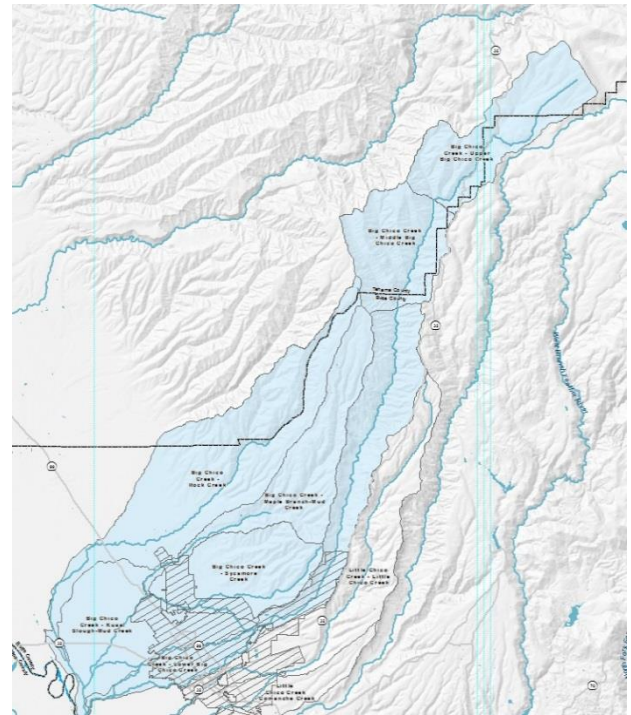


BIG CHICO CREEK 21ST CENTURY MANAGEMENT PLAN (SWRP PROJECT M)

General Project Information

This project includes a plan to manage the Big Chico Creek watershed as a holistic system with opportunities to leverage funds from County Service Area 24. The public will be encouraged to participate in the development of the plan through identification of problems to be addressed in the plan and providing input on the identified causes and recommended solutions to the problems. The plan development will be coordinated with the City of Chico, Butte County, the California Department of Fish and Wildlife, the California of Water Resources, the US Army Corps of Engineers, and other appropriate agencies. The plan will include at least the following topics:

- **Flooding:** Assess existing and future (at buildout of the City of Chico) flooding, identify the causes of the flooding, and develop a solution to reduce or eliminate the flooding. The flood evaluations will be performed using modern analysis techniques such as Geographical Information Systems land use mapping, topographic mapping, and hydrologic and hydraulic modeling to identify flooding areas. Other modern techniques include installation of stream stage and flow gages with telemetry to record the flow data. The flow data can be used for “real time” management of flood warnings and flood management operations. Once the flooding problems have been identified, solutions will be evaluated, including options for regional and local detention basins and enlargement of undersized channels, bridges, and culverts. Potential locations for detention basins include downstream of Vallombrosa Bridge and Lower Bidwell Park just west of the most eastern parking area off Petersen Memorial Drive. The potential for Low Impact Development (LID) techniques to help reduce flood flows will also be evaluated.
- **Water Quality:** Opportunities for implementing LID techniques will be identified, including adding bioswales or biofilters to storm water outlets from Manzanita Avenue to Esplanade, in Bidwell Park, and in Upper Park. Other LID techniques that will be evaluated include pervious pavement, infiltration trenches, vegetated buffer strips, bioretention, media filters, constructed wetlands, and green streets. Additional, nonstructural techniques to improve water quality through public education will be evaluated in the plan, including providing swim diaper dispensing machines at swimming holes, pet waste bags, improving the Sycamore Pool cleaning procedures, and providing water quality public education workshops. The plan will also identify opportunities to collaborate with existing watershed protection groups, such as Butte Environmental Council, Stream Team, Friends of Bidwell Park, etc., to evaluate the efficacy of the projects for improving water quality. If flood control detention basins are needed, they will be designed to also provide water quality treatment such as treatment swales and wetlands in the bottom of the basins.



