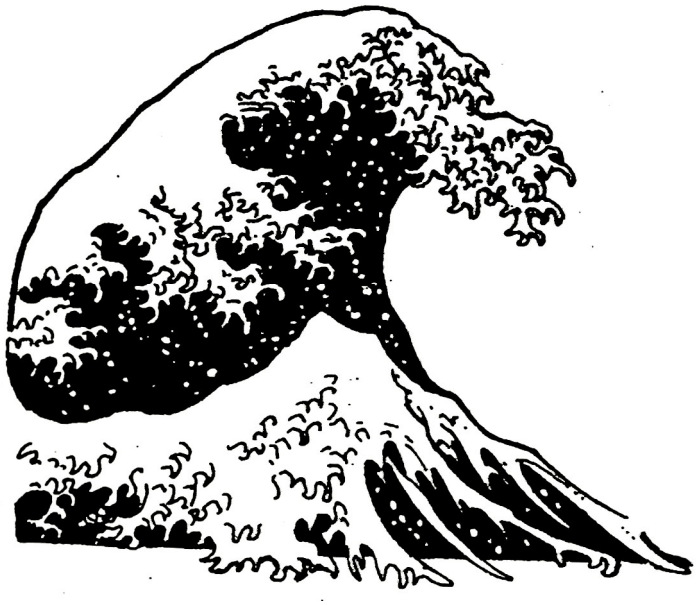
MARIN COUNTY
LOCAL COASTAL PROGRAM
UNIT 1 – *Amended*

Environmental Hazards



MARIN COUNTY COMMUNITY DEVELOPMENT AGENCY
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M A R I N C O U N T Y

L O C A L C O A S T A L P R O G R A M

U N I T I

Amended

ADOPTED BY MARIN COUNTY BOARD OF SUPERVISORS

August 21, 1979

CERTIFIED BY STATE COASTAL COMMISSION

April 1, 1980

The following document is the current amended version of the 1981 Marin County LCP Unit I, which reflects all policy text amendments approved by the California Coastal Commission from 1982 to 2004. Following each amended policy is a note that provides the details of the Resolution(s)/Ordinance(s) passed by the Marin County Board of Supervisors that proposed and adopted each text amendment, as well as the corresponding action(s) of the California Coastal Commission. All information contained herein is current as of April 16, 2010, and is the most accurate portrayal of the amended LCP Policies to the best knowledge of the Marin County Community Development Agency at this time.

III. SHORELINE PROTECTION AND HAZARD AREAS

Policies within this issue group cover several areas of concern with development in selected locations of Unit I. Policy areas include bluff top setback requirements, shoreline protective works, earthquake and other geologic hazard identification, mitigation and policy programs for notice of such hazards, and disclaimers of government liability resulting from damage by subsequent geologic activities. These policies are intended to address the specific issues discussed below, as well as implement the intent of Coastal Commission policies and Coastal Act Sections 30235 and 30253.

SEACLIFF RETREAT

The major slope stability problem in the Bolinas area is the coastal sliding, which is nearly continuous along the seacliffs. In the Bolinas planning area, this includes the bluffs from the boundary of the National Seashore to the cliffs between Brighton and Wharf Road on the Little Mesa. This is virtually the entire shoreline of the Bolinas Planning Area.

Structural weaknesses, inherent in the Monterey Shale, and the energetic erosion by the surf combine to cause active landsliding of the seacliffs. The Monterey shale involved in this sliding is intensely fractured, which significantly reduces its stability. The surf along this part of the cliff is brown and muddy, showing that it is laden with material being removed from the cliff. This process occurs year round but is most severe during winter storms.

The cliffs between Brighton Street and Wharf Road are made up of the soft sediments of the Merced formation. Galloway (1977) points out that these cliffs are protected from the open sea but bear the brunt of southerly winter storms. During these storms, waves pound the soft sediments, causing extensive falls and slumps.

Retreat rates vary depending on the location, Between the downtown section of Bolinas and Duxbury Point, landsliding has caused the cliff to retreat an average of 0.3 to 0.6 meters per year (Wahrhaftig, 1970). Along the west-facing cliffs, exposed to the open sea, retreat has been monitored since 1859 and has progressed at a rate of about .75 meters/year (Galloway, 19-77). In the vicinity of-the RCA station, rates vary from one and one-half feet per year to one quarter foot per year, depending on the location (Wagner, 1977). Retreat rates on the Little Mesa average about a half a meter per year (Galloway, 1977).

