FLOOD ZONE 1 ADVISORY BOARD
NOVEMBER 5, 2020

STAFF REPORT

Item 1. Approval of Meeting Minutes: June 4, 2020

The advisory board is being asked to approve the minutes from the June 4, 2020 meeting. The special meeting on July 13, 2020 just included an update to the advisory board on construction projects with no actions by the board, therefore minutes were not prepared. The staff report and presentation from the July 13, 2020 can be found here: https://www.marinwatersheds.org/about-us/events-meetings/flood-control-zone-1-advisory-board-meeting-14; and the draft minutes from June 4, 2020 can be found here: https://www.marinwatersheds.org/about-us/events-meetings/flood-control-zone-1-advisory-board-meeting-15.

Recommended Action: Approve minutes.

Item 2. Open Time for Items Not on the Agenda

Comments will be heard for items not on the agenda (limited to three minutes per speaker).

Item 3. Zone 1 FY 2020-21 Budget Update and Pump Station Designation

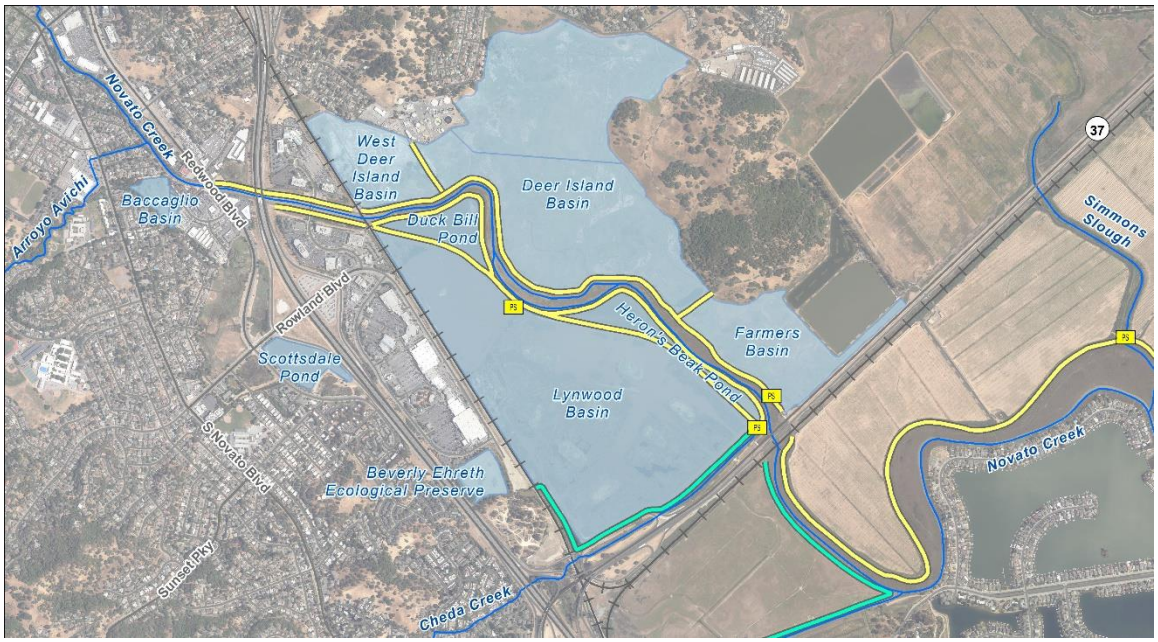
Following the Shelter In Place Order in March and with input from the County Administrator's offices most fund budgets from Fiscal Year 2019-2020 were automatically rolled over into the next fiscal year, including Zone 1's. Going forward, the County Administrator's Office requested that the zones recommend a baseline budget for the beginning of each fiscal year that does not include major project expenses. Baseline budgets are intended to be relatively consistent year to year. Major project expenditures will require separate actions from the AB and District BOS to adjust the budget as needed. As usual, the approved budget may always be adjusted as necessary as priorities and cost estimates for projects and studies planned for this coming fiscal year are more clearly identified. Staff will review the Flood Zone 1 Budget for FY 2020-2021 at the meeting: https://www.marinwatersheds.org/about-us/events-meetings/flood-control-zone-1-advisory-board-meeting-15.

