



Yosemite Slough Site

U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • August 2013

EPA Proposes Cleanup Plan for Yosemite Slough

The United States Environmental Protection Agency (EPA) has completed a draft plan to clean up Yosemite Slough ("Slough" or "Site") located in the Bayview District of San Francisco, California. This fact sheet provides summary information on EPA's recommended cleanup plan for the Slough and how the public can comment on EPA's proposal. For detailed information on EPA's cleanup plan, please contact EPA and request a copy of the technical document called draft Engineering Evaluation/Cost Analysis or "EE/CA" for the Yosemite Slough cleanup project. EPA contact information can be found on the back page of this fact sheet. EPA is using the federal Superfund law, also known as the Comprehensive Environmental Response, Compensation and Liability Act, to guide the cleanup of the Site.

What is Yosemite Slough and Why is it Contaminated?

Yosemite Slough is an inter-tidal channel connected to San Francisco Bay. The Slough is located at the east end of Yosemite Avenue between the Hunters Point Naval Shipyard to the north and the Candlestick Park to the south (see Figure 1). During typical tidal cycles, the Slough alternates as a mudflat to being covered with three to six feet of Bay water. Yosemite Slough once consisted of a larger natural marine estuary with adjacent wetlands. However, between 1940 and 1970, the Slough underwent significant narrowing due to placement of construction debris, waste materials, soil and crushed bedrock from nearby hills onto the surrounding wetlands and in the Slough itself. EPA believes the Slough mud is contaminated due to past waste disposal in and next to the Slough,



EPA Public Meeting on Yosemite Slough Cleanup Plan

EPA is requesting public comments on the Proposed Cleanup Plan for Yosemite Slough no later than September 6, 2013. Public comments can be mailed to EPA or provided in person at a public meeting to be held:

EPA Public Meeting

August 21, 6pm to 8:00pm
Bret Harte Elementary School
1035 Gilman Avenue,
San Francisco

See Page 6 for complete information on how to submit comments to EPA.

Yosemite Slough at Low Tide

past discharges from three City of San Francisco sewer pipes, and uncontrolled storm water flows into the Slough. Due to improvements the City has made to its sewer system, wastewater now flows into the Slough on average of once per year. The mud (also known as “sediment”) in Yosemite Slough contains elevated levels of a variety of chemicals including polychlorinated biphenyls (PCBs), and heavy metals such as lead. To date, there has not been any chemical contaminant cleanup work in the Slough.

What are the Risks due to Contamination at Yosemite Slough and How Does it Affect Me?

“Risk” is the likelihood or probability that a hazardous chemical, when released to the environment, will cause adverse effects such as cancer or other illnesses in people and wildlife. People are not exposed to contaminants in the Slough unless they touch the contaminated Slough mud or eat contaminated fish or shellfish in or near the Slough. Although contaminants have been detected to a depth of five feet, significant risk originates from contamination at or near the top six inches of the Slough mud where the majority of biological activity occurs. Currently, the top layer of mud at Yosemite Slough has an average PCB concentration of approximately 5,000 parts per billion. EPA has determined that an average concentration of 386 parts per billion or less is needed to adequately reduce risk and protect human health and the environment. See Table 1 for more information on EPA’s proposed cleanup goals. Wildlife at the Slough, especially birds and fish, may be exposed to Site contaminants through direct contact with Slough mud and consumption of contaminated worms and aquatic insects.



Contaminants of Concern in Yosemite Slough

PCBs: In 1979, a federal ban was imposed on the sale and production of PCBs in the United States. The federal ban was due to PCBs strong tendency to accumulate in the food chain and their toxicity to humans and wildlife. Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 ban (e.g. old electrical transformers, hydraulic oils, oil based paint, and caulking).

Lead: Lead can be found in all parts of our environment – the air, the soil, the water, and even inside our homes. Much of our exposure comes from human activities including the use of fossil fuels such as past use of leaded gasoline, some types of industrial facilities, and past use of lead-based paint in our homes. Lead and lead compounds have been used in a wide variety of products found in and around our homes, including paint, ceramics, pipes and plumbing materials, gasoline, batteries, ammunition, and cosmetics.

