

## Project Description

### Water Tank Upgrade for Community of Muir Beach

As is the case with the other communities in West Marin, the unincorporated community of Muir Beach is on its own with regard to producing water for household purposes and for fire protection – being way beyond the service reach of MMWD. Beginning in 1991, the residents of Muir Beach began to self-tax themselves to build reserves for eventual replacement of the then aged water infrastructure. With the self-imposed parcel tax of \$300 per year, the community now has almost \$475,000 on deposit to be able to contribute toward the single-most expensive upgrade to its water system, a seismically secure water tank to be located at the community's upper water tank site.

### Existing Tank not Seismically Resistant and Near End of Service Life

The upgrade comes at a time when the existing 45-year-old redwood tank suffers from rot all the way through its 3" thick redwood planks. Please note the September 2009 photo below showing the exposed liner at the base of the tank holding in the 150,000 gallons. The rot has since been removed and replaced with epoxy filler – but the tank remains totally vulnerable to any significant earthquake.



Muir Beach is subject to severe seismic events – being less than 2.4 miles from the San Andreas fault, which runs parallel to the coast directly offshore of Muir Beach. The community's geotechnical consultant, Miller-Pacific Engineering Group, has calculated seismic factors to be used at this site for the construction of a seismically secure tank. At 1.9 g peak force, the potential ground motion acceleration for this location ranks #1 of the 1,300 water tanks built by one of the national tank vendors involved in this

project. The rapid seismic acceleration of 1.2 million pounds of water is certain to crack to semi-rotten wooden planks.

Further, the extremely corrosive environment of the coastal setting (925' from the shoreline and bathed in salt) takes a toll on any corrodible materials, including galvanized steel. See the photo below showing corrosion almost all the way through the original galvanized steel bands. The life of the tank has been extended by the installation of replacement bands alongside the original bands.



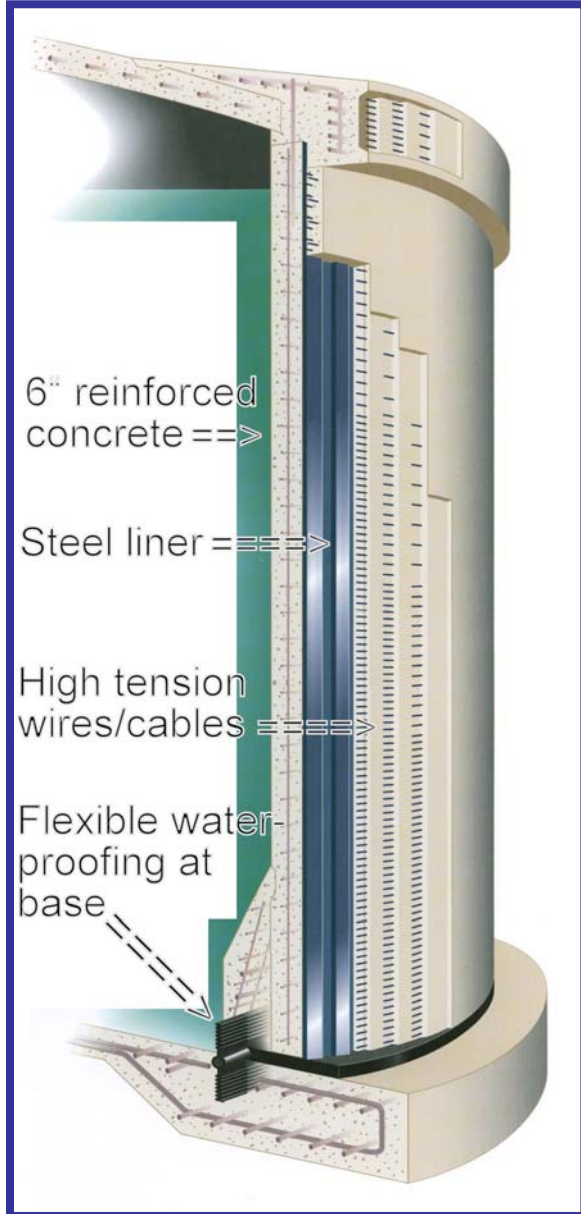
So, it's clear that the community's existing redwood plank water tank will fail in a significant earthquake. That is of course the time that water is needed most for fire protection, and the lack of household water after an earthquake and tank failure would last for an extended period. Construction of the proposed new tank is estimated to take approximately three months in normal times – and in the times after a significant earthquake in the Bay Area, arranging for construction of a new tank would likely take a greatly extended period of time.