Except for the Simmons Slough Pump Station currently under construction, all Zone 1's pump stations are nearing or beyond their expected design life of 50 years. The District learned in applying for a FEMA HMGP grant to upgrade Lynwood pump station, then 49 years old, that Cal OES does not fund pump station projects for which the existing facility is nearly 50 years old because it is not considered a hazard mitigation effort if it is near the end of its expected design life. Staff recommend setting aside $3 million in a pump station project designation in Zone 1 which could either be used to rehabilitate the three pump stations in the zone: Lynwood (built 1968), Farmers (1990), and Cheda (1971); and/or to be used as grant matching funds to construct new pump stations at Nave Gardens and/or Scottsdale Marsh as described in Item 5, depending on the outcome of the proposed feasibility study. Staff would bring a separate recommendation to your Board at a later date if grant funding is approved. A recommendation by your board and approval by the District Board of Supervisors would be required in order to move these funds into a new project budget.

Recommended Action: *Set aside $2.5 million in a project designation for pump stations.*

Item 4. Zone 1 Projects Update

See the previous Staff Reports and minutes for additional background and more details on these projects.



a) Simmons Slough Water Management System

This project involves installation of a new pump station at the long-time site of a portable diesel pump at the downstream end of Simmons Slough at Novato Creek across from Bel Marin Keys. The project also includes upgrades to several water management structures upstream of State Route 37 which benefit habitat managed by Marin Audubon (a key grant condition) as well as reduce the frequency of flooding on the highway. The Zone has $1.4 million available through the State grant and the zone is contributing an additional estimated $1.5 million for construction.

On July 10, 2020 three bids were opened. The low base bid was from Thompson Builders Corporation in the amount of $2,892,067 (note, engineer's estimate was $2.2M) and the total of the bid additive items were $648,641 (engineer's estimate was $700,000). Because bids came in higher than available funding, some of the water management structures not related to the wetland enhancement area were excluded from the construction contract. The bid additive items would have included improvements and maintenance of drainage between the Audubon property and the pump station that could have better reduced flood risk at State Route 37, but as Zone 1 has several unfunded maintenance needs only the base bid was awarded. Information on the project elements excluded is being provided to Caltrans for consideration in their environmental review of potential interim and long-term projects to reduce flooding and sea level rise vulnerability on SR 37 between US 101 and Atherton Ave (https://mtc.bonfirehub.com/opportunities/21020).

The project budget, including a 15% contingency, is $3,325,877.05. The construction work is currently underway, and Thompson Builders will complete work by the end of 2021.

New water control structures to enhance seasonal wetlands at the Audubon property

b) Novato Creek Sediment Removal and Wetland Enhancement Project

For several decades in order to maintain the design capacity of the Novato Creek Flood Control Project, sediment has been removed every four years from Novato Creek, Warner Creek, and Arroyo Avichi between approximately Diablo Ave and the SMART railroad crossing downstream of Rowland Way. The most recent sediment removal episode occurred between July and October of 2020 when the sediment was beneficially reused on a proposed future ecotone levee in Deer Island Basin and in Heron's Beak Pond (mapped above) both with the intent of helping these basins prepare for future restoration efforts, described more in Item 4.c. Team Ghilotti completed this work under the budget for a total of $1,588,753.69.

As part of the work, Sonoma Marin Area Rail Transit (SMART) and the District were able to coordinate joint efforts allowing SMART bridge maintenance to be completed while the creek was dewatered and accessible to SMART maintenance crews. In addition the project resulted in over two feet of sediment removal near and under the SMART bridge, as well as in most other project locations. A total of 34,925 cubic yards of sediment was estimated to be removed from the creek and beneficially reused within the watershed.