Big Chico Creek Watershed

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- **Water Supply:** Opportunities to increase groundwater recharge will be evaluated. Several open space areas for increasing infiltration have been identified as potential infiltration sites, including city property just upstream of the Madrone bike bridge in Lindo Channel and areas in Bidwell Park and Greenways. The potential for storm water capture and reuse projects will be identified and evaluated, which could reduce demands on the potable water system. If flood control detention basins are needed, they will be designed to also optimize infiltration.
- **Recreation:** Recreation opportunities will be identified, such as pedestrian and bike trails, parks, and sports fields located in or adjacent to detention basins or LID projects, outdoor exercise courses, fishing, swimming, and wildlife viewing. The plan will emphasize community input on recreational opportunities.
- **Gravel, Erosion, and Sediment Management:** The plan will include a comprehensive gravel, erosion, and sediment management evaluation. Management of gravel, erosion, and sediment, is critical to protect and improve the quality of the Big Chico Creek habitat. Areas of erosion along the banks and bed of Big Chico Creek will be mapped. Solutions to control the erosion and reduce the sediment in the creek will be developed. Several erosion and sediment buildup areas of concern have already been identified, including near Hooker Oak Park, near Sycamore Channel Diversion Weir, Upper Park Road, and Vallombrosa Bridge.
- **Ecosystem:** The plan will also evaluate the ecosystem health and identify ways to improve the ecosystem; including removal of fish migration blockages (such as the fish ladder at Iron Canyon), evaluation of the health of floodplain habitats, protection of endangered species such as the Valley Elderberry Longhorn Beetle and spring run salmon, and removal of invasive plants and installation of native plants. The water quality impacts and management approaches of illegal camping (such as disposal of human waste, sharps, and other biohazards) along waterways will be identified. The plan will identify approaches for long-term monitoring of ecosystem health using citizen monitoring and involvement where appropriate.
- **Public Outreach and Education:** The plan will summarize existing education and outreach programs and will evaluate improvements to these existing programs to protect watershed health, including in disadvantaged communities. Examples of existing programs include the Clean Water Science Ambassadors, Clean Creeks in the Classroom, and the Citizen Monitoring Program. This plan will involve preparing an education and outreach plan and budget that includes: 1) opportunities to collaborate with existing watershed protection groups, such as Butte Environmental Council, Stream Team, Friends of Bidwell Park, *etc.* 2) evaluates and monitors the efficacy of the projects for reducing erosion and improving water quality, and 3) provides public education and outreach events. Some topics for education include residential landscaping to conserve water, dry weather runoff capture, river-friendly landscaping, and residential pesticides and fertilizer management.
- **Funding:** Existing storm water programs will be integrated into the projects where applicable, and where appropriate grant program local match funding requirements can be met by volunteer hours. The plan will also identify specific project elements and programs that can be implemented relatively easily and at relatively low cost.
- **Watershed and Location:** This project includes the entire Big Chico Creek Watershed; approximately 134,159 acres.

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Benefits Resulting from this Project

This project includes the preparation of the Big Chico Creek 21st Century Management Plan. When the Big Chico Creek 21st Century Management Plan is fully implemented, the following benefits are expected to occur:

- **Water Quality:** Water quality is expected to improve because implementing LID, reducing urban runoff, improving riparian habitat, and minimizing erosion and scour will reduce the amount of sediment and other pollutants in receiving waters.
- **Water Supply:** Water supply is expected to improve because implementing infiltration areas will allow some flows to recharge groundwater. Additionally, the use of drought-tolerant plants, efficient irrigation methods, and capture and reuse in LIDs will also conserve water.
- **Flood Management:** Flood management is expected to improve because solutions identified in this plan will help reduce flooding problems.
- **Environmental:** The environment is expected to improve because implementing this plan will help remove invasive species, plant native species, and improve aquatic and riparian habitat.
- **Community:** The community is expected to improve because the plan enhances recreational opportunities and expands education and outreach regarding storm water.

Project Costs

- **Estimated Plan Preparation Cost:** The estimated cost of preparing this plan is \$TBD. This cost does not include the costs of designing and constructing the improvements that will be identified in the plan.

Project Photographs



Flooding in Big Chico Creek

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Initial Projects Included

This project includes the following Initial Projects in whole or in part:

