47021 PIRATES DRIVE

ANALYSIS OF COASTAL BLUFF MORNING-GLORY (*CALYSTEGIA PURPURATA* SSP. *SAXICOLA*) POPULATION

GUALALA, MENDOCINO COUNTY, CALIFORNIA

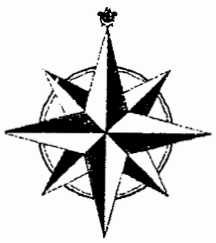
JUNE 2004

SECOND BOTANICAL REPORT

ALTERNATIVES ANALYZED

SECOND ESHA REPORT - ALTERNATIVE ANALYSIS

ALBION ENVIRONMENTAL, INC.



ANALYSIS OF COASTAL BLUFF MORNING-GLORY (*Calystegia purpurata* ssp. *saxicola*) POPULATION

47021 Pirates Drive
Gualala, Mendocino County, California

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June 2004

1.0 INTRODUCTION

Albion Environmental, Inc. conducted a biological study on the Study Area located at 47021 Pirates Drive in Gualala, Mendocino County, California. The purpose of the study was to analyze the population of coastal bluff morning-glory (*Calystegia purpurata* ssp. *saxicola*) on the Study Area with respect to two potential alternatives for locating a house and associated infrastructure.

Background

Albion Environmental, Inc. previously conducted a biological study on the Study Area on June 11, 2003 and identified approximately 265 individuals of coastal bluff morning-glory (Albion Environmental, Inc. 2003). Coastal bluff morning-glory is a perennial herb in the Convolvulaceae family that usually grows on coastal dunes, scrub, and bluffs in Marin, Sonoma, and Mendocino Counties (CNPS 2004). Coastal bluff morning-glory has no federal or state threatened or endangered status, but is on the CNPS List 1B (plants considered rare, threatened, or endangered in California and elsewhere). Normally, impacts to plants on CNPS List 1B are considered significant by the California Department of Fish and Game (CDFG) under the California Environmental Quality Act (CEQA).

Additional studies were requested on the Study Area in an April 15, 2004 email from Liam Davis of CDFG:

"*...the housing pad and other infrastructures described in your report need to be reconfigured in the lot's area which will minimize the least flower disturbance in implementing the project.*"

Therefore, this study is restricted to: (1) an analysis of the location and abundance of coastal bluff morning-glory on the Study Area; and (2) a determination of which potential building alternative would impact the fewest number of coastal bluff morning-glory plants. A more detailed discussion of biotic resources on the Study Area, including proposed mitigation measures, is detailed in Albion Environmental, Inc. (2003).

2.0 METHODS

The Study Area was surveyed on May 11, 2004 to document the location and approximate number of coastal bluff morning-glories. The survey occurred within the coastal bluff morning-glory blooming period (May-August)(CNPS 2004), and much of the population on the Study Area was in full bloom at the time of the survey. Transects were walked across the Study Area and the locations and numbers of individual coastal bluff morning-glory plants were recorded on an orthophotograph. Since the population was originally mapped in 2003, emphasis was placed on documenting any changes that may have occurred since the previous survey was conducted. Due to dense concentration of plants in certain areas, and diffuse concentrations in others, individual plants were not mapped. Rather, polygons were delimited around plant clusters and estimates of plant abundance were made for each polygon.

The surveys followed the protocol for plant surveys described by Nelson (1987) and CDFG (2000). Plant taxonomy nomenclature follows *The Jepson Manual* (Hickman 1993). Plant

community nomenclature follows Sawyer and Keeler-Wolf (1995).

3.0 STUDY AREA DESCRIPTION

The Study Area is less than 1-acre in size and is located at 47021 Pirates Drive, west of Highway 1, approximately two miles north of Gualala in coastal Mendocino County. The Study Area includes an undeveloped lot on a level marine terrace at approximately 40 feet elevation in an existing residential community, as well as a forested slope descending from the terrace south down to Glennen Gulch. Glennen Gulch flows into the Pacific Ocean at Cooks Beach southeast of the Study Area.

The Study Area consists of a mixture of plant communities, including California annual grassland series, Bishop pine series, Douglas-fir series, Grand fir series, and Red alder series. The focus of this current biological study is on the terrace portion of the Study Area composed of California annual grassland series dominated mostly by non-native species such as big quaking grass (*Briza maxima*), velvet grass (*Holcus lanatus*), wild radish (*Raphanus sativus*), and sweet vernal grass (*Anthoxanthum odoratum*), as well as scattered native species such as Douglas iris (*Iris douglasiana*), blue-eyed-grass (*Sisyrinchium bellum*), coyote brush (*Baccharis pilularis*), and coastal bluff morning-glory. A more complete Study Area description is contained in Albion Environmental, Inc. (2003).

4.0 RESULTS

4.1 Coastal Bluff Morning-Glory Population

Approximately 495 coastal bluff morning-glory plants were located on the Study Area during the May 11, 2004 plant survey (Appendix A). This number represents an increase from the approximately 265 plants observed on the Study Area by Albion Environmental, Inc. (2003). While the number of individual plants has increased, the relative locations and densities of plant clusters have not changed. The change in absolute plant numbers is likely primarily due to increased visibility of coastal bluff morning-glories (e.g., more plants in bloom, reduced overstory vegetation cover, transect location), as well as vagaries of counting dense concentrations of individual plants. Therefore, in determining plant impacts, emphasis should be placed on comparing relative impacts on different parts of the Study Area.

4.2 Alternative House and Infrastructure Locations

Two basic alternatives for the house, access road, and septic leach field are considered for this analysis: (1) locating a house near the bluff and a septic leachfield near Pirates Drive; and (2) locating a house near Pirates Drive and a septic leachfield near the bluff. Alternative 1 is detailed in the September 16, 2003 site plan prepared by Tammy Renz. (Note: this site plan differs from that used in the Albion Environmental, Inc. (2003) report. The site plan used in that report was dated May, 2002 and located the house closer to the bluff).

Proposed house and access road locations for Alternative 1 were, based on the September 16, 2003 site plan, drawn onto the orthophoto (Appendix A) based on measurements made on both the site plan and the orthophoto. The location of the house and access road in Appendix A, therefore, should be considered only a close approximate of the site plan. No site plan exists for

Alternative 2. Only general impact determinations can be made for this alternative.

Temporary impacts discussed below assume, as indicated in the Albion Environmental, Inc. (2003) report, that septic leachfield installation can take place during fall or winter dormancy, and that native topsoil can be stockpiled and backfilled into leachfield trenches. Temporary and permanent impact determinations used to analyze both alternatives assume that the dense concentration of approximately 100 individuals located under the Bishop pine (*Pinus muricata*) along the beach access trail will not be impacted either permanently or temporarily, as recommended in the Albion Environmental Inc. (2003) report.

Alternative 1: Locating House Near Bluff and Septic Leach Field Near Pirates Drive

Alternative 1, based on the September 16, 2003 site plan, would result in permanent impacts to approximately 230 to 270 individuals of coastal-bluff morning-glory due to the house and access road (Appendix A). An additional 110-135 individuals would be temporarily impacted during septic leachfield installation.

Alternative 1 requires the greatest amount of access road infrastructure and occurs near the largest concentration of coastal bluff morning-glories on the Study Area. Plant impacts could be reduced by locating the house and access road further to the east, if feasible.

Alternative 2: Locating House Near Pirates Drive and Septic Leach Field Near Bluff

No site plan exists for Alternative 2. Therefore, Alternative 2 impact determinations could be modified based on a specific site plan. In general, locating a house adjacent to Pirates Drive would result in permanent impacts of approximately 139 individuals of coastal bluff morning-glory (Appendix A). An additional 230 to 256 individuals would be temporarily impacted during septic leachfield installation.

Because Alternative 2 would locate the house closer to Pirates Drive, it would require reduced access road infrastructure and allow for continuous open space habitat from the southeastern portion of the terrace down the slope to Glennen Gulch.

5.0 CONCLUSION

An analysis was conducted to determine the location and quantity of coastal-bluff morning-glory on the Study Area, and to determine potential plant impacts that may result from two potential project alternatives. Both alternatives would result in temporary and permanent impacts to approximately 360 to 405 individuals of coastal bluff morning-glory. Alternative 1 is indicated on the September 16, 2003 site plan prepared by Tammy Renz, and locates the proposed house near the bluff and the septic leachfield near Pirates Drive. Alternative 1 would result in permanent impacts to approximately 230 to 270 individuals of coastal-bluff morning-glory from the house pad and access road, and temporary impacts to approximately 110-135 individuals during septic leachfield installation. Alternative 2 lacks a site plan, and therefore impact determinations could change based on site plan specifics. Alternative 2 would result in permanent impacts to approximately 139 individuals of coastal bluff morning-glory from the house pad and access road, and temporary impacts to approximately 230 to 256 individuals during septic leachfield installation.

Based on this analysis, Alternative 2 would result in the fewest number of permanent impacts to coastal bluff morning-glory on the Study Area. Changes in the Alternative 1 site plan and/or development of a specific site plan for Alternative 2 may result in changes to impact determinations discussed in the report.

The continued presence of coastal bluff morning glory on the Study Area, even after years of mowing and other human disturbance, indicates the resilience of this species. The landowner, Bobbie Piety, has indicated a considerable willingness to ensure a self sustaining population of coastal bluff morning-glory on the Study Area. Other alternatives not considered in this report could be analyzed in the future to determine other potential house and associated infrastructure locations.

6.0 REFERENCES CITED

Albion Environmental, Inc. 2003. Environmentally sensitive habitat assessment under the California Coastal Act and the Mendocino County Local Coastal Program.

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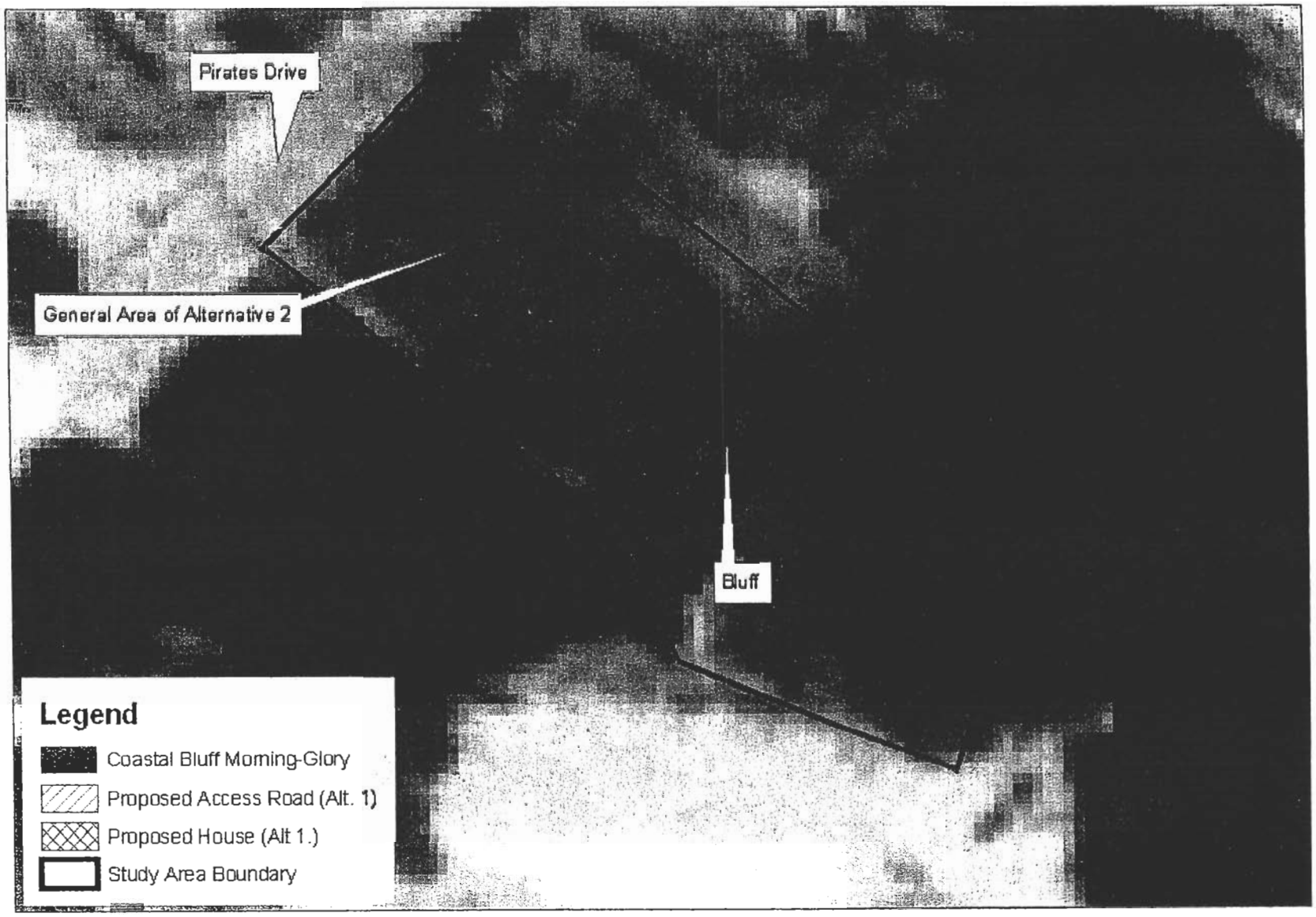
Appendix A. Map of Study Area Features



Appendix A. Map of Study Area features. Numbers inside Coastal Bluff Morning-Glory polygons indicate approximate number of individual plants in polygon.

Mitigation Plan for Coastal Bluff Morning-Glory (*Calystegia purpurata ssp. saxicola*) for Property at 47021 Pirates Drive Gualala, California

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Purpose of Report

The purpose of this report is to provide a comprehensive mitigation plan for protecting and enhancing the population of coastal bluff morning-glory *(Calystegia purpurata ssp. saxicola*), on a small coastal bluff property in Gualala, California. Coastal bluff morning-glory is not a federally or state listed species, however it is a CNPS (California Native Plant Society) List 1B species, and is therefore protected under CEQA (California Environmental Quality Act) and the California Coastal Act.

The plan provides methods for propagation and replanting, site monitoring, and recommendations for long-term maintenance. The plan calls for a biological monitor to be present and oversee all phases of the project. The mitigation plan also includes a deed restriction to protect areas where the coastal bluff morning-glory naturally occurs on the property from future impacts. A table is provided showing each activity, responsible party, and time window for each activity to occur (Table 1).

I. Introduction

The project site is located at 47021 Pirates Drive on the west side of Highway One in Gualala, California. The property is located within the Coastal Zone as defined by Section 30103 of the California Coastal Act. The site is approximately 0.5 acres in size. The buildable area is on the north and central portions of the lot, within a flat grassland area that is approximately 0.27 acres in size The remainder of the site drops off steeply to the southeast, down to the beach and the Pacific Ocean below (Figure 1). A small (2,270 ft^2.) home is proposed for the site.

Coastal bluff morning-glory (*Calystegia purpurata ssp. saxicola*) is currently a CNPS List 1B plant species. This species is a perennial herb that is closely related and very similar in appearance to the more common climbing morning glory (*Calystegia purpurata ssp. purpurata).* Recent information indicates that coastal bluff morning-glory is relatively common in Mendocino County though it is rare in Marin, Napa, and Sonoma Counties (pers. comm. Gene Cooley, DFG). Due to this new information, recommendations may be made by the Department of Fish and Game in the fall of 2004 to lower the status of this plant to CNPS List 4. This proposed mitigation plan would no longer be necessary if the plant is down-listed (personal communication Gene Cooley, DFG).

A biological report was prepared for the site by Tom Mahoney in June 2003 (Albion Environmental, July 2003) which identified the presence of coastal bluff morning-glory on the site. A follow up report in June 2004 by Mr. Mahoney (Albion Environmental, June 2004) assessed impacts to coastal bluff morning-glory from two different building alternatives. Alternative 1 would result in up to 270 plants permanently impacted, and 110 plants temporarily impacted. Alternative 2 would result in up to 139 plants permanently impacted and 256 temporarily impacted (Albion Environmental, 2004). This mitigation plan will apply consistently to both alternatives, since impact to the plants from both alternatives will occur in the same way.

Based upon the hardiness of *Calystegia,* it is reasonably expected that this plant could be protected and re-established on site through protection of existing habitat on site, propagation and replanting within temporarily disturbed areas, and long-term maintenance to prevent weeds or brush from overtaking the site. Recent mowing of the site appears to indicate that the coastal bluff morning-glory responds favorably to this management tool (Figures 2 and 3). The landowner has indicated that she is willing to conduct replanting to mitigate for temporary and permanent impacts from constructing a single family home on the site, and provide a deed

restriction on the remainder of the property to provide long term protection of the site from disturbance (pers. comm., Bobbie Piety).

The property gradually shifts from grassland/coastal prairie vegetation on the northwest (street-side) and center sections of the property to coastal scrub vegetation and trees on the southeast (ocean-side). Coastal bluff morning glory is a prostrate perennial wildflower found in coastal prairie habitats, and can easily be overgrown by brush and exotic species. For this reason, the best areas for protection and for re-planting will be on the northwest side and center portions of the property, away from the scrub boundary.

The property has been disturbed by construction activity in the recent past. In 2002, prior to the biological survey work that identified coastal bluff morning-glory on site, portions of the grassland vegetation on the property were disturbed by vehicles, and by piling of soil and construction materials on the site by work crews during construction on an adjacent property (Figures 4 and 5), (pers. comm. Bobbie Piety). This activity heavily impacted vegetation on the northern portion of the property, and is likely to have negatively impacted the coastal bluff morning-glory on the site, at least temporarily. This work was done without the permission of the landowner (pers. comm.. Bobbie Piety). Since the removal of the construction materials and vehicles, and the recent mowing of the site, the area appears to be revegetating itself and the coastal bluff morning glory has recolonized (Figures 2 and 3).

The areas on the north side of the property near Pirates Drive where the plant has recolonized after disturbance (Figure 1), demonstrates that this plant can recover after a major disturbance, (and may actually benefit from some disturbance). Though the plant was found in higher densities toward the center of the property (Figure 1), this may be a reflection of the disturbance that occurred on the north side, and the lack of any disturbance on the center of the property. It is possible that with at least some management (i.e. weed control/ mowing), the colonies of coastal bluff morning-glory on the north side will expand, and possibly reach density levels observed in the undisturbed central portion of the property. Weed control will be a critical component of protecting the species, since in some areas that were heavily disturbed, weeds have become dominant (Figure 6). It should also be noted that plant distributions are dynamic and should be expected to vary in their abundance and distribution at a particular site due to changes in physical (e.g. annual and seasonal rainfall and temperature) and biological factors (predation and competition). Plant distributions on a particular site can therefore have dramatic shifts in abundance and distribution over the course of a single year. For this reason, it is important to protect, when possible, contiguous areas that consist of high quality habitat and marginal habitat, since these habitats will fluctuate over time.

A view of the coastal prairie vegetation on site prior to the disturbance in 2002 is provided in Figure 7.

