

**Rehabilitate Tuolumne Meadows Water Distribution System
Yosemite National Park**

Draft Floodplain Statement of Findings
PEPC #99252



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**REHABILITATE TUOLUMNE MEADOWS WATER DISTRIBUTION SYSTEM
YOSEMITE NATIONAL PARK**

FLOODPLAIN STATEMENT OF FINDINGS

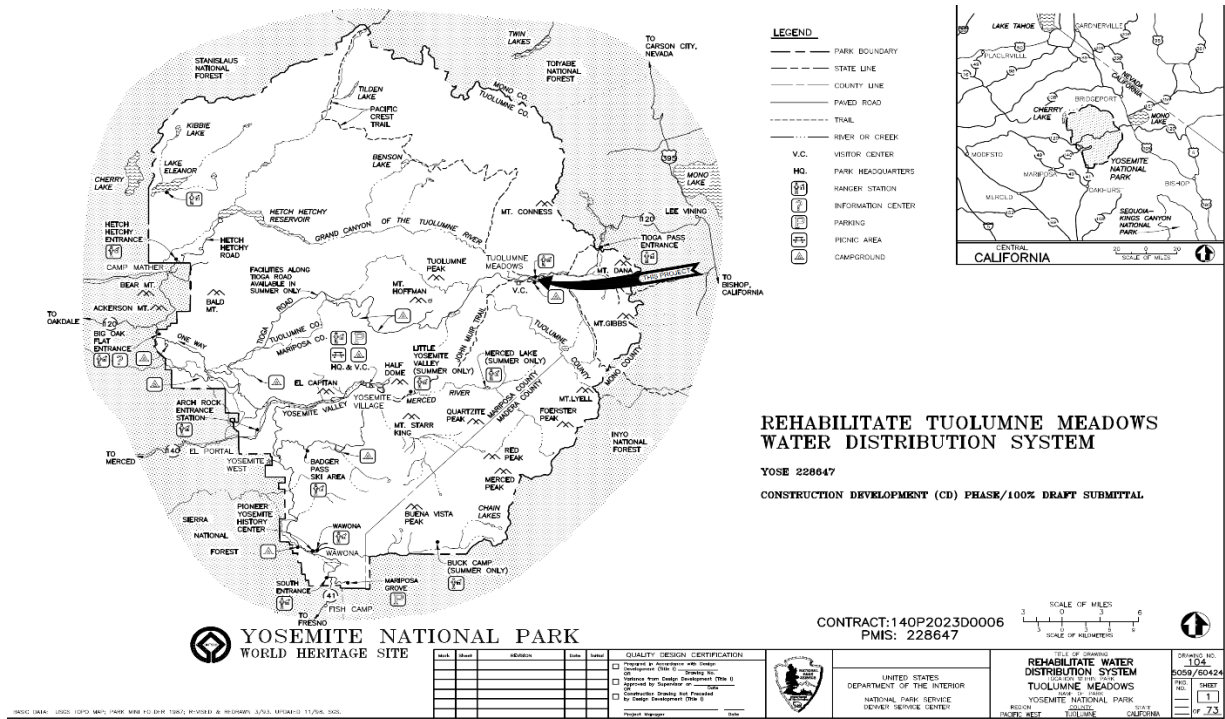
INTRODUCTION

Executive Order (EO) 11988, *Floodplain Management*, and EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, require the National Park Service (NPS) and other federal agencies to evaluate the likely impacts of actions in floodplains. The objective of EO 11988 is to avoid, to the extent possible, the long-term and short-term adverse impacts associated with occupancy, modification, or destruction of floodplains and to avoid indirect support of development and new construction in such areas wherever there is a practicable alternative. EO 13690 was issued to establish a Flood Risk Management Standard for federally funded projects to improve the nation's resilience to floods and to ensure new federal infrastructure will last as long as intended. The NPS administers floodplain policy through Director's Order 77-2: *Floodplain Management* (DO 77-2) and Procedural Manual 77-2 *Floodplain Management* (PM 77-2). NPS also complies with departmental guidance outlined in 520 DM 1, *Floodplain Management and Wetlands Protection Policy and Responsibilities*, and 520 DM 1, *Floodplain Management and Wetlands Protection Program Requirements*.