Muir Beach has two water storage tanks for its 147 residences and single commercial establishment – both are redwood, and therefore both are subject to failure. The subject upper tank location (elevation 475') can serve both the upper and lower portions of Muir Beach, but the lower tank (elevation 242') can only serve the lower portions.

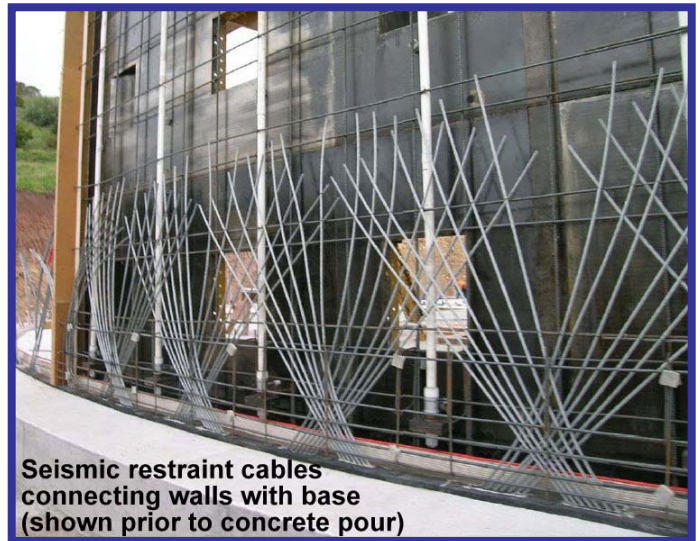
## **Proposed Tank Seismically Secure and has an Extended Design Life**

The proposed tank is a modern durable design having design life of approximately 100 years that can withstand the magnitude of earthquakes that can be generated by the San Andreas fault. The following illustration and photograph note the construction techniques used for seismic resistance. The cross section illustration on the left on the next page shows the interior reinforced concrete panels (6" thick), sur-

rounded by a steel liner, and then wrapped with high tension wires or cables tensioned to produce 15,000 pounds per square inch of compression on the concrete, not allowing it to crack. That prestressing steel is then covered with approximately 2" of low permeability shotcrete to serve as a corrosion barrier against entry of salts to the reinforcing steel embedded in the concrete.



The photograph below shows the steel seismic cables designed to keep the tank walls and base restrained during a major seismic event. The waterproof flexible joint at the base of the walls (noted in the cross section on the left) allows for the inevitable movement at that joint, with recovery and continued water tightness after the seismic event.



## Sizing of the Proposed Tank

At the time the existing Local Coastal Program including Muir Beach (Unit I) was enacted in 1988, the community had a combined water storage capacity of 276,000 gallons (the existing single tank at the upper site, and two water tanks at the lower site).

The LCP notes (page 44 of Unit I), "[Muir Beach] has two wells and three storage tanks. The wells draw from aquifers in Redwood Creek, whose precise magnitude and dependability are not known. During

periods of droughts, normal demand may exceed estimated flow capability of these underground sources. This condition sometimes requires rationing measures. No expansion of production or storage facilities is planned.”

Subsequent to that writing, two of the community’s three redwood storage tanks failed, and those two were replaced in 1988 with a single storage tank, smaller in total capacity than the two tanks it replaced (being the most the community could afford, and the community received an emergency grant to help pay for the tank). As a result, capacity was reduced below that referenced in the LCP. Sizing of the new tank at 200,000 gallons restores the capacity to within 1.5% of that referenced in the LCP.