Destruction of improvements and property in this area has occurred over time and will continue to do so as long as they are placed in this zone of active sliding. Wagner (1977) describes incidences of past damage. During the winter of 1977-1978 five blufftop homes were threatened by rapidly retreating cliffs. Three homes were declared unsafe by the Bolinas Fire Department and the two others will be threatened in the future. (Howe, in press). Slumping was evident in many other sections of the Bolinas Coast but did not directly threaten property.

There is a need to determine setback distances for developments near the retreating cliffs. The Coastal Commission in its Interpretive Guidelines for Marin County recommend a minimum setback of 150 feet from the blufftop for new construction. This setback is based on a retreat rate of 3 feet per year multiplied by an economic life expectancy for a structure of 50 years. They also require a geologic investigation and report for all blufftop development. The Environmental Hazards Element of the Marin Countywide Plan calls for adherence to the guidelines adopted by the Coastal Commission. The Bolinas Community Plan recommends a variable setback. From Little Mesa to Duxbury Reef, they recommend an 80 foot (two feet per year times 40 years) setback and from Duxbury Reef to Point Reyes National Seashore, they recommend a setback of 120 feet (three feet per year times 40 years). This is based on an economic life expectancy of 40 years for a structure and the retreat rates indicated in parenthesis.

While not as completely documented as Bolinas, Muir Beach's seacliffs also experience relative rapid rates of shoreline erosion. While development potential is limited to a few vacant ocean bluff lots, these lots were often earlier by-passed as representing more difficult or even dangerous building sites. Development on these lots must be carefully evaluated under the LCP policies to assure that the site can adequately support the proposed development without undue risk or the necessity to construct shoreline protective devices.

The LCP policies will assist in identification of lots where new construction would be hazardous and/or require future shoreline protection. Coordinated research and development of programs to reduce such hazards are encouraged. Since such programs are for the benefit of private properties, they should be financed primarily by those to be so benefited. The County would provide limited assistance in such organizing and reviewing such studies.

SEISMICITY

In November 1974, the Marin County Board of Supervisors passed Resolution 74-426, which implemented the requirements of the Alquist-Priolo Act as they pertained to Marin County. The Department of Public Works subsequently prepared a set of policies, "Policies and Criteria for Implementation of the Alquist-Priolo Geologic Hazard Zones Act", which are distributed to all applicants who propose projects, as defined by the Act, within the Special Study Zones. Appendix B contains the Alquist-Priolo Act and Marin County's implementing resolution and policies.

Development shall continue to be required to meet the seismic safety standards of the Alquist-Priolo Act, as it has been implemented by the County through Board of Supervisors Resolution 74-426, and the policies and criteria for its implementation developed by the Department of Public Works pursuant to resolution 74-426.

However, recent geologic studies indicate that the San Andreas Fault Zone covers a greater area than that indicated on the Alquist-Priolo Special Study

Zone maps. The zone of fault activity extends to approximately the eastern shore of Bolinas Lagoon and continues out to sea about one third the distance north of the Seadrift Gate. It was also determined that the Lagoon area is probably a graben, a block of material that is subsiding in relation to the surrounding land surface. This occurs as a result of earthquake activity.

The-County shall request the State Geologist's Office review the recent Study: "Depositional History and Fault-Related Studies, Bolinas Lagoon, California", Joel R. Bergquist, U.S.G.S. Open File Report 78-802, to determine if the Alquist-Priolo Special Study Zone should be extended in the Bolinas Lagoon vicinity.

SHORELINE EROSION:
STINSON BEACH SANDSPIT

Shoreline development is located on the dunes of the Stinson Beach sandspit, a mile and a half long barrier beach that separates Bolinas Lagoon from the Pacific Ocean. The spit is characterized by a short sloping section which ordinarily contains the wash of the waves, a broad level beach section which occasionally is washed over by the runup of waves at high tide, and a set of dunes 10 to 15 feet high on which the homes are built. The dunes extend a maximum of about 50 feet from the rear of the homes; where the winter storms of 1977/78 caused extensive erosion only about 10 feet of dune remains. The height and width of the dunes were artificially. increased at the time Seadrift was developed.