- 1- 21st Century Management Program: Big Chico Creek and Mud Creek Watershed.
- 4- Big Chico Creek bank erosion
- 5- Big Chico Creek storm water detention
- 8- Lindo Channel infiltration enhancement
- 9- Lindo Channel nonpoint pollution
- 12- Mitigating new impacts to Sycamore Bypass
- 19- Grassy Swale in Bidwell Park
- 41- Improve Lindo Channel
- 45- Big Chico Creek and Lindo Channel Diversions Study and Improvements
- 46- Lindo Channel Management Plan
- 48- Sycamore and Mud Creek Flood Control
- 50- Early Flood Warning System
- 52- Upper Watershed
- 53- Urban Riparian Restoration
- 54- Big Chico Creek West of Nord Ave.
- 55- Erosion Management/Prevention
- 64- Upper Park Road Improvements - Erosion Control
- 70- Lindo Channel Storm Water Infiltration and Floodplain Enhancement Project
- 75- Revised Chico State University LID Implementation and Stream Habitat Enhancement Project
- 76- Revised Little Chico Creek, Lindo Channel, Mud/Rock Creek Arundo/Broom Removal and LID Implementation Project
- 79- Revised Five Mile, Lindo Channel, and Sycamore Flood Diversion Storm Water Treatment and Habitat Enhancement Project
- A- Big Chico Creek and Mud Creek Watershed Wide Flood Control, Urban Drainage, Habitat, Public Open Space/Recreation Management Plan
- D- Creek Bank and Bed Stabilization Plan and Specific Projects, including:
- E- Homeless Camping Reduction Program

Additional Project Information

The following information was received during the public review period.

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The 5 Mile Diversion consists of 2 dams and an overflow weir. The gates on the dams are to be fully open from October 15 until April 15 in accordance with the Operation and Maintenance Manual. The dam on Big Chico Creek has 4 slide gates that pass a maximum of 1,500 cfs. The dam on Lindo Channel (Sandy Gulch) has 7 gates and culverts that pass, 6,500 cfs. The Ogee Weir passes 8,500 cfs to accommodate the balance of the 16,000 cfs design flow.

In the January 1997 flood event, the 5 Mile headworks passed greater than 20,000 cfs, according to the DWR Northern District. Water was observed only 6 inches below the levee top at the Big Chico dam. Any operation of the gates not in accordance with the Manual would be unwise.

The dams are usually jammed with logs that should be cleared expeditiously as flows can increase rapidly due to the flashy characteristics of the watershed when impacted by Atmospheric Rivers. Trash racks designed to intercept logs and not impede flow, that can be cleaned quickly between storms, should be built upstream of the dams. Also, some arrangement should be made, such as a seasonal lease, so that a large excavator with a wrist and grapple (like a logging Skidder) can be stationed in advance to clear the gates during high water.

Additionally, it has been observed that the riparian forest and brush in the stilling basin has intercepted many logs while ameliorating erosive flows near the levee.

In the mid 1980's Butte County Public Works undertook major sediment removal in the stilling basin upstream of the Lindo Channel dam. Gravel was removed daylighting the concrete sill at the head of Lindo Channel and establishing a continuous grade to the invert of the Lindo dam barrels. This material was stockpiled with the intent to place it in the gravel starved streams below the dams.

In the 1/1/97 flood a shoal formed mid-channel above the sill and continuing downstream for 150-yds reaching an elevation nearly level with the adjacent levee. An NRCS grant funded partial removal of the shoal to near its current elevation. The sill was not exposed. Removal of this sediment build-up would be a cost-effective way to move toward the mandated 200-year flood protection.

The levee between Big Chico and Lindo is the most critical flood control infrastructure for Chico. Vegetation that ameliorates erosive flows and protects the aforementioned levee should continue to be maintained.

From the time it was built, Sycamore Diversion Channel (SDC) flows eroded all loose material, carried it downstream, and deposited it at the Cohasset Road bridge and in channel just downstream. That deposit compromised channel capacity so badly that the adjacent left bank levee experienced one of 2 greatest freeboard incursions in the entire system during the 1997 flood.

DWR was/is responsible to maintain flow in the channel and so undertook clearing the sediment. Because of perennial drainage from nearby development a substantial wetland habitat had grown.

Big Chico Creek Watershed Alliance and Butte County Flood Control District negotiated with DWR to restore the channel to as built configuration with design features that move sediment through during low flows. The habitat was restored for its benefits as well as to prevent scour during high flows.

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The source of the sediment is up Sycamore Creek where the Sycamore Diversion Channel (10,000 cfs) blasts perpendicularly into South Sycamore Creek (500 cfs). It's a flaw in US Army Corps Engineers design, that they've denied, but DWR is left to design a grade control structure that they've promised to build. If it is not done soon the work below Cohasset Rd bridge will be buried as large flows over the Ogee Weir tear through the sandstone and deliver sand below Cohasset Rd bridge. Non-erodible material should be put in the channel, by some design, to stop the head-cut originating at the confluence of the Diversion Channel and South Sycamore Creek.