It is NPS policy to preserve floodplain functions and values and minimize potentially hazardous conditions associated with flooding, including threats to human health/life, risk to NPS capital investment, and impacts on natural and beneficial floodplain values. If a proposed action is found to be in an applicable regulatory floodplain with associated impacts and relocating the action to a non-floodplain site is considered not to be a practicable alternative, then a formal Floodplain Statement of Findings (FSOF) must be prepared (unless excepted per NPS policy). The FSOF must (a) quantify flood conditions and associated hazards as a basis for management decision making, (b) describe the rationale for selection of a floodplain site, (c) disclose the resources and amount of risk associated with the chosen site, and (d) explain flood mitigation plans. The FSOF will be available for public review and comment in coordination with NEPA and other compliance procedures, as applicable. If public review is not provided through the NEPA process (e.g. environmental assessment), another opportunity for public review is necessary.

This Floodplain Statement of Findings:

- Quantifies the flood hazard associated with the Rehabilitate Tuolumne Meadows Water Distribution System
- Presents the rationale for the rehabilitation of proposed facilities within the regulatory floodplain of Tuolumne Meadows, specifically the area in and around the Tioga Bridge.
- Documents the anticipated negative impacts of these improvements on human health/life, capital investment, and floodplain functions and values.
- Presents mitigations to these impacts.



LOCATION

Tuolumne Meadows is located at the East entrance to Yosemite National Park, which is visited by 4 million people annually.

