Stream Management Master Plan (SMMP): An Updated Regional Vision for Integrated Flood Management

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Zone 7 utilizes planning-level documents to aid in its ability to develop and implement effective stormwater management to reduce flood risks. These plans typically characterize current runoff patterns and areas of flood risk, and propose projects and activities to reduce flooding.

Zone 7 has produced two previous flood management master plans: The 1960 Flood Control Master Plan focused on engineered channels to maximize drainage and convey flood waters out of the Valley quickly during large storm events; and the 2006 Stream Management Master Plan incorporated a more contemporary understanding of watershed processes, how they relate to stormwater runoff and flooding (slow, spread, and sink), and acknowledged the multiple benefits that could be achieved through an interdisciplinary approach to managing storm flows.

Zone 7 began this most recent SMMP update with an eye towards developing a 21st century approach to flood management that: takes into consideration predicted changes in rainfall patterns from climate change models and resilience through adaptation; utilizes a holistic approach to stream management that looks for opportunities to detain flows upstream, use green infrastructure, and enhance the existing ecosystem to provide cost-effective and environmentally sound flood risk reduction alternatives; focuses on developing projects that provide regional benefits beyond flood management while also minimizing project impacts, and, uses up-to-date hydrologic and hydraulic models to identify potential flooding issues and develop regional solutions to reduce flooding.

This update represents the latest efforts to help manage stormwater runoff and reduce regional flood risks to the communities of the Livermore-Amador Valley. The SMMP is a living document and will be updated periodically as new critical information, technologies, and/or specific goals/opportunities are identified. While this Plan does not expressly include water supply needs or projects, Zone 7's regional water management relies on the synergy among stormwater resources, flood channels, and groundwater management.

Keywords: flood management, integrated planning, water agency

Poster Cluster Title: The Face of "Resiliency" -- At the Forefront of Translating Climate Resiliency into Implementation Projects that Reconcile Past, Present, and Future

Preparing for the Storm: Riparian Restoration, Sediment Reuse, and Urban Greening to Enhance Stream and Watershed Resilience

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As San Francisco Bay's watersheds face the twin challenges of urbanization and climate change, comprehensive, coordinated actions are increasingly needed at both the watershed-scale and site scale, immediately along stream corridors. New partnerships will be necessary to systematically improve water quality and aquatic habitat while building the resilience to withstand greater hydrological variability in the future.

Catalyzed by the extensive damage caused by the Winter 2016-2017 floods and the opportunity to align flood response with major habitat improvement, "Preparing for the Storm" is an innovative public-private partnership to improve watershed health and resilience in the Northern Alameda Creek watershed that parallels and complements Zone 7's Stream Management Master Plan Update (SMMP).

Zone 7 will collaborate with a range of organizations, including SFEI, Castlewood Country Club, Concannon Winery, and others, to implement innovative multi-benefit projects on major streamside properties owned by Zone 7 and collaborating landowners. Through Zone 7's SMMP, we will also advance stormwater management in collaboration with local cities, and develop tools for the reuse of coarse sediment both locally and regionally.

There are three major components. Task 1 is devoted to developing science-based plans and tools to guide both the design of immediate implementation projects and dozens of subsequent urban greening and stream restoration projects, through incorporation into city stormwater plans and the Zone 7 SMMP. Task 2 involves design and constructing major aquatic and riparian habitat restoration projects on Arroyo de la Laguna and Arroyo Mocho. Task 3 covers participatory outreach in collaboration with the Living Arroyos watershed stewardship program, involving volunteers in the implementation projects, and through regular interactions with local stakeholders.

Demonstrating a proactive, process-based approach to the large storm events anticipated to be more frequent in coming years, "Preparing for the Storm" provides a regional model for enhancing hydrological and ecosystem resilience.

Keywords: green infrastructure, flood management, restoration, regional planning

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Arroyo Mocho Stanley Reach: Guiding a Stream Enhancement Project through Drought and Flood — Is this the New Normal?

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The Stanley Reach of Arroyo Mocho, a tributary of Alameda Creek in Alameda County. The nearly mile-long pilot project was intended to explore methods to transform an earthen flood control channel (12.5 acres) into a riparian corridor that will function essentially like a natural stream while maintaining flood control and groundwater recharge functions.

The construction phase ran from summer to fall 2013 and included the removal or modification of four concrete grade-control structures and a concrete velocity dissipater. Two roughened channels were constructed to maintain vertical stability and improve fish passage. Aside from these, no attempt were made to control the course of the Mocho at the site. The stream was allowed to establish its own pattern, profile, and dimension within the existing stream corridor. In addition, over 5,000 riparian trees have been installed at the site including nearly 1,000 willow stakes.