More information on PCBs and lead can be found at these EPA websites:

<http://www.epa.gov/epawaste/hazard/tsd/pcbs/index.htm>

<http://www2.epa.gov/lead>

Table 1: EPA's proposed cleanup goals for mud and sediment at Yosemite Slough

Contaminant	Cleanup Goals in parts per billion(*)
PCBs	1,240 µg/kg or less at a given location and an overall area-weighted average of 386 µg/kg or less
Lead	436 mg/kg or less at a given location and an overall area-weighted average of 218 mg/kg or less

*Parts per billion is used to measure the concentration of a contaminant in soil or sediment. In this case, parts per billion is the same as micrograms per kilogram (or "ug/kg"). One part per billion can be thought of as one drop of water in an Olympic-sized swimming pool.

What will the Cleanup Accomplish?

EPA's overall objectives for the cleanup project at Yosemite Slough are:

- Protect human health by reducing or eliminating potential exposures to contaminants in the Slough
- Protect wildlife that may visit or live at the Slough now or in the future
- Support a healthy aquatic and mudflat ecology at Yosemite Slough
- Support beneficial uses of the Slough such as ecological restoration and a future park
- Prevent recontamination of the Slough
- Prevent migration of contamination from the Slough onto adjacent properties.
- Minimize impacts on local residents, workers, and natural resources during Slough cleanup work
- Conduct a cost-effective cleanup action by providing the greatest value while still meeting all the other project goals



City of San Francisco overflow sewer pipe at Yosemite Slough

How did EPA Evaluate Cleanup Options for Yosemite Slough?

EPA first evaluated cleanup technologies typically used at sediment cleanup projects (see Table 2). EPA then grouped the best aspects of each technology into seven, fully implementable cleanup alternatives (see Table 3). Per EPA's regulations, each cleanup alternative was evaluated using the criteria shown in Figure 2. Table 4 presents a summary of EPA evaluations of cleanup alternatives for Yosemite Slough.

EPA's Three Evaluation Criteria for Superfund Removal Alternatives

1 Effectiveness

- Long-term effectiveness and protection of human health and the environment
- Short-term protection of human health and site ecology
- Minimization of short-term construction impacts to the local community
- Ability to achieve site cleanup objectives



2 Implementability

- Technical feasibility
 - » Construction and operational considerations
 - » Demonstrated performance/useful life
 - » Adaptable to environmental conditions
- Administrative feasibility
 - » Easements or right-of-ways required
 - » Impact on adjoining property
 - » Ability to impose institutional controls



