

TO: PARKS AND RECREATION COMMISSION

FROM: DAREN ANDERSON DEPARTMENT: COMMUNITY SERVICES

DATE: JANUARY 23, 2018

SUBJECT: BUCKEYE CREEK HYDROLOGY STUDY

RECOMMENDATION

Staff recommends that the Parks and Recreation Commission (Commission) recommend that Council:

1. Receive the Buckeye Creek Hydrology Study report (Attachment A)
2. Direct staff to explore outside funding opportunities to implement the Wildhorse Valley and Grade Control Structures portions of the plan
3. Direct staff to add \$150,000 to the Capital Plan in Fiscal Year 22 for design and permitting to replace Grade Control Structures and Pedestrian Bridge

BACKGROUND

Buckeye Creek, which originates in Foothills Park and flows to Los Trancos Creek, has long standing erosion and flooding problems. During heavy storms, the creek down-cuts causing erosion. The eroded sediments wash downstream and deposit in various locations along the creek, especially along the 7.7 acre parcel which can lead to flooding and can obstruct downstream culverts on private properties during heavy rain events. Past erosion control measures using gabions and check dams have had limited effectiveness at reducing erosion.

Buckeye Creek was heavily modified by grading related to agricultural activities that took place prior to ownership by the City. The creek was also modified when underground utilities were installed in the 1960s. These modifications straightened and channelized the creek for approximately one mile through the park. Based on review of historic United States Geologic Survey (USGS) maps between 1898 and 1960, it appears that the alignment of Buckeye Creek is substantially different now than before agricultural uses were introduced to the area in the early 1900s. The channel was likely more centered in the Wildhorse and Las Trampas Valleys, and the entire valley floor likely served as an alluvial floodplain, which dissipated energy and allowed for moderate deposition and erosion processes for the creek system.

The City contracted with ENGEO in July 2016 to study the hydrology of Buckeye Creek and to provide recommendations to reduce erosion, sediment deposition, and flooding conditions in Foothills Park and the 7.7 acre parcel of parkland located in the northern boundary of Foothills Park. On December 6, 2016, staff hosted a community meeting to discuss the project and initial concepts. Approximately 25 people, including stakeholders from Grassroots Ecology and Audubon Society, attended the meeting. There was broad support for the initial concepts developed to solve the creek's erosion and sediment deposition issues.

On February 8, 2017, ENGEO and staff attended an inter-agency meeting with representatives from the United States Fish and Wildlife Service (USFWS), the United States Army Corps of Engineers (USACE), and the San Francisco Bay Regional Water Quality Control Board (RWQCB). This informal meeting was an opportunity to collect feedback on the preliminary restoration concepts from the regulatory agencies. The agency representatives generally supported the initial restoration concepts, and provided feedback that helped guide further development of the concepts. The key elements of the feedback were that the creek should be restored to its historic alignment to the extent practicable, and that a less engineered approach to solving issues associated with the historic modifications to the creek channel is preferred.

On March 28, 2017, staff provided an update to the Commission on the initial concepts developed to help solve the creek's erosion issues. The Commission supported the concepts; and suggested that staff and consultant further develop the concepts, host another community meeting, and return to the Commission with the draft report.

The consultant completed the hydrologic and hydraulic analyses, and refined the concepts of creek reconfiguration, which are designed to improve sediment transport conditions, resolve erosion issues, and restore geomorphic and biological function of the channel to historic conditions as much as possible. On June 12, 2017, staff hosted a community meeting to discuss the refined concepts. Although the number of participants was low (four members of the public), there was unanimous support for the recommended solutions to solve the creek's erosion problem.

On August 22, 2017, the Commission reviewed a draft of the Buckeye Creek Hydrology Study report (Attachment B). The consultant developed the report using the hydraulic analysis, and feedback from community meetings, stakeholders, regulatory agencies, and Commission. The report includes a preferred alternative conceptual design, which would restore and modify portions of Buckeye Creek by widening the creek channel to create seasonal wetland floodplains in the lower reach (Las Trampas Valley and the 7.7 acres parcel), and create a new creek channel in the upper reach (Wildhorse Valley); as well as retrofit the existing grade control structures, which have exceeded their useful lifespans. The report also discusses options for implementing portions of the full remediation alternative.

The cost of the full remediation alternative (including design, environmental review, permitting, and construction) is approximately \$9.5 million. The report includes a detailed description and itemized cost estimate for all the elements of the full remediation alternative.