Immediately following construction and initial planting, the region was hit by a severe four-year drought. The drought was brought to a close by an extremely wet winter including several intense storms exceeding a 10-year recurrence interval. The dry conditions severely hindered vegetation growth and establishment, while the storms further exacerbated conditions by eroding banks, scouring out vegetation, and burying portions of the site under several thousand cubic yards of sediment. In 2017, both roughened channels were undermined despite having been designed to withstand much higher flows.

A forensic analysis was conducted on the site geomorphology to understand why the channel responded in this way, and a vegetation analysis has been performed to re-assess the planting strategy. Both analyses were required to take into account that extreme cycles of drought and flood may be the new normal and provide guidance for future projects to ensure that stream enhancement projects can properly respond to climate extremes.

Keywords: Restoration, drought, flood, adaptive management, revegetation, floodplain

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Arroyo Mocho Medeiros Parkway: Recapturing Historical Function in a Contemporary Landscape

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The 2013 Historical Ecology Study for Alameda Creek assessed overall watershed conditions prior to significant Euro-American modification, including historical patterns of sediment transport and storage in the Livermore Valley. This study served as the basis for integrating historical understanding of watershed functions with current geomorphic research to more effectively inform resource management decisions. A follow up report presented landscape scale management strategies for Arroyo Mocho including process-based approaches for dynamic, multi-benefit urban channels, and identified Arroyo Mocho Medeiros Parkway as a site where some of the contemporary problems could be linked to the historical ecology. The site was also identified as a project in Zone 7's SMMP and is currently in the planning phases.

This multi-benefit project, one of the first SMMP projects Zone 7 is implementing, seeks to reduce flood risk while enhancing riparian habitat and restoring flow to the natural floodplain in the reach of the Arroyo Mocho between Arroyo Road and Holmes Street. Understanding the historical ecology reveals some solutions for regaining some of the function of the site, while additional analysis is needed to understand how the site is functioning in its current contemporary state (e.g., urban setting, altered hydrologic regime, non-native plant communities).

The current conceptual design acknowledges the historical ecology and works with it where possible. However, in many altered urban settings, it is unrealistic to attain full restoration of a historical landscape. Therefore resilient restoration designs should instead be framed around, not just an historical reference but multiple analytical references derived from empirically-calibrated field- and model-based techniques to develop an integrated understanding of contemporary baseline conditions. In this way the Arroyo Mocho Medeiros Parkway project is an example of process-based morphological restoration designed to prompt recovery of ecosystem processes and resilience while meeting management needs of the Zone 7 Water Agency.

Keywords: restoration, detention, flood, historical ecology, sediment, revegetation, floodplain

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Haunted by the Ghosts of Historical Landscapes: Mapping of 2017 Flood Damage

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The 2013 Historical Ecology Study for Alameda Creek assessed overall watershed conditions prior to significant Euro-American modification, including historical habitat and ecological function in the Livermore Valley. This study served as the basis for integrating historical understanding of watershed functions with current geomorphic research to more effectively inform resource management decisions. The study found that a large marsh complex occupied 2,600 acres across much of now present-day Pleasanton. The marsh was drained starting in the early 1800s and while traces of the "marsh" resurfaced briefly in 1957 during the flood of record, this area of Pleasanton has been largely paved over with development, and multiple channels/canals carry waters through to Arroyo de la Laguna, and eventually out to the Bay through Niles Canyon.

The winter 2016-17 brought an abrupt end to a four-year drought with a thorough drenching of the watershed with some storms exceeding the 10-year recurrence interval in places. Four years of extremely dry conditions for soil and vegetation were followed by high flows that saturated soils, and eroded banks causing extensive bank failures. This was the first year that Zone 7 employed the use of GIS Collector to record and inventory each slide, and keep tabs on photo monitoring and other inspections. Through this data collection effort, mapping revealed a high density of bank failures in the vicinity of the historical marsh complex in Pleasanton.

While knowing the historical ecology helps us understand the root of contemporary issues, given the highly urbanized setting and development to the edge of the channel, it is unfeasible to restore the historical marsh. In lieu of restoring the historical marsh, Zone 7's Stream Management Master Plan is looking to regional detention opportunities to regain some of the ecological functions missing today (e.g., sediment and flood attenuation, wetland habitat).

Keywords: historical ecology, watershed management, flood, bank stability, mapping

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