## **Useful Future Purpose of Existing Tank**

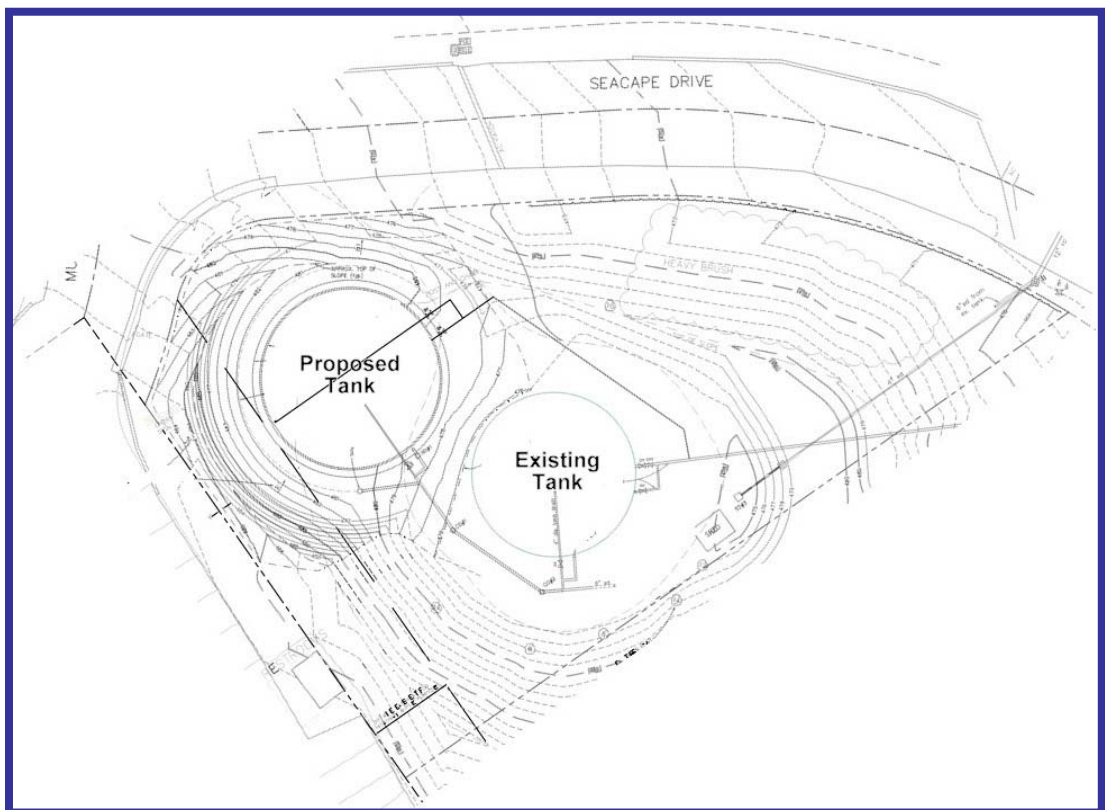
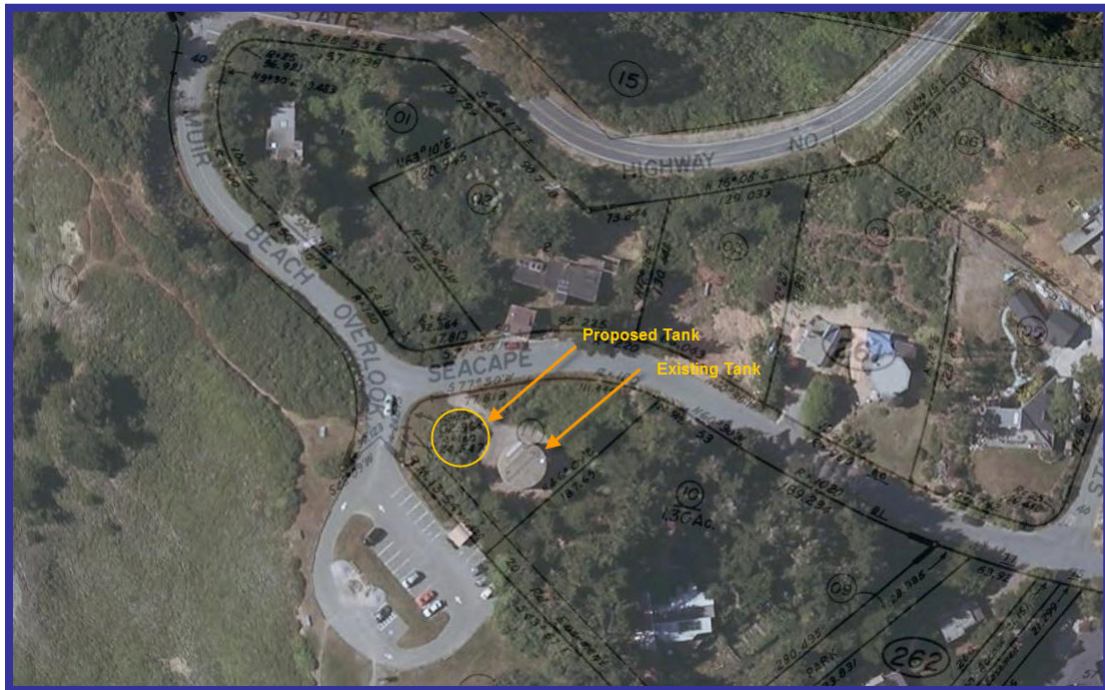
Although the proposed tank will serve as the eventual replacement for the existing aged water tank, it doesn’t make good sense from an environmental sense to destroy the existing tank prematurely. As noted in the LCP, the community draws from two wells adjacent to Redwood Creek. Working in collaboration with the National Park Service, the community modifies its pumping regime to be as responsive to creek flow conditions as possible, pumping only at night (when trees are not drawing water), and by having residents accept a program of mandatory noticed conservation when very low flow conditions exist in the creek. These conservation periods are usually in late October and last for typically 30-45 days until the first rains enhance flow conditions in Redwood Creek. NPS has asked the community to find and obtain additional temporary reserves in order to reduce the need for pumping during these prescribed periods. Although the existing 45-year-old tank will see the end of its service life at the time of the next earthquake, redwood tanks can see lives of 60+ years with patches, ongoing maintenance and the like. Utilizing the storage reserves offered by not destroying the existing tank, the community would – upon start of noticed conservation due to creek conditions – be able to go almost three weeks without pumping from its wells adjacent to the creek or more than six weeks with minimal draws. This represents a potential significant advancement of an NPS goal of restoration of habitat conditions in Redwood Creek, a creek which flows through Muir Woods and through the GGNRA, and which supports threatened and endangered fish species.