Review of Mitigation Methods

CNPS recommends that transplantation should only be used as a last recourse in conserving rare plants (CNPS, 1989), and opposes the use of transplanting as the primary method of conserving rare plant species (CNPS, 1998). In many circumstances transplantation is not an effective method for protecting rare plant species (pers. comm. Gene Cooley, DFG). This plan therefore does not rely on transplanting as means of mitigation, and describes conserving the rare *Calystegia purpurata ssp. saxicola* on site through protecting a portion of the existing plant colonies on site through deed restriction, and replanting disturbed areas with plants grown from seed collected on site. Recommended measures for offsetting impacts also include donation of seed to the Rancho Santa Ana Botanic Garden project (along with a $2,500 storage fee) and

maintenance of the site through mowing to reasonably insure the protection and preservation of the species.

Growing from seed is preferable to growing from cuttings and other plant material because plants grown from seed contain more of the genetic diversity of the source population. Climbing morning glory *(Calystegia purpurata ssp. pupurata)* has been successfully grown from seed and is currently sold at nurseries in Sonoma and Marin Counties such as Mostly Natives nursery in Tomales, California (pers. comm. nursery manager, Mostly Natives Nursery; and Dave Kaplow, North Coast Native Nursery). Other forms of Calystegia have been successfully propagated from cuttings (pers. comm. nursery manager, Cornflower Farms Nursery).

One example in which replanting with plants grown from seed and site maintenance through mowing has been successful within coastal prairie habitat is on San Bruno Mountain (San Mateo County, California). Several "habitat islands" have been successfully created for the endangered Mission blue butterfly through the planting of it's host plant Silver lupine (*Lupinus albifrons var. collinus*) (San Bruno Mountain HCP Annual Reports 2000-2003). An example where mitigation through a combination of dedication of conserved areas combined with transplantation for mitigation for rare plant species (listed and CNPS List 1B species) is the Juvenile Hall Expansion project in San Mateo County (2004). This project includes a program for ongoing monitoring of two rare plant species, Fragrant fritillary (*Fritillaria liliaceae*), and Crystal Springs Lessingia (*Lessingia arachnoidea*) which were removed from the building envelope area and transplanted into protected serpentine grassland areas on site.

II. Methods

Fencing

Prior to construction, the construction zone should be delineated by a land surveyor and fenced with temporary cyclone fencing to prevent any construction materials, vehicles, and/or foot traffic from going outside of the construction area. This will prevent impacts from occurring to the natural areas on the site that are to be conserved through deed restriction.

Seed Collection

Seed should be collected from several different plants on the site. Actual timing of collection is determined by plant phenology, and the site should be closely monitored to intercept the seed collection window. To protect plants within undisturbed areas from over-collection, CNPS seed collection guidelines should be followed. No more than 5% of seed should be taken from each plant (This restriction is not necessary for plants that are located within the approved building envelope). If possible, differentiate between *Calystegia purpurata ssp. purpurata* and *Calystegia purpurata ssp. saxicola* and label seed bag with the name of the site, date, species, and collector).

Per recommendations by DFG, a portion of seed collected will be donated to the Rancho Santa Ana Botanic Garden project along with a $2,500 contribution for preserving the seed (pers. comm. Gene Cooley, DFG).

Propagation and Replanting

A suitable nursery should be chosen to propagate the coastal bluff morning-glory plants. Seed should be collected and delivered to the nursery, according to specifications provided by the

nursery. Plants should be grown until they have a healthy root structure, approximately 4-12 months. Replanting should be done in the rainy season well after the first heavy rains, between December and February. Replanting should be done within the septic leachfield area, and any other microsites/ areas on the property that appear suitable to support the plant.

A conservative estimate of survival for plantings is approximately 20-50%, and over-planting should be done to compensate for this expected rate of survival. For example if 400 plants are expected to be impacted (temporary and permanent impacts) from development on the site, then approximately 800 - 2000 plants should be planted the first year to compensate for the impact. If necessary, replanting should be done the following year to insure that at least a 1:1 mitigation ratio is attained (1 plant replaced for every 1 plant permanently taken by development). This does not include existing plant colonies on site protected through deed restriction.

Maintenance

Because of the disturbance from construction activities and planting on site, a flush of annual grasses and weeds should be expected in the first 1-3 years after the project has been built. These invasive grasses grow faster in the spring and set seed sooner, and thus can outcompete native species such as the low-growing coastal bluff morning-glory, especially in the first few years of establishment. It will be important to control these weeds through mowing prior to seed formation in the spring, and in the fall to remove thatch.

The site was mowed just prior to a field visit on September 3, 2004. The coastal bluff morning-glory on site was found to be easily observable within the mowed areas, and was leafing out and growing back vigorously (Figure 2). For the first three years of the project, the site should be mowed 3 times per year. Twice in the early spring, and once in the fall. Care should be taken to mow above the height of the prostrate coastal bluff morning-glory, when possible. Mowing will also help control the expansion of brush into the grassland on site. Brush expansion is a problem especially in grasslands in populated areas, where fire is no longer a component of the ecosystem.

Monitoring

Plants installed should be tagged with numbered metal tags. This will allow an assessment of survival rates on site for each year's planting and to ascertain the amount of natural recruitment. The site should be evaluated in spring during the flowering period of the coastal bluff morning-glory (May/June), and numbers of plants should be counted one year after installation, and once again three years later. Photos of the site should be taken on the same schedule as the plant counts to provide before and after photo-documentation of the site.

Survival rates documented from the plantings grown from seed will provide useful information for protection and restoration of the coastal bluff morning-glory. The effect of mowing on the site on a consistent basis will also provide useful information. The biological monitor will keep track of this information and submit a brief letter report to CDFG and the County of Mendocino one year after installation, and a final follow-up summary report three years after project installation.

III. Schedule

Table 1. Schedule of Tasks and Responsible Parties.

#	Task	Time of Year	Responsibility
1	Surveyors need to mark the edge of final approved grading area so that it is unmistakable which plants are in the construction zone and which are outside of it.	*-Prior to construction / disturbance to site-*	Licensed land surveyor
2	Conduct a plant count for all coastal bluff morning-glory within areas to be disturbed in final approved grading plan for the site. If necessary mow vegetation around plants for easier visibility.	August - February 2004, 2005	Restoration Contractor/ Biological Monitor
3	Collect seed of the coastal bluff morning-glory from several places on site. Actual timing of collection is determined by plant phenology. If possible, differentiate between *Calystegia purpurata ssp. purpurata* and *Calystegia purpurata ssp. saxicola* and label seed bag accordingly. Follow CNPS seed collection guidelines of no more than 5% seed collected from plants, except for plants within the building envelope.	June – August 2005	Restoration Contractor (or) Biological Monitor
4	Deliver seed to Nursery for contract growing, according to specifications provided by Nursery	June – August 2005	Restoration Contractor (or) Biological Monitor
5	After construction phase is completed, prepare planting holes in appropriate locations, and replant with coastal bluff morning-glory propagules. Plants should be installed properly and watered. Plants should have no exposed roots or buried stems. Mark each plant with a numbered metal tag and photo-document site.	December – February 2005	Restoration Contractor (and) Biological Monitor
6	Site should be evaluated at time of installation, one year later, and three years later. Plant survival should be evaluated and photo-documentation should be conducted. Plant vigor should be evaluated and noted.	May/June 2005, 2006, 2008	Biological Monitor
7	Maintenance of site shall consist of mowing 3x per year at the appropriate season to avoid damaging the coastal bluff morning-glory, and reduce competition from annual grasses. This would be twice in early spring, and once in the fall or winter after blooming and seed dispersal. Care should be taken to mow before and after the flowering and seed set period for coastal bluff morning-glory.	March & August 2005, 2006, 2007	Restoration Contractor
8	The biological monitor will submit a brief letter report to CDFG and the County of Mendocino one year after installation, and a final follow-up summary report three years after project installation.	August 2006, 2008	Biological Monitor

References

Albion Environmental, Inc. July 2003. Environmentally Sensitive Habitat Area Assessment Under the California Coastal Act and Mendocino County Local Coastal Program. Prepared by Tom Mahoney.

Albion Environmental, Inc. June 2004. . Analysis of Coastal Bluff Morning-Glory (*Calystegia purpurata ssp. saxicola*) Population. Gualala, Mendocino County, California.

CNPS, 2001. Inventory of Rare and Endangered Plants of California (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA. x + 388pp.

CNPS, July 9, 1998. Statement Opposing Transplantation as Mitigation for Impacts to Rare Plants. http://www.cnps.org/archives/archives.htm

CNPS, December 1989. Policy on Transplanting. http://www.cnps.org/archives/archives.htm

San Bruno Mountain Habitat Conservation Plan Annual Reports 2000-2003. San Mateo County. http://www.traenviro.com/sanbruno/hcp/ann_reports/ann_reports.htm

Personal Communications

Gene Cooley, Department of Fish and Game, personal communication September 15, 2004.

Liam Davis, Department of Fish and Game, personal communication September 10, 2004.

Dave Kaplow, Manger, North Coast Native Nursery, personal communication August 26, 2004.

Bobbie Piety, landowner, several personal communications August and September 2004.

Nursery manager, Cornflower Farms, pers. comm., September 2004.

Nursery manager, Mostly Natives Nursery, pers. comm. September 2004.

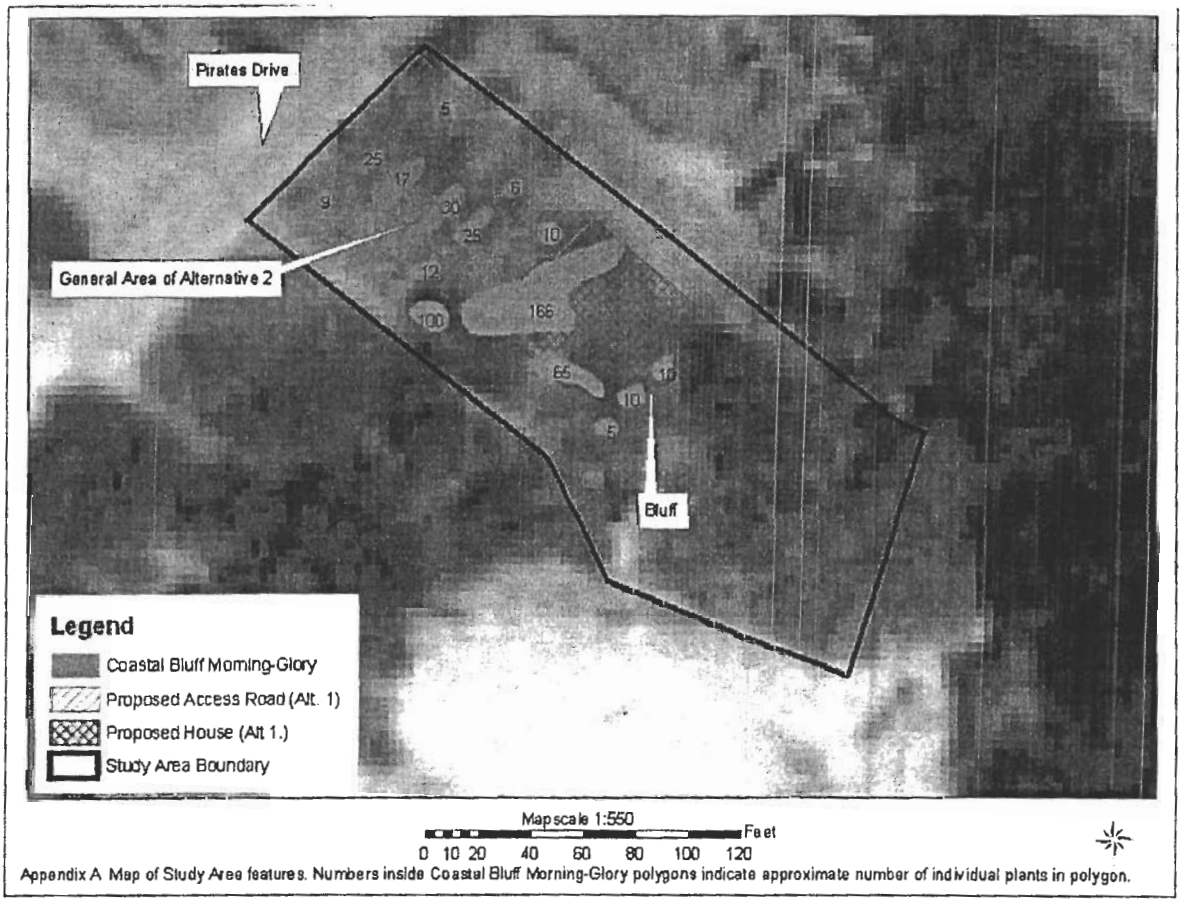

Figure 1. Map showing property, location of proposed Alternative 1 building area, and several patches of coastal bluff morning-glory mapped on the site in June, 2004 (Albion Environmental, Inc.).

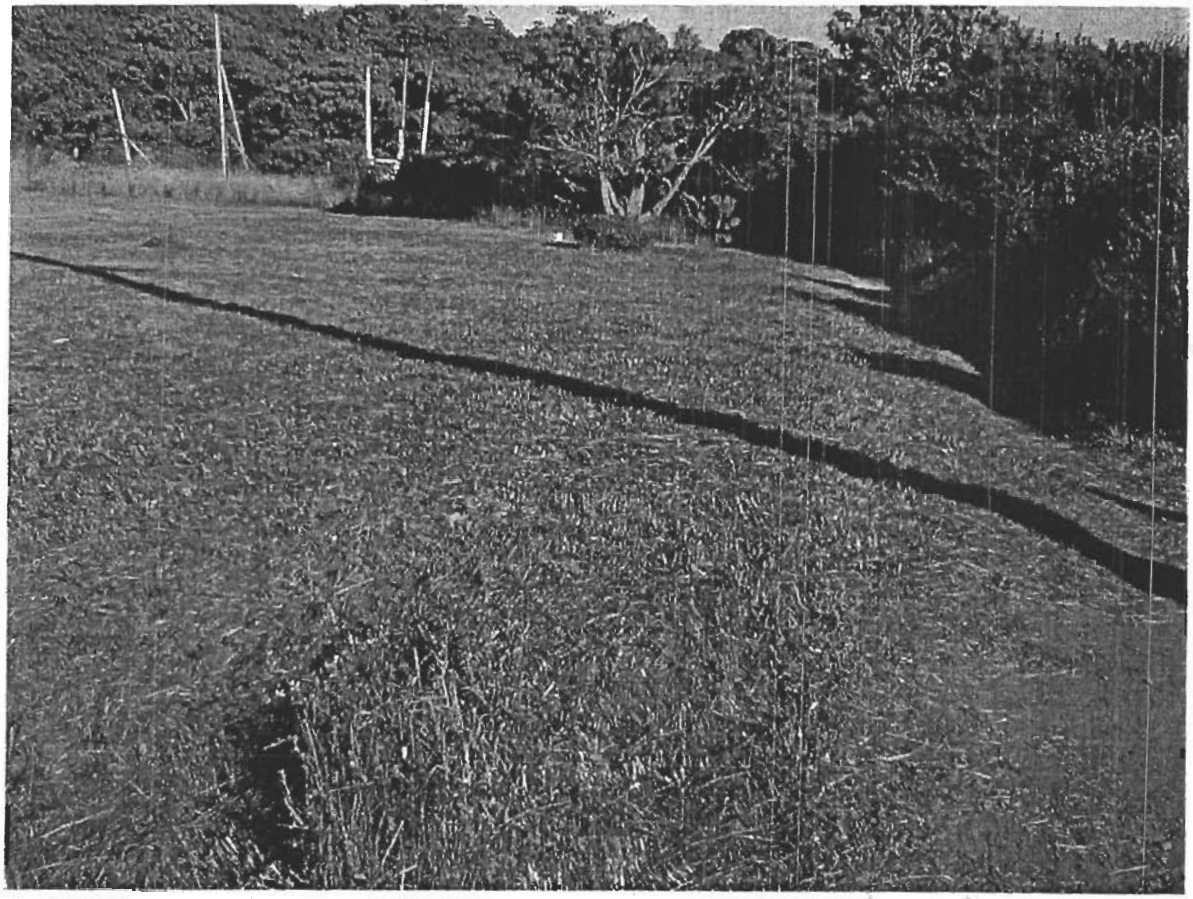

Figure 2. View of property at 47021 Pirates Drive, Gualala. View is looking southeast. Story poles in background represent the Alternative 1 building location and are near the grassland/scrub boundary. Photo date: 09/03/04. See Figure 7 for a comparative view of the site in 2001.

Figure 3. Close up view of the coastal bluff morning glory (*Calystegia purpurata ssp. saxicola)* on site. Plants appear to be responding well to the recent mowing (photo date: 09/03/04).

Figure 4. Northern side of property was scraped of vegetation and used as a parking area in 2002. View is looking southeast. Photo date: 06/11/02.

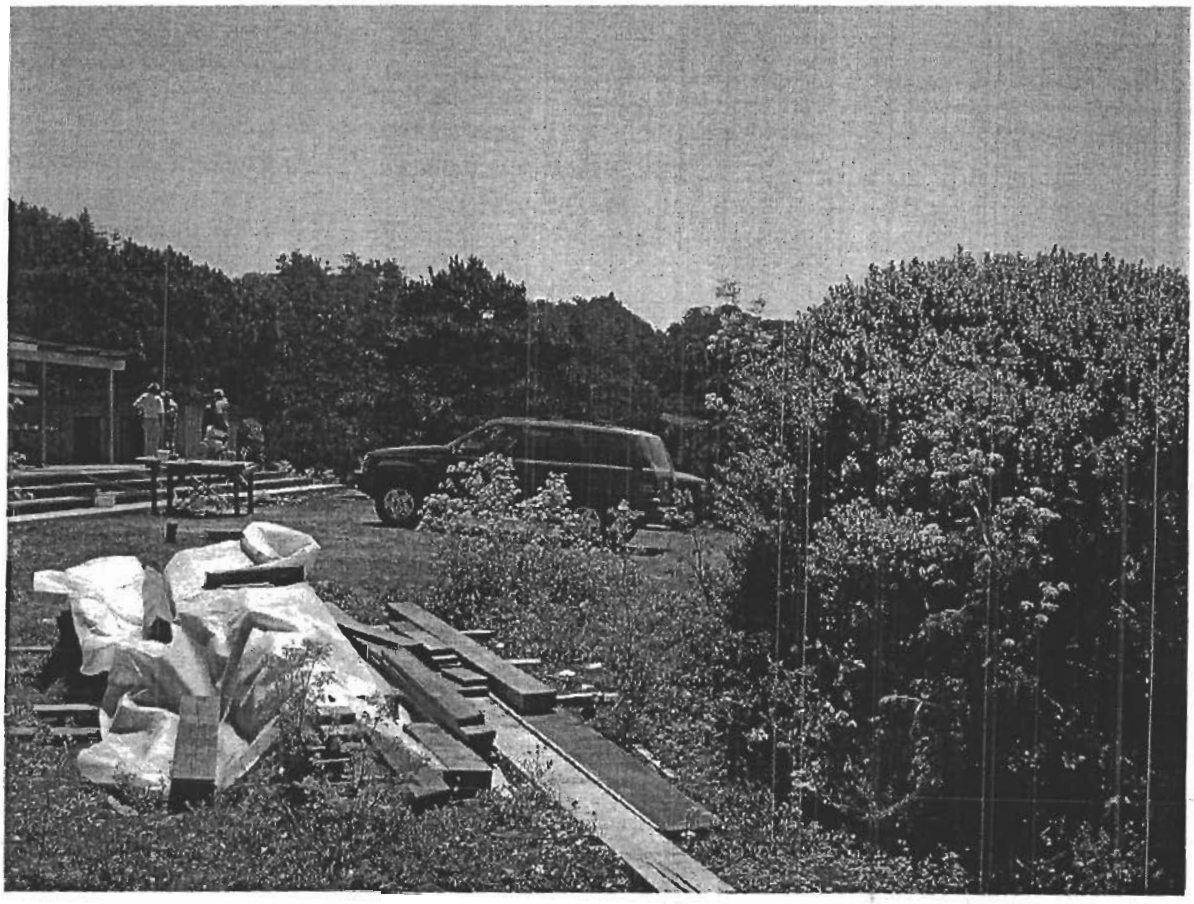

Figure 5. Vehicle usage and construction materials stored on the northern side of the property by work crews during work on an adjacent property in 2002. View is looking southeast. Photo date: 06/11/02.

