time” management of flood warnings and flood management operations, and the data will be permanently recorded for other future uses.
  - Evaluate the use of LID techniques to help reduce flood flows.
- **Environmental Benefit** – This project was assigned a Medium environmental benefit rating because implementing the projects included in this plan will:
  - Evaluate the health of floodplain habitats and protection of endangered species.
  - Remove invasive vegetation and plant appropriate native California vegetation.

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- Develop and implement a comprehensive gravel, erosion, and sediment management plan to protect and improve the quality of the Rock and Mud Creek habitat.
- Areas of erosion and sediment deposition along the banks and bed of Rock and Mud Creek will be mapped. Solutions to reduce the erosion and resulting sediment deposition will be identified.
- Identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.
- **Community Benefit** – This project was assigned a High community benefit rating because implementing the projects included in this plan will:
  - Evaluate and prioritize infrastructure in need of repair, such as bridges, levees, and culverts.
  - Evaluate flooding issues within the town of Nord.
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
  - The plan will evaluate employment opportunities for DACs and tribes by providing LID and green infrastructure job training and certification workshops utilizing LID demonstration projects as training tools.
- **Initial Costs** – The level of effort and cost of preparing this plan is provided in Table 5-3. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- **Permit Requirements** – No permits will be required for the preparation of Project 33: Rock and Mud Creek Flood Protection Plan. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include a California Department of Fish and Wildlife Streambed Alteration Agreement, a Regional Water Quality Control Board Clean Water Act (CWA) Section 401 water quality certification, a U.S. Army Corps of Engineers (USACE) CWA Section 404 permit, a Central Valley Flood Protection Board encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities. Also, coordination with the USACE will be required.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction related impacts to Rock and Mud Creeks.



Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Water Quality	500	97,000
Water Supply	300	60,700
Flood Management	1,450	290,500
Environmental Benefits	690	146,300
Community Benefits	300	66,600
<b>Total</b>	<b>3,600</b>	<b>\$661,100</b>

### 5.2.3 Project 40: Parking Lot #4 Rehabilitation, Project 50019 (Implementation Project)

This project involves the replacement of impervious pavement in a City-owned, public parking lot with pervious pavers. It also includes the conversion of some of the landscape area between the curb and sidewalk into rain gardens, including curb cuts to direct street runoff into the rain gardens. Key design and evaluation criteria include:

- The hydraulic conductivity of the soil underlying the permeable pavement is approximately 2.4 inches per hour (accessed from Natural Resources Conservation Service web soil survey), which exceeds even the 100-year, 1-hour design storm peak rainfall (accessed from National Oceanic Atmospheric Administration (NOAA) rainfall depth, duration, and frequency analysis).
- The rain gardens were sized based on available space, i.e. the existing landscape area between curb and sidewalk. The rain garden design preserved existing trees; however, protecting the tree roots also reduced the available depth for storage. The available space was not large enough to treat the 85th percentile storm as suggested by the CASQA BMP Manual; however, the hydraulic conductivity of the soil is great enough so that it can infiltrate and treat some rainfall. High flows will bypass the rain garden.
- Water Quality – This project was assigned a Medium water quality benefit rating. The pervious paver component of this project will allow rainfall to infiltrate into the soil rather than turn into runoff and enter the storm drain system. In addition, the rain gardens will capture runoff from surrounding streets and allow it to infiltrate. The water quality evaluation is summarized in Table 5-1 and discussed below:
  - Improve Aquatic Organism Health (Bioassessment) – This project will reduce pollutants to creeks and therefore meets one out of the three criteria listed for “improve aquatic organism health”.
  - Mercury (303(d) List Pollutant) – The method of treatment for the rain garden and pervious pavement is infiltration. The amount of mercury potentially removed is related to the amount of sediment removed and therefore the amount of sediment removed from receiving waters is used as a proxy for estimating mercury reduction. The amount of sediment removed was calculated by estimating the

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volume of flow that would be infiltrated through the pervious pavement and the rain gardens per year and a typical loading of sediment in urban storm water.

- Diuron (303(d) List Pollutant) – This project involves the planting of native grasses, which could reduce the potential for pesticide use. However, this property is City-owned and maintained and the City does not currently use diuron. Therefore, this project will not have a change on diuron use.
- DDT (303(d) List Pollutant) – DDT has been found in urban storm water and its removal is found to be associated with sediment removal. The amount of DDT potentially removed is related to the amount of sediment removed; therefore, the amount of sediment removed from receiving waters is used as a proxy for estimating DDT reduction. The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain garden per year and a typical loading of sediment in urban storm water.
- Dieldrin (303(d) List Pollutant) – Dieldrin has been found in urban storm water and is found to be associated with sediment removal. The amount of DDT potentially removed is related to the amount of sediment removed and therefore the amount of sediment removed from receiving waters is used as a proxy for estimating DDT reduction. The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain garden per year and a typical loading of sediment in urban storm water.
- PCBs (303(d) List Pollutant) – PCBs can enter a watershed through transformers, atmospheric deposition, and eroded or re-suspended particles. PCBs tend to behave like sediment, and settle out through infiltration and treatment. BMPs that remove PCBs will need to be maintained with special handling and disposal. The quantity of PCBs removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain garden per year and a typical loading of PCBs in urban storm water.
- Chlorpyrifos (MS4 Pollutant) – This project involves the planting of native grasses, which could reduce the potential for pesticide use. However, this property is City-owned and maintained and the City does not currently use chlorpyrifos. Therefore, this project will not have a change on chlorpyrifos use.
- Diazinon (MS4 Pollutant) – This project involves the planting of native grasses, which could reduce the potential for pesticide use. However, this property is City-owned and maintained and the City does not currently use Diazinon. Therefore, this project will not have a change on Diazinon use.
- Trash – The rain garden component of this project might provide a small amount of trash capture but does not include a 5-mm screen and therefore will not comply with the California Trash Amendments.
- Sediment – The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain gardens per year and a typical loading of sediment in urban storm water.

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- Pathogens and Bacteria – The quantity of bacteria removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain gardens per year and a typical loading of bacteria in urban storm water.
- Heavy Metals (cadmium, copper, lead, and zinc) – The quantity of heavy metals removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain gardens per year and a typical loading of heavy metals in urban storm water.
- Oils and Grease (polyaromatic hydrocarbons (PAHs)) – The quantity of oils and grease removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain garden per year and a typical loading of PAHs in urban storm water.
- Total Nitrogen – The quantity of nitrogen removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain gardens per year and a typical loading of nitrogen in urban storm water.
- Total Phosphorus – The quantity of phosphorus removed was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain gardens per year and a typical loading of phosphorus in urban storm water.
- Increased Infiltration – The increase in infiltration was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain gardens per year.
- Water Quality Monitoring and Assessment – No monitoring locations are planned for this project.
- Water Supply – This project was assigned a Low water supply benefit rating. This project will provide an increase in infiltration; although the volume of infiltration is not enough to significantly increase groundwater supply. However, if more similar projects are implemented, the cumulative benefit could be significant.
  - Water Supply Reliability – This project augments the groundwater supply. It does not replace a water supply. Although this project does involve the planting of native California vegetation, which reduces the need for irrigation, there would not be a significant impact on reducing the City’s groundwater demand.
  - Conjunctive Use – The storm water captured in this project is not being used as an alternative water supply.
  - Groundwater Recharge – The groundwater recharge was assumed to be equivalent to the increase in infiltration, which was calculated by estimating the volume of flow that would be infiltrated through the pervious pavement and the rain garden.
  - Water Conservation – This project involves the planting of native California vegetation, which reduces the need for irrigation.
  - Recycled Water Use – This project does not involve or create recycled water.
  - Storm Water Runoff Direct Use – This project uses storm water for landscape irrigation.