Heron's Beak pond in 2020 after placement of sediment removed from Novato Creek

Hydraulic Modeling for Novato Creek Sediment Removal Scenarios was completed this year by Stetson Engineers, Inc. Utilizing recent countywide LiDAR data Stetson also added the Arroyo Avichi-Baccaglio-Scottsdale-Lynwood drainage and bypass system to the model. This refined HEC-RAS model is not only being used for the design of the Deer Island Basin Complex Wetland Restoration, but also to help determine if reducing the footprint of the sediment removal provides a similar level of flood control protection while reducing costs and temporary habitat impacts. The results of the model can be found at this link:

https://www.marinwatersheds.org/resources/publications-reports/hydraulic-modeling-novato-creek-sediment-removal-scenarios

According to their model the benefits of removing sediment from the creek are modest, and the benefits of removing sediment downstream of Redwood Blvd are even smaller. Although this year the District removed sediment from the normal length of creek, over the next few years staff is recommending your board consider potential projects that may be more effective at protecting downtown Novato including Nave Gardens than sediment removal, e.g. tide gates and pump stations as conceptualized in the 2016 Novato Watershed Hydraulic Study alternatives analysis:

https://www.marinwatersheds.org/resources/publications-reports/novato-watershed-hydraulic-study-2014-2016

c) Deer Island Basin Complex Tidal Wetlands Restoration Project

The SF Bay Restoration Authority (SFBRA) Governing Board approved funding design, preparation of construction plans and specifications and permitting for the first phase of Deer Island Basin Tidal Wetlands Complex Restoration Project. The District's Deer Island Basin Complex includes both the Deer Island Basin and the two stormwater ponds (Ducks Bill and Herons Beak) along Novato Creek as shown on the map on the previous page.

Following a solicitation for proposals, competitive selection, and negotiation, the cost for the proposed scope exceeded available budget. Staff worked with SFBRA staff to modify the scope to scale back the design for the Deer Island Basin restoration element to a preliminary design level while leaving the scope for the restoration of the two ponds adjacent to Novato Creek unchanged. Restoration of the two ponds would effectively widen Novato Creek and increase the floodplain in that location. The cost for this reduced scope still

exceeds the $630,000 grant by $108,540 which must come from Flood Control Zone 1 funds. On January 28, 2020, the District awarded the contract to ESA and we have been working closely with them on the project design. ESA has conducted biological surveys, an aquatic habitat report and a public access assessment that are all in final drafts and should be available soon. In addition, Staff have been working with ESA engineers and modelers on an improved HEC-RAS model based on the Stetson model of the lower watershed and on preliminary design for the restoration alternatives. Our goal is to keep improving the Novato watershed RAS model for current and future projects.

It is estimated that the design and environmental compliance including permitting will be completed by 2021, with intermediate results and products to be presented through the watershed website www.marinwatersheds.org, Flood Control Zone 1 Advisory Board meetings, and community meetings. We currently anticipate having design alternatives and preliminary costs available in the first half of 2021. Additional funds, which are currently not identified, would be needed for actual construction of the project. Construction is likely to cost several millions of dollars, but the cost estimate will be refined as part of the final design.

d) Lynwood Pump Station Reconstruction

In 2005 plans were made to replace this now 52-year old pump station and nearby Cheda stormwater pump station. At the time the Zone did not have adequate funding to proceed with construction so the project was put on hold. In the interim $369,312 in contracting costs for repairs and replacements have been needed, including replacing the pump station discharge pipes, several severely corroded beams that are part of the pump station structure, and several repairs to and replacements of the pumps and motors. During the 2016-2017 winter storms Novato Creek flooded the adjacent area along Highway 37, and the Highway was closed repeatedly for weeks at a time while portable pumps were used to redirect floodwater into Lynwood Detention Basin. This basin's water levels are controlled by the pump station. The extra water in Lynwood Detention Basin did result in flooding conditions to the Highway 101 off-ramp at Rowland Way, which was closed for the duration of flooded conditions. The District applied for funding from FEMA both to reimburse storm-related damage costs and to upgrade the pump station utilizing the plans that were prepared in 2005 and updated in 2017. The funding was denied because the facility was already reaching the end of its design life. In the summer of 2019, during the course of routine preventive maintenance on two of the pump station's four pumps, it was discovered that the beams supporting them were severely corroded and the pump station structure is in need of rehabilitation as soon as possible. The District has taken short-term measures to reinforce the structure.

