
To: Mayor and City Council

From: Mary Neilan, City Manager

Subject: Update on DWR grant (Belvedere Lagoon Coastal Levee Evaluation) and meeting with FEMA personnel; recommendation from Citizens' Flood Zone Committee meeting

Recommended Motion/Item Description

1. Pursuant to Citizens' Flood Zone Committee recommendation, direct staff to proceed with a structural evaluation of San Rafael Avenue and Beach Road levees and to develop alternatives for 100-year flood protection.
2. Appropriate \$84,000 from the FY 2015-16 budget surplus to fund the City's share of the portion of this grant funded project to be accomplished this fiscal year.

Background

(This report was distributed to the Citizens Flood Zone Committee and discussed at their meeting of March 9, 2016.)

In December, the CFZC met to discuss the award of the Dept. of Water Resources Local Levee Assistance Program grant and the workplan it is intended to fund. At that meeting the CFZC recommended that the City Council "consider the positive aspects of the potential studies as a benefit to all Belvedere citizens" when deciding whether to accept the grant and allocate the required matching funds.

In anticipation of the publication of a final list of awardees (supposed to occur in "early 2016" per the DWR website), James Reilly and I met recently with FEMA Region 9 personnel, to confirm that the advice received from FEMA last year regarding our approach to the levee evaluation had not changed.

That meeting took place on February 23 at the offices of AECOM (civil engineering consultant for FEMA) in Oakland. In attendance were Region 9 Civil Engineers Shilpa Mulik and Ed Curtis, FEMA Risk Analysis Branch Chief Juliette Hayes, FEMA Natural Hazards Program Specialist Michael Hornick and AECOM Coastal Engineer Kris May. James Reilly reviewed the grant workplan to conduct a feasibility study of potential modifications to the embankments along San Rafael Ave. and Beach Rd. and reiterated the City's goal of amending the Flood Insurance Rate Map (FIRM), specifically lowering the Base Flood Elevation (BFE) and removing Belvedere properties around the Lagoon from Flood Zone AE.

When we met with this same group in early 2015 (minus Kris May), we were told that FEMA could not provide much preliminary guidance to clarify their numerous and often conflicting regulations regarding levee evaluation and how they apply to the specific situation that exists in Belvedere. At that time, they advised that we proceed with the feasibility study and propose a project by submitting a Conditional Letter of Map Revision (CLOMR) that would then be evaluated by FEMA personnel pursuant to their regulatory framework. That is what the LLAP grant workplan proposes to do.

However, when we met with them in February, there were several concerns expressed and issues raised that, if not resolved, may severely limit the City's ability to amend the FIRM and remove properties from the AE zone.

Findings

Characterization of the structures

If the City characterizes Beach Rd. and San Rafael Ave. as "non-levee embankments", as we were advised to do by FEMA in late 2014, then FEMA guidance (Procedure Memorandum 51, 2/27/09) dictates that the embankments would provide no barrier effect against coastal flooding; that is, the interior lagoon area would be flood mapped assuming total failure of the embankments during the 1% annual chance coastal flood (i.e., as if the embankments did not exist). This is the approach FEMA has taken to date and is reflected in the current FIRM and new FIRM which will become effective March 16, 2016. No partial credit can be granted to non-levee embankments.

If the City characterizes the Beach Rd. and San Rafael Ave. structures as "levees," the City must demonstrate to FEMA that they meet the following criteria: the levees must be (a) designed for flood protection; (b) operated as a "levee," and (c) operated and maintained by a public entity.

In this case, the levee system is what FEMA would evaluate: not only the roads, but the lagoon, the pumps and the drainage system used to manage the water level. FEMA would want to see the City or some other public entity assume complete responsibility for the system and would require that an approved Operations and Maintenance plan be in place.

FEMA's rules also require levees to be free of encroachments that could affect their structural stability. After conducting a site visit on March 1, FEMA made the following observations regarding encroachments and other deficiencies in the levees.