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- Flood Management – This project was assigned a Low flood management benefit rating. This project will reduce runoff due to pervious pavement and will decrease runoff conveyed to the storm drain system due to the rain garden. However, this area does not have a history of flooding and therefore the flood management benefit of reducing runoff is insignificant. However, if more similar projects are implemented, the cumulative flood management benefit could be significant.
  - Improved flood protection – The parking lot and building just west of the parking lot will have improved flood protection due to the reduction in runoff.
  - Reduction of flood risk-life and safety – This project has the potential to reduce street flooding in this area.
  - Sanitary sewer overflow reduction – This project does not reduce acres of urban floodplain and therefore no reduction of sewer overflow will occur.
  - Enhance natural floodplain for improved conveyance – There is no change in the natural floodplain.
- Environmental – This project was assigned a Medium environmental benefit rating. This project is within an urbanized area and has a small tributary area, so the benefit of this project on the environment is considered small but significant. If more similar projects were implemented, the cumulative benefit on the environment would be more significant.
  - Created Wetland/Riparian Habitat – No new wetland or riparian habitat will be created.
  - Improved Wetland/Riparian Habitat – The planting of native grasses with the creation of the rain gardens will improve about 200 square feet of vegetated landscape areas.
  - Environmental Flow (Instream Flow) – The increase in infiltration through installation of the pervious pavers and the rain gardens helps restore the local hydrology to pre-development conditions. Restoring the natural hydrograph in this area will help restore environmental flows to more natural conditions and therefore the environmental flow is enhanced.
  - Energy Use – This project does not involve any change in energy use.
  - Greenhouse Gas – This project does not involve any change in greenhouse gases.
  - Restore Natural Hydrograph – The increase in infiltration through installation of the pervious pavers and the rain gardens helps restore the local hydrology to pre-development conditions and restores the natural hydrograph. Therefore, the natural hydrograph is improved.
  - Water Temperature – The increase in infiltration through installation of the pervious pavers and the rain gardens help restore the local hydrology to pre-development conditions; and therefore, helps restore water temperatures to more natural conditions. Therefore, the water temperature is improved.
- Community – This project was assigned a Low community benefit rating. This project includes educational signage about the benefits of reducing runoff and is located in a popular downtown area, so the impact on the community is limited to users of the parking lot and visitors to the downtown.

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- Public Use/Recreation – This project does not increase public use or recreation areas.
- Community Involvement – This project includes educational signage about pervious pavement and rain gardens and therefore will help educate the community on the benefits of reducing runoff.
- Employment Opportunities – This project will have a temporary increase in employment jobs during construction.
- Mosquitoes and Vectors – This project is designed to infiltrate runoff and is not designed to store runoff for longer than 48 hours; therefore, mosquito and vector control should not change.
- Environmental Justice – The project is located in a disadvantaged community.
- Disadvantaged Communities – The project is located in a disadvantaged community.
- Public Health – This project does not have an impact on public health.
- Public Education, Outreach, and Involvement – This project includes educational signage about pervious pavement and rain gardens, and therefore will help educate the community on the benefits of reducing runoff.
- Housing Homeless – This project does not change housing for the homeless.
- Neighborhood Beautification – This project increases neighborhood beautification with the installation of California native vegetation in a rain garden and the pervious pavers.
- Construction and Total Capital Costs – The construction and total capital costs of this project are estimated in Table 5-4. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- Annual O&M Costs – The annual O&M costs of this project are approximately \$2,800. A detailed cost estimate is provided in Appendix 5D.
- Permit Requirements – Permits required for this project include applicable City permits.
- Environmental Impacts – This project should improve the environment; however, the construction of this project could result in temporary construction impacts. Therefore, a categorical exemption, negative declaration, or mitigated negative declaration will be prepared to evaluate the impacts of this project.

**Table 5-4. Estimated Cost for Preparing Project 40: Parking Lot 4 Rehabilitation**

Bid Item	Cost Summary, dollars
Replacing existing parking lot with permeable pavement	365,900
Bio-retention basin (rain garden)	37,400
General Construction Fees	141,200
Engineering and Design Fees	121,000
<b>Total</b>	<b>\$665,500</b>

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#### 5.2.4 Project 44: 5 Mile and Lindo Channel Diversion Structures Study (Plan)

The evaluation of this planning project is presented in Table 5–1 and discussed below:

- **Water Quality** – This project was assigned a Low water quality benefit rating because the adjustment of flows will help reduce scour, which will reduce the levels of erosion and suspended sediment in downstream waters.
- **Water Supply** – This project was assigned a None water supply benefit rating because implementing this will not increase water supply reliability or groundwater recharge nor promote water conservation or recycled water use.
- **Flood Management Benefit Category** – This project was assigned a High flood management benefit rating because the adjustment of the gate operations will be designed to decrease risk of flooding.
- **Environmental** – This project was assigned a Medium environmental benefit rating because balancing the flows at Lindo Channel, Big Chico Creek, and Sycamore Creek will reduce scour and improve gravel management, which will reduce negative impacts on habitat and protect creek beds and banks.
- **Community** – This project was assigned a None community benefit rating because adjusting the gate operations to balance flows will not involve the community and will not include any public outreach or education.
- **Initial Costs** – The level of effort and cost of preparing this plan is provided in Table 5-5. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.

**Table 5-5. Estimated Cost for Preparing Project 44: 5-Mile and Lindo Channel Diversion Structure Study**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Diversion Structure Study	475	98,700
<b>Total</b>	<b>475</b>	<b>\$98,700</b>

- **Permit Requirements** – No permits will be required for the preparation of Project 44: 5 Mile and Lindo Channel Diversion Structures Study. However, the study will include coordination with various agencies to determine appropriate adjustments to the gate operations, including the USACE, DWR, and CVFPB.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Balancing flows through gate and operation adjustments that will be identified in the plan should mostly result in improvements to the environment. However, the study will consider any adverse environmental impacts.



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#### 5.2.5 Project 59: Routine Community Creek Clean Up Project (Program)

The evaluation of this planning project is presented in Table 5–1 and discussed below:

- **Water Quality** – This project was assigned a Medium water quality benefit rating because regular removal of trash will help improve water quality of creeks and streams.
- **Water Supply** – This project was assigned a None water supply benefit rating because implementing creek clean ups will neither increase water supply reliability nor groundwater recharge, nor promote water conservation or recycled water use.
- **Flood Management Benefit Category** – This project was assigned a Low flood management benefit rating because the removal of trash will help reduce likelihood of debris clogging storm drain systems.
- **Environmental** – This project was assigned a Medium environmental benefit rating because removing trash will help improve habitat.
- **Community** – This project was assigned a Medium community benefit rating because involving the community in trash cleanup projects and making it easier for the community to participate in trash cleanup projects will provide outreach and education to increase knowledge of storm water, watersheds, and pollutants.
- **Initial Costs** – The level of effort and cost of preparing this plan is provided in Table 5-6. These costs include City costs. A detailed cost estimate is included in Appendix 5D.
- **Permit Requirements** – Some City permits may be required for implementing community cleanups.
- **Environmental Impacts** – No environmental impacts will occur from the community cleanups.

**Table 5-6. Estimated Annual Cost for Preparing Project 59: Routine Community Clean Up Project**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Existing Cleanup Efforts	--	3,800
Additional Cleanup Efforts	--	6,000
<b>Total</b>	--	<b>\$9,800</b>

#### 5.2.6 Project 65: Laxson South Bioswale (Implementation Project)

This project involves the construction of bioswales along the south side of Laxson Auditorium. The bioswales will be planted with California native vegetation and will include boulders, cobble, and plant material to slow down flow within the swales. Additionally, a new drain inlet would be installed in the lawn area south of Laxson Auditorium and tied into the existing drain to the west. The new drain inlet will be located within the proposed bioswale. Catch basins will be installed in

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the bioswales to allow for increased infiltration. The project will incorporate two sampling points to test the bioswale system's effectiveness and educational signage. Key design and evaluation criteria include:

- The hydraulic conductivity of the soil in this area is approximately 3.4 inches per hour (accessed from Natural Resources Conservation Service web soil survey)
- The bioswales were sized based on available space, i.e. the existing landscape area between curb/sidewalk and buildings, trees, and impervious surfaces. The bioswale design preserved existing trees, however, protecting the tree roots also reduced the available depth for storage.
- Water Quality – This project was assigned a Medium water quality benefit rating. The bioswales will allow some rainfall to infiltrate into the soil rather than turn into runoff and enter the storm drain system. In addition, the bioswale will capture runoff from surrounding streets and allow it to infiltrate. The water quality evaluation is summarized in Table 5-1 and discussed below:
  - Improve Aquatic Organism Health (Bioassessment) – This project will reduce pollutants to creeks, and therefore meets 1 out of the 3 criteria listed for “improve aquatic organism health.”
  - Mercury (303(d) List Pollutant) – The method of treatment for the bioswale is infiltration. The amount of mercury potentially removed is related to the amount of sediment removed, and therefore, the amount of sediment removed from receiving waters is used as a proxy for estimating mercury reduction. The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of sediment in urban storm water.
  - Diuron (303(d) List Pollutant) – This project involves the planting of native vegetation, which could reduce the potential for pesticide use. However, this property is University owned and maintained and the University does not currently use diuron. Therefore, this project will not have a change on diuron use.
  - DDT (303(d) List Pollutant) – DDT has been found in urban storm water, and its removal is found to be associated with sediment removal. The amount of DDT potentially removed is related to the amount of sediment removed, and therefore, the amount of sediment removed from receiving waters is used as a proxy for estimating DDT reduction. The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of sediment in urban storm water.
  - Dieldrin (303(d) List Pollutant) – Dieldrin has been found in urban storm water and is found to be associated with sediment removal. The amount of Dieldrin potentially removed is related to the amount of sediment removed, and therefore, the amount of sediment removed from receiving waters is used as a proxy for estimating Dieldrin reduction. The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of sediment in urban storm water.