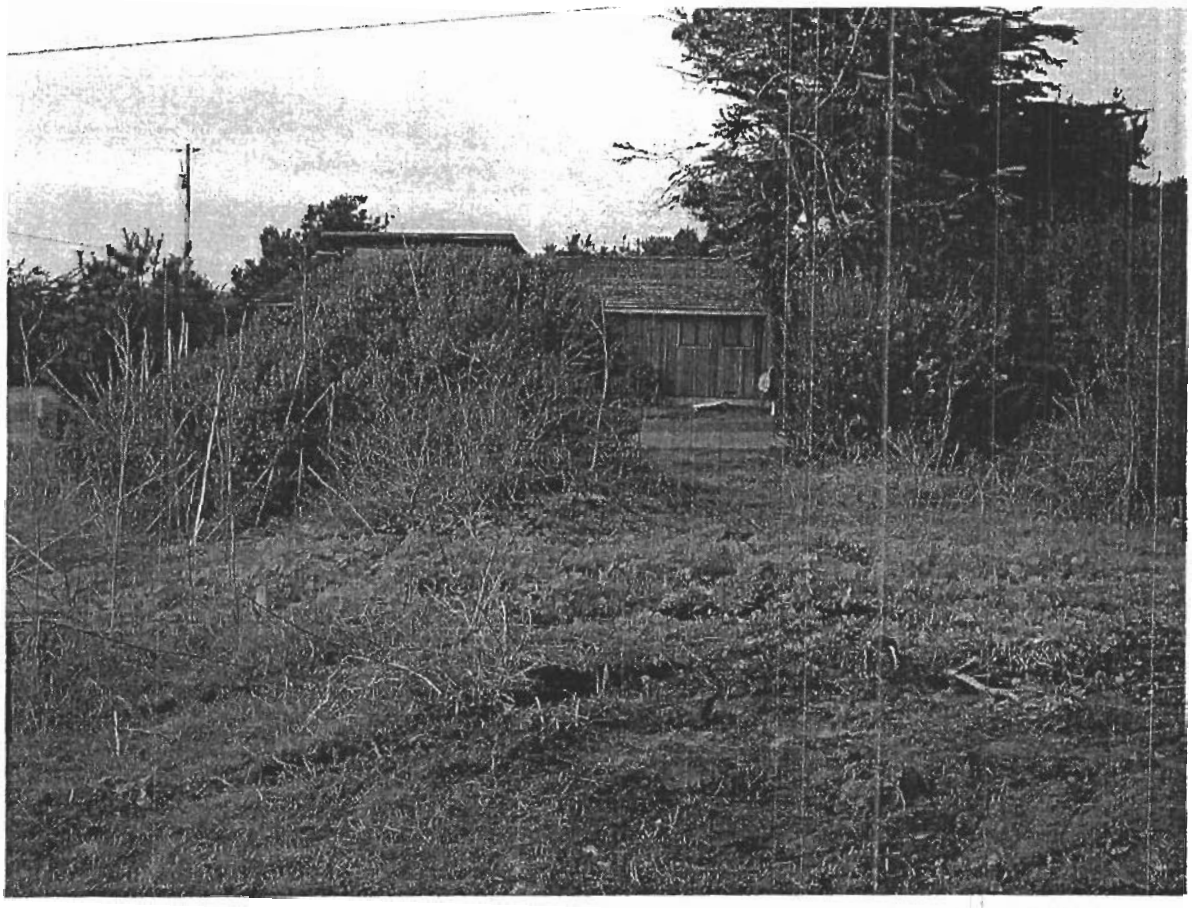

Figure 6. Northern portion of site where vehicles have disturbed the soil (tire tracks) and non-native mustard has invaded the site. View is looking northwest. Photo date: 12/15/01.

Figure 7. Coastal prairie vegetation on site, prior to clearing work in June, 2002. View is looking southeast. Photo date: 01/13/02.

Management Plan for Coastal Bluff Morning-Glory
(*Calystegia purpurata ssp. saxicola*)

for Property at 47021 Pirates Drive
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Purpose of Report

The purpose of this report is to provide a comprehensive management plan for protecting and enhancing the population of coastal bluff morning-glory *(Calystegia purpurata ssp. saxicola*), on a small coastal bluff property in Gualala, California. The plan incorporates recommended mitigation measures by DFG staff and information compiled in earlier reports prepared by Albion Environmental and Thomas Reid Associates.

Coastal bluff morning-glory is not a federally or state listed species, however it is a CNPS (California Native Plant Society) List 1B species, and is therefore protected under CEQA (California Environmental Quality Act) and the California Coastal Act.

This management plan provides methods for avoidance, transplanting, site monitoring and long-term maintenance. The plan calls for a biological monitor to be present and oversee all phases of the project. A table is provided showing each activity, responsible party, and time window for each activity to occur (Table 1). The proposed management period would be in effect for 5 years from the date of it's acceptance by DFG (Department of Fish and Game).

I. Introduction

The project site is located at 47021 Pirates Drive on the west side of Highway One in Gualala, California. The property is located within the Coastal Zone as defined by Section 30103 of the California Coastal Act. The site is approximately 0.5 acres in size. The buildable area is on the north and central portions of the lot, within a flat grassland area that is approximately 0.27 acres in size. The remainder of the site drops off steeply to the southeast, down to the beach and the Pacific Ocean below (Figure 1). A small (2,270 ft^2.) home is proposed for the site, along with a septic leach field to be located on the north (street) side of the lot.

Coastal bluff morning-glory (*Calystegia purpurata ssp. saxicola*) is currently a CNPS List 1B plant species. This species is a perennial herb that is closely related and very similar in appearance to the more common climbing morning-glory (*Calystegia purpurata ssp. purpurata).* Recent information indicates that coastal bluff morning-glory is relatively common in Mendocino County though it is rare in Marin, Napa, and Sonoma Counties (pers. comm. Gene Cooley, DFG). Due to this new information, recommendations may be made by the DFG to lower the status of this plant to CNPS List 4. This proposed management plan would no longer be necessary if the plant is down-listed (personal communication Gene Cooley, DFG).

A biological report was prepared for the site by Tom Mahoney in June 2003 (Albion Environmental, July 2003) which identified the presence of coastal bluff morning-glory on the site. A follow up report in June 2004 by Mr. Mahoney (Albion Environmental, June 2004) assessed impacts to coastal bluff morning-glory from two different building alternatives. This management plan will apply to either alternative, since impact to the plants would occur in a similar way, however the property owner wishes to build Alternative 1.

The property gradually shifts from grassland/coastal prairie vegetation on the northwest (street-side) and center sections of the property to coastal scrub vegetation and trees on the southeast (ocean-side), (Figure 2). Coastal bluff morning glory is a prostrate perennial wildflower found in coastal prairie habitats, and can easily be overgrown by brush and exotic species. For this reason, the best areas for protection and for re-planting will be on the northwest side and center portions of the property, away from the scrub boundary.

Based upon the hardiness of coastal bluff morning-glory, (the plant has recovered well after past ground disturbance on site) it is reasonably expected that this plant could be protected and re-established on site through a combination of protection of existing habitat on site, transplantation within temporarily disturbed areas, and long-term maintenance to prevent weeds or brush from overtaking the site. Critical to the successful management of the site will be some form of weed and brush control. Mowing of the site has demonstrated that coastal bluff morning-glory responds favorably to this management tool (Figures 3 and 4). The landowner has indicated that she is willing conduct each of the protection measures stated above to provide long-term protection of the coastal bluff morning-glory on her property (pers. comm., Bobbie Piety).

II. Methods

Fencing

Prior to any construction on the property, the construction zone should be delineated by a land surveyor and fenced with temporary cyclone fencing to prevent any construction materials, vehicles, and/or foot traffic from going outside of the construction area. This will prevent impacts from occurring to the undisturbed areas on the site that are to be conserved.

Transplantation

As part of the proposed construction plans for the property, disturbance to the front (street) side of the lot will need to occur for a septic leach field and driveway, and disturbance on the back side of the lot will need to occur for home building. For these areas, the coastal bluff morning-glory will be salvaged and transplanted. For the septic leach field, the plants will be temporarily placed in a protected area, and then replanted back into their original location. For the home site and driveway, the plants will need to be transplanted from these areas to another location on the property, most likely the front side of the property where disturbance and weeds (such as wild radish and mustard) have degraded the grassland vegetation.

changed from st rgmt plan

Prior to any construction or disturbance, the trenching locations for the septic leach field should be marked, and all plants within the trenching area, driveway, and home site should be identified for removal. Prior to trenching/ construction, the coastal bluff morning-glory should be carefully removed with hand tools. Slabs of topsoil (4-6" deep) may be removed along with the plants from the trenching locations only (personal communication, Carl Rittiman, County of Mendocino Soils Engineer). For all other areas within the septic leach field, soil will need to be left in place and plants should be carefully removed by hand and placed in pots. The plants and soil should then be carefully set aside in a designated protected location during the leach field trenching and construction.

The plants should be sufficiently watered (but not over-watered) to avoid stressing the plants, both during their temporary storage, and for some time after the plants have been replanted. When the work is completed, the slabs of topsoil and coastal bluff morning-glory plants should be replanted into the septic leach field trenches and into the new designated location for the plants on the property. Site preparation including mowing should be done to clear the thatch and weedy vegetation from the new site before planting.

Most transplanting projects are conducted with the purpose of moving sensitive plants to a different location, and often these receptor sites are not suitable for long-term survival of the plants. Because the plants within the septic leach field will be returned to their original location,

and the plants within the home and driveway location will be replanted into grassland areas adjacent to an existing population of coastal bluff morning-glory, it is expected that the plants will have a better chance of survival than what has been observed for other transplantation projects. However the most important element that will determine long-term plant survival at the site will be the institution of a thorough and regular maintenance program.

Maintenance

Because of the disturbance from construction activities, a flush of annual grasses and weeds can be expected in the first 1-3 years after the project has been built. These invasive species grow faster in the spring and set seed sooner than many native plants, and thus can outcompete native species such as the low-growing coastal bluff morning-glory, especially in the first few years of establishment. It will be important to control these weeds through mowing and hand weeding in the spring prior to seed formation, and in the fall to remove thatch.

For the first three years of the project, the site should be mowed three times per year, twice in the early spring, and once in the fall. Care should be taken to mow around and above the height of the prostrate coastal bluff morning-glory. Mowing will also help control the expansion of brush into the grassland on site. Brush expansion is a problem especially in grasslands in residential areas, where fire and grazing are no longer a component of the ecosystem.

Monitoring

Transplanted plants should be tagged with numbered metal tags. This will allow an assessment of survival rates for transplanted plants and to ascertain the amount of natural recruitment. The site should be evaluated in spring during the flowering period of the coastal bluff morning-glory (May/June), and numbers of plants should be counted one year after installation, and annually in the spring for five successive years. Photos of the site should be taken on the same schedule as the plant counts from four established photo points to provide before and after photo-documentation of the site. ? Not referenced in report

Survival rates documented from the plantings grown from seed and transplanted plants will provide useful information for protection and restoration of the coastal bluff morning-glory. The effect of mowing on the site on a consistent basis will also provide useful information. The biological monitor will keep track of this information and submit a brief letter report to DFG and the County of Mendocino one year after installation, an annual report once per year for five successive years, along with a final follow-up summary report at the completion of the project.

Success Criteria

The number of *Calystegia purpurata ssp. saxicola* on site is estimated at approximately 500 plants (Figure 1; plant counts by Tom Mahoney, Albion Environmental in 2004). The house will impact approximately 268 of these, which will be transplanted to areas on the property outside the construction zone. This project should be considered a success if plant numbers stay within the range of 500 +/- 200 plants over the five-year monitoring period. Plant populations will fluctuate over time depending upon variables such as weather and pressure from herbivores.

If the annual monitoring reveals that the *Calystegia purpurata ssp. saxicola* on site has dropped below 300 plants, DFG staff should be notified and the site should be evaluated by DFG, the

landowner, and biological monitor, and any resulting recommended changes in management shall be incorporated into the management program for Calystegia at that time.

III. Schedule

Table 1. Management Plan Schedule of Tasks and Responsible Parties.

#	Task	Time of Year	Responsibility
1	Surveyors need to mark the edge of final approved grading area so that it is unmistakable which plants are in the construction zone and which are outside of it.	*-Prior to any construction or disturbance to site--*	Licensed land surveyor
2	Conduct a plant count for all coastal bluff morning-glory plants within areas to be disturbed in final approved grading plan for the site. If necessary mow vegetation around plants for easier visibility.	May/June	Restoration Contractor/ Biological Monitor
3	Prior to any construction or disturbance on site, the trenching locations for the septic leach field should be marked, and all Calystegia plants within the trenching and construction areas should be identified with flagging for removal. Prior to trenching and construction, slabs of the topsoil containing the Calystegia should be carefully removed by with hand tools. The slabs of topsoil (4-6" deep) may be removed along with the plants from the trenching locations only. The Calystegia should be carefully set aside in a designated protected location during construction and the leach field trenching. When the work is completed, the topsoil and plants should be returned to their original location in the septic leach field, and in a new designated location on the property for Calystegia restoration. The topsoil and Calystegia plants should be sufficiently watered (but not over-watered) to avoid stressing the plants, both during the trenching operation and for some time after the plants have been placed back into their original location. Site preparation including mowing should be done to clear the thatch and weedy vegetation from the new site before planting	Anytime, but may be best to transplant during fall dormancy period (Sept – Nov.)	Restoration Contractor/ Biological Monitor
4	The property should be evaluated at time of transplantation, and on an annual basis during the flowering period of the species for 5 successive years. Plant survival should be evaluated and photo-documentation should be conducted. Plant vigor should be evaluated and noted.	May/June	Biological Monitor
5	Maintenance of the site shall consist of mowing 3x per year at the appropriate season to reduce competition from annual grasses and brush. Mowing should be done twice in early spring, and once in the fall, after blooming and seed dispersal. Care should be taken to avoid directly impacting the Calystegia.	March & August	Restoration Contractor
6	The biological monitor will submit an annual report to CDFG and the County of Mendocino (in June) for 5 years. A final report will be submitted at the completion of the 5 year period.	June	Biological Monitor

References

Albion Environmental, Inc. July 2003. Environmentally Sensitive Habitat Area Assessment Under the California Coastal Act and Mendocino County Local Coastal Program. Prepared by Tom Mahoney.

Albion Environmental, Inc. June 2004. . Analysis of Coastal Bluff Morning-Glory (*Calystegia purpurata ssp. saxicola*) Population. Gualala, Mendocino County, California.

CNPS, 2001. Inventory of Rare and Endangered Plants of California (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA. x + 388pp.

CNPS, July 9, 1998. Statement Opposing Transplantation as Mitigation for Impacts to Rare Plants. http://www.cnps.org/archives/archives.htm

CNPS, December 1989. Policy on Transplanting. http://www.cnps.org/archives/archives.htm

Thomas Reid Associates, September 2004. Mitigation Plan for Coastal Bluff Morning-Glory (*Calystegia purpurata ssp. saxicola*) for Property at 47021 Pirates Drive Gualala, California. Prepared for Bobbie Piety-Panelli.

Personal Communications

Gene Cooley, Department of Fish and Game, personal communication September 15, 2004.

Liam Davis, Department of Fish and Game, personal communication September 10, 2004.

Bobbie Piety, landowner, several personal communications August and September 2004.

Carl Rittiman, County of Mendocino Soils Engineer, personal communication, April 14, 2005.

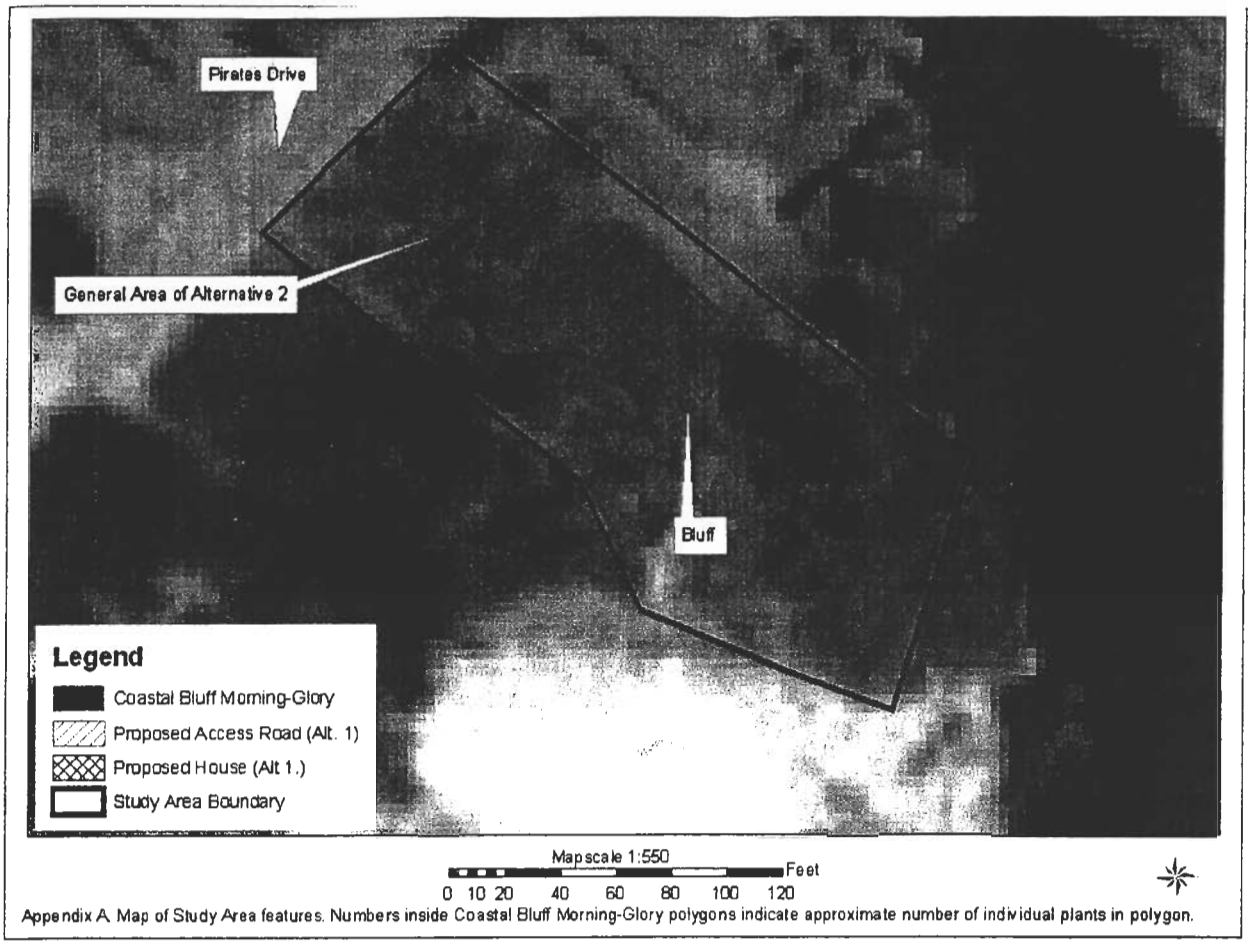

Figure 1. Map showing property, location of proposed Alternative 1 building area, and several patches of coastal bluff morning-glory mapped on the site in June, 2004 (Albion Environmental, Inc.). Dense trees and scrub are visible on the south (rear) side of the lot, and this area is unsuitable for the coastal bluff morning-glory.