The following is a brief summary of the different elements of the full remediation alternative:

Improvements to the Lower Reach (Las Trampas Valley and the 7.7 acres parcel)

Widening the creek in the 7.7 acres of undeveloped parkland would create a 1.2-acre floodplain at approximately the ordinary high water mark and extend westerly at a 2% slope approximately to the extent of the 100-year water surface elevation. Based on hydraulic modeling performed, creating a floodplain by lowering portions of the parcel adjacent to the current creek channel would help dissipate peak flows, equilibrate sediment transport, and enhance habitat. Energy dissipation consisting of rock rip-rap would be installed at both expansion and contraction

locations. Trails could be built within the floodplain area, to allow park visitors access to the creek to learn about riparian habitat, with the understanding that they would need to be maintained after large rain events.

Widening the section of creek along the Las Trampas Valley would create approximately 3 acres of floodplain by removing soil material in the existing grass field, which appears to consist of fill material placed in the historic floodplain. The existing channel would be moved closer to its historic alignment, and the grade adjusted to create an extensive floodplain above the ordinary high water mark. As in the 7.7 acre area, energy dissipation consisting of rock rip-rap would be installed at both expansion and contraction locations, which would help with flow reduction, sediment transport equilibrium, and habitat enhancement. Some tree removals are required in this reach of creek to create the floodplain.

Upper Reach (Wildhorse Valley)

The recommended improvements to the upper reach of creek involve creating a new creek channel that would meander through the historic floodplain (current grass meadow) in Wildhorse Valley. Approximately 2,655 linear feet of new creek channel and 5.5 acres of floodplain would be created.

The improvements recreate the historic floodplain by re-routing flows entering the westerly portion of the upper Buckeye Creek into the new channel. The new channel would be designed using geomorphic principles, including a low flow channel, a stable slope and a floodplain. The upper westerly tributary to Buckeye Creek would need to be re-routed near the existing sediment basin at the upper end of Wildhorse Valley to capture flows, and a stabilized confluence would also be installed where the new creek would meet the existing creek channel. The existing creek channel in Wildhorse Valley would remain and continue capturing flows from south eastern tributaries of the valley. However, the existing channel would have significantly less flow and there would be minimal erosion because the new creek channel would capture majority of flows from the upper Buckeye Creek. The existing sediment basin located at the base of the creek system at the top of Wildhorse Valley would be eliminated.

Grade Control Structures

The existing grade control structures, which are expected to fail in the next five to ten years, would be retrofitted and/or replaced to meet current restoration standards.

DISCUSSION

After careful consideration, the staff and Ad Hoc Committee recommend that the City should pursue outside funding to implement the portion of proposed work that includes creating a new creek channel in the upper reach (Wildhorse Valley) and retrofitting the existing grade control structures throughout the creek (approximate cost: \$3.7 million). The recommendation also includes directing staff to request \$150,000 to the Capital Plan in Fiscal Year 22 for design and permitting to replace grade control structures and pedestrian bridge (located at the creek across from the Foothills Park Interpretive Center). Adding \$150,000 to the Capital Plan provides a fallback option if the City is not able to obtain outside funding to implement the recommendations.

The key factors that guided this recommendation include:

1. The City's approximately \$50 million capital budget gap
2. Creating a new section of creek in Wildhorse Valley addresses a significant portion of the erosion and sedimentation issue (approximately 50%).
3. The construction of a new section of creek in Wildhorse Valley and replacing the grade control structures will disrupt park visitors and wildlife less than implementing all portions of the preferred alternative.
4. If more erosion and sediment control is needed in the future, the City can learn from the experience with the Wildhorse Valley creek improvements and consider implementing the creek improvements in Las Trampas Valley and the 7.7 acres area.
5. The grade control structures and the pedestrian bridge are expected to fail in the next five to ten years, and must be replaced.

Alternative Options

The following is a list of the options and their implications:

1. The City could take no action

The creek is expected to continue to down cut, and the existing grade control structures, which are at the end of their useful life, will likely fail in 5 to 10 years. When the grade control structures fail, severe erosion problems are anticipated in several areas of Foothills Park, especially in Wildhorse Valley (upper reach) where the utility corridor would be threatened. The utility corridor consists of electric, phone, sanitary sewer, a pressurized water main, and fiber optic communication lines that are positioned along the edge of the Buckeye Creek channel in Wildhorse Valley.