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- PCBs (303(d) List Pollutant) – PCBs can enter a watershed through transformers, atmospheric deposition, and eroded or re-suspended particles. PCBs tend to behave like sediment, which will be removed through pollution. BMPs that remove PCBs will need to be maintained with special handling and disposal. The quantity of PCBs removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of PCBs in urban storm water.
- Chlorpyrifos (MS4 Pollutant) – This project involves the planting of native vegetation, which could reduce the potential for pesticide use. However, this property is University owned and maintained and the University does not currently use chlorpyrifos. Therefore, this project will not have a change on chlorpyrifos use.
- Diazinon (MS4 Pollutant) – This project involves the planting of native vegetation, which could reduce the potential for pesticide use. However, this property is University owned and maintained and the University does not currently use Diazinon. Therefore, this project will not have a change on Diazinon use.
- Trash – The bioswale might provide a small amount of trash capture, but does not include a 5-mm screen, and therefore, will not comply with the California Trash Amendments.
- Sediment – The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of sediment in urban storm water.
- Pathogens and Bacteria – The quantity of bacteria removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of bacteria in urban storm water.
- Heavy Metals (cadmium, copper, lead, and zinc) – The quantity of heavy metals removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of heavy metals in urban storm water.
- Oils and Grease (polyaromatic hydrocarbons, PAHs) – The quantity of oils and grease removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of PAHs in urban storm water.
- Total Nitrogen – The quantity of nitrogen removed was calculated by estimating the volume of flow that would be infiltrated through bioswales per year and a typical loading of nitrogen in urban storm water.
- Total Phosphorus – The quantity of phosphorus removed was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year and a typical loading of phosphorus in urban storm water.
- Increased Infiltration – The increase in infiltration was calculated by estimating the volume of flow that would be infiltrated through the bioswales per year.
- Water Quality Monitoring and Assessment – Two water quality sampling locations will be incorporated into the bioswales to assess the systems effectiveness.

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- **Water Supply** – This project was assigned a Low water supply benefit rating. This project will provide an increase in infiltration; although the volume of infiltration is not enough to significantly increase groundwater supply. However, if more similar projects are implemented, the cumulative benefit could be significant.
  - **Water Supply Reliability** – This project augments the groundwater supply. It does not replace a water supply. Although this project does involve the planting of native California vegetation which reduces the need for irrigation, there would not be a significant impact on reducing the City’s groundwater demand.
  - **Conjunctive Use** – The storm water captured in this project is not being used as an alternative water supply.
  - **Groundwater Recharge** – The groundwater recharge was assumed to be equivalent to the increase in infiltration, which was calculated by estimating the volume of flow that would be infiltrated through the rain garden.
  - **Water Conservation** – This project involves the planting of native California vegetation which reduces the need for irrigation.
  - **Recycled Water Use** – This project does not involve or create recycled water.
  - **Storm Water Runoff Direct Use** – This project uses storm water for landscape irrigation.
- **Flood Management** – This project was assigned a Medium flood management benefit rating. This project will decrease runoff conveyed to the storm drain system due to the bioswale. Additionally, this area has a history of flooding, and therefore, the flood management benefit of reducing runoff is significant.
  - **Improved Flood Protection** – The sidewalks, walkways, and traffic circle south of Laxson Auditorium will have improved flood protection due to the reduction in runoff.
  - **Reduction of Flood Risk-Life and Safety** – This project has the potential to reduce street and sidewalk flooding in this area.
  - **Sanitary Sewer Overflow Reduction** – This project does not reduce acres of urban floodplain, and therefore no reduction of sewer overflow will occur.
  - **Enhance Natural Floodplain for Improved Conveyance** – There is no change in the natural floodplain.
- This project was assigned a Medium environmental benefit rating. This project is within an urbanized area and has a small tributary area, so the benefit of this project on the environment is considered small but significant. If more similar projects were implemented, the cumulative benefit on the environment would be more significant.
  - **Created Wetland/Riparian Habitat** – A small amount of new wetland or riparian habitat will be created.
  - **Improved Wetland/Riparian Habitat** – The planting of native vegetation with the creation of the bioswales will improve about 8,000 square feet of vegetated landscape areas.
  - **Environmental Flow (Instream Flow)** – The increase in infiltration through installation of the bioswales helps restore the local hydrology to pre-development

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conditions. Restoring the natural hydrograph in this area will help restore environmental flows to more natural conditions, and therefore, the environmental flow is enhanced.

- Energy Use – This project does not involve any change in energy use.
- Greenhouse Gas – This project does not involve any change in greenhouse gases.
- Restore Natural Hydrograph – The increase in infiltration through installation of the bioswales helps restore the local hydrology to pre-development conditions and restores the natural hydrograph. Therefore, the natural hydrograph is improved.
- Water Temperature – The increase in infiltration through installation of the bioswales help restore the local hydrology to pre-development conditions; and therefore, helps restore water temperatures to more natural conditions. Therefore, the water temperature is improved.
- Community – This project was assigned a Low community benefit rating. This project includes educational signage about the benefits of reducing and managing runoff, benefits of bioswales, and incorporation of bioswales into commercial and residential uses and is located in a high traffic area of the University, so the impact on the community is limited to users and visitors to the University.
  - Public Use/Recreation – This project does not increase public use or recreation areas.
  - Community Involvement – This project includes educational signage about bioswales and storm water, and therefore will help educate the community that walk through the university and use areas near Laxson Auditorium on the benefits of bioswales and of reducing storm water runoff. Additionally, students of the university will utilize the bioswales for class work and research opportunities.
  - Employment Opportunities – This project will not result in increases to employment during construction.
  - Mosquitoes and Vectors – This project is designed to infiltrate runoff and is not designed to store runoff for longer than 48 hours; therefore, mosquito and vector control should not change.
  - Environmental Justice – The project is located in a disadvantaged community.
  - Disadvantaged Communities – The project is located in a disadvantaged community.
  - Public Health – This project does not have an impact on public health.
  - Public Education, Outreach, and Involvement – This project includes educational signage about storm water runoff/management and bioswales, and therefore will help educate the community that walk through and use the area on the benefits of reducing runoff.
  - Housing Homeless – This project does not change housing for the homeless.
  - Neighborhood Beautification – This project increases neighborhood beautification with the installation of California native vegetation in a bioswale.
- Permit Requirements – Permits required for this project include applicable City permits.

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- Environmental Impacts – This project should improve the environment; however, the construction of this project could result in temporary construction impacts. Therefore, a categorical exemption, negative declaration, or mitigated negative declaration will be prepared to evaluate the impacts of this project.
- Construction and Total Capital Costs – The construction and total capital costs of this project are estimated in Table 5-7. Cost includes university and consultant costs. A detailed cost estimate is provided in Appendix 5D.
- Annual O&M Costs – The annual O&M costs of this project are approximately \$26,200. A detailed cost estimate is provided in Appendix 5D.

Bid Item	Cost Summary, dollars
Bio-swale	112,600
Construction Fees	39,600
Engineering and Design Fees	33,800
<b>Total</b>	<b>186,000</b>

#### 5.2.7 Project 73: Bidwell Avenue/Grape Way Storm Water Protection and Restoration Project

The project is a plan to maintain and restore pre-development hydrology and improve water quality in Big Chico Creek and consequently the Sacramento River by managing urban runoff at its source through the integration of low impact development practices along Bidwell Avenue and Grape Way.

The qualitative and quantitative evaluation of this planning project is presented in Table 5–1 and discussed below:

- Water Quality – This project was assigned a Medium water quality benefit rating because implementing the projects included in this plan will:
  - Identify opportunities for implementing various types of LID techniques at multiple locations along Big Chico Creek.
  - Evaluate structural techniques to reduce or eliminate erosion and sedimentation at outfalls, bridges, major bends in waterways, and other identified areas of concern
  - Evaluate nonstructural techniques to improve water quality through public education and providing water quality public education workshops.
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality including Butte Environmental Council and the Stream Team.
  - Include water quality treatment facilities in the bottoms of any flood control detention basins identified in this project.