With increased pumping capacity and an automated electrical system at the Lynwood Pump Station prior flooded conditions and road closures may have been significantly reduced. The proposed Lynwood Pump Station Improvement Project would have upgraded the existing pumps at the pump station and added an additional 10,000 gallons per minute pumping capacity to the system to better protect the surrounding community by allowing the detention basin to collect flows during peak storm runoff events and then quickly and effectively pump down the basin both during and after the storm events to prepare the basin to contain the maximum capacity storage for the next storm system. The pump station is currently only operated manually. Additionally, the project would have upgraded the electrical and mechanical systems to current standards, include a new motor control center equipped with a warning and alarm system using telemetry via cell phone dialer and add an automated system to switch power to an emergency generator so that the pump station could continue to function in the event of a power outage. Every year the Lynwood Pump Station experiences several power outages, and these outages are unknown unless maintenance personnel are physically at the pump station to observe that the power is not available. Upgrading the Pump Station to

an automated system would potentially save hours of critical continued pumping in the event of power outages between storm patrol inspections.

Staff recommend putting the Lynwood Pump Station Reconstruction project on hold until completion of the potential feasibility study described in Item 5.

Item 5. Begin Discussion of Zone Work Plan for FY 2022

a) Watershed and Sea Level Rise Context

Zone 1 revenues are nowhere near sufficient to keep pace with the financial needs of climate change related increases in flood risk. The expected costs are compounded by many District maintained facilities reaching the end of their design service life. Additionally, environmental regulation of maintenance activities is becoming increasingly restrictive and costly. Staff are faced with the challenges of maintaining aging infrastructure while simultaneously planning for sea level rise adaptation with any additional funding dependent upon State and Federal grant programs. Consistent with the Novato Watershed project, staff would like to bring to your Board a new set of priorities to re-design the Novato flood system consistent with regional, state, and federal priorities such as wetland restoration, sea level rise adaptation, transportation improvements, and hazard mitigation in order to attract more grant funding and leverage local funding as matching funds. However, it should be noted is that current grant funding sources for major flood control improvements is very limited and highly competitive and doesn't necessarily address the existing infrastructure deficit. Unless there are major changes in funding priorities and availability there will likely continue to be flooding over major infrastructure (e.g. highways, railroads, and other public facilities) in the lower Novato watershed as sea levels rise. Staff plan a workshop in February 2021 to describe the opportunities available for funding and what additional resources may be required to pursue additional funds and how that process aligns with the Zone's existing cash flow.

Here is a summary of potential funding sources that staff could begin planning around:

FEMA Hazard Mitigation Grant Program (HMGP) – Funding for up to 75% of hazard mitigation projects, available only after disasters occur in the state (which has been a regular occurrence the past five years). Typically, projects are limited to $4 to $5 million in scale and must have a benefit to cost ratio greater than one. This program is generally less competitive than FEMA's national grants. Hazard Mitigation Plan required.

FEMA Building Resilient Infrastructure and Communities (BRIC) – Brand new program. Funding for up to 75% of the cost of hazard mitigation projects, up to $50 million projects. Nationally competitive but there are set asides for each state as well ($500 million total available in 2020). Hazard Mitigation Plan required.

San Francisco Bay Restoration Authority (SFBRA Measure AA) – Funding for wetland restoration projects around the Bay. Flood protection costs can be included only if they are needed for the wetlands project. Ecotone levees along State Route 37 and restoration of the diked basins may be attractive projects to the SFBRA.

DWR Floodplain Management Protection and Risk Awareness Program – New state program focuses on economically disadvantaged communities and multi-benefit projects that primarily address stormwater, mudslide, and flash flood-related protections. Projects in FEMA special flood hazard areas are prioritized. 25% local match is required, except for projects that directly benefit a disadvantaged community. Stormwater Resource Plan required.

Caltrans SB1 Adaptation Planning Grants – grants for studies to support sustainable regional transportation. Caltrans is also looking at alternatives for SR 37 and may be interested in restoration of the diked baylands.

b) Baccaglio Basin and Scottsdale Pond Flood Improvement Study

As presented at the February 6, 2017 Advisory Board meeting, a limited evaluation of the flood reduction benefit for Scottsdale Pond was included in the Novato Watershed Study. Staff recommend that a more detailed analysis be performed using the new Stetson HEC-RAS model with updated storm drain inputs from the City of Novato storm drain model to review these results and to assess if there are flood reduction benefits not previously considered given that this area is publicly owned. Staff developed a preliminarily estimated cost of $100,000 for the study. Staff now recommend initiating an expanded feasibility study that includes the scope of the previously proposed Baccaglio Basin and Scottsdale Pond Flood Improvement Study along with a feasibility analysis for the following project elements:

1) Revisit alternatives to protect Nave Gardens, utilizing savings from foregoing or reducing Novato Creek Sediment Removal in 2024 and onward.