Figure 2. Coastal prairie grassland on site, prior to disturbance in June 2002. View is looking southeast toward tree and scrub boundary. Photo date: 01/13/02.

Figure 3. View of property after site was mowed. View is looking southeast. Photo date: 09/03/04. Story poles in background represent the Alternative 1 building location and are near the tree and scrub boundary.

Figure 4. Close up view of the coastal bluff morning glory (*Calystegia purpurata ssp. saxicola)* on site, after mowing. Plants appear to be respond well to mowing (photo date: 09/03/04).

Bobbie Piety - Panelli

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California, 95521
Phone: (707) 822-7201 FAX: (707) 822-8411

In Reply Refer To:
AFWO

SEI

California Coastal Commission
North Coast District Office
710 E Street, Suite 200
Eureka, CA 95501

Subject: Review of Construction Project at 47021 Pirates Drive, Gualala, Mendocino County, California (APN 144-290-01), Permit Number A-1-MEN-05-037 (Agenda Item Number 13b; AFWO File Number 8-14-2005-2791.1)

To Whom It May Concern:

The U.S. Fish and Wildlife Service (Service) is in receipt of a Public Hearing Notice dated September 1, 2005 for the above listed project. The Service currently does not have the information necessary to review this construction project to determine if incidental take of Behren's silverspot butterfly (*Speyeria zerene behrensii*) could occur. The Behren's silverspot butterfly is listed as endangered under the Endangered Species Act of 1973, as amended. If suitable Behren's silverspot butterfly habitat exists at the site, the species may be present and construction could inadvertently result in unauthorized take. The Service recommends that the California Coastal Commission not approve this permit until the Service is provided with the opportunity and information necessary to adequately review this project for potential effects on this species.

In correspondence dated January 31, 2005 (AFWO File Number 1-14-2004-TA-2367), the Service requested that prior to permit approval, the Mendocino County Department of Planning and Building Services provide the Arcata Office of the Service with the opportunity to review projects such as this that involve ground disturbance or vegetation alteration within the range of this butterfly in coastal Mendocino County. While some projects are routed to the Service for review and input early in the planning process, many others are not. As a result, the Service only becomes aware of some projects during the Coastal Commission appeal process.

If you or the project proponents have any questions regarding this correspondence, please contact Mr. John Hunter of my staff at the above letterhead address or at (707) 822-7201.

Sincerely,

Michael M. Long
Field Supervisor

cc:
Raymond Hall, Mendocino County Department of Planning and Building Services, Fort Bragg, CA

ALBION ENVIRONMENTAL, INC.
NATURAL AND CULTURAL RESOURCES CONSULTANTS

1414 SOQUEL AVENUE, SUITE 205
SANTA CRUZ, CALIFORNIA 95062

TELEPHONE (831) 469-9128
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EXHIBIT NO. 18
APPEAL NO.
A-1-MEN-05-037
(PIETY/PANELLI)
NOVEMBER 8, 2005 INITIAL BUTTERFLY HABITAT LETTER

November 8, 2005

Bobbie Piety
809-B Cuesta Drive #173
Mountain View, CA 94040

Re: Plant Survey at 47021 Pirates Drive Gualala, Mendocino County, California

Dear Bobbie:

This letter is in response to a request for additional information related to the presence of western dog violet (*Viola adunca*[1]), the principal larval host plant for the federal endangered Behren's silverspot butterfly (*Speyeria zerene behrensii*) on the property located at 47021 Pirates Drive in Gualala, Mendocino County, California ("Study Area"). I conducted an Environmentally Sensitive Habitat Area assessment on the Study Area on June 11, 2003 (Albion Environmental, Inc. 2003). The assessment included a special-status plant survey, which consisted of two parts: (1) a background literature search to document the occurrence of special-status plant species known from the region, which would form the basis of a field survey; and (2) a field survey, following guidelines for plant surveys described by Nelson (1987) and CDFG (2000). Methodologies used for the background literature search and field survey are discussed in more detail in Albion Environmental, Inc. (2003).

Since the background literature search focused on special-status (e.g., rare, threatened, or endangered) plant species—and western dog violet is itself not a special-status species—neither it, nor the presence of suitable habitat for Behren's silverspot butterfly, was specifically evaluated as part of the assessment. However, the survey occurred within the western dog violet survey window mentioned in the October 11, 2005 correspondence to you from the California Coastal Commission, which stated: *"In a typical year, surveys for the Viola adunca must be conducted between 21 April and 14 June."*

During the survey, I walked transects across the Study Area and recorded each plant species that I observed. Any plant species on the Study Area in bloom or otherwise identifiable would have been included on my species list (Appendix A). Western dog violet is not on the species list, and therefore I did not observe it on the Study Area during the June 11, 2003 survey.

Please contact me if you have questions or need additional information.

Sincerely,

Tom Mahony
Plant Ecologist

[1] Botanical nomenclature follows Hickman (1993)

References

Albion Environmental, Inc. 2003. Environmentally sensitive habitat assessment under the California Coastal Act and the Mendocino County Local Coastal Program.

California Department of Fish and Game. 2000. Guidelines for assessing the effects of proposed projects on rare, threatened, and endangered plants and natural communities. California Department of Fish and Game, Sacramento, CA.

Hickman, J.C. (ed.). 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, CA.

Nelson, James R. 1987. Rare plant surveys: techniques for impact assessment. From proceedings of a California conference on the conservation and management of rare and endangered plants. California Native Plant Society, Sacramento, CA.

Appendix A. Plant species observed on the 47021 Pirates Drive Study Area during the June 11, 2003 site visit (taken from Appendix C in the Albion Environmental, Inc. (2003) report).

Scientific Name	Common Name
Abies grandis	grand fir
Achillea millefolium	yarrow
Alnus rubra	red alder
Anagallis arvensis	scarlet pimpernel
Anthoxanthum odoratum	sweet vernal grass
Arbutus menziesii	Pacific madrone
Athyrium filix-femina var. *cyclosorum*	lady fern
Avena sp.	wild oat
Baccharis pilularis	coyote brush
Briza maxima	big quaking grass
Briza minor	little quaking grass
Bromus diandrus	ripgut brome
Calystegia purpurata ssp. *saxicola*	coastal bluff morning-glory
Carduus pycnocephalus	Italian thistle
Ceanothus thyrsiflorus	blue blossom
Chamomilla suaveolens	pineapple weed
Chrysolepis chrysophylla	chinquapin
Cirsium sp.	thistle
Cortaderia jubata	pampas grass
Cynosurus echinatus	hedgehog dogtail
Dudleya farinosa	powdery dudleya
Erigeron glaucus	seaside daisy
Eschscholzia californica	California poppy
Foeniculum vulgare	fennel
Fragaria chiloensis	beach strawberry
Galium aparine	goose grass
Garry elliptica	coast silk tassel
Genista monspessulana	French broom
Geranium dissectum	geranium
Holcus lanatus	velvet grass
Hypochaeris glabra	smooth cat's-ear
Iris douglasiana	Douglas iris
Linum bienne	flax
Lithocarpus densiflorus	tanoak
Lolium multiflorum	Italian ryegrass
Lonicera hispidula var. vacillans	honeysuckle
Lotus sp.	
Lupinus sp.	lupine
Lythrum hyssopifolium	hyssop loosestrife
Malva sp.	mallow
Marah oreganus	coast manroot
Medicago polymorpha	California burclover
Mimulus aurantiacus	bush monkeyflower
Mimulus guttatus	seep monkeyflower
Petasites frigidus var. *palmatus*	coltsfoot
Pinus muricata	Bishop pine

Scientific Name	Common Name
Plantago lanceolata	English plantain
Polystichum munitum	swordfern
Prunella vulgaris	self-heal
Pseudotsuga menziesii var. *menziesii*	Douglas-fir
Pteridium aquilinum	bracken fern
Raphanus sativus	wild radish
Rubus discolor	Himalayan blackberry
Rubus parviflorus	thimbleberry
Rubus ursinus	California blackberry
Rumex acetosella	sheep sorrel
Rumex crispus	curly dock
Salix sp.	willow
Scrophularia californica ssp. *californica*	California figwort
Sequoia sempervirens	redwood
Sisyrinchium bellum	blue-eyed-grass
Sonchus asper	prickly sow thistle
Stachys sp.	hedgenettle
Toxicodendron diversilobum	poison oak
Trifolium incarnatum	crimson clover
Trifolium repens	white clover
Tropaeolum majus	garden nasturtium
Umbellularia californica	California bay
Vaccinium ovatum	evergreen huckleberry
Zigadenus fremontii	death camas

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EXHIBIT NO. 19
APPEAL NO.
A-1-MEN-05-037
(PIETY/PANELLI)
NOVEMBER 19, 2005 BEHRENS SILVERSPOT BUTTERFLY HABITAT ASSESSMENT

Bobbie Piety-Panelli
809-B Cuesta Drive #173
Mountain View, CA 94040

November 19, 2005

Re: Clarification on Potential for Behren's Silverspot Butterfly and Habitat Types at 47021 Pirates Drive, Gualala, California (Coastal Development Permit # A-1-Men-05-037).

Dear Ms. Piety-Panelli,

I am responding to the California Coastal Commission's letter dated October 11, 2005 to you regarding Coastal Development Permit # A-1-Men-05-037. The following responses address the Coastal Commissions requests for clarification on 1) the potential for habitat on site for the federally endangered Behren's Silverspot butterfly; and 2) existing habitat types at 47021 Pirates Drive, Gualala, California.

California Coastal Commission Comment #1: Additional Botanical Information On Habitat for Behren's Silverspot Butterfly

The Commission has received a letter from the U.S. Fish and Wildlife Service requesting information on the project's potential effects on the endangered Behren's silverspot butterfly (*Speyeria zerene behrensii*), in order to determine if incidental take of the butterfly could occur. The Behren's silverspot butterfly is listed as endangered under the Endangered Species Act of 1973, as amended. Section 9 of the Act prohibits any takings (i.e. harass, harm, pursue, hunt, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct) of listed species without special exemption. Since the proposed project occurs within the range of the butterfly, the service is requesting information necessary to adequately review this project for potential effects on this species. This includes whether suitable habitat for the butterfly exists on the site, such as coastal grasslands, and whether the principle larval host plant, the early blue violet (*Viola adunca*) is present on the site. We reviewed the August 2003 Environmentally Sensitive Habitia Area (ESHA) Assessment by Albion Environmental, and it is unclear as to whether the biologist surveyed the site for the plant. Therefore, please submit a letter from the botanist as to whether the presence of *Viola adunca* was evaluated in the initial survey, and a revised botanical survey that addresses this issue if the presence of this plant or potential habitat for the Behren's silverspot butterfly has not been yet evaluated. In a typical year, surveys for the Viola adunca must be conducted between 21 April and 14 June.

Response to Comment #1:

Tom Mahoney with Albion Environmental has submitted a letter dated November 8, 2005 to the California Coastal Commission. The letter states that *Viola adunca* was not found to be present on site during a botanical inventory of the site conducted on June 11, 2003. I would like to add

further information in regards to the known range and habitat requirements of the Behren's Silverspot butterfly.

The current distribution of the Behren's silverspot butterfly is a single extant location on private land near Point Arena, Mendocino County, California (USFWS Draft Recovery Plan, Behren's Silverspot (*Speyeria zerene behrensii*), November 2003).

Behren's silverspot is a large, strong flying (with respect to other butterfly species) Speyeria butterfly species. Speyeria butterfly species, which depend on a grassland host plant, require either large grassland habitat areas on the order of tens to several hundred acres, or at the minimum, smaller grassland habitat areas that are connected to one another through open grassland corridors. The project site is a 0.5-acre lot located at 47021 Pirates Drive in Gualala, California, which is approximately 12 miles south of the only known location of Behren's Silverspot at Point Arena, California. The project site is isolated within an existing residential development with developed lots on the east and north, and dense scrub and forest vegetation and residential development on the west. On the south side of the lot is a coastal bluff that drops steeply to Pirates Cove beach and the Pacific Ocean. Furthermore dense coniferous forest is located east of the site, precluding any connection with other grassland areas (Figure 1). The combination of the forest vegetation and residential properties in the Pirates cove area likely creates an impenetrable barrier to Behren's silverspot butterfly. Because of the large distance of the project site from the only known location of Behren's silverspot butterfly, and, more importantly, the isolated nature of the project site within an existing residential community surrounded by dense coniferous forest on the east and the Pacific Ocean on the west, there is an extremely low probability that Behren's silverspot butterfly could be present on site. For these same reasons, if the Behren's silverspot butterfly was re-introduced to the project site area, there is an extremely low likelihood that it would persist for very long.

California Coastal Commission Comment #2: Clarification of Existing Habitat Types on the Lot

The Albion Environmental botanical report says that the coastal bluff morning glory on the site grows in "California Annual Grassland", while the Thomas Reid Associates management report states that it grows in "grassland/coastal prairie." Please clarify which portions of the site are categorized as coastal prairie habitat.

Response to Comment #2:

The site is dominated by grassland, and like many grassland areas in California, it is composed of a combination of native and nonnative grasses and herbs. This combined assemblage of native and nonnative species is relatively uniform within the grassland portion of the site. Overall the site is more dominated by non-native annual grasses, which include Velvet grass (*Holcus lanatus*), Italian wild rye (*Lolium multiflorum*), wild oat (*Avena sp.*), little quaking grass (*Briza minor*), big quaking grass (*Briza maxima*), and ripgut brome (*Bromus diandrus*), (Albion Environmental 2003).

Due to the dominance of nonnative annual grasses on site, it is my contention that that the grassland on site be consistently referred to as "California Annual Grassland". This is consistent with the original botanical inventory conducted by Albion Environmental in June 2003.

Please contact me if you have questions or require further information.

Sincerely,

Patrick Kobernus
Senior Biologist

References:

Albion Environmental, Inc. July 2003. Environmentally Sensitive Habitat Area Assessment Under the California Coastal Act and Mendocino County Local Coastal Program. Prepared by Tom Mahoney.

Albion Environmental, Inc. Letter re: Plant Survey at 47021 Pirates Drive Gualala, Mendocino County, California, November 8, 2005.

US Fish and Wildlife Service, November 2003. Draft Recovery Plan for Behren's Silverspot Butterfly (*Speyeria zerene behrensii*). Region 1, US Fish and Wildlife Service, Portland, Oregon.

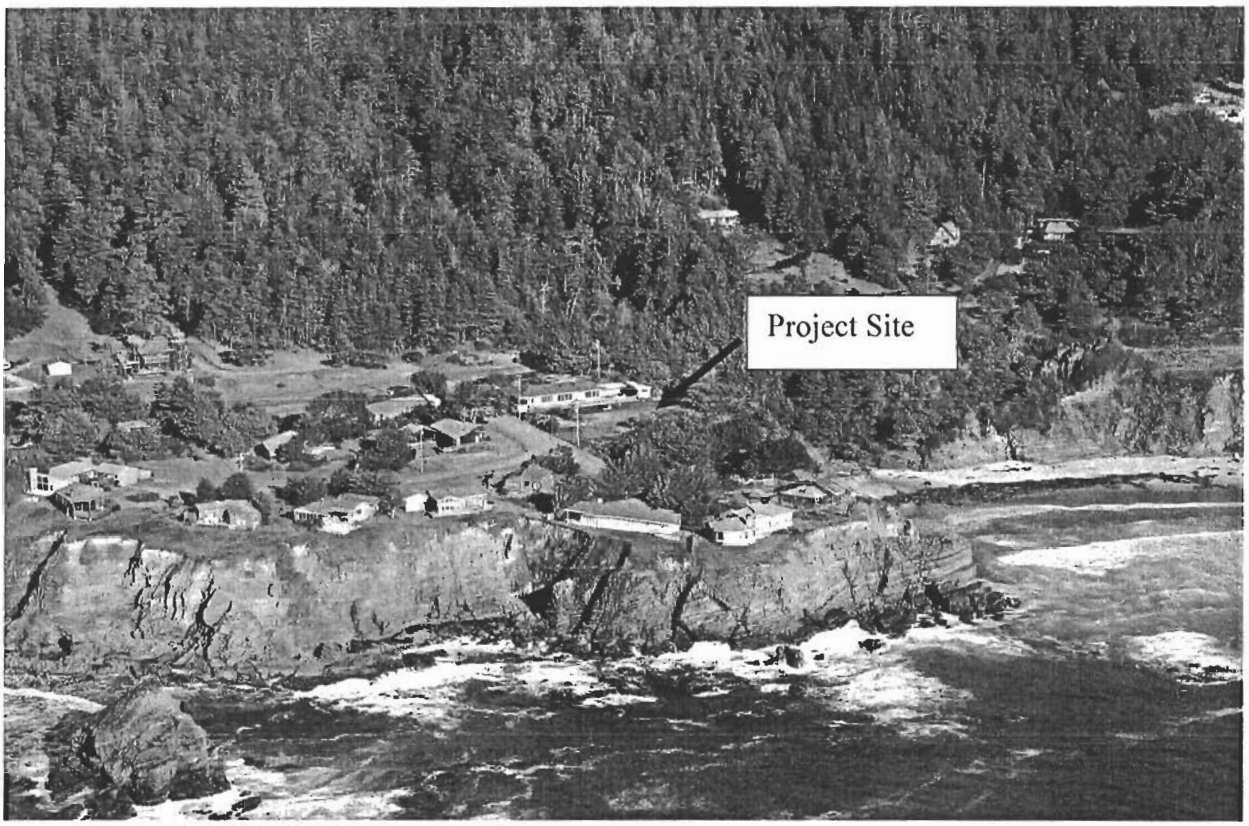

Figure 1. Location of 47021 Pirates Drive, Gualala, California. Project site is bordered by residential development, coniferous forest, and the Pacifica Ocean.