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- Evaluate water quality impacts from illegal camping (such as disposal of human waste, sharps, and other biohazards) along waterways and identify approaches to reduce this waste.
- Water Supply – This project was assigned a Low water supply benefit rating because implementing the projects included in this plan will:
  - Identify LID opportunities, many of which will increase groundwater recharge.
  - Evaluate open space areas for increasing infiltration and groundwater recharge.
  - Identify and evaluate storm water capture and reuse projects, which could reduce demands on the potable water system. If flood control detention basins are needed, they will be designed to also optimize infiltration.
- Flood Management – This project was assigned a Medium flood management benefit rating because implementing the projects included in this plan will:
  - Evaluate the feasibility of set-back levees.
  - Evaluate the use of LID techniques to help reduce flood flows.
- Environmental Benefit – This project was assigned a Medium environmental benefit rating because implementing the projects included in this plan will:
  - Evaluate the health of floodplain habitats and protection of endangered species.
  - Remove invasive vegetation and plant appropriate, native California vegetation.
  - Develop and implement a comprehensive gravel, erosion, and sediment management plan to protect and improve the quality of the Big Chico Creek habitat.
  - Areas of erosion and sediment deposition along the banks and bed of Big Chico Creek will be mapped. Solutions to reduce the erosion and resulting sediment deposition will be identified.
  - Evaluate setback levees if appropriate for improving habitat and providing greater connections between the floodplain and the creek.
  - Identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.
- Community Benefit – This project was assigned a Low community benefit rating because implementing the projects included in this plan will:
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
- Initial Costs – The level of effort and cost of preparing this plan is provided in Table 5-8. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.



**Table 5-8. Estimated Cost for Preparing Project 73: Bidwell/Grape Avenue Storm Water Protection and Restoration Project**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Water Quality	450	88,600
Water Supply	300	59,900
Flood Management	1,300	259,500
Environmental Benefits	680	144,300
Community Benefits	300	71,400
<b>Total</b>	<b>3,030</b>	<b>\$623,700</b>

- **Permit Requirements** – No permits will be required for the preparation of Project 73: Bidwell Avenue/Grape Way Storm Water Protection and Restoration Plan. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include a California Department of Fish and Wildlife Streambed Alteration Agreement, a Regional Water Quality Control Board Clean Water Act (CWA) Section 401 water quality certification, a U.S. Army Corps of Engineers CWA Section 404 permit, a Central Valley Flood Protection Board encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities. Also, coordination with the USACE will be required.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction related impacts to Big Chico Creek.

#### 5.2.8 Project 77: Revised Low Impact Development and Green Infrastructure Implementation Program for Butte County Schools (Plan Plus Implementation Projects)

The qualitative and quantitative evaluation of this planning project is presented in Table 5–1 and discussed below. In addition to the planning project evaluation, LID projects at Fairview High School were evaluated and the results were extrapolated to represent the approximate benefits of installing similar LID projects at 25 schools in Butte County Office of Education and Chico Unified School District. The evaluation is included in Table 5-1.

- **Water Quality** – This project was assigned a High water quality benefit rating because implementing the projects included in this plan will:
  - Identify opportunities for implementing various types of LID techniques at multiple locations at multiple schools.
  - Evaluate nonstructural techniques to improve water quality through public education, providing cohesive water quality and storm water educational programs targeting area students.



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- Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.
- Water Supply – This project was assigned a Medium water supply benefit rating because implementing the projects included in this plan will:
  - Identify LID opportunities, many of which will increase groundwater recharge.
  - Evaluate open space areas within Chico and Butte County schools for increasing infiltration and groundwater recharge.
  - Identify and evaluate storm water capture and reuse projects, which could reduce demands on the potable water system.
- Flood Management – This project was assigned a Medium flood management benefit rating because implementing the projects included in this plan will:
  - The use of LID could help reduce flood flows.
- Environmental Benefit – This project was assigned a Medium environmental benefit rating because this projects within this plan are within urbanized areas and multiple, small tributary areas. The benefit of each project on the environment is considered insignificant, but since LID will be installed at multiple locations, the cumulative benefit on the environment would be significant.
  - Install native vegetation in urbanized areas.
  - Identify approaches for long-term monitoring of ecosystem health using student monitoring and involvement where appropriate.
- Community Benefit – This project was assigned a High community benefit rating because implementing the projects included in this plan will:
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
  - Collaborate with neighboring school districts, community organizations, and municipal storm water programs to align storm water protection efforts, share resources, identify cost-saving opportunities, and develop consistent public messaging regarding storm water issues. Additionally, Project 77 builds on an existing Drought Response Outreach Program Grant.
- Construction and Total Capital Costs – The construction and total capital costs of this project are estimated in Table 5-9 for implementing LID projects at twenty-five schools. These costs include both District and consultant costs. A detailed cost estimate is included in Appendix 5D.
- Annual O&M Costs – The annual O&M costs of this project are approximately \$1,200 per school, a total of \$30,000/year once projects are implemented at each school. A detailed cost estimate is provided in Appendix 5D.
- Permit Requirements – No permits will be required for the preparation of Project 77: Revised Low Impact Development and Green Infrastructure Implementation Program for Butte County Schools. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include



attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities.

- Environmental Impacts – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment.

**Table 5-9. Estimated Cost for Preparing Project 77: Low Impact Development and Green Infrastructure Implementation Program for Butte County Schools**

Bid Item	Estimated Cost, dollars
Project Planning (25 schools)	606,300
Construction Cost (25 schools)	2,425,000
<b>Total</b>	<b>\$3,031,300</b>

#### 5.2.9 Project 85: Chapman Mulberry Rain Garden (Implementation Project)

This project involves the construction of a rain garden with basins mulched with appropriate species of fungus for mycoremediation and planted with California native vegetation. It will also include curb cuts to direct street runoff into the rain garden. Key design and evaluation criteria include:

- The hydraulic conductivity of the soil underlying the project area is approximately 3.4 inches per hour (accessed from Natural Resources Conservation Service web soil survey), which exceeds even the 100-year, 1-hour design storm peak rainfall (accessed from National Oceanic Atmospheric Administration rainfall depth, duration, and frequency analysis).
- The rain garden was sized based on available space, i.e. the existing landscape area between curb and existing trees. The rain garden design preserved existing trees, however, protecting the tree roots also reduced the available depth for storage. High flows will bypass the rain garden.
- Water Quality – This project was assigned a Medium water quality benefit rating. The rain garden will allow rainfall to infiltrate into the soil rather than turn into runoff and enter the storm drain system. In addition, the rain garden will capture runoff from surrounding streets and allow it to infiltrate. The water quality evaluation is summarized in Table 5-1 and discussed below:
  - Improve Aquatic Organism Health (Bioassessment) – This project will reduce pollutants to creeks, and therefore meets 1 out of the 3 criteria listed for “improve aquatic organism health.”
  - Mercury (303(d) List Pollutant) – The method of treatment for the rain garden is infiltration. The amount of mercury potentially removed is related to the amount of sediment removed, and therefore, the amount of sediment removed from receiving waters is used as a proxy for estimating mercury reduction. The amount of sediment removed was calculated by estimating the volume of flow that would

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be infiltrated through the rain garden per year and a typical loading of sediment in urban storm water.