San Rafael Avenue

- 1. Vegetation including mature trees located on the crest of the embankment (most notably at the north tie-in to Tiburon Boulevard) whose root structures may compromise the structural integrity of the embankment.*
- 2. A large intake/outlet structure for the lagoon pumping system that may compromise the structural integrity of the embankment.*

3. *Residential structures that encroach the seaward side of the embankment, most notably at the southern tie-in point approximately 500 feet south of the San Rafael Avenue/West Shore Road intersection*
4. *Close proximity of residential structures on both the seaward and lagoonward sides of the embankment that potentially interfere with regular inspection and maintenance of the embankment.*

Beach Road

1. *Upper portion of the concrete seawall has openings that require coverings (e.g., flap gates) if the upper portion of the seawall is considered to be part of the flood control structure.*
2. *Upper portion of the concrete seawall is not continuous; it stops and starts again on either side of a house built on pilings on the seaward side of the seawall.*
3. *Upper portion of the concrete seawall has visible cracks.*
4. *Lower portion of the concrete seawall along Main Street near the southern tie-in point is undermined.*
5. *Close proximity of residential structures on both the seaward and lagoonward sides of the seawall and road embankment that potentially interfere with regular inspection and maintenance of the embankment, most notably at the northern tie-in to Acacia Avenue.*

While some of these deficiencies may be able to be mitigated (removal of trees, for example), there are others that cannot (such as the structures that exist at San Rafael/West Shore Rd and on Beach Rd.).

What if?

If these issues were somehow resolved and FEMA allowed Beach Rd and San Rafael Ave to be characterized as “levees,” then there are two paths to obtain FEMA recognition of a total or partial barrier effect and re-map the flood risk of the interior lagoon area:

- 1) *By gaining FEMA’s “accreditation” of the levees*
 - a) *Procedures for levee accreditation are set forth in NFIP Regulations Sec. 65.10*
 - (1) *Levee accreditation in accordance with Sec. 65.10 would require that the levees provide a total barrier effect; that is, they must be raised to elevations sufficient to prevent overtopping from the 1% annual chance still water (el. 10 ft NAVD), plus the maximum wave height/run-up, plus 1 ft of freeboard. This would likely require raising Beach Rd and San Rafael Ave by 4 ft or higher. In addition to the height requirements, all of the other requirements as per 44 CFR 65.10 would have to be met to qualify for levee accreditation (e.g., public entity responsibility, operations and maintenance plans, etc.).*
- 2) *Through revised flood mapping following FEMA’s new Levee Analysis and Mapping Procedures (LAMP) for “non-accredited levees.”*
 - a) *FEMA’s allowable applicability of LAMP to Beach Rd and San Rafael Ave is uncertain because LAMP was designed to apply to “levees” as they exist; not to “levees” as they*

are proposed to be modified. Before the LAMP process could be initiated, FEMA would first need to make the determination that LAMP could be applied to Beach Rd and San Rafael Ave “levees” as they are proposed to be modified.

- (1) If FEMA makes the determination that LAMP could be applied to Beach Rd and San Rafael Ave, then FEMA would create a Local Levee Partnership Team (LLPT), composed of “stakeholders,” to guide the LAMP process. The LLPT would likely include FEMA, City of Belvedere, BLPOA, and possibly Town of Tiburon.
- (2) Under the guidance of the LLPT, the City would undertake the technical studies to justify re-mapping the flood risk of the interior lagoon area. These studies would need to include geotechnical and structural evaluations of the stability of the levees, hydraulic analysis of overtopping the levees and flooding, and operations and maintenance plans, all certified by an engineer. These studies are included in the scope of the City’s DWR LLAP grant project.
- (3) The end product of the LAMP would be the LLPT’s submittal to FEMA of a request to re-map the flood risk in the interior lagoon flood zone along with supporting technical justification, all of which are included in the scope of the City’s DWR LLAP grant project.

Flood Zone D and Flood Zone AE

And yet, even if FEMA acknowledged that our “non-accredited levees” mitigated flood risk in the lagoon, they would likely designate the parcels around the lagoon as Zone D, which is referred to as an “uncertain” flood risk zone. Although not required by federal regulators, some lenders nonetheless require mortgage holders in Zone D to carry flood insurance.