The function of beaches and dunes is to act as an energy absorber; the waves break on the slope of the beach and energy is consumed as the water rushes up the slope and onto the broad, flat berms. The dunes act as the last natural barrier to flooding of the inland section during storms. They retreat in the face of storm waves and rebuild during later calm periods. During intense storm activity in natural situations, the dunes are occasionally washed over by waves. The shape of the spit is controlled by several factors, including the location of the Bolinas bluffs. Changes in these factors result in changes in the shape and size of the spit:

The winter of 1977/78 saw a series of severe storms batter the California coast. The combination of high waves, high tides and recurring storm activity led to extensive damage of coastal structures from shoreline erosion. At Stinson Beach this took the form of eroding away the beach and dune system. Eight homes in Seadrift were threatened by this erosion, and an emergency revetment was placed. Research by Howe (in press) suggests that the conditions experienced that winter were not a "freak" or rare occurrence, and areas which experienced damage will likely experience similar conditions in the future.

The section of Seadrift threatened by the shoreline erosion consisted of nine lots, one of which did not contain a home. Several emergency measures, which failed, were attempted to protect these properties before the revetment (a type of seawall, that is laid on the dune or bluff to prevent wave attack from removing sand) was constructed by the County. The seawall runs the length of the nine lots and at its highest point was 14 to 15 feet high at the time of construction. Beach replenishment over the summer has reduced this height to about 10 feet, but rock still remains exposed above the beach in front of the dunes.

As noted in the "Final Staff Report and Recommendations on Issues Raised by Development of Seadrift Subdivision, Stinson Beach", May 1978, as amended, there is a wave erosion hazard to beach front lots and homes at Seadrift. The precise extent of this hazard is not known. It is likely the hazard will vary over time, depending on the severity of the winter, and place, because of the constantly shifting nature of both the beach and off-shore sand bars. The fact that the dunes were artificially increased in size at the time Seadrift was constructed and have now been significantly reduced by last winter's storm activity with little summer replenishment could further increase this hazard.

Given the unpredictable occurrence of this hazard and its generally localized area of impact (only nine lots were significantly threatened during the winter of 1977/78), it is likely the majority of permit applications will be on an emergency basis for a small number of lots. This would result in a haphazard placement of emergency erosion control structures. How these structures would physically and visually impact the remainder of the beach could not be determined in an emergency situation.

PROTECTION OF EXISTING STRUCTURES AND COUNTY LIABILITY

In addition to policies that address development standards and new project review for areas of seacliff retreat, earthquake hazards, shoreline and dune erosion, this chapter also establishes policies that encourage investigation and development of joint programs to protect existing structures from shoreline erosion. These policies are desirable to successfully implement Coastal Act goals regarding development of shoreline protective works. Through identification of areas potentially subject to shoreline erosion, there exists an opportunity to develop programs to mitigate such hazard before emergency situations development. This provides flexibility in design techniques, financing and engineering feasibility to assure the balancing of public and private interests can be accomplished in a nonemergency period.

The policies identify strong review standards for new development in hazardous areas, coupled with attempts to adequately evaluate and respond to potential geologic hazards prior to their occurrence. The County of Marin does not accept responsibility for the protection of areas subject to shoreline erosion. Additionally, the County accepts no liability for approved development in areas identified as subject to geologic hazards. A waiver of liability would be recorded on all new development otherwise permitted by this
section's policy standards.

LCP POLICIES ON SHORELINE PROTECTION AND HAZARD AREAS

1. New structure shall be set back from the Bolinas and Mir Beach bluffs a sufficient distance to ensure with reasonable certainty that they are not threatened from cliff retreat within their economic life expectancies. Adequate setback distances will be determined from information contained in required geologic reports and the setback formula established below. These setbacks will be of sufficient distance to eliminate the need for shoreline protective works.