It is not feasible to first tear down the existing tank and then construct the new tank in its place. Unlike lower Muir Beach which can be served by either the lower or upper tanks, upper Muir Beach is dependent upon the upper tank alone. The estimated three months of construction time for a new tank requires that the new tank be constructed adjacent to the existing tank leaving the existing tank in service to provide drinking water and fire protection for the upper portions of Muir Beach. Given the result of ending up with two tanks, the creek stands to benefit from having both tanks available, as mentioned. Notably, no stimulus to development occurs from temporarily having this additional water storage. Muir Beach has only 3 or 4 vacant buildable lots remaining in Muir Beach out of the 147 lots that have already been developed – and water connections for those buildable lots are available based upon existing production capacity. With Muir Beach being surrounded by park lands, no outward growth of the community can occur. As a result, and in concert with NPS goals, the community suggests that the existing tank be retained in reserve to assist with pumping regime alternatives to benefit the Redwood Creek habitat.

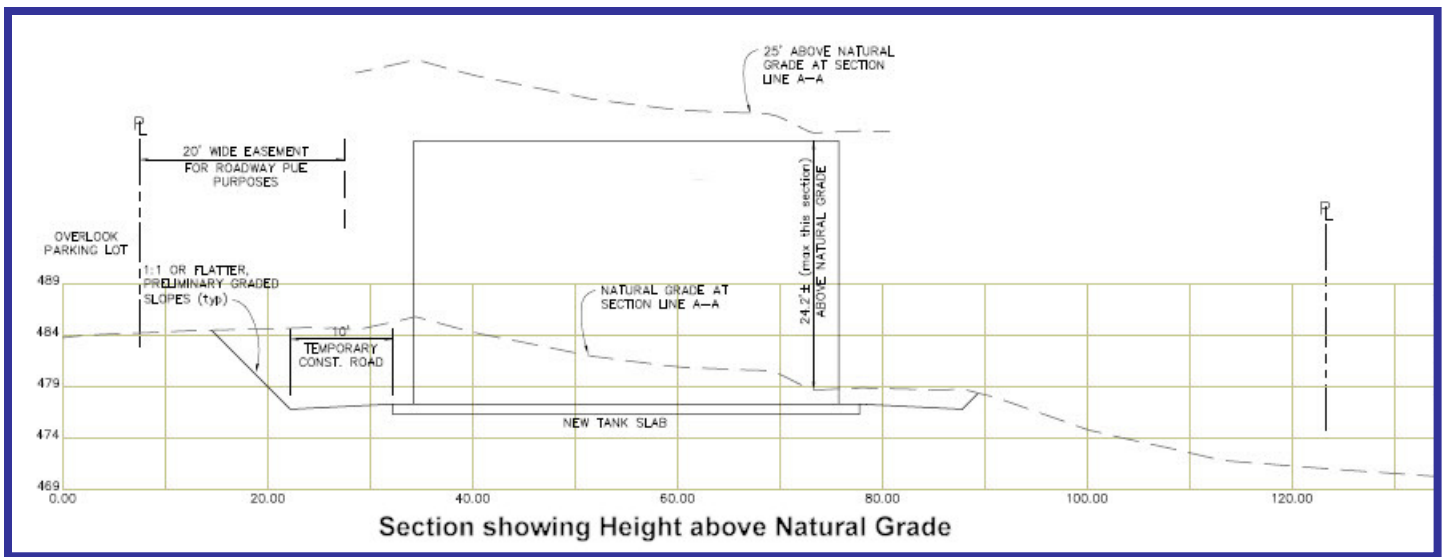
## **Siting of Proposed Tank – Height and Color**

The community’s upper water tank parcel is located at the top of the Seacape subdivision, with the final map for the subdivision approved in January 1966. The parcel was surveyed for this project by Meridian Surveying Engineering, Inc. with a Record of Survey recorded in the County records on December 4, 2009 in Book 2009 of Maps at page 175. The parking lot for the Muir Beach Overlook is west of the site, with the Overlook’s restroom facility abutting the tank parcel.

The proposed location for the new water tank is excavated approximately 10 feet into natural grade, lessening the apparent height of the water tank from the perspective of the Overlook parking lot. The floor of the proposed tank is as low as will still permit connection with the community's water main system. Another siting option would be to place the new tank between the existing tank and Seacape Drive, but doing so would not take advantage of the topography of the site and would have the inevitably massive structure on a slightly elevated pad looming over the street. The proposed location notches the tank into the topography and allows a modest amount of backfill to be placed against the rear of the tank. See the aerial photo and proposed site plan below, and the photograph and cross section on the following page.



Although the existing tank is approximately 22 feet high, its height and bulk are shielded by both topography and vegetation as shown in the photo below.