Description	**Time to Construct**	**Preliminary Cost Estimate* (includes uncertainty plus 30% for soft costs)**	**Potential Funding Sources**
S-2: Install Storm Drain Flap Gates at Nave Gardens to reduce backflow from creeks to streets (look at deploying portable pump in interim before M-4 below)	Short (5 years)	$325,000	Savings from skipping 2024 sediment removal.
M-4: Nave Gardens - Install Pump to Novato Creek	Medium (10 years)	$4,030,000	Potentially savings from skipping 2024 sediment removal (25%) plus FEMA HMGP funding (75%)

2) Look at alternatives to replacing Lynwood Pump Station in place that are compatible with the Deer Island Basin Complex Restoration Project.

Description	**Time to Construct**	**Preliminary Cost Estimate* (includes uncertainty plus 30% for soft costs)**	**Potential Funding Sources**
S-4: Increase Scottsdale Marsh conveyance by installing a pump from the Marsh to Lynwood Basin	Short (5 years)	$6,500,000	Savings from decommissioning Lynwood pump station (25%) plus FEMA BRIC funding (75%)
Reconfigure Lynwood Basin and how it is managed.	Medium (10 years)	TBD	TBD

***cost estimates came from the Novato Watershed Hydraulic Study in 2016 and need to be updated and detailed as part of the feasibility study.**

c) Rush Creek Watershed Study

This project was identified by the Advisory Board as a secondary priority after the Simmons Slough Water Management System. Staff, the City of Novato, and Caltrans met in 2018 with the primary property owner in the lower Rush Creek area (east of Binford Road), the California Department of Fish & Wildlife (CDFW), to discuss cooperation and participation in the study as well as partnering on future maintenance activities. During the meeting it became apparent that a study which may identify the cause of backwatering the drainage channel and clarify the levels of sedimentation within the marsh immediately downstream of Binford Road is a necessary step in defining the issue.

Once all the funding for this study is identified, the Rush creek watershed model will leverage the City of Novato's storm drain master plan hydraulic model and the new County-wide LIDAR elevation data. The City of Novato has offered $20,000 towards this study and the Transportation Authority of Marin is able to contribute $25,000. **A call for applications for Caltrans SB1 Adaptation Planning grants is expected in November 2020 and staff recommend applying for the remaining approximately $100,000 needed to undertake this study.**

Staff continues to monitor the Rush Creek outfalls pending completion of the Rush Creek drainage study, as noted above, which will inform decisions as to the tide gate structure's (including un-gated culverts) desired effectiveness and planned repairs.

d) Prepare for flood fighting response by Conservation Corps North Bay around Deer Island Basin

In 2019 a levee failure occurred on Novato Creek along Deer Island Basin. The site has been treated with plastic and sandbags each winter to reduce saturation of the failed levee to minimize the likelihood of further damage. Permanent repairs to the levee would be costly and staff hope for Measure AA funding in the next 5 years to complete final design and construction to remove this levee in order to restore the basin to tidal wetland. In the interim an additional precaution the zone may take is to be prepared to implement an emergency flood barrier (e.g. sandbag and/or Muscle Wall) along the back side of lower-lying properties around Deer Island Basin to prevent the areas from flooding should the levee breach during a high water event in the winter. **With property owner permission, this could be accomplished through a $25,000 amendment to the annual maintenance contract with the Conservation Corps North Bay. Stormwater runoff would need to be observed by staff to determine if deployment of portable pumps is necessary should any temporary barriers be built.**

Item 6. Operations and Maintenance Update

Staff will be available for questions but are providing this written update only.