- Diuron (303(d) List Pollutant) – This project involves the planting of California native vegetation, which could reduce the potential for pesticide use. However, this property is city owned and maintained and the city does not currently use diuron. Therefore, this project will not have a change on diuron use.
- DDT (303(d) List Pollutant) – DDT has been found in urban storm water, and its removal is found to be associated with sediment removal. The amount of DDT potentially removed is related to the amount of sediment removed, and therefore, the amount of sediment removed from receiving waters is used as a proxy for estimating DDT reduction. The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of sediment in urban storm water.
- Dieldrin (303(d) List Pollutant) – Dieldrin has been found in urban storm water and is found to be associated with sediment removal. The amount of Dieldrin potentially removed is related to the amount of sediment removed, and therefore, the amount of sediment removed from receiving waters is used as a proxy for estimating Dieldrin reduction. The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of sediment in urban storm water.
- PCBs (303(d) List Pollutant) – PCBs can enter a watershed through transformers, atmospheric deposition, and eroded or re-suspended particles. PCBs tend to behave like sediment, which will be removed through pollution. BMPs that remove PCBs will need to be maintained with special handling and disposal. The quantity of PCBs removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of PCBs in urban storm water.
- Chlorpyrifos (MS4 Pollutant) – This project involves the planting of native vegetation, which could reduce the potential for pesticide use. However, this property is City owned and maintained and the City does not currently use chlorpyrifos. Therefore, this project will not have a change on chlorpyrifos use.
- Diazinon (MS4 Pollutant) – This project involves the planting of native vegetation, which could reduce the potential for pesticide use. However, this property is City owned and maintained and the City does not currently use Diazinon. Therefore, this project will not have a change on Diazinon use.
- Trash – The rain garden might provide a small amount of trash capture, but does not include a 5-mm screen, and therefore, will not comply with the California Trash Amendments.
- Sediment – The amount of sediment removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of sediment in urban storm water.
- Pathogens and Bacteria – The quantity of bacteria removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of bacteria in urban storm water.

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- Heavy Metals (cadmium, copper, lead, and zinc) – The quantity of heavy metals removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of heavy metals in urban storm water.
- Oils and Grease (polyaromatic hydrocarbons, PAHs) – The quantity of oils and grease removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of PAHs in urban storm water.
- Total Nitrogen – The quantity of nitrogen removed was calculated by estimating the volume of flow that would be infiltrated through rain garden per year and a typical loading of nitrogen in urban storm water.
- Total Phosphorus – The quantity of phosphorus removed was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year and a typical loading of phosphorus in urban storm water.
- Increased Infiltration – The increase in infiltration was calculated by estimating the volume of flow that would be infiltrated through the rain garden per year.
- Water Quality Monitoring and Assessment – No monitoring locations are planned for this project.
- Water Supply – This project was assigned a Low water supply benefit rating. This project will provide an increase in infiltration; although the volume of infiltration is not enough to significantly increase groundwater supply. However, if more similar projects are implemented, the cumulative benefit could be significant.
  - Water Supply Reliability – This project augments the groundwater supply. It does not replace a water supply. Although this project does involve the planting of native California vegetation which reduces the need for irrigation, there would not be a significant impact on reducing the City’s groundwater demand.
  - Conjunctive Use – The storm water captured in this project is not being used as an alternative water supply.
  - Groundwater Recharge – The groundwater recharge was assumed to be equivalent to the increase in infiltration, which was calculated by estimating the volume of flow that would be infiltrated through the rain garden.
  - Water Conservation – This project involves the planting of native California vegetation which reduces the need for irrigation.
  - Recycled Water Use – This project does not involve or create recycled water.
  - Storm Water Runoff Direct Use – This project uses storm water for landscape irrigation.
- Flood Management – This project was assigned a Medium flood management benefit rating. This project will decrease runoff conveyed to the storm drain system due to the rain garden. However, this area does not have a history of flooding, and therefore, the flood management benefit of reducing runoff is insignificant. However, if more similar projects are implemented, the cumulative flood management benefit could be significant.

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- Improved Flood Protection – The streets adjacent to the rain garden will have improved flood protection due to the reduction in runoff.
- Reduction of Flood Risk-Life and Safety – This project has the potential to reduce street flooding in this area.
- Sanitary Sewer Overflow Reduction – This project does not reduce acres of urban floodplain, and therefore no reduction of sewer overflow will occur.
- Enhance Natural Floodplain for Improved Conveyance – There is no change in the natural floodplain.
- Environmental – This project was assigned a Medium environmental benefit rating. This project is within an urbanized area and has a small tributary area, so the benefit of this project on the environment is considered small but significant. If more similar projects were implemented, the cumulative benefit on the environment would be more significant.
  - Created Wetland/Riparian Habitat – No new wetland or riparian habitat will be created.
  - Improved Wetland/Riparian Habitat – The planting of native vegetation with the creation of the rain garden will improve approximately 7,500 square feet of vegetated landscape areas.
  - Environmental Flow (Instream Flow) – The increase in infiltration through installation of the rain garden helps restore the local hydrology to pre-development conditions. Restoring the natural hydrograph in this area will help restore environmental flows to more natural conditions, and therefore, the environmental flow is enhanced.
  - Energy Use – This project does not involve any change in energy use.
  - Greenhouse Gas – This project does not involve any change in greenhouse gases.
  - Restore Natural Hydrograph – The increase in infiltration through installation of the rain garden helps restore the local hydrology to pre-development conditions and restores the natural hydrograph. Therefore, the natural hydrograph is improved.
  - Water Temperature – The increase in infiltration through installation of the rain garden help restore the local hydrology to pre-development conditions; and therefore, helps restore water temperatures to more natural conditions. Therefore, the water temperature is improved.
- Community – This project was assigned a High community benefit rating. This project includes education signage about the benefits of reducing runoff and is located in a neighborhood open space area, so the impact on the community is limited to users of the open space area.
  - Public Use/Recreation – This project does not increase public use or recreation areas.
  - Community Involvement – This project includes public access areas and educational signage about rain gardens, and therefore will help educate the community that walk through the downtown area and use the parking lot on the benefits of reducing runoff.
  - Employment Opportunities – This project will have a temporary increase in employment jobs during construction.

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- Mosquitoes and Vectors – This project is designed to infiltrate runoff and is not designed to store runoff for longer than 48 hours; therefore, mosquito and vector control should not change.
- Environmental Justice – The project is located in a disadvantaged community.
- Disadvantaged Communities – The project is located in a disadvantaged community.
- Public Health – This project does not have an impact on public health.
- Public Education, Outreach, and Involvement – This project includes educational signage about pervious pavement and rain gardens, and therefore will help educate the community that walk through and use the area on the benefits of reducing runoff.
- Housing Homeless – This project does not change housing for the homeless.
- Neighborhood Beautification – This project increases neighborhood beautification with the installation of California native vegetation in a rain garden.
- Permit Requirements – Permits required for this project include applicable City permits.
- Environmental Impacts – This project should improve the environment; however, the construction of this project could result in temporary construction impacts. Therefore, a categorical exemption, negative declaration, or mitigated negative declaration will be prepared to evaluate the impacts of this project.
- Construction and Total Capital Costs – The construction and total capital costs of this project are estimated in Table 5-10.
- Annual O&M Costs – The annual O&M costs of this project are approximately \$11,200. A detailed cost estimate is provided in Appendix 5D. These costs include volunteer labor.

**Table 5-10. Estimated Cost for Constructing Project 85: Chapman Mulberry Rain Garden**

Bid Item	Cost Summary, dollars
Rain Garden Construction	8,900
General Construction (includes 30% contingency)	3,400
Engineering and Design	2,700
<b>Total</b>	<b>15,000</b>

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#### 5.2.10 Project G: Storm Water Monitoring for compliance with MS4 permit (Program)

The evaluation of this program is presented in Table 5–1 and discussed below:

- Water Quality – This project was assigned a Medium water quality benefit rating because implementing the projects included in this plan will:
  - Evaluate the efficacy of various types of LID techniques at multiple locations within the City of Chico.
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.
- Water Supply – This program was assigned a None water supply benefit rating because it will not increase groundwater recharge.
- Flood Management – This project was assigned a None flood management rating benefit because implementing the monitoring projects included in this plan will not address flood control.
- Environmental Benefit – This program was assigned a Low environmental benefit rating because it will identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement.
- Community Benefit – This program was assigned a Low community benefit rating because it will data collected during monitoring could be used to enhance outreach and education opportunities for the community on the benefits of reducing pollutants.
- Initial Costs – The level of effort and cost of preparing this plan is provided in Table 5-11. These costs include only City costs.
- Permit Requirements – No permits will be required for the implementation of Project G: Storm Water Monitoring for Compliance with MS4 Permit.
- Environmental Impacts – No environmental impacts will occur from the implementation of this program.