The proposed tank has the same proposed maximum water level as the existing tank. However because of code changes relating to the construction of water tanks, mandatory allowance for the damaging effects of sloshing of water during seismic events requires the tank to have several feet of empty space above the maximum water level. This results in the tank reaching a height (at the lower edge) of 24.2' above natural grade. The rear portions of the tank are less than 20' above natural grade. Please see the section shown on the previous page. Story poles are present at the site.

It should be noted that the community has not elected to propose a domed-roof design, often typical for new water tanks. Although the flat roof adds more than \$30,000 to the cost of the tank, it avoids an extra 5'-10" of overall height to the structure due to the domed shape.

The color of the existing tank, through the natural weathering of its redwood planking, blends with its surroundings. The community proposes that the new tank also be colored a soft brown in order to similarly blend with the surroundings at the site. See the proposed color sample below, and a hard sample is submitted as part of this application.

The screenshot shows the Davis Colors website interface. At the top, there is a navigation bar with tabs for 'Colors', 'Products', 'Suppliers', 'Gallery', and 'Literature', along with a search bar and a 'LIVE CHAT' button. The main content area is titled 'Color Pigments for Concrete, Sealers and Automatic Color Handling Equipment' and features a grid of various color swatches. Below this is a 'Featured Projects' section with a grid of images showing concrete surfaces in different colors. On the right side, a 'Concrete Color Card' is displayed for 'Western Gold 5844'. The card includes a color swatch, technical specifications such as 'Liquid Dose Rate: 2.01' and 'Powder Dose Rate: 1.5', and a 'Proposed Color (Western Gold - Brown)' label. The footer of the website contains copyright information and navigation links.

## Siting of Proposed Tank – Biological and Archeological Assessments

### Biological

The community retained Wood Biological Consulting to perform a reconnaissance-level habitat assessment of the proposed site for the new water tank. The report prepared by the consultant provides background and site-specific information pertaining to potentially occurring special-status wildlife and plant species and other biological resources and is intended to identify potential constraints to potential site improvements. Included in the report is a discussion of the existing plant communities, wildlife associations, potentially occurring special-status plant and wildlife species and natural communities, and recommended impact avoidance and minimization measures. The conclusions contained in the report are based on background research and a reconnaissance-level survey.

Please see the 37-page report for the particulars, but in summary, the consultant found no significant plant-related issues, but found that impacts could occur on the nesting habitat of migratory birds if the recommendations in the report were not followed – primarily related to the completion of land- or brush-clearing activities prior to nesting season.

**Botanical Species:**

*“No federally or State-listed plant species were detected during the present survey and none is considered to have any potential for occurrence on site. Similarly, no special-status plant species were detected and none is considered to have a high potential for occurrence on site due a lack of suitable habitat or that fact that they would have been detectable during the present survey. No further surveys for botanical resources are warranted.”*

**Animal Species:**

*“Based on our knowledge of the geographic range and habitat affinities of special-status animals recorded from the region, and evaluation of on-site habitats, no federally- or State-listed species is considered to have any potential for occurrence on site. However, there is a high potential for the occurrence of several migratory birds to nest on site.”*

As noted, the consultant's primary recommendation in this regard is to have land- or brush-clearing completed prior to nesting season. Please see the full report submitted as part of this application.

**Archeological**

The community retained Holman & Associates, Archeological Consultants, to conduct a cultural resources study of the proposed site for the new water tank. The report prepared by the consultant presents the results of the consultant's review of the archeological literature to obtain information regarding recorded historic and/or prehistoric archeological sites in and around the project site. It also presents the results of a field inspection conducted by the consultant at the project site.