Thousands of cubic yards of sediment per winter could be deposited into the 7.7 acre parcel, and eventually into Los Trancos and San Francisquito Creeks. Excess sediment can negatively impact creeks. The soil particles cover spawning areas, smothering trout eggs, aquatic insects, and oxygen producing plants. Increased turbidity levels (suspended sediment) in a stream will increase water temperatures, reduce light penetration and plant growth, and affect the ability of fish to locate and capture prey by greatly reducing visibility. Steelhead trout and other fish can die from the abrasive, gill clogging effects of suspended sediment, which interferes with their breathing.

There would likely be substantially more down cutting in the creek channel; up to 30 feet below grade in some areas. In the mid-1970s the deepest section of the creek was measured at 7.4 feet below grade, and currently it is 20-22 feet below grade (Wildhorse Valley). With the deep down-cut creek channel, the water table in the meadows (in all reaches of the creek) is expected to prematurely drain with less mid/late season water for shrubs/trees. The exposed creek banks will allow water to seep out of the horizontal layers like poking a hole in the side of a barrel.

Several bridge structures would also become unusable. If no action was taken, the pedestrian bridges will likely fail in the next 5 to 10 years as the creek banks, where the bridge footings are located, erode.

Eventually the City would have to propose some structural improvements in the creek channel to protect the existing utility corridor from being undermined. This would require the same federal and state permits that would be required for the preferred alternative. The USACE/RWQCB and California Department of Fish and Wildlife (CDFW) may ask the City to provide a more holistic intervention approach to managing issues in the watershed, and potentially deny permitting clearances for activities where continued regular maintenance of the channel is proposed solely to prevent disruption of utility services.

2. The City could propose to retrofit existing grade control structures and the pedestrian bridges as a minimum project.

This would not solve the erosion, sediment deposition, or flooding issues. Given the current state of the channel, retrofitted grade control structures would need to be geotechnically designed to withstand additional scour and very large sediment loads, making them more expensive to build and maintain. This scenario may be more challenging to permit because the USACE/RWQCB and CDFW may ask for a less engineered approach to solve issues associated with the historic modifications to the creek channel.

Approximate Cost for Grade Control Structures and One Pedestrian Bridge Replacement: \$1,572,768

Grade Control Structures	\$706,800
(50% increase due to standalone project)	\$353,400
1 Pedestrian Bridge	\$50,000
Subtotal	\$1,110,200
Assume 4% Construction Cost Increase over 5-years	\$1,350,728
Permitting, Design, Administration (20% of Present Day Cost)	\$222,040
Total	\$1,572,768

3. The City could elect to implement the Wildhorse Valley Restoration, grade control structures, and pedestrian bridge.

Because the majority of excess sediment appears to be generated in the upper reach of Wildhorse Valley, implementation of that project first would provide the greatest benefit to the creek channel downstream. Only implementing the new creek channel in Wildhorse Valley, the grade control structures, and pedestrian bridge would help protect the utility corridor, and resolve the erosion and sediment transfer in Wildhorse Valley; and help reduce those problems downstream. A significant amount of the creek's erosion issue would likely be resolved through this work. Additionally, this work would be more isolated within Foothills Park and likely result in \ less interruption to most areas of the park while remediation work is underway (*i.e.*, fewer effects to existing environmental resources and

park users). However, some continued erosion in the Las Trampas Valley and some sediment deposition in the 7.7 acre area will continue. This project would also temporarily limit access to multiple trails and the campground, as well as impact the Orchard Glen picnic area.

Approximate Cost for Wildhorse Valley Restoration and Grade Control Structures and Pedestrian Bridge: \$3,739,818

Wildhorse Valley	\$1,793,100
Existing and New Grade Control Structures	\$706,800
One Pedestrian Bridge (Las Trampas Valley)	\$50,000
Subtotal	\$2,549,900
Assume 4% Construction Cost Increase over 5-years	\$3,102,343
Permitting, Design, Administration (25% of Present Day Cost)	\$637,475
Total:	\$3,739,818

If the City elects to do more than the Wildhorse Valley project, and take a phased approach to doing one or both of the other projects (Las Trampas Valley and the 7.7 acre parcel) at future dates, there would be added cost and time of repeating the regulatory permitting and construction costs inflation.

Summary of itemized project costs:

7.7-acre parcel (construction)	\$838,400
Las Trampas Valley (construction)	\$3,358,130
Wildhorse Valley (construction)	\$1,793,100
Retrofit of Existing Grade Control Structures (construction)	<u>\$706,800</u>
Subtotal	\$6,696,430
Assume 4% Construction Cost Increase over 5-years	\$8,147,231
Permitting, Design, Administration (20% of Present Day Cost)	\$1,339,286
Total	\$9,486,517

Impacts and Challenges:

While the proposed improvements would have a number of benefits, including resolving the erosion and sedimentation issues, creating more (and vastly improved) riparian habitat, providing public access to the creek areas, enhanced environmental education opportunities, and reduced ornamental turf and potable water savings, there are some impacts from the creek improvements.