Even with the remapping, lenders may still consider some residential structures in the lagoon to be located in Zone AE. The reason is that the lagoon itself (i.e., the open water area) would still be mapped Zone AE -- albeit at a lower BFE (projected to be approx. el. 5 ft NAVD) – with only the higher shoreline areas mapped out of Zone AE. And, if any part of a residential structure (i.e., any part that’s structurally connected to the residential structure) is determined to touch the lagoon, then the entire residential structure is considered to be in Zone AE. For example, if a residential structure is structurally connected to an outside deck which is structurally connected to a dock or bulkhead which touches the lagoon, then the entire residential structure (i.e., residence, deck, and dock/bulkhead) would be considered in Zone AE. In order for the residential structure to be mapped out of Zone AE, an Elevation Certificate would be required certifying that the “lowest adjacent grade” along the perimeter of the structure’s foundation, including any deck and dock/bulkhead that are structurally connected to the structure or its foundation, is at or above the BFE for the Zone AE (i.e., higher than el. 5 ft, again which is the projected future BFE with the future “levee” modifications in place).

Conclusion

Given current conditions on San Rafael Ave and Beach Rd, and FEMA’s existing regulatory framework, there is not a path for the City to seek “credit” for the levee system that protects Belvedere properties from flood risk and seek to amend the FIRM.

There remains, however, an opportunity to use the LLAP grant to help fund necessary improvements to that system and enhance flood protection in Belvedere, even if those improvements do not change the flood zone designation.

Citizens Flood Zone Committee Recommendation

At their meeting on March 9, the CFZC discussed the information from FEMA and concluded that at this time, there remained significant hurdles to satisfying FEMA requirements and amending the flood maps or flood zone designation in the Lagoon. They agreed the DWR LLAP grant could still be put to good use to investigate the structural integrity of the levees and explore alternatives to improve the levee system and enhance flood protection in Belvedere.

The CFZC recommended that the City proceed with a structural evaluation of the San Rafael Ave. and Beach Rd. levees and develop alternatives for 100-year flood protection (Tasks 1 and 2 shown on the DWR LLAP Grant Implementation Plan, attached). Additional grant funded activity should be considered once these first two tasks are complete.

Staff Recommendation

These tasks dovetail nicely with work that staff had already contemplated in the coming year, particularly with regard to Beach Rd. The seawall continues to suffer the effect of erosion and will very likely require structural improvements in the near term. Staff recommends proceeding with the geotechnical evaluation and alternatives analysis, even as the City waits for final approval of the DWR LLAP grant. Funds expended now on this project will be reimbursed once the grant agreement is executed.

Fiscal Impact

The tasks recommended by the CFZC will require a financial commitment from the City of \$144,000 (total cost of these tasks is estimated at \$325,000). However, only the first task will be accomplished in this fiscal year. The Council should appropriate \$84,000 from the FY15/16 budget surplus to fund the City's share of this work. Next year's capital improvement budget will include \$60,000 for the second task.

Recommendation

1. Pursuant to Citizens' Flood Zone Committee recommendation, direct staff to proceed with a structural evaluation of San Rafael Avenue and Beach Road levees and to develop alternatives for 100-year flood protection.
2. Appropriate \$84,000 from the FY 2015-16 budget surplus to fund the City's share of the portion of this grant funded project to be accomplished this fiscal year.

Attachments

DWR LLAP Grant Implementation Plan (Stetson Engineering)

DWR LLAP Grant Implementation Plan

Timeline	Task	Outcome	DWR's Cost Share (55%)	City's \$ Cost Share (45%)		Total \$ Cost*
				Task \$ *	Cumulative \$ *	
3 months	Phase 1 Geotechnical and Coastal Structural Evaluation of Existing Levees	Identify deficiencies, describe remedial measures, estimate costs	111,000	84,000	84,000	195,000
	Stop? ← off-ramp					
2 months	Alternatives Analysis	Develop alternatives for 100-year flood protection, estimate costs; identify preferred alternative	80,000	60,000	144,000	140,000
	Stop? ← off-ramp					
5 months	Feasibility Study and Phase 2 Geotechnical and Coastal Structural Evaluation of Modified Levees	Prepare feasibility-level design and estimate cost for preferred alternative w/sea level rise adaptability	174,000	135,000	279,000	309,000
	Stop? ← off-ramp					
12 months	Environmental Review and Permitting	Prepare CEQA/NEPA documentation; prepare environmental permit applications	213,000	168,000	447,000	381,000
	Stop? ← off-ramp					
7 months	FEMA CLOMR	FEMA issues CLOMR	33,000	28,000	475,000	61,000
	End		611,000	475,000		1,086,000

* Does not include City's in-kind contribution (staff time) of approximately \$25,000.