

**Prospective Adaptive Management Scenarios for the San Francisquito Creek Flood Protection,
Ecosystem Restoration, and Recreation Project, SF Bay - Highway 101**

Appendix H to the Operations and Maintenance Manual



SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

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1. Introduction:

This document describes the long-term monitoring of, and a process for determining future actions to, Project features that are not specifically designed for flood protection or as mitigation for environmental impacts. Inspection and maintenance of engineered levees and other flood protection features is described in the body of the Operations and Maintenance Manual. Monitoring and maintenance of mitigation features is described in the Mitigation and Monitoring Plan.

This document discusses expected changes over time that will facilitate project performance keeping pace with changing conditions, catalogues potential changes over time that may compromise the project's performance, quantifies how much change can be accommodated by the project design, and finally, identifies potential remedial actions that may be taken to restore project performance.

Adaptive management by definition is intended to deal with unpredicted changes, sometimes using science or techniques that weren't known or in practice at the time a project was completed. This document will be used to initiate discussion of potential actions

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if a particular scenario arises by providing a suite of potential remedial actions. Future managers may have a larger toolbox to work from than we have today.

It's also important to note that the "solution" to changing conditions may not be to restore project features to their designed function. External conditions, such as the need to restore a fluvial sediment source to a marsh for sea level rise resilience, may cause future managers to decide to make changes that best meet emerging needs. This document will be reviewed and updated every 5 years as appropriate and will survive the 50-year project life.

2. Adaptive Management Process

The SFCJPA will coordinate a decision-making process to optimize the long-term implementation of flood protection measures for San Francisquito Creek and adjoining habitats. The objective of adaptive management is to ensure that hydraulic performance, ecological functions and habitat values created by the Project are maintained. Key components of adaptive management are identifying indicators for ecological functions and habitat values, monitoring the indicators, setting measurable objectives (numerical and descriptive goals) for the indicators, and planning and implementing remedial actions. The adaptive management process provides a mechanism by which remedial actions can be implemented if a measurable objective is not achieved or project performance diminishes due to changing conditions.

Project Feature Monitoring:

The SFCJPA will monitor the project area and features as described in the Operations and Maintenance Manual for levees and other flood protection features, the Mitigation and Monitoring Plan for habitat created or enhanced by the Project, and as described in Section 3, Potential Changes to Project Features, below.

Performance Triggers:

Determining tolerances to change for some Project features, landscapes and habitats is more achievable than for others during the design and construction of a project that must consider complex pre-project hydrologic and hydraulic conditions, predictable but not yet ground-truthed post-project conditions, and reasonably foreseeable but not precisely predictable future environmental conditions. For example, hydraulic performance of a channel can be measured and assessed over time through periodic channel surveys and hydraulic modeling, while marsh viability requires observation of less quantifiable indicators. As such, it is important to establish performance triggers as a baseline for determining when future environmental conditions warrant close observation and discussion of potential adaptive management actions. This document attempts to establish reasonable performance triggers, which if realized, would set in motion a process for determining appropriate action. In some cases, no action may be the best alternative, depending on situational realities at the time.

Adaptive Management Conference:

Should a currently defined or future performance trigger be realized, the SFCJPA will host an Adaptive Management Conference with participants from local, State and Federal agencies, as well as subject matter experts who may be able to provide professional insights on the specific project objective or set of objectives that may be experiencing a

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decline in performance. The intent of the Adaptive Management Conference will be to determine a process for decision making that leads to a recommended action, and set up an Adaptive Management Steering Committee to carry out that process. The members of the Adaptive Management Steering Committee may be the same as those participating in the Adaptive Management Conference, or include other individuals determined to be of value to the discussions and decisions.

Consensus Based Deliberations:

The Adaptive Management Steering Committee will employ a consensus process in its deliberations and strive to resolve all differences. The guidelines for this consensus process will be developed prior to establishment of the Adaptive Management Steering Committee. Upon agreement via the consensus process, and if an action is prescribed, the SFCJPA will recommend such actions and any additional measures required be added to the Operations and Maintenance Manual. If a situation arises where full consensus of the Adaptive Management Steering Committee is not achievable, the regulatory authority of agencies with jurisdiction over the creek shall prevail.