**Table 5-11. Estimated Annual Cost for Preparing Project G: Storm Water Monitoring for Compliance with MS4 Permit**

Bid Item	Estimated Cost, dollars
Operation	39,000
<b>Total</b>	<b>\$39,000</b>

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#### 5.2.11 Project I: Trash Reduction Master Plan and Specific Implementation Projects (Plan Plus Meyers and Otterson Industrial Park)

Project I is the preparation of a trash master plan and specific implementation projects. As part of the project evaluation, two watersheds with high-trash generating land uses were identified and evaluated further. The evaluation of this planning project is presented in Table 5–1 and discussed below:

- **Water Quality** – This project was assigned a High water quality benefit rating because implementing the projects included in this plan will remove trash from the creeks and streams of Chico.
  - A trash capture device at Meyers Street Industrial Park watershed will remove approximately 683 gallons of trash per year.
  - A trash capture device at Otterson Drive Industrial Park watershed will remove approximately 415 gallons of trash per year.
- **Water Supply** – This project was assigned a None water supply benefit rating because implementing trash capture is not expected to change infiltration and groundwater recharge nor increase water supply reliability or water conservation.
- **Flood Management** – This project was assigned a None flood management benefit rating because implementing trash capture devices is not expected to improve flood management.
- **Environment** – This project was assigned a High environmental benefit rating because implementing trash capture projects will remove trash from waterways, which will improve habitat.
- **Community** – This project was assigned a High community benefit rating because implementing trash capture will:
  - Remove trash from waterways, which will beautify the community.
  - Involve the community in helping reduce trash in waterways.
  - Expand existing public education and outreach campaigns to help reduce trash in the community.
- **Initial Costs** – The level of effort and cost of preparing this plan is provided in Table 5-12. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- **Construction and Total Capital Costs (Meyers Street)** – The construction and total capital costs of implementing the Meyers Street trash capture project are approximately \$60,700. These costs include both City and consultant costs. Annual O&M costs were estimated to be around \$4,000. A detailed cost estimate is included in Appendix 5D.
- **Construction and Total Capital Costs (Otterson Drive)** – The construction and total capital costs of implementing the Otterson Drive trash capture project are approximately \$63,500. These costs include both City and consultant costs. Annual O&M costs were estimated to be around \$4,000. A detailed cost estimate is included in Appendix 5D.



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- **Permit Requirements** – Coordination with the State Water Resources Control Board will be required for preparing the plan for Project I: Trash Reduction Master Plan. Depending on the location of trash capture devices, permits likely required for the implementation of devices identified in the plan include a CDFW Stream Bed Alteration Agreement, a RWQCB CWA Section 401 certification, a USACE CWA Section 404 permit, a CVFPB encroachment permit. Also, coordination with the USACE and local mosquito and vector control districts will be required.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Implementation of trash capture devices that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction-related impacts.

**Table 5-12. Estimated Cost for Preparing Project I: Trash Reduction Master Plan and Specific Implementation Projects**

Benefit Category	Estimated Level of Effort, hours	Estimated Cost, dollars
Trash Capture Study	374	72,000
Trash Reduction Strategies and Outreach	109	23,400
<b>Total</b>	<b>483</b>	<b>\$95,400</b>

#### 5.2.12 Project M: Big Chico Creek 21st Century Management Plan (Plan)

The evaluation of this planning project is presented in Table 5–1 and discussed below:

- **Water Quality** – This project was assigned a High water quality benefit rating because implementing the projects included in this plan will:
  - Identify opportunities for implementing various types of low impact development (LID) techniques at multiple locations.
  - Evaluate nonstructural techniques to improve water quality through public education, provide swim diaper dispensing machines at swimming holes, provide pet waste bags, improve the Sycamore Pool cleaning procedures, and provide water quality public education workshops.
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.
  - Include water quality treatment facilities in the bottoms of any flood control detention basins identified in this project.
  - Evaluate water quality impacts from illegal camping (such as disposal of human waste, sharps, and other biohazards) along waterways and identify approaches to reduce this waste.

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- **Water Supply** – This project was assigned a Medium water supply benefit rating because implementing the projects included in this plan will:
  - Identify LID opportunities, many of which will increase groundwater recharge.
  - Evaluate open space areas for increasing infiltration and groundwater recharge.
  - Identify and evaluate storm water capture and reuse projects, which could reduce demands on the potable water system. If flood control detention basins are needed, they will be designed to also optimize infiltration.
- **Flood Management** – This project was assigned a High flood management rating benefit because implementing the projects included in this plan will:
  - Assess existing and future (at buildout of the City of Chico) flooding.
  - Identify the causes of the flooding.
  - Develop solutions to reduce or eliminate the flooding.
  - Develop a system of stream stage and flow gages with telemetry that will provide data for “real-time” management of flood warnings and flood management operations, and the data will be permanently recorded for other future uses.
  - Evaluate the use of LID techniques to help reduce flood flows.
- **Environmental Benefit** – This project was assigned a High environmental benefit rating because implementing the projects included in this plan will:
  - Identify how to remove fish migration blockages (such as the fish ladder at Iron Canyon).
  - Evaluate the health of floodplain habitats and protection of endangered species.
  - Remove invasive vegetation and install appropriate, native California vegetation.
  - Develop and implement a comprehensive gravel, erosion, and sediment management plan to protect and improve the quality of the Big Chico Creek habitat.
  - Map areas of erosion and sediment deposition along the banks and bed of Big Chico Creek and identify solutions to reduce the erosion and resulting sediment deposition.
  - Identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.
- **Community Benefit** – This project was assigned a High community benefit rating because implementing the projects included in this plan will:
  - Identify recreation opportunities such as pedestrian and bike trails, parks, and sports fields, outdoor exercise courses, fishing, swimming, and wildlife viewing.
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
  - Emphasize community input on planning the recreational opportunities.

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- Initial Costs – The level of effort and cost of preparing this plan is provided in Table 5-13. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- Permit Requirements – No permits will be required for the preparation of Project M: Big Chico Creek 21st Century Management Plan. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include a CDFW Stream Bed Alteration Agreement, a RWQCB CWA Section 401 certification, a USACE CWA Section 404 permit, a CVFPB encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities. Also, coordination with the USACE will be required.
- Environmental Impacts – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction-related impacts to Big Chico Creek.

**Table 5-13. Estimated Cost for Preparing Project M: Big Chico Creek 21st Century Management Plan**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Water Quality	490	97,000
Water Supply	300	60,000
Flood Management	1,450	290,500
Environmental Benefits	690	146,300
Community Benefits	400	90,600
<b>Total</b>	<b>3,330</b>	<b>\$684,400</b>

#### 5.2.13 Project N: Little Chico Creek 21st Century Management Plan (Plan)

The evaluation of this planning project is presented in Table 5–1 and discussed below:

- Water Quality – This project was assigned a High water benefit quality rating because implementing the projects included in this plan will:
  - Identify opportunities for implementing various types of LID techniques at multiple locations.
  - Evaluate nonstructural techniques to improve water quality through public education, providing pet waste bags, and providing water quality public education workshops.
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.

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- Include water quality treatment facilities in the bottoms of any flood control detention basins identified in this project.
- Evaluate water quality impacts from illegal camping (such as disposal of human waste, sharps, and other biohazards) along waterways and identify approaches to reduce this waste.
- Water Supply – This project was assigned a Medium water supply benefit rating because implementing the projects included in this plan will:
  - Identify LID opportunities, many of which will increase groundwater recharge.
  - Evaluate open space areas for increasing infiltration and groundwater recharge.
  - Identify and evaluate storm water capture and reuse projects, which could reduce demands on the potable water system. If flood control detention basins are needed, they will be designed to also optimize infiltration.
- Flood Management – This project was assigned a High flood management benefit rating because implementing the projects included in this plan will:
  - Assess existing and future (at buildout of the City of Chico) flooding through the City and downstream to at least Ord Ferry Road. Also included is an evaluation of the diversion culverts and channel from Little Chico Creek to Butte Creek including the wintertime diversion of the Comanche Creek flow near Skyway Road.
  - Identify the causes of the flooding.
  - Develop solutions to reduce or eliminate the flooding.
  - Develop a system of stream stage and flow gages with telemetry that will provide data for “real-time” management of flood warnings and flood management operations, and permanently record the data for other future uses.
  - Evaluate the use of LID techniques to help reduce flood flows.
- Environmental Benefit – This project was assigned a High environmental benefit rating because implementing the projects included in this plan will:
  - Evaluate the health of floodplain habitats and protection of endangered species.
  - Remove *Arundo donax* and other invasive vegetation and install appropriate, native California vegetation.
  - Develop and implement a comprehensive gravel, erosion, and sediment management plan to protect and improve the quality of the Big Chico Creek habitat.
  - Map areas of erosion and sediment deposition along the banks and bed of Big Chico Creek and identify solutions to reduce the erosion and resulting sediment deposition.
  - Identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.