3 Cost

- Capital cost
- Operation and maintenance cost



Figure 2: Evaluation Criteria

Table 2: Evaluation of Common Cleanup Technologies for Contaminated Sediment

Technology Name	Technology Description	Summary of EPA Conclusions Concerning the Use of Technology at Yosemite Slough
No Action	The No Action alternative leaves contaminated material at the Site in its current condition and assumes no further intervention would occur.	EPA concluded that the No Action option by itself is not protective of human health and the environment and not acceptable at Yosemite Slough.
Institutional Controls (ICs)	ICs are administrative and legal restrictions that help minimize the potential for human exposure to contamination and protect the integrity of the remedy. At the Slough, ICs may include restrictions on the use of boats with propellers, use of anchors, or other limitations on public use of the Site (i.e. fish consumption advisory).	ICs alone will not sufficiently protect human health and the environment. ICs may be used in conjunction with other technologies to augment protectiveness and the integrity of the cleanup action. Any IC developed at Yosemite Slough would be coordinated with the General Plan for the Candlestick Point State Recreational Area.
Monitored Natural Recovery (MNR) and Enhanced MNR (EMNR)	MNR relies on natural processes that reduce toxicity or reduce exposure through natural burial or mixing-in-place. PCBs and lead are not easily destroyed in nature. For this reason, risk reduction due to natural burial through sedimentation is more common and can be an acceptable sediment management option. EMNR involves the immediate placement of a thin-layer clean sand cover which provides short-term protection while natural sedimentation improves protectiveness in the long-term.	Additional technical studies of the Slough during the cleanup action design stage are necessary to better estimate net natural burial rates in the Slough. MNR must be combined with an active remedial technology to achieve project goals. EMNR could provide short-term protection by depositing clean sand compatible with Slough ecology in certain portions of the Slough. MNR and EMNR appear to be best suited for locations where contaminants in Slough sediments are marginally above cleanup goals.
In Situ Sediment Treatment	In situ (“in-place”) treatment is an approach that involves the biological, chemical, or physical treatment of contaminated sediment in place without any dredging, removal or capping of the contaminated sediment.	Although In situ treatment at the Slough using activated carbon would target the PCBs present in the sediment at the Site, this technology is not expected to achieve project goals because metal contaminants such as lead are not targeted by this technology.
Sediment Capping	Capping consists of physically isolating the contaminated sediment. Sediment caps are usually constructed of clean sand. At Yosemite Slough, due to the project goals to maintain the current elevation of the mudflat, sediment dredging would need to occur prior to placement of a sediment cap.	A well-designed sediment cap can achieve all project goals at Yosemite Slough. Cap design would need to consider a number of factors including potential for mixing during placement and potential for consolidation and erosion of the clean sand. Additional studies are necessary during the design stage to determine the appropriate cap thickness and if amendments such as activated carbon are appropriate.
Sediment Dredging	Sediment dredging consists of using equipment to excavate and remove contaminated sediments from the site. Mechanical dredging operations can occur through the use of long-reach excavators or cranes with large scoops. Hydraulic dredging vacuums out contaminated sediment using suction hoses. Dredged sediment is initially too wet to transport and dispose at landfills. Therefore, much of the water will need to be removed from the sediment prior to transport and disposal at an approved landfill outside San Francisco.	Any dredging operation creates risks by stirring up and re-suspending contaminants to the water column and spreading of contaminated sediments to adjacent areas. Sediment curtains and other technologies must be used to control the spread of contaminated sediments. Water from the sediment drying operations would need to be collected, treated and likely discharged to the City of San Francisco sewer system. Sediment drying operations, which would likely be located in a Candlestick Park overflow parking lot, may create unpleasant odors. Tests regarding the potential for odor generation must occur during the design stage.

Table 3: Cleanup Alternatives for Yosemite Slough

Alternative	Depth of Dredging	Estimate Volume of Sediment Removed from Site		Sediment Cap	MNR/EMNR*	ICs**/Control Future Site Uses	Effectiveness Monitoring
		Cubic Yards	Truck loads				
1	N/A	0	0	No	No	No	No
2	1 foot	5,900	590	Yes	Optional	Yes	Yes
3	1 foot	4,200	420	Yes	Yes	Yes	Yes
4	1 foot	2,500	250	Yes	Yes	Yes	Yes
5	Up to 2 feet	10,700	1,070	Yes	Optional	Yes	Yes
6	2 feet	25,300	2,530	Yes	Optional	Yes	Yes
7	Up to 5 feet	41,100	4,100	No	No	No	Yes

*Monitored Natural Recovery/Enhanced Monitored Natural Recovery

**Institutional Controls

Table 4: Evaluation of Cleanup Alternatives for Yosemite Slough

Alternative	Effectiveness					Approximate Cost (millions of dollars)	Overall Score
	Estimated Average Contaminant Concentration after Cleanup Work**		Long-Term Effectiveness and Protection of Human Health	Short Term Protection of Human Health and Site Ecology	Minimization of Short-Term Construction Impacts to Local Community		
	Lead (mg/kg)	PCBs (ug/kg)					
1	359	5,049	Not protective of human health and environment and deemed unacceptable				
2	123	315	Moderate	High	High	\$7.2M	High
3	143	499	Moderate	Moderate	High	\$6.2M	Moderate
4	259	793	Low	Low	High	\$5M	Low
5*	123	315	High	High	Moderate	\$11.6M	High
6	49	35	High	Moderate	Low	\$23.1M	Moderate
7	42	27	High	Low	Low	\$35.7M	Low

*EPA's recommended alternative

**Estimated average concentration of contaminant in top one foot of slough mud

What is EPA's Proposed Cleanup Plan for Yosemite Slough?