Rick Miller

From: "Tracie Hughes" <THUGHES@dfg.ca.gov>
To: <millerr@co.mendocino.ca.us>
Cc: "Liam Davis" <LDAVIS@dfg.ca.gov>; "Scott Wilson" <SWILSON@dfg.ca.gov>
Sent: Wednesday, November 17, 2004 12:29 PM
Subject: CDP #08-03 (Piety/Panelli)

Date: 17 November 2004

To: Rick Miller, Mendocino County Planning Department

From: Tracie Hughes, California Department of Fish and Game

RE: Analysis of Coastal Bluff Morning-Glory and Mitigation Plan for the Coastal Development Permit application at 47021 Pirates Drive in Gualala, Mendocino County

EXHIBIT NO. **20**
APPEAL NO.
A-1-MEN-05-037
(PIETY/PANELLI)
DFG COMMENTS ON PROPOSED BOTANICAL MITIGATION MEASURES

The Department of Fish and Game (DFG) recieved the botanical analysis reports and mitigation strategy report for coastal bluff morning glory (Calystegia purpurata ssp. saxicola), which you sent for the above property. Liam Davis and Tracie Hughes (DFG) attended a site visit with you in the April of 2004, after receiving the first botanical analysis of the property; Environmentally Sensative Habitat Area Assessment by Tom Mahony of Albion Environmental, Inc. (August 2003). As a follow up to the site visit, DFG provided recommendations to the county regarding the ESHA and the Calystegia population.

A second botanical report, Analysis of Coastal Bluff Morning-Glory (Tom Mahony, June 2004) was then prepared for the property. The report includes a quoted recommendation from DFG; "...the housing pad and other infrastuctures described in your report need to be reconfigured in the lot's area which will minimize the least flower disturbance in implimenting the project." The analysis explores two alternatives in which the property can be configured, and what impacts it may have to the coastal bluff morning glory population. Alternative 1: Locating house near bluff and septic leach field near Pirates Drive, would permanently impact approximately 230-270 individuals and temporarly impact approximately 110-135 individuals. Alternative 2: Locating house near Pirates Drive and septic leach field near bluff, would permanently impact approximately 139 individuals and temporarly impact 230-256 individuals. DFG is most concerned with the permanent impacts, since these are associated with a permanent loss of habitat. It appears that Alternative 2 will create the least amount of permanent disturbance to the coastal bluff morning glory population. Therefore, for the protection of the species which is currently listed CNPS 1B, DFG would recommend Alternative 2 for the project.

Regarding the Mitigation Plan for Coastal Bluff Morning-Glory (Patrick

Kobernus, September 2004), DFG recommends acceptance of the the mitigation measures as proposed by the project proponent's consultant. These mitigations are applicable to either Alternative 1 or 2, and include fencing, seed collection (donation to Rancho Santa Ana Botanic Garden along with $2500 for preservation of seed), propagation and replanting, maintenance (seasonally appropriate mowing 3X per year), and monitoring survival rates (follow-up report at post-project year 1 and year 3).

If you have any questions, please feel free to call me at 707/836-8675.

Tracie Hughes (Nelson)
Environmental Scientist
Department of Fish and Game))

Rick Miller

From: "Corinne Gray" <CGray@dfg.ca.gov>
To: <millerr@co.mendocino.ca.us>; <bobbie@pinetree.com>
Sent: Monday, April 25, 2005 11:18 AM
Subject: Re: Revised Plant monitoring plan, CDP-08-03

Rick and Bobbie,

Looks good. I'd only add a final report after the five years be submitted to DFG. The report should describe the success or failure of mitigation measures applied on the site.

Cori

Corinne Medlin Gray
Environmental Scientist
Department of Fish and Game
1600 Program
(707) 944-5526
fax (707) 944-5595
cell (707) 738-3439

>>> Bobbie <bobbie@pinetree.com> 04/20/05 7:44 PM >>>
Dear Rick,

Attached is the revised monitoring plan that meets Carl Rittiman's--and
presumably the County Environmental Health representative's--requirements. Essentially, the changes are that heavy equipment was replaced by hand digging, only in the trench areas.

I will be out of town until Monday, but will respond to any email or messages you may leave for me while I'm gone.

Bobbie Piety
bobbie@pinetree.com
650-969-7459

Rick Miller

From: "Corinne Gray" <CGray@dfg.ca.gov>
To: <millerr@co.mendocino.ca.us>
Sent: Wednesday, May 04, 2005 3:47 PM
Subject: Revised letter for CDP-08-03 Revised Plant Mitigation

To: Rick Miller, Mendocino County Planning Department

From: Corinne Gray, California Department of Fish and Game

RE: Analysis of Coastal Bluff Morning-Glory and the revised Mitigation Plan
for the Coastal Development Permit application at 47021 Pirates Drive
in
Gualala, Mendocino County

The Department of Fish and Game (DFG) has reviewed the Management Plan (Kobernus April 2005) regarding additional protective measures for the Coastal Bluff Morning-Glory (Calystegia purpurata ssp. saxicola). Original analysis explored two alternatives in which the property could be configured and what impacts they might have on the Coastal Bluff Morning Glory population. The landowner has chosen Alternative 1 over DFG's recommendations for the implementation of Alternative 2 in our correspondence dated November 17, 2004. The Department has reviewed the additional materials and determined that impacts associated with Alternative 1 will be adequately mitigated by the implementation of the mitigation measures proposed in the April 2005 Management Plan and the following success criteria. To ensure a successful revegetation effort, all plantings shall have a minimum of 80% survival at the end of 5 years. If these survival requirements are not met, the landowner is responsible for replacement planting, additional watering, weeding, invasive exotic eradication, or any other practice, to achieve these requirements. Replacement plants shall be monitored with the same survival and growth requirements for five years after planting. An annual status report on the mitigation shall be provided to the Department of Fish and Game by December 31 of each year. This report shall include the survival, percent cover, and height of both tree and shrub species. The number by species of plants replaced, an overview of the revegetation effort, and the method used to assess these parameters shall also be included. Photos from designated photo stations shall be included. If after five years it is determined that the population has not achieved 80% survival, additional mitigation and monitoring will be imposed upon the project including fencing, seed collection (donation to Rancho Santa Ana Botanic Garden along with $2500 for preservation of seed), propagation and replanting, maintenance, and further monitoring and reporting.

DFG - FINAL ACCEPTANCE.

If you have any questions, please feel free to call me at (707)

5/4/2005

GEOTECHNICAL INVESTIGATION

PLANNED PIETY RESIDENCE
47021 PIRATES DRIVE
GUALALA, CALIFORNIA

11798.1

August 29, 2003

EXHIBIT NO. 21
APPEAL NO.
A-1-MEN-05-037
(PIETY/PANELLI)
AUGUST 29, 2003 BACE
GEOTECHNICAL REPORT

Brunsing Associates, Inc.

GEOTECHNICAL INVESTIGATION

PLANNED PIETY RESIDENCE
47021 PIRATES DRIVE
GUALALA, CALIFORNIA

11798.1

prepared for

Ms. Bobbie Piety
809-B Cuesta Drive #173
Mountain View, CA 94040

Prepared by

BACE GEOTECHNICAL
A Division of Brunsing Associates, Inc.
P. O. Box 749
Windsor, CA 95492

August 29, 2003

Bret D. McIntyre
Project Geologist

REGISTERED GEOLOGIST
ERIK E. OLSBORG
No. 1072
Certified
Engineering
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STATE OF CALIFORNIA

2/28/05

Erik E. Olsborg
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GEOTECHNICAL
STATE OF CALIFORNIA

Roy A. Bell
Geotechnical Engineer - 136

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LIST OF ILLUSTRATIONS

1.0 INTRODUCTION

This report presents the results of our Geotechnical Investigation for the planned Piety Residence at 47021 Pirates Drive, Gualala, California. The property, A.P. No. 144-290-001, is located on an ocean bluff about two miles northwest of Gualala, as shown on the Vicinity Fault Map, Plate 1. The entrance to the property as shown in Photograph A, Plate 2.

On June 10, 2003, BACE transmitted to you a topographic map showing our staked bluff edge and recommended building setback. Two of the bluff edge stakes are shown in Photograph B, Plate 2. Stake locations are shown on the Site Plan, Plate 3. No building plans have been prepared yet, but according to your preliminary plan sketches, the proposed one-story house will have an attached garage at the north end of the structure. The leach field will be on the northwest side of the structure. We understand that site grading will be limited to minor, if any, cuts or fills for drainage around the structure, and reprocessing of weak soils for support of slab-on-grade floors in the garage and/or elsewhere within the structure.

The purpose of our investigation was to evaluate the soil and rock conditions at the parcel with respect to the feasibility and design of the planned residence. Our scope of services, as outlined in our Service Agreement, dated May 15, 2003, included geologic map and literature research, study of recent (2000) and older (1981 & 1963) aerial photographs, geologic reconnaissance, subsurface exploration, laboratory testing, engineering and geologic analyses in order to provide conclusions and recommendations regarding:

- Geologic/subsurface conditions at the site;
- The potential effects of seismicity and fault rupture;
- Historic, current, and anticipated bluff retreat rate;
- Building and leach field setback criteria from bluff edges;
- Geologic suitability of the site, including a discussion of geologic hazards;
- Foundation design criteria;
- Site drainage;
- The need for supplemental geotechnical engineering services, as appropriate.

2.0 INVESTIGATION

2.1 Reconnaissance

Our Project Engineer observed the site on May 9, 2003. Our Principal Engineering Geologist performed a reconnaissance on May 28, 2003. The field

reconnaissance consisted of close examination of the soil and rock materials exposed on the upper bluffs. The geologic conditions of the upper bluff were examined and photographed. Also, the bluff edge was staked with white lathes at several points for future reference.

As part of our reconnaissance, we also examined aerial photographs, dated 1963 1981, and 2000; enlarged to a scale of one-inch equals approximately 200 feet. The bluff lines in both photographs were compared with existing bluff conditions in order to determine the relative bluff retreat rate. The results of our aerial photograph study are incorporated into the Site Geology and Soils and the Conclusions sections of this report.

In addition, we reviewed the following published references:

- Geology and Geomorphic Features Related to Landsliding, Gualala 7.5-Minute Quadrangle, Mendocino County, California, 1984, California Division of Mines and Geology (CDMG).
- Geologic Factor in Coastal Zone Planning, Schooner Gulch to Gualala River, Mendocino County, 1976, Open File Report 76-3, CDMG.
- Geologic Map of The Santa Rosa Quadrangle, 1982 Map No. 2A, Regional Geologic Map Series, California Division of Mines and Geology (CDMG).

2.2 Field Exploration

The field exploration consisted of the drilling, logging, and sampling of three test borings within the planned building area. The borings were drilled on June 12, 2003, with a track-mounted all-terrain drill rig utilizing flight auger equipment. The test borings, B-1 through B-3, were 10, 12, and 13-1/2 feet in depth, respectively. Our Project Geologist logged the borings and obtained both relatively undisturbed tube and loose bulk-samples of the materials encountered for visual classification and laboratory testing. The approximate boring locations are shown on the Site Plan, Plate 3.

Our Project Geologist obtained relatively undisturbed tube samples using a 3-inch outside-diameter Sprague & Henwood split-barrel sampler, driven by a 140-pound drop-hammer falling 30-inches-per-blow. Blows required to drive the sampler were converted to equivalent "Standard Penetration" blow counts for correlation with empirical test data. Sampler penetration resistance (blow counts) provides a relative measure of soil/rock consistency and strength.

The logs of the test borings, showing the various soil and rock materials encountered and the depths at which samples were obtained, are presented on Plates 4 and 5. The soils are classified in accordance with the Unified Soil Classification System, Plate 6, using the Physical Properties Criteria for Soil

Classification, presented on Plate 7. The bedrock materials are described using the various criteria shown on the Rock Characteristics Chart, Plate 8.

2.3 Laboratory Testing

Selected samples were tested in our laboratory to determine their pertinent geotechnical engineering characteristics. Laboratory testing consisted of moisture content/dry density and triaxial compressive strength tests. The laboratory test data are summarized on the boring logs in the manner shown on the Key to Test Data on Plate 5.

3.0 SITE CONDITIONS

The project site is located on the bluff above the northwest end of Cooks Beach. Pirates Drive and Doubloon Way serve a cluster of residential properties on a small headland on the southwest side of Highway One. The headland is a remnant of a gently sloping marine terrace that extends from approximate Elevation 70 feet, up to 120 feet. The headland is bordered by the Pacific Ocean on the southwest; by the cove and beach (Cook's Beach) formed by the mouth of Glennen Gulch on the southeast, and by the cove and beach formed by the mouth of St. Orres Creek on the northwest. The gently to moderately sloping coastal terrace was created by sea level fluctuations during the Pleistocene Epoch.

The subject property is situated on a gently-sloping portion of the marine terrace, near the edge of a 75 feet high bluff. The steep-sided Glennen Gulch ravine is located east of the southwest corner of the property. The ocean bluff and ravine adjacent to the property have a slope gradient that varys from about one horizontal to one vertical (1H:1V), to ½H:1V. There are no sea caves at the property, as shown by Photograph C, Plate 9.

There is a sand, gravel, and cobble beach (Cooks Beach) at the bluff toe. A pathway to Cooks Beach runs from Pirated Drive along the southwest side of the property, then down the bluff face along the south-southwest side of the property, as shown on Plate 2. The cut into the bluff for the path cut us approximately 12 feet, or more in vertical height, with slope gradients that vary from about 1H to 1 ½ H:1V.

The upper property within the marine terrace (at the planned house and leach field locations) has a very gentle slope gradient of approximately 10 horizontal to one vertical (10H:1V) toward the southwest. The upper marine terrace is covered with grass, weeds, and brush, with some small pine trees.

No surface water or evidence of ground-water seepage was observed at the site during our June, 2003, field exploration. No free water was encountered in out test borings.

4.0 SITE GEOLOGY AND SOILS

The site bedrock consists of sedimentary rocks of the Late Cretaceous Period Anchor Bay member of the Gualala Formation. These sedimentary rocks are comprised of sandstone and shale. The rocks within the upper 15 to 20 feet of the property are orange brown, light brown, and gray, intensely fractured to crushed, moderately hard to hard, and deeply weathered.

The rocks within the lower approximately 50 to 60 feet of the property (as exposed in the bluff face) are generally gray to brown, thick-bedded, moderately to occasionally fractured, moderately hard to hard, and moderately to little weathered. Site bedding orientation consists of a north-northwest trending strike with a gentle dip (5 to 15 degrees from horizontal) to the southwest. A syncline axis is located southwest of the property. The rocks on the westerly limb of the syncline (on the headlands) dip gently to the northeast.

The bedrock is overlain by 5 to 6 feet of residual soil consisting of 2 to 3 feet of sandy silt overlain by 2-1/2 to 3 feet of silty sand-gravelly silty sand. The sandy silt is stiff to very stiff. The silty sand and gravelly (angular rock fragments) silty sands are loose to medium dense. The upper 1 to 1-1/2 feet of these soils are loose and porous with some roots. The site soils appear relatively low in expansion potential (tendency for volume change with changes in moisture content).

No landslides were observed at the site except for some relatively minor sloughing on the outer bluff face. No evidence of faulting was observed in the property vicinity and none of the published references that we reviewed show faults on, or trending towards the property. The active San Andreas Fault is located within the canyon of Little North Fork of the Gualala River approximately 2-½ miles to the northeast, as shown on Plate 1.

5.0 DISCUSSIONS AND CONCLUSIONS

5.1 General

Based upon the results of our investigation and review of available seismic data, we conclude that the site is geotechnically suitable for the planned residential construction. The main geotechnical constraints that should be considered in the design and construction of this project include slope stability, weak near-surface

soils, and strong seismic shaking from future earthquakes. These considerations and their possible mitigation measures are discussed below along with other specific aspects of this project.

5.2 Weak Near-Surface Soils

The upper 1 to 1 1/2 feet of the site soils are weak, porous and of variable density, therefore, are not suitable for foundation support in their present condition. Within and adjacent to foundation and slab areas, these soils need to be disregarded as supporting material. Foundation support should be obtained within the stiff to very stiff sandy silt or underlying siltstone/sandstone.

5.3 Bluff Stability/Setback Criteria

The property bluff appears relatively stable. The subject bluff is protected by the beach from most ocean waves. Based upon the results of our aerial photograph study and reconnaissance, we estimate that the bluff is eroding at the relatively low average rate of about one inch per year. Therefore, over a period of 75 years (the economic lifespan of a house per the California Coastal Commission), we estimate that the bluff will erode back approximately 6-¼ feet. Using a safety factor of two, a suitable bluff setback would be 12-½ feet, as shown on Plate 2.

5.4 Fault Rupture Hazard

Mendocino County is within a zone of seismic activity associated with the San Andreas Fault. The main trace (1906 movement) of the San Andreas Fault is located approximately 2-½ miles northeast of the site. Since the San Andreas Fault is 2-½ miles away, and no evidence of faulting was observed at the site, nor shown on the geologic maps and reports that we reviewed, we consider the potential for fault rupture at the site to be very low.

5.5 Seismic Ground Shaking

As is typical of the Mendocino County area, the site will be subject to strong ground shaking during future, nearby, large magnitude earthquakes. The intensity of ground shaking at the site will depend on the distance to the causative earthquake epicenter, the magnitude of the shock, and the response characteristics of the underlying earth materials. Generally, one- and two-story wood-frame structures supported on foundations in firm soil/rock, and designed in accordance with current building codes are well suited to resist the effects of ground shaking. With firm bedrock within a few feet from the ground surface at the planned building area, the site should receive short period, jarring

motions during an earthquake, with no significant ground wave amplifications that otherwise would be produced by a thick, weak soil deposit.

5.6 Erosion Control

The planned residence will be intercepting the natural sheet flow drainage across the site. As much as practical, concentrated runoff (including water from roof gutter downspouts) should be dispersed onto the ground surface on the inland side of the residence. Drain water should be outletted to the drainage ditch alongside Pirates Drive or into the densely vegetated ravine near the southeast corner of the property as described in the Site Drainage Section of this report.

5.7 Construction Impact

In general, the proposed residence, constructed in accordance with our recommendations, should have little effect upon bluff stability. The necessary surface (including roofs) drainage facilities, emptying in to the ditch at the northwest end of the property, or into the ravine at the southeast corner of the site, should adequately mitigate increased erosion concerns.

6.0 RECOMMENDATIONS

6.1 Site Grading

6.1.1 Preparation and Grading

Areas to be graded should be cleared of existing vegetation, rubbish, and debris. After clearing, surface soils that contain organic matter should be stripped. In general, the depth of required stripping will be about 2 to 3 inches; deeper stripping and grubbing may be required to remove isolated concentrations of organic matter or roots. The cleared materials should be removed from the site; however, strippings can be stockpiled for later use in landscaped areas.

Concrete slab-on-grade areas within the building, and for a distance of at least three feet beyond their edges, and within fill areas, weak porous soils should be removed for full depth. Within the pavement areas, porous soil removal can be limited to 12 inches below soil subgrade (SSG).

A BACE representative should observe the soils exposed by the recommended excavations. These exposed soils should then be scarified to about six inches deep, moisture conditioned to at least 2 percent over optimum moisture content (OMC) and compacted to at least 90 percent relative compaction as determined

by the ASTM D 1557 test procedure, latest edition. These moisture conditioning and compaction procedures should be observed by BACE.