In view of the fact that the retreat rate varies markedly along the cliffs, and that the life expectancy of different kinds of structures varies greatly, the following formula will be used to determine setbacks from the bluff for new structures:

Setback (meters) = structure life (yrs.) X retreat rate (meters/yr.) In areas where vigorous sliding is taking place, an additional 15 meters should be added as a safety factor.

The retreat rate will be determined by a complete geotechnical investigation which will be required if one or both of the following conditions are met: The building or proposed development site is within 150 feet of the blufftop, or the site is located in stability zones 2, 3 or 4 as indicated on the Slope Stability of the Bolinas Peninsula Study Area map which accompanies Wagner's 1977 report, "Geology for Planning, Western Marin County". This report and accompanying maps is incorporated by reference as part of the LCP.

2. Development shall continue to be required to meet the seismic safety standards of the Alquist-Priolo Act as it has been implemented by the County.

   The County shall request that the State Geologist's Office review the recent study, "Depositional History and Fault-Related Studies, Bolinas Lagoon, California", by Joel R. Bergquist, U.S.G.S. Open File Report 78-802, to determine if the Alquist-Priolo Special Study Zone should be extended in the Bolinas Lagoon vicinity.

3. The County shall seek public funds to contract with the State Division of Mines and Geology to initiate a study to identify lots and/or structures threatened with cliff retreat within their economic life expectancy. The results of this study shall be incorporated into the general restoration program for the Bolinas Mesa as described in Chapter II of the LCP.

4. Many of the building sites in Unit I are characterized by one or more potential geologic hazards. The development of residential structures on such parcels may be subject to often sudden and destructive geologic phenomenon. The County of Marin does not encourage new residential development of such parcels and expressly states that the issuance of a coastal development permit for such property does not warrant said property's safety_ from geologic hazards. Further, the County of Marin will not accept liability for subsequent personal or property damage caused by geologic processes on said properties. To assure that the builder and subsequent purchasers are expressly aware of the policy, a "waiver of liability" shall be executed and recorded by said for short-term, emergency food, shelter, and said property owner prior to the issuance of a coastal development permit. Further, clothing, the County of Marin will not participate in emergency or disaster relief funding for properties so identified and would recommend such limitations on State and/or federal disaster/emergency grants and/or loans.

Existing geologic information indicates this geologic hazard policy shall apply to new development (excluding improvements to existing structures that would not result in an increase of 50 percent or more of internal floor area of the structure) on lots located in the following areas:

- Lands located in the "Alquist-Priolo" earthquake hazard zones, as said zones may be amended.
- Development within 300 feet of the mean high tide of the sea.
- Development on parcels with slopes averaging over 35 percent.
- All lots within the Seadrift sandspit to include the Patios, Calles and Seadrift Subdivision.

(Those lands covered by this "geologic hazards" policy are shown on the geologic hazard maps on file in the Marin County Planning Department)

5. The following policy from Section 30235 of the Coastal Act is incorporated into the County LCP:
   Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline process shall be permitted when required to serve coastal-dependent uses or to protect existing structures (constructed before adoption of the LCP), or public beaches in danger from erosion and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply.

6. To minimize visual and sand transport impacts on Stinson Beach, any permit granted to construct erosion control structures shall require the re-establishment of the former dune contour and appearance. In case of emergency permits, the property-owner of record shall agree, in writing, that such restoration work will be accomplished within 60 days after the threat of damage has passed.

7. Because revetments, seawalls or other shoreline protective works can be detrimental to maintenance of natural shoreline processes and can interfere with visual enjoyment and coastal access, such works are discouraged. The County of Marin through the LCP and other documentation has identified those coastal areas potentially subject to significant wave and run-off erosion. Because such probable risk areas are identified, sufficient opportunity for private investigation and response to such hazards is available. Therefore, the County of Marin shall not finance or construct emergency shoreline protective devices for the benefit of private developments.

8. It shall be County policy to encourage property owners subject to ocean-front erosion hazards to develop responses to such hazards prior to emergency conditions. Where contiguous properties are subject to generally similar erosion hazards, joint program development should occur. The County will not finance such engineering studies (or any subsequent construction activities), but will seek aid from Federal

and State agencies, colleges and universities to assist private consulting engineers in such review and recommendations. Where existing community organizations or special districts are unable to provide organizational support for such area-wide joint studies, the County, upon request, will assist in the organization and administration of such privately funded studies.