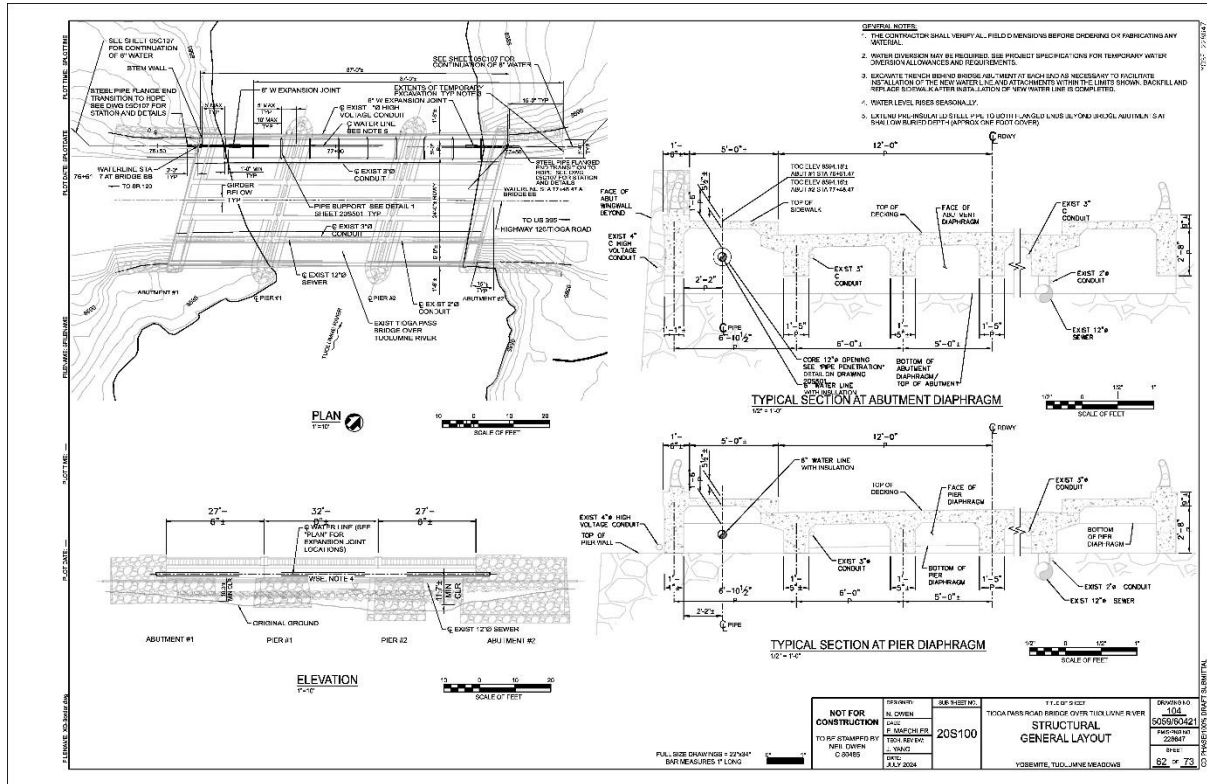
PROPOSED ACTION

The NPS is preparing a Categorical Exclusion (CE) for the repair and rehabilitation of the Tuolumne Meadows water distribution system that provides an average of 34,000 gallons of potable water a day and a daily maximum of 73,000 gallons to NPS facilities, visitors, visitor campgrounds, the local community, concession employees and NPS employee housing. Specific work will include:

- 1) Replace 25,000 linear feet of outdated water line, including distribution mains and laterals to all buildings and facilities. Water line sizes will vary as required, likely between 1-inch to 8-inches. Pipe material will be PVC, HDPE, and DIP.
- 2) Replace 100,000 gallon above grade water tank with a larger above grade tank (size to be validated during design). The existing tank is steel; new tank will likely be steel.
- 3) Replace 8 fire hydrants.
- 4) Install water meters at all facilities (approximately 60 total).

Replacing the outdated piping, will ensure providing potable water that complies with the current state and federal regulations and provide useable water for basic sanitation that reduces potential impact to area surface water that feeds the Tuolumne River, a designated Wild and Scenic River.

All the work in this action is exempt from Director Order #77-2 requirements except for the 37 feet of water line that will be attached to the underside of the Tioga Bridge and lies within the floodplain.



JUSTIFICATION FOR USE OF THE FLOODPLAIN

INVESTIGATION OF ALTERNATIVE SITES

To limit impacts to cultural resources outside the road corridor, the rehabilitated water distribution system follows the road prism and stays in areas of previous disturbance. There is no other reasonable place for the water line to cross the river other than by attaching the water supply line to the Tioga Bridge. Using the bridge is the simplest and least impactful location for the water line to cross the river.

JUSTIFICATION FOR FLOODPLAIN LOCATION

Most of the water line rehabilitation consists of lines that follow the roadway and shoulder but are buried in the ground. This small 37-foot river crossing is a key section of the water supply line needed to distribute potable water throughout Tuolumne Meadows. The current water line also attaches to this historic bridge.

FLOODPLAIN DESCRIPTION, STANDARDS AND RISK

DETERMINATION OF ACTION CLASS AND FFRMS FLOODPLAIN

Following PM 77-2, three action classes were considered when establishing the regulatory floodplain:

1. Class I Actions (i.e. non-critical actions) include location or construction of administrative, residential, warehouse, and maintenance buildings; non-excepted parking lots; or other man-made features which by their nature entice or require individuals to occupy the site, are prone to flood damage, or result in impacts to natural floodplain values.
2. Class II Actions (i.e. critical actions) include any activity for which even a slight chance of flooding is too great such as construction of schools, medical facilities, emergency services, hazardous material storage, and records/collections storage.
3. Class III Actions include any action that involves human occupation or substantial human exposure in high hazard areas such as drainages subject to flash flooding.

Following PM 77-2, the actions associated with the proposed alternative are Class I, or noncritical actions. The regulatory floodplain for Class I actions is the 1 percent annual exceedance probability flood, also referred to as the 100-year flood or the base flood (DO #77-2).