3. Potential Changes to Project Features

a. Channel – Hydraulic Performance

Potential Change: Establishment of Large Woody Vegetation on Levees

Monitoring Method: Visual inspection and updating of Manning's N value for channel roughness. HEC-RAS modeling runs if channel constriction is suspected.

Trigger for initiating adaptive management conference: HEC-RAS outputs showing hydraulic capacity at less than 8,000 cfs during a 9.6 NAVD (10-year) tide. 8,000 cfs was chosen because a reduction of hydraulic capacity to this level would represent a significant loss of hydraulic capacity but not to a level to where flooding is likely during a 100-year event (*Design conveys 9,400 cfs; maximum flow that can be delivered from upstream is 7,400 cfs*).

Potential Remedial Actions

- 1) Do Nothing – Determination may be made that the impacts of taking an action outweigh the benefits of that action.
- 2) Remove Vegetation
- 3) Initiate Vegetative Management Plan – Include tree trimming in O&M.

Potential Change: Aggradation of Sediment in Channel

Emerging science suggests that the aggradation of fluvial and tidal sediments within and along the perimeter of coastal marsh plains will be a key factor in that marsh's resiliency to future sea level rise. Similarly, the newly created in-channel marsh would benefit from the gradual accumulation of fluvial and tidal sediments to calibrate its elevation and keep pace with sea level rise. San Francisco Bay water surface elevation and tides set the

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downstream boundary condition and will control the change of channel elevation equilibrium over time. Once all SFCJPA-planned projects upstream of the Project reach are completed, a maximum of 7400 cfs will pass to the Project reach during extreme events. The Project has been constructed to accommodate 9400 cfs, with additional conveyance capacity to accommodate 26 inches of sea level rise, plus 3 feet of freeboard.

While aggradation to keep pace with sea level rise is an expected and beneficial change over time, accelerated aggradation due to poor channel design, as had been observed resulting from the 1958 channel design in the Project reach, would diminish flow conveyance and overlay marsh habitat. To avoid making the same mistake twice, an innovative project design was developed to optimize sediment transport to safeguard against unwanted accumulation of fluvial sediment within the project reach over time. The widened channel is graded at 2%, from an average elevation of 8.0 NAVD88 at the inboard toe of the new levees down to an average elevation of 6.0 NAVD88 at the outboard hinge point of the low flow channel. The low flow channel invert is set at 0.0 NAVD88. Absent fluvial flows, daily high tides will inundate the newly created in-channel marsh. As large fluvial events subside, diminishing water surface elevations within the channel will be contained within a continually narrowing channel cross section to maintain stream energies needed to effectively transport excess fluvial sediments through the project reach to San Francisco Bay.

Monitoring Method: Channel cross-section surveys 2 and 4 years after construction, then every 5 years thereafter; HEC-RAS model runs to determine conveyance capacity if constriction suspected

Trigger for initiating adaptive management conference: HEC-RAS outputs showing hydraulic capacity at less than 8,000 cfs during a 9.6 NAVD (10-year) tide. (*Design conveys 9,400 cfs; maximum flow that can be delivered from upstream is 7,400 cfs*)

Potential Remedial Actions

- 1) Do Nothing – Determination may be made that the impacts of taking an action outweigh the benefits of that action.
- 2) Add elevation to the tops of Project features to increase freeboard
- 3) Degrade levee between Creek and Faber Tract to reduce in-channel water surface elevations during high flow events
- 4) Remove sediment from channel

b. Managed Levee between San Francisquito Creek and Faber Tract

Potential Change: Erosion/scour or settlement lowers the top of levee

Monitoring Method: Visual inspection after large flow events, LiDAR 2 and 4 years after construction, then every 5 years thereafter.

Trigger for initiating adaptive management conference: Scour marked by loss of vegetation, or LiDAR results indicating settlement greater than 2 inches in elevation.

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Potential Remedial Actions

- 1) Do Nothing; future managers may decide that gradual depletion of the levee is a reasonable way to slowly restore the fluvial sediment source to the marsh.
- 2) Repair or fill levee to restore it to design dimensions

c. Faber Tract Marsh

Potential Change: Daily inundation due to sea level rise

Monitoring Method: Observation of tide levels, protocol surveys of indicator species

Trigger for initiating adaptive management conference: Sustained decline in indicator species over two monitoring periods

Potential Remedial Actions

- 1) Restore fluvial sediment source by removing levee between Creek and marsh. Increasing fluvial sediment deposition will likely aide the aggradation of the marsh and improve sea level rise resilience.
- 2) Improve coastal levees to maintain flood protection. Current research indicates that levees built with a gradual inboard gradient (30H:1V) provide valuable transitional ecotone habitat while reducing the severity of wave run up, which his advantageous for both marsh health and flood risk reduction.