Fill material, either imported or on-site, should be free of perishable matter and rocks greater than six inches in largest dimension, and have an Expansion Index of less than 40, and should be approved by BACE before being used on site as structural fill.

Fill should be placed in thin lifts (six to eight inches depending on compaction equipment), conditioned to near OMC, and compacted to at least 90 percent relative compaction as determined by the ASTM D 1557 test procedure, latest edition, to achieve planned grades.

6.1.2 Slopes and Finish Grading

Construction slopes for retaining walls may be excavated at 1H:1V (if required) or flatter. In general, cut slopes should be no steeper than 2H:1V, unless the cuts are reviewed by BACE during the excavation process. Fill slopes (if required) should be no steeper than 2H:1V and should be constructed by over-building and cutting back to present a firm, uniformly compacted surface. Slopes should be planted with erosion-resistant vegetation or protected from erosion by other measures upon completion of grading. The surface runoff should be intercepted and diverted away from the slope surface.

Finished pad surfaces should be graded to drain away from foundations. A minimum surface drainage gradient of two percent is recommended.

Soil subgrades should be finished true to line and graded to present a smooth, firm, and unyielding surface. Finished surfaces should be maintained moist and free of shrinkage cracks until covered by permanent construction. Pad surfaces allowed to dry out and crack should be re-moisture conditioned to at least OMC and recompacted prior to foundation and concrete slab-on-grade installation.

6.2 Foundation Support

6.2.1 Alternate A - Drilled Piers

The residential structure can be supported on a system of drilled, cast-in-place concrete piers interconnected with grade beams. The piers should be a minimum of 12 inches in diameter (18 inches is easier for clean-out consideration), and should extend through the near-surface weak soils a minimum of 9 feet below the lowest adjacent soil grade. Piers should bottom a minimum of 3 feet into supporting weathered bedrock or be drilled to refusal in hard rock with a

suitably-powered drill rig, as verified by BACE. Pier-hole bottoms should be at least 5 feet horizontal-distance from outer slope faces.

Spacing for the piers should be no closer than 3 pier diameters, center to center. Support for the piers may be gained from skin friction resistance equal to 500 pounds per square foot of pier surface area below the upper 2-1/2 to 3 feet of loose/medium dense soils for dead plus long-term live downward loads. For the total downward load design, including wind or seismic forces, increase downward capacity by 1/3. Uplift frictional capacity for piers should be limited to 2/3 of the allowable downward capacity.

When final pier depths have been achieved, as verified by BACE, the bottoms of the pier holes should be thoroughly cleaned of loose material. BACE should observe the drilling and final clean out of the pier holes, prior to the placement of reinforcing steel and concrete.

No ground water was encountered in our test borings. However, if ground water is encountered during construction, the pier holes should be dewatered prior to placement of reinforcing steel and concrete. Alternatively, if more than six inches of ground water has entered the pier hole, concrete can be tremied into place with an adequate head to displace water or slurry. Concrete should not be placed by freefall in such a manner as to hit the sidewalls of the pier holes.

During bidding, we recommend that proposed foundation drillers be given a copy of this report to review. The foundation contractor should be prepared to case pier holes where caving occurs.

6.2.2 Lateral Loads

Resistance to lateral loads for the piers can be obtained using an allowable passive pressure of 700 psf plus 110 psf per foot of depth below soil subgrade (trapezoidal distribution).

Passive pressure should be neglected within the upper weak or loose soil zones, unless concrete slabs or pavement confines the surface, and, if not upgraded by removal and replacement with compacted fill, in the near surface weak-porous zone. Passive pressure can be projected over two pier diameters, and should not be used below a depth of seven diameters from top of pier.

6.2.3 Alternate B - Spread Footings

The planned residence may be supported on conventional spread footing foundations. These footings should be at least 12 and 15 inches wide for one and

two story construction, respectively. The footings should be at least 30 inches below lowest adjacent ground surface and below the upper loose porous soils regardless of the number of stories.

A bearing capacity not to exceed 2,000 psf for dead plus live loads should be used for design. A one-half increase is allowable when considering short term total loads, including wind or seismic forces.

Lateral loads can be resisted by a combination of passive pressure on the sides of foundations and friction on the bottom of foundations. A passive pressure not to exceed 200 psf (rectangular distribution) is recommended. Passive pressure should be neglected within the upper weak or loose soil zones, unless concrete slabs or pavement confines the surface or the weak soils are upgraded by removal and replacement with compacted fill. A coefficient of friction of 0.30 is considered appropriate for design.

6.3 Seismic Design Criteria

The proposed structures should be designed and constructed to resist the effects of strong ground shaking (on the order of Modified Mercali Intensity IX) in accordance with current building codes. The Uniform Building Code (UBC), 1997 edition, indicates that the following seismic design criteria, based upon the proximity of the Type A, San Andreas Fault are appropriate for the site:

Seismic Zone Factor, Z = 0.40
Soil Profile Type = S_B
Seismic Coefficients, Ca = 0.40 Na
Cv = 0.40 Nv
Near Source Factors, Na = 1.3
Nv = 1.7
Seismic Source Type = A (San Andreas Fault)
Distance to Fault = Approximately 4 kilometers

6.4 Concrete Slabs-On-Grade

Slab-on-grade floors should be underlain by at least 4 inches of clean, free-draining gravel or crushed rock, graded in size from 1-1/2 or 3/4 maximum to 1/4 inches minimum, to act as a capillary moisture break. Within traffic or vibratory loaded areas, crushed material should be used to provide a tight interior lock for the aggregates. In areas where movement of moisture vapor through the slab would be detrimental to its intended use, installation of a vapor barrier (e.g., visqueen) should be considered.

Exterior concrete flatwork (non-traffic areas) can be placed directly on a minimum of 12 inches of suitably prepared low expansive, select fill compacted as described in the previous sections of this report. Where the compacted subgrade soils have been disturbed by traffic or foundation excavations, the subgrade should be scarified, moisture conditioned, and recompacted to at least 90 percent RC.

During foundation and utility trench construction, previously compacted subgrade surfaces may be disturbed. Where this is the case, the subgrade should be moisture conditioned as necessary, and rerolled to provide a firm, smooth, unyielding surface compacted to at least 90 percent RC.

6.5 Retaining Walls

Retaining walls can be supported on either drilled piers or footings, as per Section 6.2 of this report. The retaining or subsurface walls should be provided with permanent back drainage to prevent buildup of hydrostatic pressure. Drainage and backfill details are presented on Plate 10. Quality, placement and compaction requirements for backfill behind subsurface walls are the same as previously presented for select fill. Light compacting equipment should be used near the wall to avoid overstressing the walls.

Retaining walls should be designed to resist the lateral earth pressures presented on Plate 11. These pressures do not consider additional loads resulting from adjacent foundations, vehicles, or other downward surcharge loads. BACE can provide consultation regarding surcharge loads, if needed.

The lateral influence on the wall due to vehicle loads is illustrated on Plate 12. These pressures assume a fully drained condition.

6.6 Site Drainage

Because surface and/or subsurface water is often the cause of foundation or slope stability problems, care should be taken to intercept and divert concentrated surface flows and subsurface seepage away from the building foundations and the top and toe of the cut and fill slopes. Drainage should be directed to the inland side of the house, and as much as practical, drain water should be conducted to the ditch alongside Pirates Drive. Drain outlets into the nearby ravine should be located within densely vegetated areas, or should be protected from erosion by riprap (large cobbles or small boulders).

6.7 Additional Services

Before construction, BACE should review the final grading, drainage, and foundation plans and geotechnical-related specifications for conformance with our recommendations.

During construction, BACE should be retained to provide periodic observations, together with the appropriate field and laboratory testing, during site preparation, placement and compaction of fills and backfills, subdrain installation and foundation construction. Foundation excavations should be reviewed by BACE while the excavation operations are being performed. Our reviews and tests would allow us to check that the work is being performed in accordance with project guidelines, confirm that the soil conditions are as anticipated, and to modify our recommendations, if necessary.

Furthermore, BACE can provide material testing and observation during construction, including observations and test during concrete placement, compressive strength determination, reinforcing steel placement, and masonry inspection and testing, where required.

7.0 LIMITATIONS

This geotechnical investigation was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report. Our conclusions are based upon reasonable geologic and engineering interpretation of available data. A soil corrosivety study was not included in our scope of services for this project.

The samples taken and tested, and the observations made, are considered to be representative of the site; however, soil and geologic conditions may vary significantly between borings. As in most projects, conditions revealed during construction excavation may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by BACE Geotechnical (BACE), and revised recommendations be provided as required.

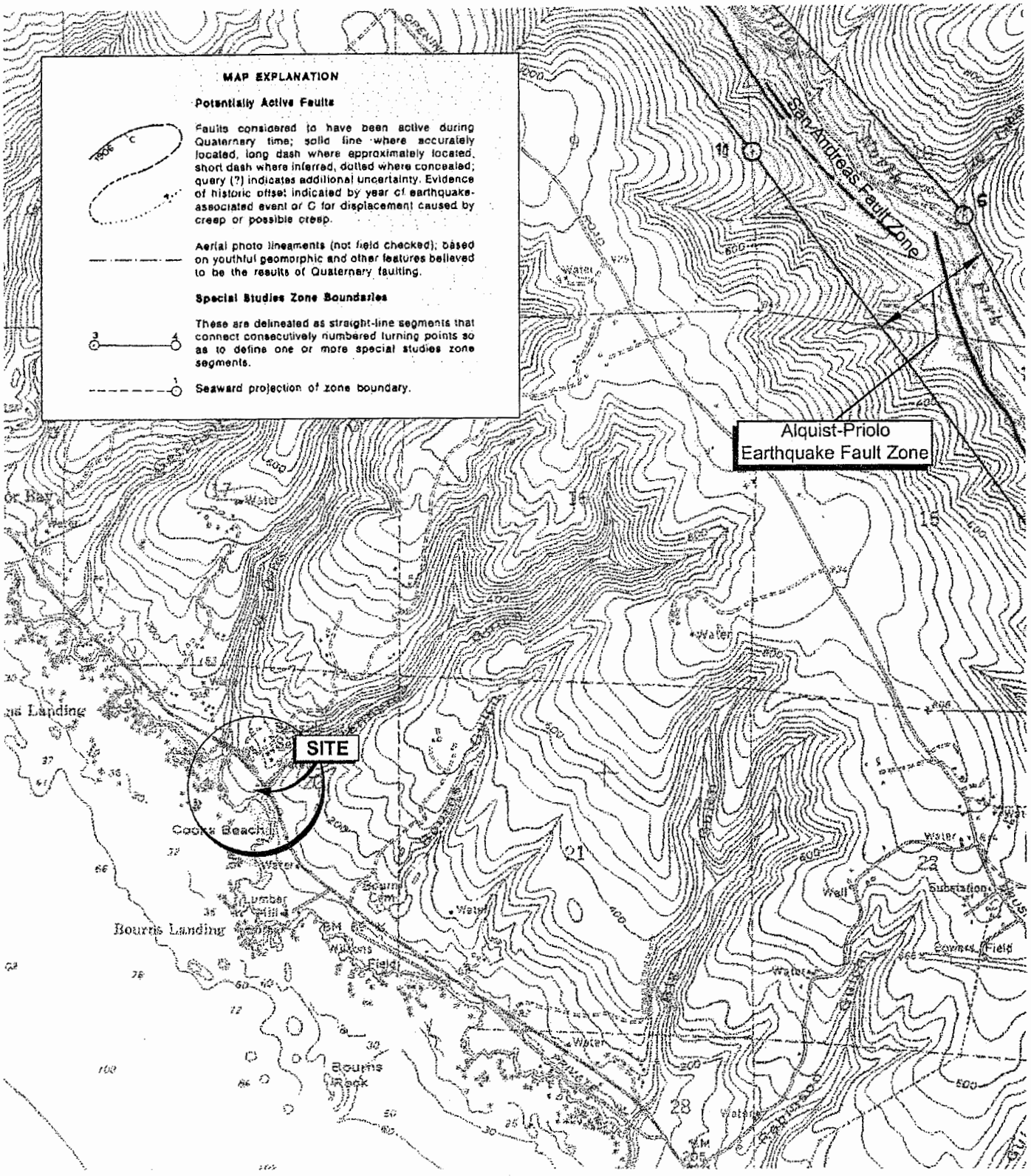
This report is issued with the understanding that the Owner, or his/her representative, has the responsibility to provide the information and recommendations contained herein to other design professionals for the project, and incorporated into the plans, and that the Contractor and Subcontractor implement such recommendations in the field. The safety of others is the responsibility of the Contractor. The Contractor should notify the Owner and

BACE if he/she considers any of the recommended actions presented herein to be unsafe or otherwise impractical.

Changes in the conditions of a site can occur with the passage of time, whether they are due to natural events or to human activities on this, or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

The recommendations contained in this report are based on certain specific project information regarding type of construction and building location, which has been made available to us. If conceptual changes are undertaken during final project design, we should be allowed to review them in light of this report to determine if our recommendations are still applicable.

ILLUSTRATIONS

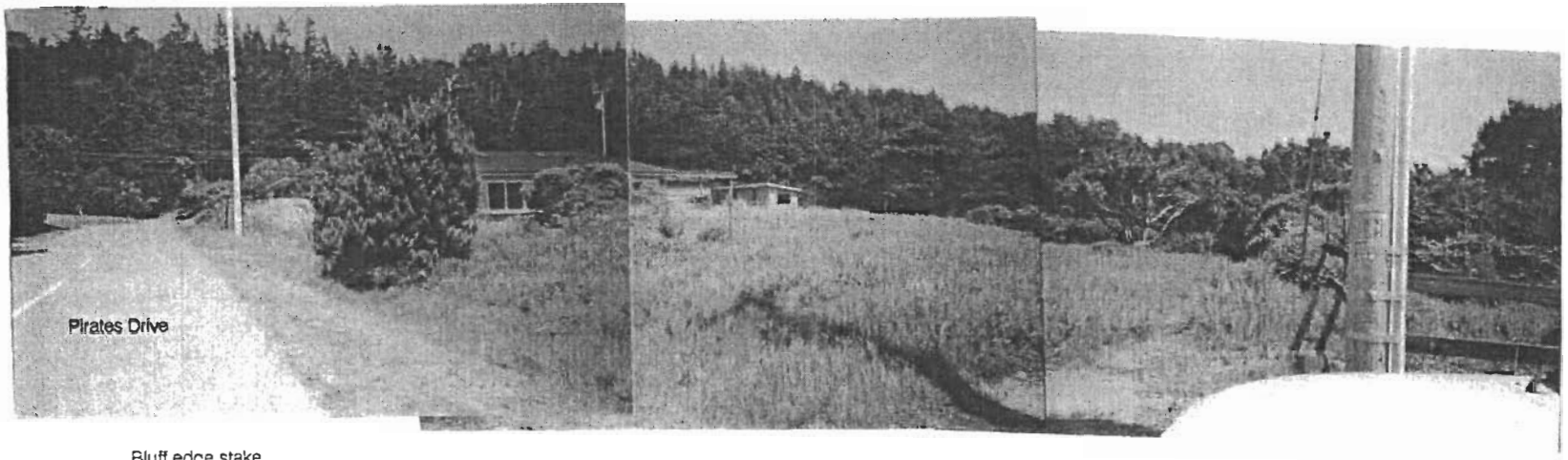


Reference:
Gualala, 1983, 7.5 Minute Quadrangle
Earthquake Fault Zone Map, CGS.

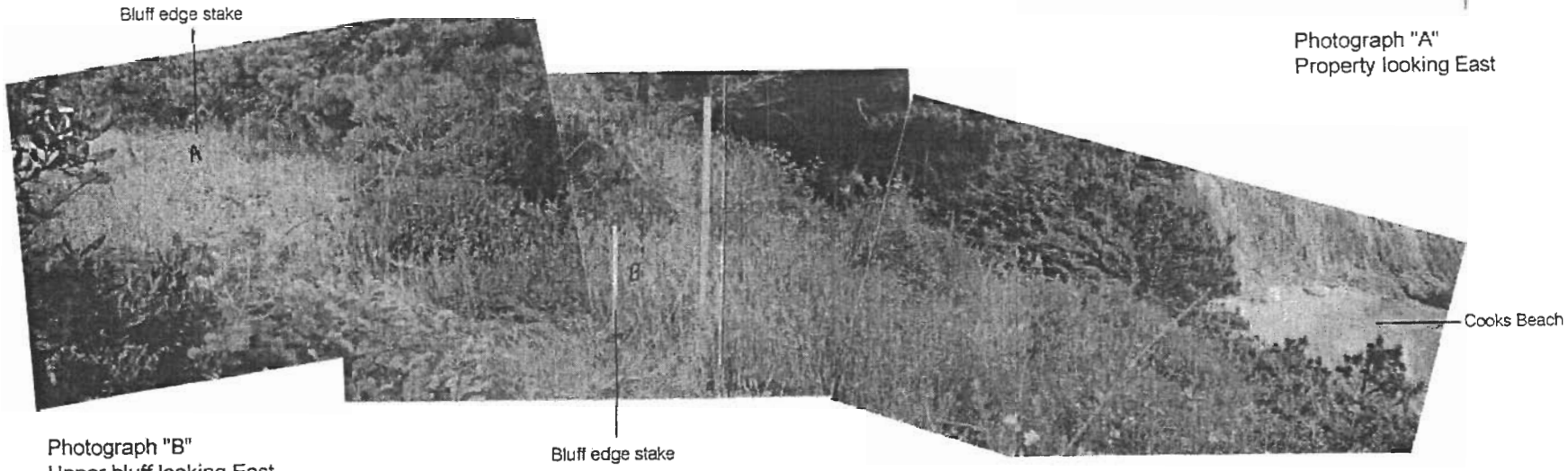
APPROXIMATE SCALE (FEET)
0 1000 2000 4000

NORTH

BACE Geotechnical a division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11798.1 Appr.: EEO Date: 8/29/03	VICINITY FAULT MAP PLANNED PIETY RESIDENCE 47021 Pirates Drive Gualala, California	PLATE 1