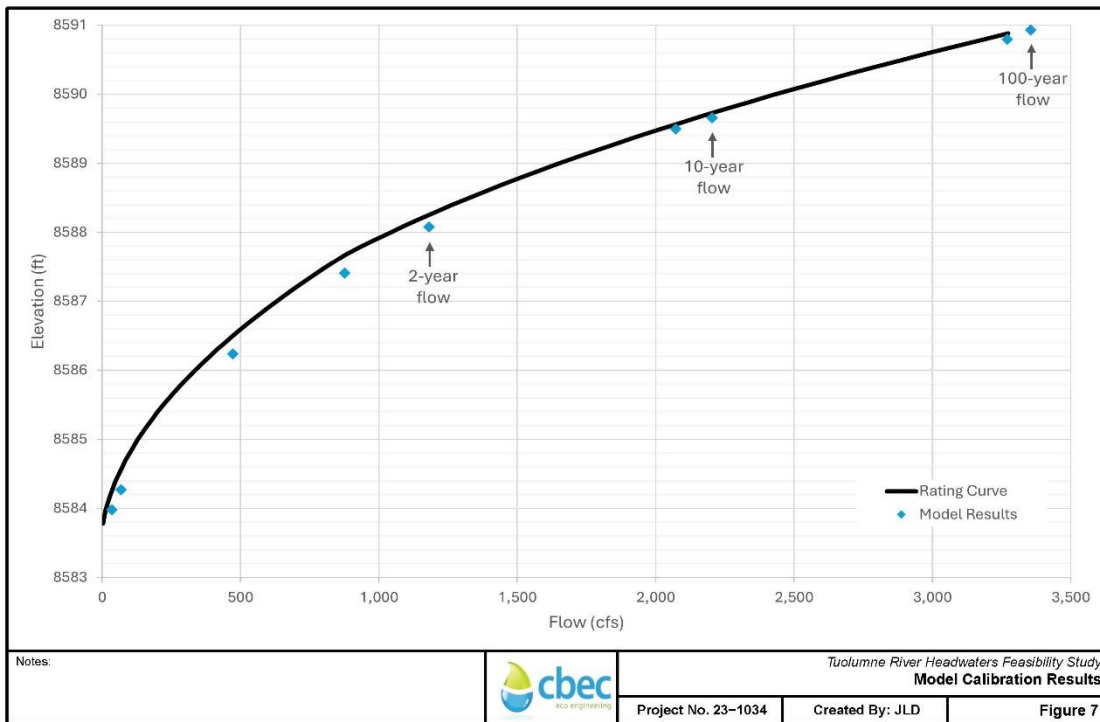
Following EO 13690, any proposed action that involves federal capital investment must include a Federal Flood Risk Management Standard (FFRMS) for new construction, substantial improvement, or repairing substantial damage. Per the Federal Emergency Management Agency's implementing guidelines for EOs 11988 and 13690, agencies may select one of three approaches to implementing the flood resiliency:

- Climate-Informed Science Approach (CISA) – the elevation and flood hazard area that result from using the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding, including climate change and other physical processes (e.g. land-use change).
- Freeboard Value Approach (FVA) – the elevation and flood hazard area that result from adding an additional 2 feet to the base flood elevation (BFE) for non-critical actions and by adding an additional 3 feet to the BFE for critical actions.
- 0.2-Percent Annual-Chance Flood Approach (0.2PFA) – the area subject to flooding by the 0.2-percent (500-year) annual-chance flood.

Freeboard Value Approach establishing FFRMS flood elevations is employed for this proposed action. This method adds 2 feet to the BFE. Therefore, the regulatory floodplain for the proposed action is the 1% annual chance (100-year) flood elevation plus 2 feet.

The park modeled the 100yr flood event at the Tioga Bridge site using a 1D Hec-Ras model, which estimated the 100-yr flood elevation at 8591ft. More recent 2D hydraulic modeling, conducted by cbec ecoengineering, estimated the 100-yr flood elevation at 8591.4ft. Modeled average velocities at this site range from 8-14 ft/s.

Thus, the FFRMS floodplain elevation is 8593 ft (8591 ft plus 2 ft freeboard). The water supply centerline crosses the bridge at elevations ranging from 8591.29 ft - 8592.31 ft. Based on these estimates, during a 100-yr flood the pipeline would be submerged by <1ft of water. The pipeline would be submerged in 1-2 feet of water under the FFRMS flood elevation.



DESCRIPTION OF SITE-SPECIFIC FLOOD RISK

The Dana Fork of the Tuolumne River provides the water source feeding the Tuolumne Meadows water supply line. The extraction point and water storage tank are located to the east of Tuolumne Meadows near the Tuolumne Meadows Lodge. Although the Tuolumne Lodge and some park housing (Ranger Camp, Road Camp, Tuolumne Lodge housing) is located to the east of Tioga Bridge, a high amount of water use occurs in areas west of Tioga Bridge – the Tuolumne Meadows campground area, the Tuolumne SAR site, the Tuolumne store and grill, concessionaire housing, the Visitor Center, and Road Camp. Importantly, the sewage treatment plant serving all of Tuolumne Meadows is also located on the western side of the bridge. If the water supply line across the river is damaged during a flood, these areas would lose their potable water supply and likely these facilities would need to be closed temporarily. Recreational and public health and safety services would be unavailable or diminished during this time.