4. Monitoring and Reporting

The SFCJPA will conduct annual visual inspections of all project features and environs.

In addition to the annual monitoring, which is reported in the annual Mitigation Monitoring Report, LiDAR and cross-sectional surveys will be conducted in years 2 and 4 after construction, and every 5 years thereafter. More frequent surveys would likely be an indicator of seasonal or event-based transient depositional patterns that will reach equilibrium later in the year after subsequent storm events. Adaptive management is intended to document seasonal changes but not prescribe actions based on single events or seasons. It shall consider actions only after reliable evidence that permanent changes resulting from patterns of change accumulate to produce a negative condition.

We anticipate that changes in Marsh elevation will occur in the future due to sea level rise. We would anticipate, and hope, that the Marsh would aggrade to keep pace with sea level rise. Suspended Bay sediments that contribute to this aggradation are not influenced by the Project and are not appropriate for the SFCJPA to monitor. Success rates of the native plant species and wildlife inhabiting the marsh is a better indicator of marsh health than elevation.

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Protocol level surveys for Ridgway's Rail in coordination with DENWR will be conducted every 2 years in the Faber Tract marsh as an indicator of marsh and habitat health. Sustained decline over two survey periods (4 years) will trigger an Adaptive Management Conference to investigate the apparent decline, identify potential causes, recommend remedial actions to be taken, and identify the appropriate agency to take such actions.

5. Future Actions by Others

While adaptive management is most often associated with changes in conditions resulting from unknowable environmental factors, changes to the Project reach could, in the future, result from a future action or set of actions by another entity within the watershed. At present time, the most identifiable potential future action by others is the future management of Searsville Dam and Reservoir.

Searsville Reservoir, located in the upper watershed of San Francisquito Creek, has been filling with sediment since its construction in 1896, and currently is nearly full. Stanford University, which owns and operates Searsville, has assembled a Steering Committee of key stakeholders and subject matter experts to evaluate potential alternatives for future management of Searsville Reservoir.

Any future action or management strategy will have implications for the downstream environment. Should Stanford choose to leave the dam in place and manage the established marsh behind the dam as critical habitat, the dam and reservoir will eventually fill completely and will no longer trap sediment, resulting in the return of historic sediment loads to the downstream environment. The SFCJPA project has been designed to assume this future scenario, and includes tolerances to accommodate the historic sediment load. Should Stanford decide to implement a change at Searsville that would result in the mobilization of stored sediments behind the dam to the downstream environment, Stanford will be required under the California Environmental Quality Act to mitigate for those downstream impacts.

Should Stanford make a decision to take an action at Searsville Reservoir that causes changes in downstream conditions beyond the return of historic sediment regime that is imminent even with no action at Searsville, the SFCJPA would partner with Stanford to develop models to understand what those downstream impacts are, and augment this document or create a new document to outline adaptive management practices that may be incorporated. Stanford would be responsible for implementing those practices, and the SFCJPA and its member agencies will provide access to the Project site and the upstream reaches of the creek channel to Stanford to allow them to mitigate for the impacts of their action, as long as mitigation activities result in conditions consistent with the objectives of the SFCJPA project. Future mitigation activities by Stanford will be subject to review by the Adaptive Management Steering Committee, if deemed necessary by the SFCJPA or the resource agencies.

Another future project adjacent and potentially adjoining to the new creek levees are planned improvements to coastal levees to reduce the risk of tidal flooding under future sea level rise scenarios. While it will be important to document any changes to the surrounding areas resulting from this type of improvement, it is not clear at this time if these improvements could impact the performance of this project. Monitoring and adaptive management of all projects that could influence the creek and tidal hydraulic interface will be done together to the extent possible.

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Since future actions to implement adaptive management strategies cannot be identified now, they are not covered under existing Project permits and would require separate regulatory permitting, if applicable.