a) Programmatic Maintenance Permitting Status

In 2011 District staff began working with State environmental regulatory agencies requiring programmatic maintenance permits for agencies working in waterways. Creek maintenance activities requiring programmatic permitting include vegetation management, sediment and debris removal, erosion control, maintenance and repair of flood control structures, and levee maintenance. The process began by developing a Stream Maintenance Program (SMP) Manual (see it here: https://www.marinwatersheds.org/resources/publications-reports/marin-county-stream-maintenance-manual) and then applying for permits from relevant agencies, which for most sites includes the CA Department of Fish and Wildlife and the San Francisco Bay Regional Water Quality Control Board.

i. *Department of Fish & Wildlife (DFW) Routine Maintenance Agreement (RMA)*

In October of 2012 the CA Department of Fish & Wildlife issued a Routine Maintenance Agreement (see it here: https://www.marinwatersheds.org/resources/publications-

reports/dfw-saa-routine-maintenance-agreement-permit) for the District's creek maintenance activities. This RMA outlines various measures required in order to minimize impacts to valuable fish and wildlife resources in Marin's creeks. The measures were not significantly different from procedures outlined in the SMP Manual. Conditions also included annual notifications, reports, and fees. Annual fees per site were originally $112 but are now $305.25, which for example last year in Zone 1 added up to $6,105. The 2012 RMA was set to expire at the end of 2016, but an extension was approved until the end of 2021. This year's work program includes activities necessary in order to reapply and/or extend the RMA, including evaluating any potential for consolidating "site" definitions in order to reduce annual fees.

Note: the District has a separate RMA for the quadrennial Novato Creek sediment removal project in Item 4.b) which expires in 2022 before the next effort is due.

ii. *San Francisco Bay Regional Water Quality Control Board (RWQCB) Order*

This permit an additional 2-3 years to develop than the RMA on which it was built. During the summer of 2017 RWQCB issued the first Waste Discharge Requirements and Water Quality Certification for five years of the District's Stream Maintenance Program. The thirty-page order came with 62 conditions (see here it: https://www.marinwatersheds.org/resources/publications-reports/rwqcb-smp-permit) and RWQCB has allowed the District to stagger their compliance over the first several years of the permitted period. Some conditions resulting in the most significant changes to maintenance practices, creek inspection, and documentation processes include:

- Maintenance activities including vegetation management (not for purposes of fire fuel reduction), sediment and debris removal, erosion control, maintenance and repair of flood control structures, and levee maintenance may not exceed a program wide cumulative total of 5,000 linear feet of creek channel and 11,000 cubic yards of sediment and debris.
- Vegetation management activities are limited to above ground trimming, limbing and removal. The SMP Manual allows for limited treatment of emergent vegetation removal (like cattails and tulles). The work must leave the subsurface root structures behind to allow it to reestablish in the spring and summer. Full root mass removal of cattails can be performed using hand tools to maintain a low flow channel if approved on a case by case basis.
- By May 1 of each year RWQCB requests that the District submit a list of sites to be maintained that summer for their review and approval. 2019 is the first year that RWQCB denied vegetation management approval until it could verify planned work would not exceed program limits. Because of this, staff needed to identify specifically a subset of which sites would have maintenance activities and what the estimated length was. Previously we had been notifying DFW and RWQCB each May that the full length of nearly all sites would be included in the program as we do not know exact sites and lengths needing work that early in the year, but this exceeded the program limits of 5,000 linear feet by approximately twelve-fold. In order to narrow down the program early in the year staff developed a new method of tracking maintenance needs based on GIS data collection coupled with prioritization of sites based on property ownership that allows for more accurate reporting to the regulatory agencies.
- **With respect to sediment removal, when the District notifies the RWQCB of planned activities for the summer an update is required regarding potential capital improvement projects that may reduce or eliminate the need for the maintenance activity in the future.**

b) Preventive Maintenance Program Status

i. Pump Station Maintenance
None of the pump stations had pumps up for major preventative maintenance this year. (Individual pumps and motors are scheduled for major maintenance on a six-year interval.) All of the pumps in the zone (Lynwood and Cheda Pump Station, and Farmers), are run and checked monthly during the summer and more frequently during the winter season even if there is a dry period. Each year before the rainy season each pump station's electrical components are tested and the engines maintained.