Potential Risk to Property

The water pipe attached to the bridge will be 6 inch, pre-insulated, steel pipe. It will be attached between steel girders under the bridge which will provide some protection from debris in the case of a flood. The location of the water line will make it possible for the park to regularly inspect the line, and should there be damage or total loss of this section of line, the repair would be simple.

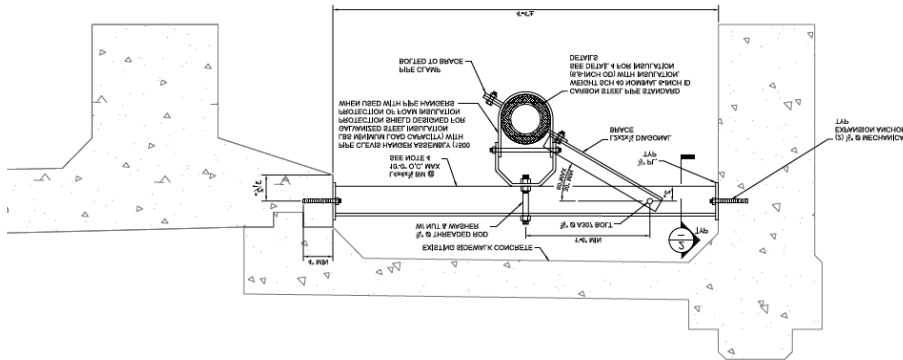
Potential Risk to Floodplain Values

Floodplains provide an array of natural and physical resource values within Yosemite. These values include habitat for vegetation and wildlife, periodic disturbance to habitats within floodplains, which can support ecological value and spatial diversity in habitat, dissipation of flood energy, and benefits to waterway hydrologic processes including fluvial transport mechanisms and river geomorphic processes. The floodplain also recharges groundwater in areas where soils are sufficiently pervious.

Replacement of the existing waterline with a new waterline attached to the underside of the Tioga Bridge will have no significant impact on water-related or other resources from potential leakage should the pipe be damaged. The only discharge would be clean drinking water. The location of the pipe is a man-made historic bridge and will have no impact to wetlands.

FLOODPLAIN IMPACT MITIGATION MEASURES

The design for the new water distribution system will incorporate requirements and methods for minimizing flood damage. The water supply pipe will be securely anchored to the underside of the bridge to mitigate for any damage or loss during a flood.



In addition, park staff maintains an active flood evacuation plan for the Tuolumne Meadows area. The plan details responsibilities of individual park employees for advanced preparedness measures; removing or securing park property; records and utility systems; monitoring communication; and conducting rescue and salvage operations.

Site-Specific Mitigation

- The water supply line will be designed from durable pre-insulated, steel pipe and attached between girders under the bridge to protect against scour or damage from floating debris. Brackets will hold the pipe in place. Long, diagonal bolts will provide additional strength.

- The largest floods in this system occur in the winter months (October thru April) due to atmospheric river events. During these months, the water supply system is shut off and there will be no immediate impacts to facilities or public health and safety if the water line is compromised at the bridge. Damage to the line can be identified and repaired before the water supply system is activated in the spring.

SUMMARY

The NPS has determined that the water supply line attached above ground and to the historic Tioga Bridge must remain within the regulatory floodplain and there are no practicable alternatives to relocating this critical utility. Repairs and rehabilitation of the Tuolumne Meadows Water Distribution System shall take place in compliance with regulations and policies to prevent impacts to property. The NPS concludes that with specified mitigation measures in place there will be no unacceptable risks to human health and safety, unacceptable impacts to property, or substantial long-term adverse impacts to floodplain values. Therefore, the NPS finds the proposed action to be consistent with requirements of Executive Order 11988, Executive Order 13690, and the NPS Directors Order 77-2 for the protection of floodplains.

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