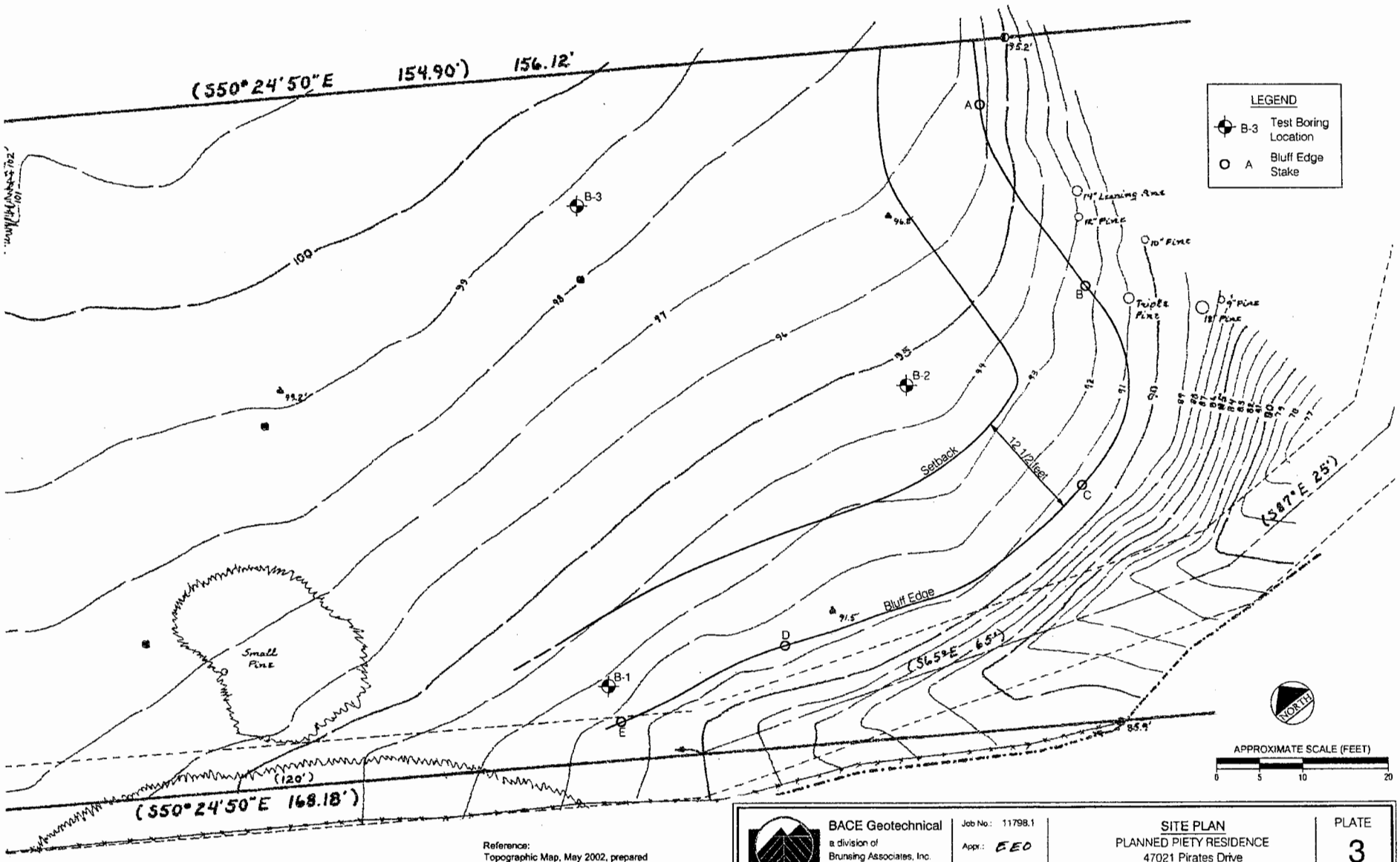


Photograph "A"
Property looking East



Photograph "B"
Upper bluff looking East

BACE Geotechnical a division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11798.1 Appr: CEO Date: 5/29/03	PHOTOGRAPHS "A" AND "B" PLANNED PIETY RESIDENCE 47021 Pirates Drive Gualala, California	PLATE 2



Reference:
Topographic Map, May 2002, prepared by E and J Professional Land Surveying

BACE Geotechnical a division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11798.1 Appr.: EEO Date: 6/29/03	SITE PLAN PLANNED PIETY RESIDENCE 47021 Pirates Drive Gualala, California	PLATE 3

Log of Boring B-1

Equipment: MST-600
Date: 06/12/03
Logged By: BDM Elevation: 92.5 Feet **

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Blows/foot *	Depth (ft.)	Sample
				1	LIGHT BROWN GRAVELLY SILTY SAND (SM) loose to medium dense, damp
			26	2	
				3	
Tx 3020 (720)	25.6	95	30	4	MOTTLED LIGHT BROWN AND ORANGE-BROWN SANDY SILT (ML) stiff, damp, with abundant very fine-grained sand
				5	
			42/9"	6	MOTTLED LIGHT BROWN AND ORANGE-BROWN SANDY SILTSTONE (ML) crushed, moderately hard to hard, deeply to moderately weathered
				7	
				8	
				9	
			32/4"	10	

NOTES:
(1) No caving
(2) No free water encountered
(3) Practical drilling refusal at 10 ft.

Log of Boring B-2

Equipment: MST-600
Date: 06/12/03
Logged By: BDM Elevation: 94.5 Feet

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Blows/foot *	Depth (ft.)	Sample
	12.9	110	32	1	LIGHT AND DARK BROWN SILTY SAND (SM) loose to dense, moist, porous with roots in upper 1 ft.
				2	
				3	MOTTLED ORANGE-BROWN AND LIGHT BROWN SANDY SILT (ML) very stiff, moist
			36	4	
				5	
				6	MOTTLED LIGHT BROWN AND ORANGE-BROWN SANDY SILTSTONE crushed, moderately hard, deeply weathered, with some very fine-grained sand
			40/9"	7	
				8	
				9	GRAY AND ORANGE-BROWN SILTY FINE GRAINED SANDSTONE intensely fractured to crushed, hard, little weathered
				10	
				11	
			38/4"	12	

NOTES:
(1) No caving
(2) No free water encountered
(3) Practical drilling refusal at 12 ft.

* Equivalent "Standard Penetration" Blow Counts.
** Elevations interpolated from contours on Site Plan, dated May 2002, prepared by E and J Professional Land Surveying

BACE Geotechnical a division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11798.1 Appr.: EEO Date: 6/29/03	LOGS OF BORINGS B-1 & B-2 PLANNED PIETY RESIDENCE 47021 Pirates Drive Gualala, California	PLATE 4

Log of Boring B-3

Equipment: MST-600

Date: 06/12/03

Logged By: BDM Elevation: 99.0 Feet

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Blows/foot *	Depth (ft.)	Sample
				1	DARK AND LIGHT BROWN SILTY SAND (SM) loose to medium dense, damp, porous with roots in upper 1 ft.
			11/6"	2	
Tx 3460 (576)	21.0	99	27/9"	3	MOTTLED ORANGE-BROWN AND LIGHT BROWN SANDY SILT (ML) very stiff, damp to moist, with some very-fine grained sand
				4	
Tx 2200 (864)	34.8	85	33/9"	5	
				6	MOTTLED LIGHT BROWN AND ORANGE-BROWN SANDY SILTSTONE crushed, moderately hard to hard, deeply weathered
				7	
			32/2"	8	
				9	
				10	
				11	GREY SANDSTONE little fractured, hard, little weathered
			32/3"	12	
				13	

* Equivalent "Standard Penetration" Blow Counts.

** Elevations interpolated from contours on Site Plan, dated May 2002, prepared by E and J Professional Land Surveying

NOTES:
(1) No caving
(2) No free water encountered
(3) Practical drilling refusal at 13 ft.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
				SP	WELL-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, CLEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

KEY TO TEST DATA

Consol - Consolidation
LL - Liquid Limit
PI - Plasticity Index
EI - Expansion Index
SA - Sieve Analysis
■ - Sample Retained
▨ - Sample Recovered
⊠ - Bulk Sample

Shear Strength, psf	Confining Pressure, psf	
Tx 320	(2600)	- Unconsolidated Undrained Triaxial
TxCU 320	(2600)	- Consolidated Undrained Triaxial
DS 2750	(2600)	- Consolidated Drained Direct Shear
FVS 470		- Field Vane Shear
UC 2000		- Unconfined Compression
PP 2000		- Field Pocket Penetrometer
Sat		- Sample saturated prior to test

BACE Geotechnical
a division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11798.1
Appr.: EEO
Date: 8/29/03

SOIL CLASSIFICATION CHART
& KEY TO TEST DATA
PLANNED PIETY RESIDENCE
47021 Pirates Drive
Gualala, California

PLATE
6

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	Standard Penetration Test Blow Count (blows per foot)
Very loose	Less than 4
Loose	5 to 10
Medium dense	11 to 30
Dense	31 to 50
Very dense	More than 50

CONSISTENCY OF FINE-GRAINED SOILS

Consistency	Identification Procedure	Approximate Shear Strength (psf)
Very soft	Easily penetrated several inches with fist	Less than 250
Soft	Easily penetrated several inches with thumb	250 to 500
Medium stiff	Penetrated several inches by thumb with moderate effort	500 to 1000
Stiff	Readily indented by thumb, but penetrated only with great effort	1000 to 2000
Very stiff	Readily indented by thumb nail	2000 to 4000
Hard	Indented with difficulty by thumb nail	More than 4000

NATURAL MOISTURE CONTENT

Dry	No noticeable moisture content. Requires considerable moisture to obtain optimum moisture content* for compaction.
Damp	Contains some moisture, but is on the dry side of optimum.
Moist	Near optimum moisture content for compaction*.
Wet	Requires drying to obtain optimum moisture content for compaction.
Saturated	Near or below the water table, from capillarity, or from perched or ponded water. All void spaces filled with water.

* Optimum moisture content as determined in accordance with ASTM Test Method D1557-91.

Where laboratory test data are not available, the above field classifications provide a general indication of material properties; the classifications may require modification based upon laboratory tests.

Generalized Graphic Rock Symbols


Siltstone or Claystone


Limestone


Tuff (Volcanic Ash)


Shale


Little Weathered Lava or Greenstone


Andesite


Sandstone


Serpentine


Basalt


Conglomerate


Deeply (Spheroidally) Weathered Lava


Granite

Stratification

Bedding of Sedimentary Rocks	Thickness of Beds
Massive	No apparent bedding
Very thick bedded	Greater than 4 feet
Thick bedded	2 feet to 4 feet
Thin bedded	2 inches to 2 feet
Very thin bedded	0.5 inches to 2 inches
Laminated	0.125 inches to 0.5 inch
Thinly laminated	less than 0.125 inch

Fracturing

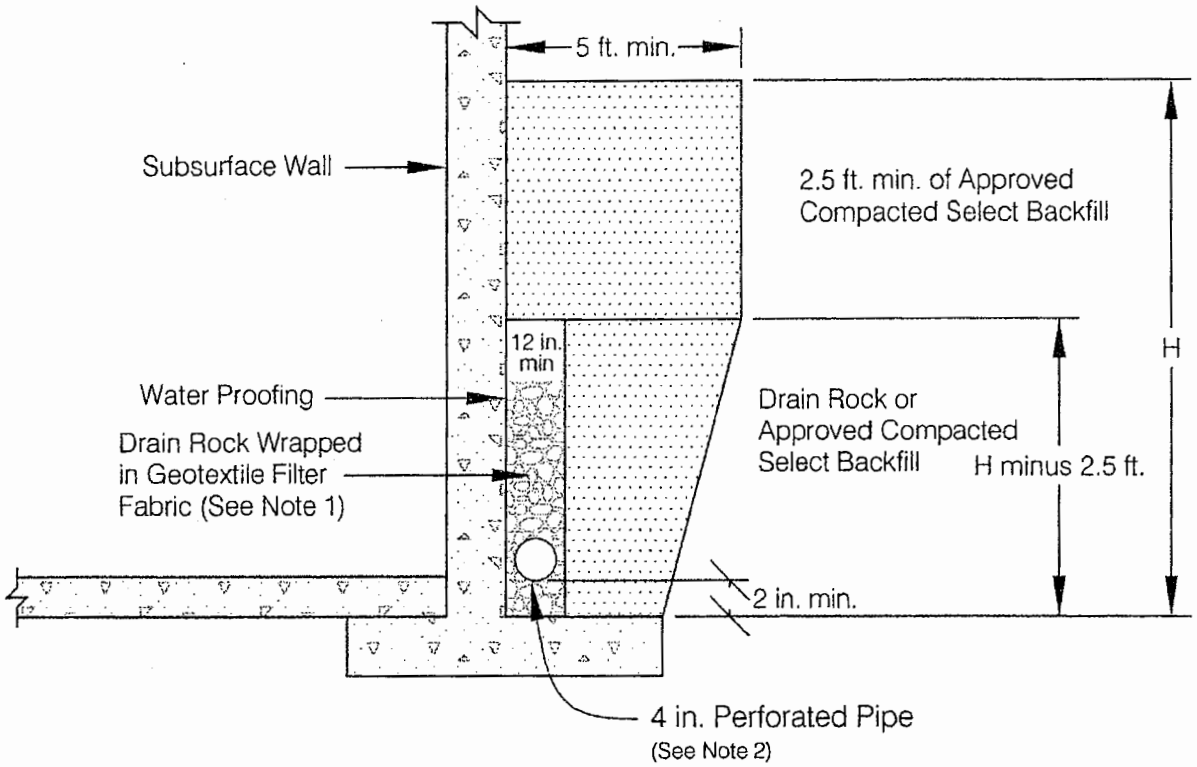
Fracturing Intensity	Thickness of Beds
Little	Greater than 4 feet
Occasional	1 foot to 4 feet
Moderate	6 inches to 1 foot
Close	1 inch to 6 inches
Intense	0.5 inches to 1 inch
Crushed	less than 0.5 inches

Strength

Soft	Plastic or very low strength.
Friable	Crumbles by hand.
Low hardness	Crumbles under light hammer blows.
Moderate hardness	Crumbles under a few heavy hammer blows.
Hard	Breaks into large pieces under heavy, ringing hammer blows.
Very hard	Resists heavy, ringing hammer blows and will yield with difficulty only dust and small flying fragments.

Weathering

Deep	Moderate to complete mineral decomposition, extensive disintegration, deep and thorough discoloration, many extensively coated fractures.
Moderate	Slight decomposition of minerals, little disintegration, moderate discoloration, moderately coated fractures.
Little	No megascopic decomposition of minerals, slight to no effect on cementation, slight and intermittent, or localized discoloration, few stains on fracture surfaces.
Fresh	Unaffected by weathering agents, no disintegration or discoloration, fractures usually less numerous than joints.



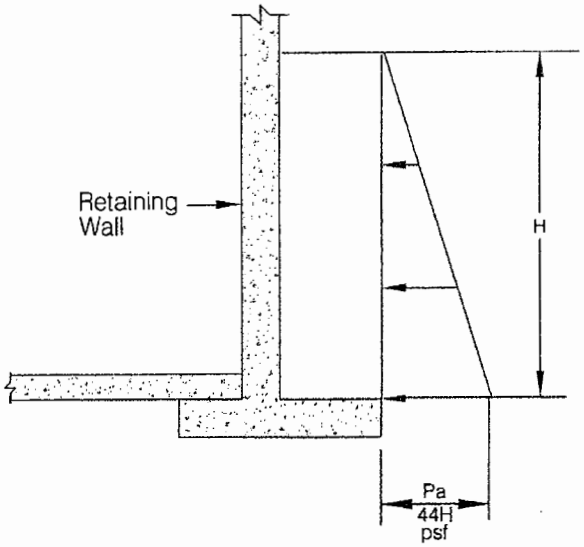
SUBSURFACE WALL DRAINAGE DETAIL
(Not to Scale)

(1) Drain rock should be clean, free-draining and meet the requirements for Class 1, Type B, Permeable Material, Section 68, Caltrans Standard Specifications, latest edition, and should be wrapped in geotextile filter fabric (Mirafi 140 or equivalent).

(2) Pipe should conform to the requirements of Section 68 of Standard Specifications, placed with perforations down, and sloped at 1% to drain to gravity outlet or sump with automatic pump.

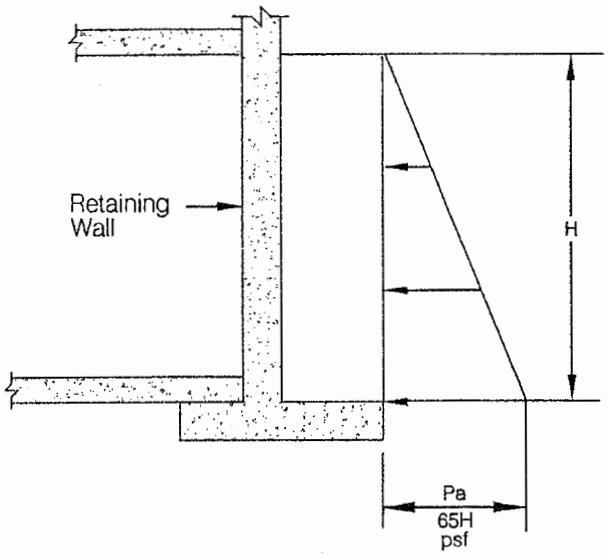
(3) A Clean-out pipe with cap should be installed at the up-slope end of perforated pipe.

BACE Geotechnical a division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11798.1 Appr.: EED Date: 8/29/03	RETAINING WALL DRAINAGE DETAIL PLANNED PIETY RESIDENCE 47021 Pirates Drive Gualala, California	PLATE 10



ACTIVE SOIL PRESSURE DIAGRAM

For walls that are free to yield slightly (See Note 2)



AT-REST SOIL PRESSURE DIAGRAM

For braced walls of substantial rigidity (See Note 2)

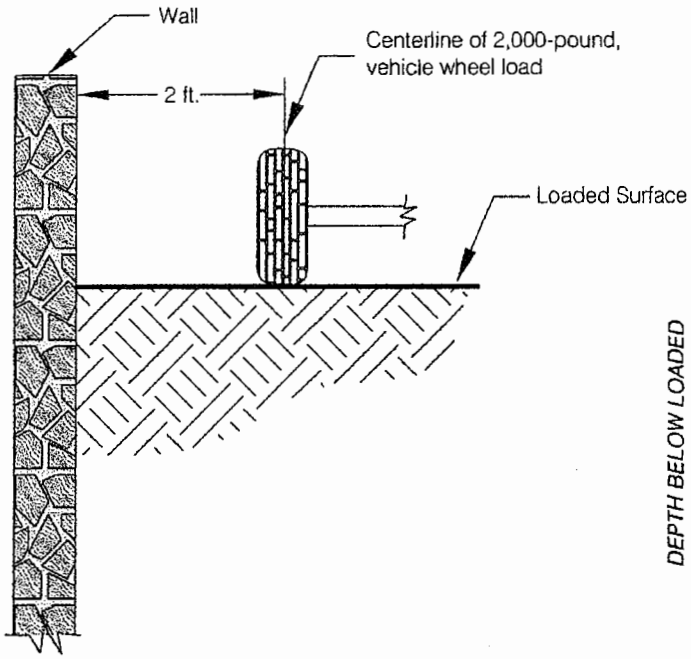
NOTES:

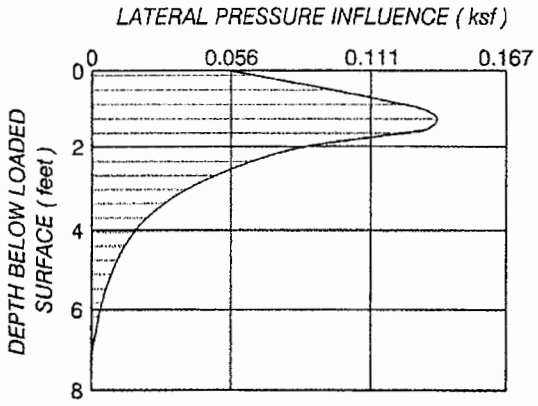
(1) The above are soil pressures only and do not include lateral loads resulting from such as traffic, floor loads, adjacent foundations or other vetical loads.