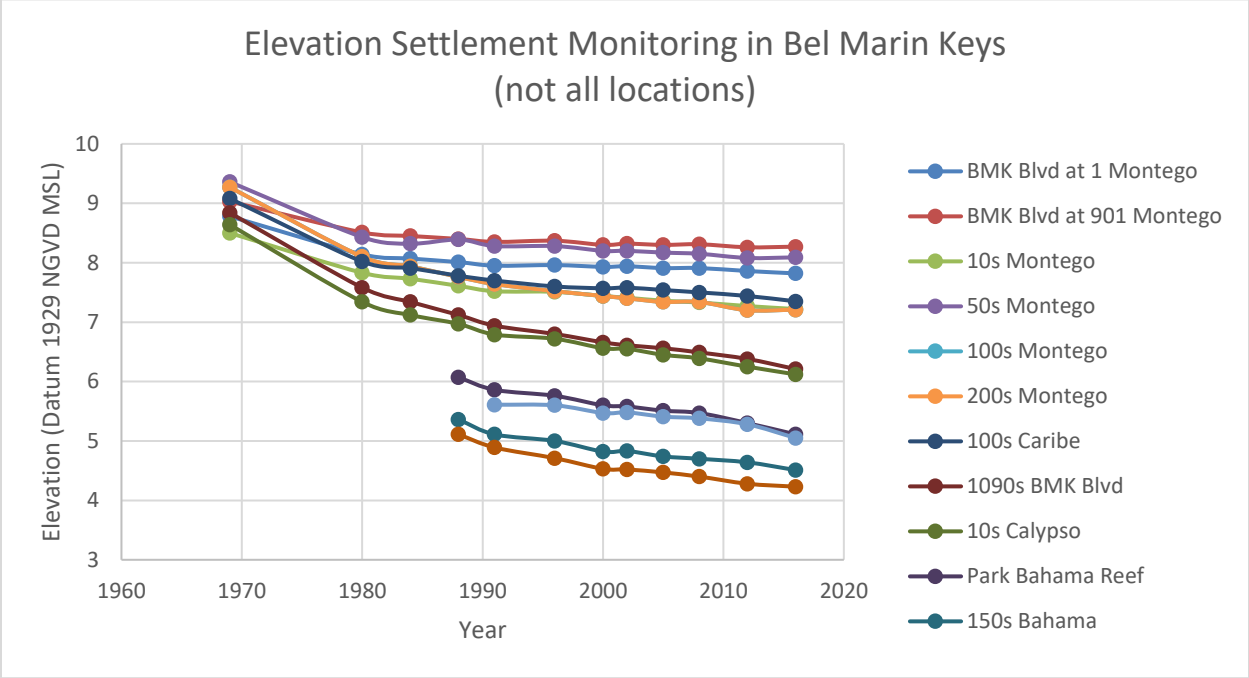
Power interruptions to the Lynwood Pump station continue to be a frequent occurrence. PG&E is meeting with staff this fall about planning for the pump station and potential for back-up power generator installation.

ii. Vegetation Management
Vegetation maintenance within flood control owned properties and easements occurs July through October. Maintenance work includes trimming of vegetation in the channel and debris removal. Most of the work is performed under contract with the North Bay Conservation Corps. Pre-inspections of the creeks and channels are conducted to determine maintenance needs so as to reduce annual costs and to prioritize work. Maintenance operations continue throughout the summer so that creeks and channels throughout the Zone ready for the winter season flows. The final step is cutting of cattails which occurs in October right before the rains.

iii. Sediment Management
Aside from the reach of Novato Creek and tributaries where major sediment removal took place (see Item 5.b), there was also a small section of Arroyo Avichi farther upstream where the District worked with the City to coordinate sediment removal.

iv. Precipitation and Stream Gauge Maintenance
The District maintains several precipitation and stream gauges throughout the County which help inform us of water levels in creeks and heavy rainfall in real-time. With grant funding, Zone 1 has new and recently updated gauge sites near Stafford Lake, and on Novato Creek and at the Library, Rowland Way, and the confluence with Pacheco Creek. Some additional grant funding supports rating curve development. For more information on the gauges visit https://marin.onerain.com/home.php. Preventive maintenance on the gauges is performed twice annually - September/October and February/March - and as needed. Since July 2019, further maintenance and expansion of the gaging system is funded through the General Fund's emergency preparedness funds.