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- **Community Benefit** – This project was assigned a High community benefit rating because implementing the projects included in this plan will:
  - Identify recreation opportunities such as pedestrian and bike trails, parks, and sports fields, outdoor exercise courses, and wildlife viewing.
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
  - Emphasize community input on planning the recreational opportunities.
- **Initial Costs** – The level of effort and cost of preparing this plan is provided in Table 5-14. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- **Permit Requirements** – No permits will be required for the preparation of Project N: Little Chico Creek 21st Century Management Plan. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include a CDFW Stream Bed Alteration Agreement, a RWQCB CWA Section 401 certification, a USACE CWA Section 404 permit, a CVFPB encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities. Also, coordination with the USACE will be required.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction-related impacts to Little Chico Creek.

**Table 5-14. Estimated Cost for Preparing Project N: Little Chico Creek 21st Century Management Plan**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Water Quality	340	66,000
Water Supply	240	47,000
Flood Management	1,090	220,000
Environmental Benefits	520	110,000
Community Benefits	320	73,000
<b>Total</b>	<b>2,510</b>	<b>\$516,000</b>

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#### 5.2.14 Project O: Comanche Creek Management Plan (Plan Plus Crouch Ditch Project)

The evaluation of this planning project is presented in Table 5–1 and discussed below. As part of the project evaluation, a watershed identified in the project description was evaluated for trash capture.

- **Water Quality** – This project was assigned a High water quality benefit rating because implementing the projects included in this plan will:
  - Identify opportunities for implementing various types of LID techniques at multiple locations.
  - Evaluate nonstructural techniques to improve water quality through public education, providing pet waste bags, and providing water quality public education workshops.
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.
  - Include water quality treatment facilities in the bottoms of any flood control detention basins identified in this project.
  - Evaluate water quality impacts from illegal camping (such as disposal of human waste, sharps, and other biohazards) along waterways and identify approaches to reduce this waste.
  - A trash capture device at Crouch Ditch prior to entering Comanche Creek watershed will remove approximately 3,619 gallons of trash.
- **Water Supply** – This project was assigned a Medium water supply benefit rating because implementing the projects included in this plan will:
  - Identify LID opportunities, many of which will increase groundwater recharge.
  - Evaluate open space areas for increasing infiltration and groundwater recharge.
  - Identify and evaluate storm water capture and reuse projects, which could reduce demands on the potable water system. If flood control detention basins are needed, they will be designed to also optimize infiltration.
- **Flood Management** – This project was assigned a High flood management benefit rating because implementing the projects included in this plan will:
  - Assess existing and future (at buildout of the City of Chico) flooding from the wintertime Comanche Creek diversion downstream to Ord Ferry Road
  - Identify the causes of the flooding.
  - Develop solutions to reduce or eliminate the flooding.
  - Develop a system of stream stage and flow gages with telemetry that will provide data for “real-time” management of flood warnings and flood management operations, and the data will be permanently recorded for other future uses.
  - Evaluate the use of LID techniques to help reduce flood flows.

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- **Environmental Benefit** – This project was assigned a High environmental benefit rating because implementing the projects included in this plan will:
  - Evaluate the health of floodplain habitats and protection of endangered species.
  - Remove invasive vegetation and install appropriate, native California vegetation.
  - Develop and implement a comprehensive gravel, erosion, and sediment management plan to protect and improve the quality of the Big Chico Creek habitat.
  - Map areas of erosion and sediment deposition along the banks and bed of Big Chico Creek will be mapped and identify solutions to reduce the erosion and resulting sediment deposition.
  - Identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.
- **Community Benefit** – This project was assigned a High community benefit rating because implementing the projects included in this plan will:
  - Identify recreation opportunities such as pedestrian and bike trails, parks, sports fields, outdoor exercise courses, and wildlife viewing.
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
  - Emphasize community input on planning the recreational opportunities.
- **Initial Costs** – The level of effort and cost of preparing this plan is provided in Table 5-15. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- **Construction and Total Capital Costs** – The construction and total capital costs of implementing a trash capture project are approximately \$37,600. These costs include both City and consultant costs. Annual O&M costs were estimated to be around \$2,000. A detailed cost estimate is included in Appendix 5D.
- **Permit Requirements** – No permits will be required for the preparation of Project O: Comanche Creek Management Plan. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include a CDFW Stream Bed Alteration Agreement, a RWQCB CWA Section 401 certification, a USACE CWA Section 404 permit, a CVFPB encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities. Also, coordination with the USACE will be required.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction-related impacts to Comanche Creek.

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**Table 5-15. Estimated Cost for Preparing Project O: Comanche Creek Management Plan**

Benefit Category	Estimated Level of Effort, hours	Estimated Cost, dollars
Water Quality	300	60,000
Water Supply	220	43,000
Flood Management	980	198,000
Environmental Benefits	400	86,000
Community Benefits	250	57,000
<b>Total</b>	<b>2,150</b>	<b>444,000</b>

#### 5.2.15 Project P: Updating the City's Storm Water Master Plan and Policies (Plan Plus Project 21 City Corp Yard)

The evaluation of this planning project is presented in Table 5–1 and discussed below:

- Water Quality – This project was assigned a High water quality benefit rating because implementing the projects included in this plan will:
  - Develop computer models of the City's drainage systems that are capable of modeling water quality.
  - Develop water quality best management practices and water quality monitoring to improve water reuse opportunities.
  - Update the City's development standards to identify water quality improvements and facilities that are needed and appropriate sizing criteria.
  - Identify areas where LID and green streets can be implemented.
  - Evaluate nonstructural techniques to improve water quality through public education and provide water quality public education workshops, such as river-friendly landscaping.
  - Identify opportunities to collaborate with existing watershed protection groups to evaluate improving water quality.
  - Evaluate water quality impacts from illegal camping (such as disposal of human waste, sharps, and other biohazards) along waterways and identify approaches to reduce this waste.
- Water Supply – This project was assigned a High water supply benefit rating because implementing the projects included in this plan will:
  - Identify LID opportunities, many of which will increase groundwater recharge.
  - Evaluate opportunities for increasing infiltration and groundwater recharge and develop standards for when groundwater recharge should be implemented.
  - Identify and evaluate storm water capture and reuse projects, which could reduce demands on the potable water system.



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- Flood Management – This project was assigned a High flood management benefit rating because implementing the projects included in this plan will:
  - Update the City’s Storm Drainage Master Plan and develop solutions to reduce or eliminate flooding.
  - Evaluate the use of LID techniques to help reduce flood flows.
- Environmental Benefit – This project was assigned a Medium environmental benefit rating because implementing the projects included in this plan will:
  - Evaluate the health of floodplain habitats and protection of endangered species.
  - Identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.
- Community Benefit – This project was assigned a Medium community benefit rating because implementing the projects included in this plan will:
  - Document the existing education and outreach programs and evaluate improvements to these existing programs to better protect watershed health, including in disadvantaged communities.
  - Develop a program (or enhance current efforts) and budget to utilize citizen monitoring to evaluate project effectiveness, perform MS4 permit monitoring as appropriate, and monitor receiving waters to track cumulative effects of implementation projects for improving water quality.
- Initial Costs – The level of effort and cost of preparing this plan is provided in Table 5-16. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- Permit Requirements – No permits will be required for the preparation of Project P: Updating the City’s Storm Water Master Plan and Policies.
- Environmental Impacts – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment.

**Table 5-16. Estimated Cost for Preparing Project P: Updating the City’s Storm Water Master Plan and Policies**

Benefit Category	Estimated Level of Effort, hours	Estimated Cost, dollars
Water Quality	500	97,000
Water Supply	300	60,000
Flood Management	330	66,000
Environmental Benefits	300	62,800
Community Benefits	200	45,000
<b>Total</b>	<b>1600</b>	<b>\$330,800</b>

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#### 5.2.16 Project Q: Teichert Ponds Improvement Project (Plan Plus)

The evaluation of this planning project is presented in Table 5–1 and discussed below. As part of the project evaluation, the Teichert Ponds watershed was evaluated for trash capture.