Please see the report for the full particulars, but in summary, the consultant found, *“There are no recorded historic and/or prehistoric sites inside the proposed project area or within a thousand feet of it”* and *“... it is the finding of this report that construction related to the new tank (pad, roads, a new berm) will have no effect on historic and/or prehistoric cultural resources.”*

**Exemption of Project from County Zoning and Building Ordinances**

Based upon an examination and discussion of Section 53091 of the CA Gov't Code by County Counsel's office (David Zaltsman and Jennifer Vuillermet) and the Community Development Agency (Tom Lai) in September 2009, it appears that this project is subject to the Local Coastal Program and requirements for a Coastal Permit (within the County's Coastal Permit jurisdiction and the Coastal Commission's appeal jurisdiction), but is otherwise exempt from County zoning regulations and building permit regulations. Please see the applicable section of the government code set out below.

**CA Government Code Sec. 53091**

*(a) Each local agency shall comply with all applicable building ordinances and zoning ordinances of the county or city in which the territory of the local agency is situated.*

*(b) On projects for which state school building aid is requested by a local agency for construction of school facilities, the county or city planning commission in which the local agency is located shall consider in its review for approval information relating to attendance area enrollment, adequacy of the site upon which the construction is proposed, safety features of the site and proposed construction, and present and future land utilization, and report thereon to the State Allocation Board. If the local agency is situated in more than one city or county or partly in a city and partly in a county, the local agency shall comply with the ordinances of each county or city with respect to the territory of the local agency that is situated in the particular county or city, and the ordinances of a county or city shall not be applied to any portion of the territory of the local agency that is situated outside the boundaries of the county or city. Notwithstanding the preceding provisions of this section, this section does not require a school district or the state when acting under the State Contract*

*Act (Article 1 (commencing with Section 10100) of Chapter 1 of Part 2 of Division 2 of the Public Contract Code) to comply with the building ordinances of a county or city.*

*(c) Each local agency required to comply with building ordinances and zoning ordinances pursuant to this section and each school district whose school buildings are inspected by a county or city pursuant to Section 53092 shall be subject to the applicable ordinances of a county or city requiring the payment of fees, but the amount of those fees charged to a local agency or school district shall not exceed the amount charged under the ordinance to nongovernmental agencies for the same services or permits.*

*(d) **Building ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water**, wastewater, or electrical energy by a local agency.*

*(e) **Zoning ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water**, or for the production or generation of electrical energy, facilities that are subject to Section 12808.5 of the Public Utilities Code, or electrical substations in an electrical transmission system that receives electricity at less than 100,000 volts. Zoning ordinances of a county or city shall apply to the location or construction of facilities for the storage or transmission of electrical energy by a local agency, if the zoning ordinances make provision for those facilities. (emphasis added)*

Under the exemption in the government code, the Muir Beach Community Services District is the local agency responsible for the subject water storage project. The District will not be requesting grading or erosion control permits from the County, or requesting that the County provide inspection of the work. Through the Muir Beach Community Services District, the community has retained Steven Bowser, a licensed civil engineer, to ensure compliance with regulatory requirements and AWWA standards, and to provide inspection services on behalf of the District acting as local agency in this regard.

## Conclusion

Although the community of Muir Beach has been concerned about replacement of its upper water tank for more than a decade, recent inspections of the redwood tank have revealed its condition to be far more precarious than previously believed. Seismically secure water tanks have been available but the community has previously been unable to afford the high cost of such tanks. With the community's self-imposed parcel tax reaching a substantial balance, and with the recession causing seismically secure tanks to become more affordable, the community has a window in which it can afford a major, lasting upgrade to its water system.

Through the Muir Beach Community Services District, the community has developed a proposal for a new water tank which, based on input from a team of qualified professionals, assesses and satisfactorily addresses potential visual, biological, archeological, geotechnical and engineering challenges and impacts. The estimated cost of the project will still moderately exceed the present balance of the community's capital improvement fund, but with supplemental funds from the Community Services District's general fund, the community will be able to complete the major project for which the self-tax was created, benefitting the health and safety of the community.

The community suggests that based on the contents of this application, the findings required for issuance of a Coastal Permit can be made, and it respectfully requests issuance of a Coastal Permit so the community can proceed with this milestone project for Muir Beach.