9. In the absence of an overall wave hazard/shoreline erosion study, any-permit application for seawalls, riprap or other protective structures on beaches, shall be accompanied by engineering reports stating the nature and extent of wave erosion hazard along the beach area and an explanation of how the proposed protective works will mitigate the hazard, both on and off the project site. This policy shall not apply to emergency permit applications applied for within three years of the date of adoption of the LCP. Emergency permit applications after that date shall be subject to report requirement or shall specifically establish why the need for such protective devices was not foreseen.

IV. PUBLIC SERVICES AND NEW DEVELOPMENT

LOCATION AND DENSITY OF NEW DEVELOPMENT

Development Issues under the Coastal Act. The California Coastal Act of 1976 establishes policies under which the LCP planning and regulations must be based. Several of these policy standards apply at the Seadrift Subdivision. These general coastal issues include:...

- The reduction of geologic hazards associated with new development;...

Geologic Hazards. Publications of the U.S. Geological Survey, U.S. Army Corps of Engineers and California Division of Mines and Geology substantiate a variety of geologic hazards on the Seadrift Spit. The San Andreas fault and its mapped cone include portions of the Seadrift Subdivision. Coupled with the future probability of earth shaking is the generally poor foundation base afforded by the sandy material of the Seadrift Spit. The sandy soils of the natural spit as well as the Lagoon muds comprising area of artificial fill are both foundation materials which are highly intolerant to earthquake intensities. Additionally, sandy soil materials in combination with high groundwater in the areas are subject to the geologic phenomenon of liquefaction during earthquake shaking. This phenomenon can be extremely hazardous to buildings so situated.

The Seadrift Subdivision is at a relatively low elevation with a gently sloping beach profile. These characteristics subject the Seadrift Spit to the dangers of seismic seawaves, particularly waves generated from a southerly direction. Wave run-up estimates are such that total overtopping of the Spit may be possible during such seismic wave occurrences. A less drastic geologic occurrence, wind and wave erosion of the Spit, is a continuing process. Along the Bolinas Lagoon side of the spit, for example, gross estimates of shore erosion range from 3 to 10 inches a year.

Wave erosion hazard along the ocean front is even more pronounced and, as recently demonstrated, can, with sudden efficiency, extensively erode the protective sand dunes fronting the Seadrift houses. The result of this phenomenon is twofold: the physical endangerment to the structures and the pressure to develop shoreline protective works that often distract from the public's visual and physical use and enjoyment of the coast.

In summary, the range of possible physical hazards at Seadrift is extensive. The predictability of experiencing some or all of these hazards is relatively high. Build-out of the Subdivision's existing residential lots will expose a significant number of houses and people to these geologic hazards.

LCP POLICIES ON LOCATION AND DENSITY OF NEW DEVELOPMENT

... Where plans and policies of the local coastal program conflict with policies of local plans, the policies of the LCP shall govern. Maps showing the LCP land use designations are on file with the Marin County Planning Department.

Stinson Beach (excluding Seadrift)

The Stinson Beach LCP land use designations are those identified in the adopted Community Plan except as modified below:

30. The properties presently Zoned R-3 along Shoreline Highway shall be rezoned to R-2 in order to minimize flood hazards and the adverse impacts on Easkoot Creek which would result from such development (Easkoot Creek runs across the subject properties). Redesignation of the R-3 properties to R-2 will also assure development consistent with the existing character of the community. Development shall not be permitted within the 100-year floodplain of Easkoot Creek and shall otherwise conform with LCP Policies on septic systems and stream protection.

APPENDIX B: SEISMICITY

ALQUIST-PRIOLO SPECIAL STUDIES ZONES ACT

Excerpts from California Public Resources Code
(Signed into law December, 1972, amended September 26, 1974,
May 4, 1975 and September 28, 1975)

BOARD OF SUPERVISORS OF THE COUNTY OF MARIN

RESOLUTION NO. 74-426

A RESOLUTION AUTHORIZING IMPLEMENTATION
OF THE ALQUIST-PRIOLO GEOLOGIC HAZARD ZONES ACT

See Unit I Appendix B for copies of the documents above