- **Water Quality** – This project was assigned a High water quality benefit rating because implementing the projects included in this plan will:
  - Evaluate various efforts to improve water quality, including a study to assess water quality entering and leaving the ponds to identify potential issues, sources, and solutions for water quality impairments; installing a settling basin (possibly by modifying the existing concrete inlet channel) and/or a constructed wetlands that help reduce sedimentation, trash, and other pollutants in the ponds; re-routing smaller storm drains so they don't discharge directly into Pond 1, identifying pollutants in silt and removing silt buildup in the ponds; separating Pond 1 from Ponds 2 and 3; and modifying Ponds 2 and 3 so that they can be periodically drained and cleaned.
  - Evaluate the effectiveness and feasibility of source reduction for trash and pollutants, including locations in the Teichert Ponds watershed where LID could be installed to help improve water quality and reduce runoff.
  - Identify ways to reduce trash (both floating and sinking trash) entering and leaving Teichert Ponds, such as trash racks on the pond inlets or outlet. A trash reduction campaign will also be evaluated for reducing trash entering the ponds, such as an increase in trash receptacles, increase in street sweeping, installation of trash capture devices in upstream drain inlets, and ways to limit illegal camping in the pond areas. This program will include education/outreach to citizens. It will include coordination with Caltrans, the upstream commercial areas, and organizations that already perform trash cleanups (such as Butte Environmental Council).
  - A trash capture device installed at the inlet to Teichert Ponds in the concrete channel will remove approximately 3,644 gallons of trash.
- **Water Supply** – This project was assigned a None water supply benefit rating because implementing these projects is not expected to change the infiltration and groundwater recharge capabilities of Teichert Ponds.
- **Flood Management** – This project was assigned a Medium flood management benefit rating because the operations of the pond will be improved, including reconstructing the existing outlet to provide greater hydraulic control, reducing the desirability for beavers to build dams that block pond outflow, and reducing flooding on the access road to facilitate maintenance.
- **Environment** – This project was assigned a High environment benefit rating because the implementation of the projects in this plan will:
  - Identify ways to improve the existing wildlife and riparian habitat at the Ponds. Habitat will also be considered in the development of solutions that are needed to improve water quality and maintenance.

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- Identify invasive aquatic and terrestrial plants and various solutions for treating invasive species; including use of herbicides where necessary, professional removal services, and a program to coordinate City efforts with interested community organizations to remove invasive plants and plant native species.
- Identify solutions to water quality impairments, which will improve aquatic and riparian habitats.
- Include an ecological and biological assessment to evaluate ecosystem health.
- **Community** – This project was assigned a High community benefit rating because the implementation of the projects in this plan will:
  - Provide educational opportunities, including school field trips and walking paths with educational signage.
  - Evaluate how to limit illegal camping and illegal dumping in the area.
  - Identify where walking paths, education, signage, and picnic areas could be constructed and incorporated into the Chico Bike Path.
  - Identify community groups to lead volunteer educational/outreach efforts.
  - Green jobs training could be evaluated for implementation of construction projects and vegetation management.
  - Include ideas for collaboration with existing monitoring programs and ways to provide public storm water education and outreach.
  - The Pond and habitat health could be monitored by citizen organizations, including water quality testing.
- **Initial Cost** – The level of effort and cost of preparing this plan is provided in Table 5-17. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.
- **Construction and Total Capital Costs** – The construction and total capital costs of implementing a trash capture project are approximately \$163,700. These costs include both City and consultant costs. Annual O&M costs were estimated to be around \$6,000. A detailed cost estimate is included in Appendix 5D.
- **Permit Requirements** – No permits will be required for the preparation of Project Q: Teichert Ponds Improvement Project Plan. However, the permits that will likely be required for the implementation of the improvements identified in the plan include a CDFW Stream Bed Alteration Agreement, a RWQCB CWA Section 401 certification, a USACE CWA Section 404 permit, a CVFPB encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities.
- **Environmental Impacts** – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction-related impacts to Teichert Ponds and Little Chico Creek.



**Table 5-17. Estimated Cost for Preparing Project Q: Teichert Ponds Detention Basin**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Operations and Maintenance Improvements Study	562	107,240
Tash Capture Facility	130	26,350
Habitat/Vegetation Plan	207	42,570
Community Benefits	208	48,050
<b>Total</b>	<b>1107</b>	<b>224,210</b>

#### 5.2.17 Project R: Fair Street Detention Basin Improvement Project (Plan Plus Trash Project)

The evaluation of this planning project is presented in Table 5-1 and discussed below. As part of the project evaluation, the Fair Street Detention Basin watershed was evaluated for trash capture.

- **Water Quality** – This project was assigned a Medium water quality benefit rating because implementing the projects included in this plan will:
  - Identify ways to reduce trash entering and leaving the Ponds, such as trash racks on the pond inlets or outlet.
  - A trash capture device at the Fair Street Detention Basin outlet structure will remove approximately 5,425 gallons of trash.
- **Water Supply** – This project was assigned a None water supply benefit rating because implementing these projects are not expected to change the infiltration and groundwater recharge capabilities of Fair Street Detention Basin.
- **Flood Management** – This project was assigned a Medium flood management benefit rating because the BD ditch will be evaluated to identify flooding problems, and solutions to fix these problems will be implemented.
- **Environment** – This project was assigned a Medium environment benefit rating because the implementation of the projects in this plan will:
  - Identify invasive aquatic and terrestrial plants and various solutions for treating invasive species; including use of herbicides where necessary, professional removal services, and planting native vegetation.
- **Community** – This project was assigned a Low community benefit rating because the implementation of the projects in this plan will:
  - Evaluate ways to improve vector control to promote public health.
  - Improve community recreation by updating the wildlife viewing area.
- **Initial Cost** – The level of effort and cost of preparing this plan is provided in Table 5-18. These costs include both City and consultant costs. A detailed cost estimate is included in Appendix 5D.

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- Construction and Total Capital Costs – The construction and total capital costs of implementing a trash capture project are approximately \$92,200. These costs include both City and consultant costs. Annual O&M costs were estimated to be around \$6,000. A detailed cost estimate is included in Appendix 5D.
- Permit Requirements – No permits will be required for the preparation of Project Q: Teichert Ponds Improvement Project Plan. However, the permits that will likely be required for the implementation of the improvements that will be identified in the plan include a CDFW Stream Bed Alteration Agreement, a RWQCB CWA Section 401 certification, a USACE CWA Section 404 permit, a CVFPB encroachment permit, and attaining coverage under the California General Permit for Storm Water Discharge Associated with Construction Activities.
- Environmental Impacts – No environmental impacts will occur from the preparation of this plan. Implementation of the projects that will be identified in the plan should mostly result in improvements to the environment. However, implementation of these projects could result in temporary construction-related impacts to Teichert Ponds and Little Chico Creek.

**Table 5-18. Estimated Cost for Preparing Project R: Fair Street Detention Basin**

Task	Estimated Level of Effort, hours	Estimated Cost, dollars
Ditch and Basin Hydraulic Study	500	100,000
Tash Capture Study	154	30,900
Landscape Plan	123	23,700
Wildlife Viewing Area	96	20,300
<b>Total</b>	<b>873</b>	<b>174,900</b>

### 5.3 PROJECT RANKING/PRIORITIZATION

The projects are ranked in Table 5-19 based on their total normalized point scores (from Table 5-1). Project 77: Revised LID and Green Infrastructure Implementation Program for Butte County Schools A has the highest ranking of 1 is the highest total normalized point score, and consequently is ranked number 1. This ranking is based only on the State's SWRP benefit categories, and does not include estimated cost or regulatory requirements that will affect project scheduling. See Chapter 6 for the project implementation plan and schedule, which includes availability of project funding, project dependencies, *etc.*

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**Table 5-19. Project Ranking Summary Based on Multiple Benefit Evaluation**

Ranking	Project Title	Total Normalized Points
1	77: Revised LID and Green Infrastructure Implementation Program for Butte County Schools	273.6
2	65: Laxson South Bioswale	234.0
3	85: Chapman Mulberry Rain Garden	210.5
4	40: Parking Lot 4 Rehabilitation #50019	203.8
5	O: Comanche Creek Management Program and Implementation Projects	60.8
6	M: Big Chico Creek 21st Century Management and Implementation Projects	57.0
7	N: Little Chico Creek 21st Century Management Plan and Implementation Projects	57.0
8	P: Updating the City's Storm Water Planning and Policies and Implementation Projects	54.5
9	33: Mud and Rock Creek Flood Protection Project	52.8
10	Q: Teichert Ponds Improvement Project	44.6
11	R: Fair Street Detention Basin Improvement Project	34.2
12	73: Bidwell Avenue/Grape Way Storm Water Protection and Restoration Project	33.3
13	16 and 68: Channel Stabilization and Hydrologic Floodplains on Streams	31.4
14	44: 5 Mile and Lindo Channel Diversion Structures Study	30.3
15	I: Trash Reduction Master Plan and Specific Implementation Projects	28.6
16	59: Routine Community Creek Clean Up Project	25.0
17	G: Storm Water Monitoring for compliance with MS4 permit	11.0