Wildlife Impacts:

During construction there will be significant efforts to protect nesting birds and threatened plant species. However, some wildlife (deer, coyote, bobcats, etc.) will likely avoid the immediate project site during construction. Post construction there will be a settling period where plants gradually establish. Wildlife will be attracted to the natural stream channel. Visitors will have additional viewing potential of native riparian plants, multiple bird species, and larger wildlife like raccoons, rabbits and deer. It is possible that the project could be completed in one summer; however, it may take three to five years for the vegetation to fully establish.

More information about wildlife impacts will be known during the permitting and environmental review process of the project.

Park Visitor Impacts:

There may be certain areas of the park that are closed to public access during construction.

If the improvements are implemented in Wildhorse Valley, the construction would limit access to Towle Campground, four trail heads, and have impacts to Orchard Glen Picnic Area.

If the improvements are implemented in Las Trampas Valley there would be permanent change to the look and use of the grass field. The grass field in Las Trampas Valley is used for recreation activities. In addition to individual park visitors and families relaxing and recreating on the field, the area is also frequently used by park visitors picnicking at the adjacent Orchard Glen picnic area and by people who have rented the Oak Grove picnic area. The Oak Grove picnic area accommodates up to 150 people. The lawn area is also used by City's Recreation Division to host Foothills Park summer camps. Staff have evaluated the amount of use on the grass field, and have determined that half of the grass field could be used for restoring the creek, and the remaining half of the turf (approximately 5 acres) could still meet the recreational needs for the park visitors. Recreation staff believes the proposed improvements to the creek would allow them to incorporate more nature elements into the curriculum for the camps. Improved access to riparian areas next to the turf will be a helpful addition.

There are 16 acres of turf grass in Foothills Park, including 10 acres in Las Trampas Valley and 6 acres near the park entrance and lake area. If the section of creek in Las Trampas Valley were widened as proposed, there would still be 11 acres of turf grass in the park.

If the improvements are implemented in the 7.7 acre parcel, the area would need to be closed to public access during the construction phase. There would also be impacts to the Oak Grove Picnic Area.

The impacts from the Buckeye Creek improvements would be similar to the Boronda Lake Dam reconstruction project, which occurred in summer of 1987. During the 1987 project, park visitors

concentrated towards the lower section of Foothills Park and Vista Hill. The Buckeye Creek project would likely result in greater concentration of park visitors in the upper sections of the park near Boronda Lake/dam and Vista Hill.

Funding Challenges:

Staff will likely need to find multiple outside funding sources to finance any of the creek improvements. The draft report highlights several grant funding sources that may be available to assist in the financing of the project. In addition to grant funding, it is also possible that the project may be used as a mitigation bank to offset unavoidable wetland or stream impacts created by projects elsewhere in the City of Palo Alto area, preferably in the San Francisquito Creek watershed. If unavoidable project impacts to wetland or stream areas are acceptable to the RWQCB or USACE as part of the 401/404 permitting process, the permittee may be able to purchase created wetlands or stream features from the Buckeye Creek project to offset their unavoidable impacts as compensatory mitigation. Implementation of the creek improvements for Buckeye Creek would generate stream, riparian, and/or freshwater wetland mitigation credits that could be marketed to permittees in order to offset up-front funding costs for the project.

Permitting:

In order to implement the initial concepts of restoring portions of the creek, the project would likely require the following permits: United States Army Corps of Engineers (USACE), United States Fish and Wildlife Service (USFWS), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW):

The project would need to also complete a document to show compliance with the California Environmental Quality Act (CEQA) in order to receive permitting clearances from CDFW and RWQCB. Overall, the permitting review is expected to take approximately 18 to 36 months to complete.

NEXT STEPS AND TIMELINE

Discuss the report with Council March 2018

ATTACHMENTS

Attachment A: Draft Buckeye Creek Hydrology Study Report

Attachment B: August 22, 2017, Parks and Recreation Commission Staff Report Regarding the Buckeye Creek Hydrology Study

PREPARED BY: _____

DAREN ANDERSON

Open Space, Parks, and Golf Division Manager,
Community Services Department