EPA recommends Alternative 5, which consists of a combination of sediment dredging (including sediment drying and off-site disposal), sediment capping, MNR/EMNR if deemed appropriate, ICs, and effectiveness testing. Alternative 5 is described in Section 8.1 and 8.6 of the Draft EE/CA report and a summary is provided below:

- **Sediment Dredging:** Contaminated Slough sediment in the top one foot is removed. Sediment removal continues up to two feet in depth in the same dredging area if the deeper sediment exceeds the cleanup goal. The final dredging depth will be determined during the remedy design stage and will be based on the technical requirements of the engineered sediment cap. The exact dredge technology would be determined during the design stage. Contaminated mud from the Site will be pumped via pipeline or transported via barge/truck to a mud drying area near the Site. Mud drying operations will last for approximately three to five months. Emissions and odors would be mitigated to the extent practical. The dried mud will be loaded onto trucks and transported on roads around Candlestick Park to Highway 101 for disposal at landfills outside San Francisco. If it is determined during the design stage that odors cannot be adequately mitigated, mud drying will be moved to an alternative location approximately two miles north of the Slough and the dried mud will be transported out of San Francisco via truck or rail. See Figure 3 for a map of potential mud-drying locations.
- **Engineered Sediment Cap:** Clean sand material will be placed over the dredged areas. The sand cap will be designed and constructed with a top layer compatible with Yosemite Slough ecology. Clean sand and other materials for the sediment cap would likely be brought to the Site by barge.
- **Optional MNR/EMNR:** As a supplementary, optional component to this alternative, MNR/EMNR may be implemented as needed in portions of the Slough where contaminants in surface sediments are marginally above cleanup goals. Use of MNR/EMNR will be subject to EPA approval.
- **Institutional Controls:** ICs will be fully developed during the design stage and would likely include use of informational signs, public education, periodic site inspections, and restrictions on boating and digging anywhere within the Site boundaries.
- **Effectiveness Testing:** To ensure that the remedy is performing as planned, the Site will be inspected and tested on a periodic basis.
- Alternative 5 requires that approximately 10,700 cubic yards, or approximately 1,100 truckloads, of contaminated mud and debris be removed from the Site and transported to an approved landfill outside San Francisco. This quantity may be reduced or increased during the remedy design stage once exact dredge boundaries, cap properties, site hydrodynamics, and other design parameters are determined and approved by EPA. Alternative 5 complies with federal and State environmental laws and requirements. Alternative 5 also requires Slough bank stabilization to prevent erosion into the Slough and possible modifications to sewer outfall aprons to prevent damage to the sediment cap when the sewer pipes overflow into the Slough. In addition, reasonable regulatory and public educational efforts will be taken to prevent recontamination of the Slough by illicit dumping or storm water runoff from nearby industrial properties.

How to Comment on the Proposed Plan for Yosemite Slough

Provide written comments to EPA no later than **September 6, 2013** by one of the following ways:

Email: cooper.craig@epa.gov

Fax: (415) 947-3520

Mail: Craig Cooper
Superfund Project Manager
U.S. EPA, Region IX
75 Hawthorne Street,
Mail Code SFD8-3
San Francisco, CA 94105

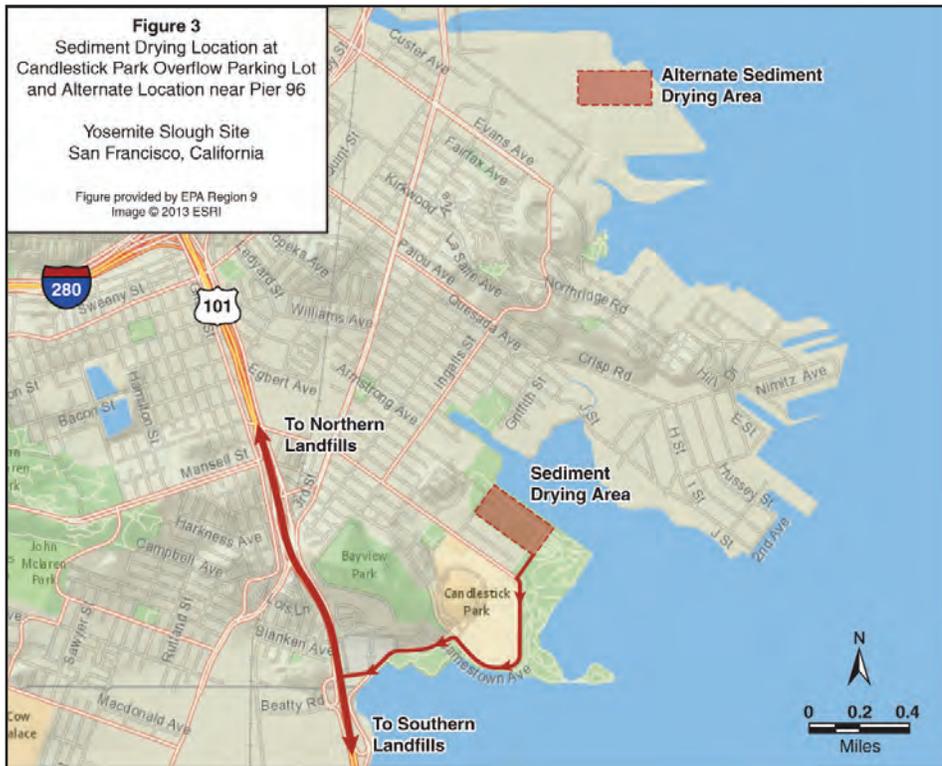
Attend the public meeting and provide verbal or written comments:

EPA Public Meeting

**August 21, 2013
6pm to 8:00pm**

Bret Harte
Elementary School
1035 Gilman Avenue
San Francisco





the EPA and State of California regulatory agencies. Hunters Point Shipyard Parcel F includes portions of San Francisco Bay immediately east of Yosemite Slough. The Navy has investigated Parcel F for contamination. In 2014, the Navy is scheduled to release its proposed cleanup plan for Parcel F. EPA will coordinate with the Navy so the cleanup of Parcel F happens at the same time or shortly after completion of the Yosemite Slough cleanup action.

What Are EPA Next Steps at Yosemite Slough?

- Finalize the EE/CA report based on comments received during the public comment period
- Issue an Action Memorandum which selects the final cleanup action for Yosemite Slough
- Negotiate legal settlement with certain parties to fund and perform the final selected cleanup action
- Commence technical studies needed for the design of the selected cleanup action
- Conduct periodic meetings with the community concerning details about the design of the selected cleanup action
- Carry out the selected cleanup action
- Commence routine testing and inspections to ensure cleanup is performing as planned

What is EPA's Rationale for Recommending Alternative 5?

Of the seven alternatives, Alternative 5 offers the best opportunity to achieve all project goals and sediment cleanup goals in a timely, efficient, and permanent fashion while minimizing short-term impacts to the Site ecology and local community. Alternatives 2 and 5 rank the best overall; however, EPA recommends the selection of Alternative 5 as it provides additional certainty with respect to long-term effectiveness compared to Alternative 2. For these reasons, EPA considers Alternative 5 to be the best and most appropriate alternative for cleanup of Yosemite Slough.

How Might the Cleanup Work Affect Me?

If you live or work close to Yosemite Slough, there is a good chance that you will hear heavy equipment noise and see increased truck traffic during working hours. You may periodically smell unpleasant odors from the mud that is temporarily being dried south of the Site. These impacts should last no longer than three to five months. EPA will require actions to control or reduce any unpleasant odors. In addition, plans for truck traffic routes, worker and public safety, dust control, and community outreach will be used to minimize disruptions to nearby business and residences.

What are the Future Plans for Yosemite Slough?

The California State Parks has begun work to restore ecological wetland habitat at Yosemite Slough (see Figure 1). In addition, State Park plans include a walking trail and other park amenities at the Slough. Just to the east of the Slough, the Hunters Point Shipyard Superfund Site is being remediated by the U.S. Navy under the oversight of

United States Environmental Protection Agency, Region 9
75 Hawthorne Street (SFD-6-3)
San Francisco, CA 94105
Attn: Jackie Lane (Yosemite Slough 8/13)

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San Francisco CA 94124

Where can I get detailed documents about this site?

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Visit EPA's Website on Yosemite Slough:
www.epa.gov/region9/YosemiteSlough

Please contact:
Jackie Lane
EPA Community Involvement Coordinator
(415) 972-3236
lane.jackie@epa.gov

For general information on the Yosemite Slough site:

EPA Proposes Cleanup Action For Yosemite Slough – Public Comment Period From August 7, 2013 to September 6, 2013

Yosemite Slough Site