c) Settlement Monitoring
For several decades the District has been monitoring settlement markers in residential communities adjacent to tidal creeks approximately every four years, including at Bel Marin Keys since 1969. We had scheduled to do a survey in 2020 but this was impacted COVID-19 and staff are now considering ending the existing elevation settlement program. **Staff do not know what the intent was in collecting this data and don't recommend prioritizing its continued collection given that settlement rates are slowing considerably since 2000.**



The Novato Creek Levee Evaluation scope included a memo recommending expansion of the settlement monitoring program to the Novato levees. There is no funding available for this currently but using this memo the Zone could consider incorporating new settlement markers into future projects on Lynwood Levee associated with Deer Island Basin Complex Wetland Restoration or other future projects.

Item 7. Marin County Flood Forecast Model

A brief presentation on this item will be provided to the Board of Supervisors on November 10th (https://www.marincounty.org/depts/bs/meeting-archive) and a longer presentation to the North Bay Watershed Association (https://www.nbwatershed.org/) on this item on November 6th.

County staff are developing a Marin Real-Time Flood Forecast Model. This tool is being developed through statistical analysis of every event in the District's roughly 25 years of rain and stream data record. One thing that jumped out is that Marin flooding is really spiked by the shorter duration rainfall events in the 10 to 15-minute rainfall bursts. Marin's watersheds are flashy, so these short-term rainfall bursts impact our creek water surface levels. Marin's small and flashy watersheds make it immediately clear that our new Marin model needs to account for the short-term duration intensities both historically and in order to forecast flooding. The new model considers:

1. Antecedent (past) Rainfall conditions

2. Maximum Rainfall Intensity for six storm durations currently set at 10-, 30-, 60-, 120-, 240- and 360- minutes.

3. Average Rainfall Intensity for Same Durations as 2.

4. Rainfall Intensity "Spikiness" Factor staff have proposed a new factor which is simply the maximum rainfall intensity divided by the average rainfall intensity for each duration (i.e. 10-minute max/10-minute average) which is a rainfall intensity "spikiness" factor of sorts.

Inputs 2 and 3 of the forecast model depend on the forecast precipitation data from the National Weather Service (NWS). NWS does not currently provide precipitation forecasts for those relatively small durations, but they are discussing with staff a Marin-customized forecast with at least some of the data needed for Marin's new model. NWS believes they can provide hourly data for sure, and likely some version of 15-minute data for some time before storms. We know we already get the 360-minute data for 4 or 5 days before events (the quantitative precipitation forecast, QPF tables) so we may also be able to obtain forecasts for the 120- and 240-minute intervals.

Item 8. Climate Change Discussion

This is an opportunity for the advisory board to generally discuss climate change and the appropriate role of Zone 1.

A September 11, 2020 Marin County Civil Grand Jury Report entitled *Climate Change: How Will Marin Adapt?* which can be found here: https://www.marincounty.org/depts/gj/reports-and-responses/reports-responses/2019-20/climate-change-how-will-marin-adapt. A response from the County of Marin is anticipated by December 11, 2020.

Flooding of major transportation corridors, even on sunny days, is expected to become a more regular occurrence with rising sea levels due to climate change. Tidal flooding of the road network causes broad regional traffic and transportation delays so while there are available funds to leverage the resources in Zone 1, the burden of sea level rise adaptation on these roadways should not be only on the flood zone (see this article for more about regional delays caused: http://www.homelandsecuritynewswire.com/dr20200806-bay-area-coastal-flooding-triggers-regionwide-commute-disruptions). To this end, Zone 1 staff are regularly coordinating with the County's BayWAVE Program, County Road Maintenance and Engineering Divisions of Public Works, and Caltrans to promote the design and maintenance of more flood resilient roadways in Zone 1. This includes encouraging Caltrans participation in District projects outside their right-of-way that have beneficial impacts to State Route 37 and US 101.

Item 9. Schedule Next Meeting

The next meeting is tentatively scheduled for February 4, 2021 to review proposed Zone 1 baseline budget for FY 2022 and receive an update on the Deer Island Basin Complex Restoration Project.