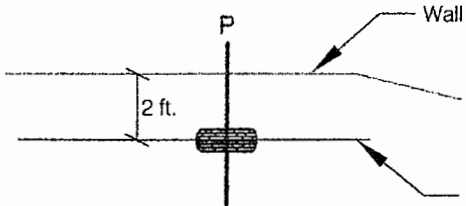
(2) If the wall, at surface of the backfill, cannot yield about 0.1 % of its' height, the wall should be considered as a braced wall and the at-rest soil pressures should be used.

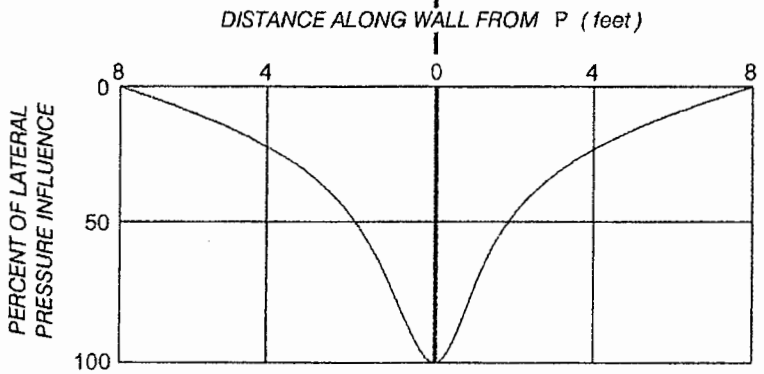
(3) The above pressures assume a drained condition.. See Plate 8 for drainage and backfill details.

(4) The above pressures should be used where backfill slope is flatter than 3 horizontal to 1 vertical (3H:1V). Where backfill slope is between 3H:1V and 1.5H:1V, use active pressure of 55H psf and at-rest pressure of 87H psf.









NOTES:
(1) Reference:
Highway Research Bulletin 141.

(2) Lateral pressures influence for other wheel loads located behind a wall would be linearly proportion to those shown for an 2,000-pound, vehicle wheel load.

BACE Geotechnical a division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11798.1 Appr.: EEO Date: 8/29/03	LATERAL PRESSURE INFLUENCE DIAGRAMS FOR VEHICLE WHEEL LOADS PLANNED PIETY RESIDENCE 47021 Pirates Drive Gualala, California	PLATE 12

DISTRIBUTION

Five Copies	Ms. Bobbie Piety 809-B Cuesta Drive Mountain View, CA 94040

BACE Geotechnical
A Division of Brunsing Associates, Inc.

Th 13b

EXHIBIT NO. 22
APPEAL NO.
A-1-MEN-05-037
(PIETY/PANELLI)
EXCERPTS FROM
GEOTECHNICAL REPORTS

September 14, 2005

11798.2

Ms. Bobbie Piety
809-B Cuesta Drive #173
Mountain View, CA 94040

RE: Response to Comments, California Coastal Commission Staff Report, Planned Piety/Panelli Residence, 47021 Pirates Drive, Gualala, Mendocino County, California, California Coastal Commission Permit No. A-1-MEN-05-037

Dear Ms. Piety:

This letter presents the results of BACE Geotechnical's (BACE's) supplemental analyses in response to comments presented in the California Coastal Commission (CCC) staff report for your project. BACE previously performed a geotechnical investigation for your planned blufftop residence; the results of our investigation were presented in a report dated August 29, 2003.

Subsequent to our report production, the undersigned, Erik E. Olsborg performed a site re-evaluation on July 13, 2005. The results of our re-evaluation were presented in a letter dated July 21, 2005.

The following comments are in regards to the CCC staff report, including a letter dated August 1, 2005 from Appellant Ann Zollinger to Dr. David Colfax, Mendocino County Board of Supervisors.

Landslides

A Geotechnical Evaluation Report, dated April 18, 2003, prepared by Jim Glomb, mentions a small landslide "measuring about 30 feet across and estimated to be 3 feet deep is exposed on the lower portion of the slope...". He goes on to state other "off-site features include an actively failing massive landslide at the south end of Cook's beach", as well as another landslide "on the Bergman property, a few hundred feet west of the subject property".

As stated in BACE's referenced report, there are no landslides on the Piety property. Field Photograph A, Plate 2 of BACE's July 21, 2005 letter shows the entire bluff face (with no landslide) below the Piety property. In Ms. Zollinger's letter, she states that the "landslide is at the base of the property (not on the applicant's property)". This landslide, if it exists, must then be on the Zollinger property. Therefore, it does not appear to be a threat to the Piety property. The landslide at the south end of Cook's beach is on a

different bluff approximately 600 feet from the Piety property. The Bergman landslide was evaluated by the undersigned for Mr. Bergman in May, 2000. Neither of these landslides are of concern to the Piety property.

Severe Erosion

The CCC staff report states that BACE never "addressed the 'severe erosion' under the trees that is shown as sloping on his topographical map". The topographic map that BACE used for the Site Plan, Plate 3 of our 2003 report was, as referenced, prepared by Edward R. Way; not BACE. The "severe erosion" is on the upper portion of the near-vertical cut bank for the beach trail on the Piety property. The weak soils on the upper portion of the cut have eroded back, as expected, except where the masses of shallow tree roots are holding the surficial soils in place. Where this has happened, the weak soils beneath the root mass have eroded away, leaving an overhang of approximately 12 to 18 inches. The rocks exposed in the lower portion of the trail cut have remained intact. This erosion within the upper soils was not mentioned in either our original report or our recent response letter since this is a minor, localized feature of little or no significance.

Faulting

Thomas E. Cochrane, prepared a report and an addendum dated January 4, 2002 and March 1, 2003, respectively. In his addendum he mentions two small "adjustment faults...on the bluff edge just west of" the Piety property. The two faults that he mentions are clearly visible in Field Photographs A and B, Plate 2 of our July 21, 2005 letter. As stated in our 2003 report, there is no evidence of faulting on the Piety property. The two off-site faults mentioned by Cochrane are not unusual within the Cretaceous bedrock that comprises the bluffs in this area. These ancient faults are not considered "active" faults capable of generating earthquakes, but are only of concern where exposed to erosion. Since there are no (even ancient) faults exposed on the Piety property, faulting and associated fault-related erosion are of little concern at this site.

Slope Stability Analysis

The results of the slope stability analysis of the bluff are attached in Appendix A. Four soil/rock "units", with different density and strength parameters, were delineated within the bluff for our stability analysis. Unit "A" is the upper, relatively thin deposit of loose to dense, silty sand topsoils. Unit "B" is the very stiff, sandy silt beneath Unit "A". Both Units "A" and "B" are considered to be, or derived from, the Pleistocene terrace deposits. Unit "C" is the upper weathered, siltstone bedrock beneath the terrace deposits. Unit "D" is the moderately hard to hard, moderately to little weathered, erosion-resistant bedrock within the lower bluff.

For our stability analysis Units "A" and "B" were assigned wet densities of 130 pounds per cubic foot (pcf), and low strength parameters, cohesion (C) of 500 and 1000 pounds per square foot (psf), respectively, and friction angles (phi) of 35 and 24 degrees,

respectively. These values are "typical" for the surficial soils and terrace deposits at similar sites on the Mendocino Coast.

Unit "C" was assigned a higher wet density of 135 pcf, and moderately high strength parameters, 1250 C and phi of 29 degrees. Unit "D" was assigned a wet density of 135 pcf, C of 3500 and a phi of 0. These higher values would be expected to support a very steep bluff slope as well as to provide drilling refusal to the drill rig used in our investigation.

The above assigned strengths were assumed from strength test results obtained from geotechnical investigations of other projects with similar geologic conditions, as well as from back-analysis of the slope stability calculations. Results of the stability analyses are presented in Appendix A.

Our slope stability analyses were performed to correspond to the guidelines by Mark J. Johnsson, Staff geologist, California Coastal Commission, "Establishing Development Setbacks from Coastal Bluffs", Proceedings, California and the World Ocean '02, in which he suggests a factor of safety greater than 1.5 for static conditions and 1.1 for seismic conditions is necessary for the area beyond the required setback distance.

Aerial Photograph Analysis

During our reconnaissance, enlargements (from the negatives) of 1963, 1981 and 2000 aerial photographs were used as an aid in determining the bluff retreat rate. In our analyses, BACE determined the scale of each photograph by measuring the distance in the field between the Highway One centerline and the westerly roof line of the Zollinger residence. We then measured the distance between the two features on the photographs to determine the photograph scales, as shown on Plates 3 through 5.

Due to the tree and brush cover on the upper bluff at the Piety property, no direct measurements to the bluff edge could be made. However, for comparative purposes, measurements were made from the Highway One centerline to a point on the bluff edge at the headlands, as shown on Plates 3 through 5. These measurements indicate a retreat rate of approximately 3.5 inches per year for the headlands. However, the headlands are subject to constant wave action, whereas the Piety property is only infrequently subject to ocean waves. Therefore, we determined the retreat rate at the Piety property to be much less, at approximately one inch per year, to which we applied a safety factor of two, for a setback of 12 ½ feet.

Also, the bluff edge at the Piety property is not a sharp, well-defined feature, since it steepens gradually, not abruptly. Our determined bluff edge, in accordance with CCC guidelines, is well back of the steep outer bluff, as shown in Photograph B on Plate 2 of our 2003 report.

Sea Level Rise

Although not previously mentioned, the potential for increased erosion as sea level rises due to global warming was considered during our investigation. Sea level rise appears probable, however, the projected rise (1.6 feet over the next century, or 1.2 feet in the next 75 years) will be a gradual process, with the ocean rising slowly over the years. Since the lower bluffs are comprised of relatively hard rock, and the property is at the back of a broad beach, a gradual rise in sea level should have little effect upon present erosion rates.

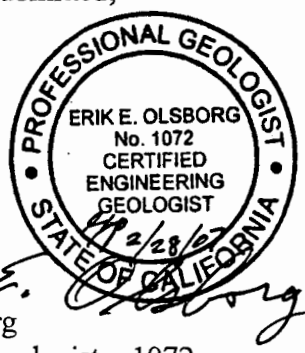
Conclusions

The bluff retreat rate provided in our referenced report and letter was based upon a study of aerial photographs, our test boring data, and our field reconnaissances in 2003 and 2005. Our supplemental analyses have confirmed our initial findings. The stability analysis shows that the bluff is not threatened by imminent failure, although continuing erosion will occur. Our aerial photograph study demonstrates that our estimated bluff retreat rate is reasonable. Therefore, our recommended bluff setback remains unchanged at 12-1/2 feet.

Closing

We trust the above information provides the information that you require at this time. Please contact us if you have further questions.

Respectfully submitted,



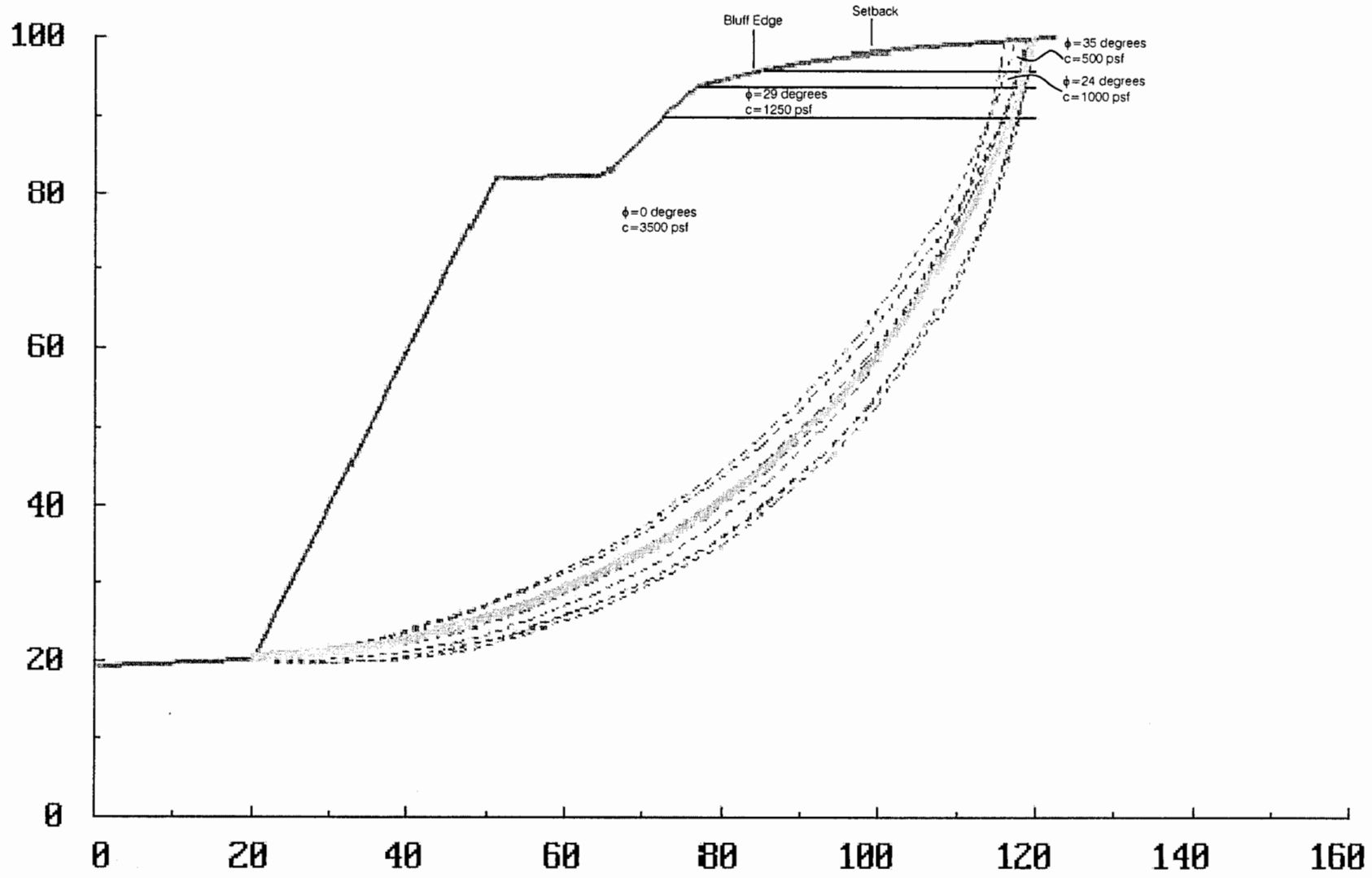
Erik E. Olsborg
Engineering Geologist – 1072

Lawrence R. Houps
Geotechnical Engineer – 416

One copy submitted to Client
Two copies – Ms. Ruby Pap, California Coastal Commission

EEO/LRH/ces

Piety Static
10 most critical surfaces, MINIMUM BISHOP FOS = 1.730



APPROXIMATE SCALE
(FEET)
0 10 20 40

BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 528-6108

Job No.: 11798.2
Appr.:
Date: 09/14/05

SLOPE STABILITY STATIC
PLANNED PIETY RESIDENCE
47021 Pirates Drive
Gualala, California

PLATE
1

BACE Geotechnical
A Division of Brunsing Associates, Inc.

February 15, 2006

11798.2

Ms. Bobbie Piety
809-B Cuesta Drive #173
Mountain View, CA 94040

RE: Supplemental Slope Stability Analysis Data in Response to California Coastal Commission Letter Dated October 11, 2005, Planned Piety/Panelli Residence, 47021 Pirates Drive, Gualala, Mendocino County, California, California Coastal Commission Permit No. A-1-MEN-05-037

Dear Ms. Piety:

This letter presents the results of BACE Geotechnical's (BACE's) supplemental analyses in response to comments presented in the California Coastal Commission (CCC) letter dated October 11, 2005 for your project. BACE provided a response to CCC staff report comments in a letter dated September 14, 2005. BACE's letter included a preliminary slope stability analysis based upon an estimated slope height and slope angle.

BACE previously performed a geotechnical investigation for your planned blufftop residence; the results of our investigation were presented in a report dated August 29, 2003. Subsequent to our report production, the undersigned, Erik E. Olsborg performed a site re-evaluation on July 13, 2005. The results of our re-evaluation were presented in a letter dated July 21, 2005.

Slope Stability Analysis

A Cross Section Exhibit of the Piety bluff, dated October 25, 2005, was prepared by Phelps & Associates Land Surveyors. BACE re-evaluated our slope stability analysis based upon this bluff slope profile. In addition, BACE re-evaluated the soil and rock parameters used in the analysis by obtaining more data from other previous geotechnical investigations in this area of the Mendocino County coast with similar geologic conditions. The results of the slope stability analysis of the bluff are attached to this letter along with the other, previous investigation locations, boring logs, and laboratory test data.

Four soil/rock "units", with different density and strength parameters, were delineated within the bluff for our stability analysis. Unit "A" is the upper, relatively thin deposit of loose to dense, silty sand topsoils. Unit "B" is the very stiff, sandy silt beneath Unit "A". Both Units "A" and "B" are considered to be, or derived from, the Pleistocene terrace deposits. Unit "C" is the upper weathered, siltstone bedrock beneath the terrace deposits. Unit "D" is the moderately hard to hard, moderately to little weathered, erosion-resistant bedrock within the lower bluff.

For our stability analysis Units "A" and "B" were assigned wet densities of 124 pounds per cubic foot (pcf), and low strength parameters, cohesion (C) of 700 and 1000 pounds per square foot (psf), respectively, and friction angles (phi) of 15 and 25 degrees, respectively. These values are "typical" for the surficial soils and terrace deposits at similar sites on the Mendocino Coast.

Unit "C" was assigned a higher wet density of 135 pcf, and moderately high strength parameters, 1000 C and phi of 20 degrees. Unit "D" was assigned a wet density of 135 pcf, C of 3000 and a phi of 30. These higher values would be expected to support a very steep bluff slope as well as to provide drilling refusal to the drill rig used in our investigation.

Our slope stability analyses were performed to correspond to the guidelines by Mark J. Johnsson, Staff geologist, California Coastal Commission, "Establishing Development Setbacks from Coastal Bluffs", Proceedings, California and the World Ocean '02, in which he suggests a factor of safety greater than 1.5 for static conditions and 1.1 for seismic conditions is necessary for the area beyond the required setback distance.

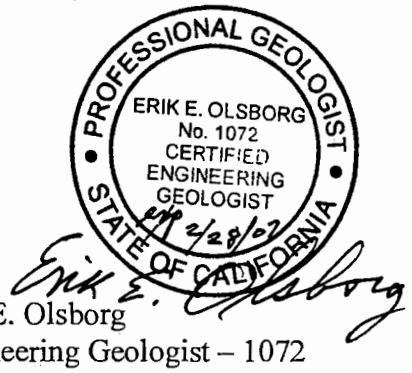
Conclusions

Our supplemental analyses have confirmed our initial findings. The stability analysis shows that the bluff is not threatened by imminent failure, although continuing erosion will occur. Therefore, our recommended bluff setback remains unchanged at 12-1/2 feet.

Closing

We trust the above information provides the information that you require at this time. Please contact us if you have further questions.

Respectfully submitted,



Erik E. Olsborg
Engineering Geologist – 1072

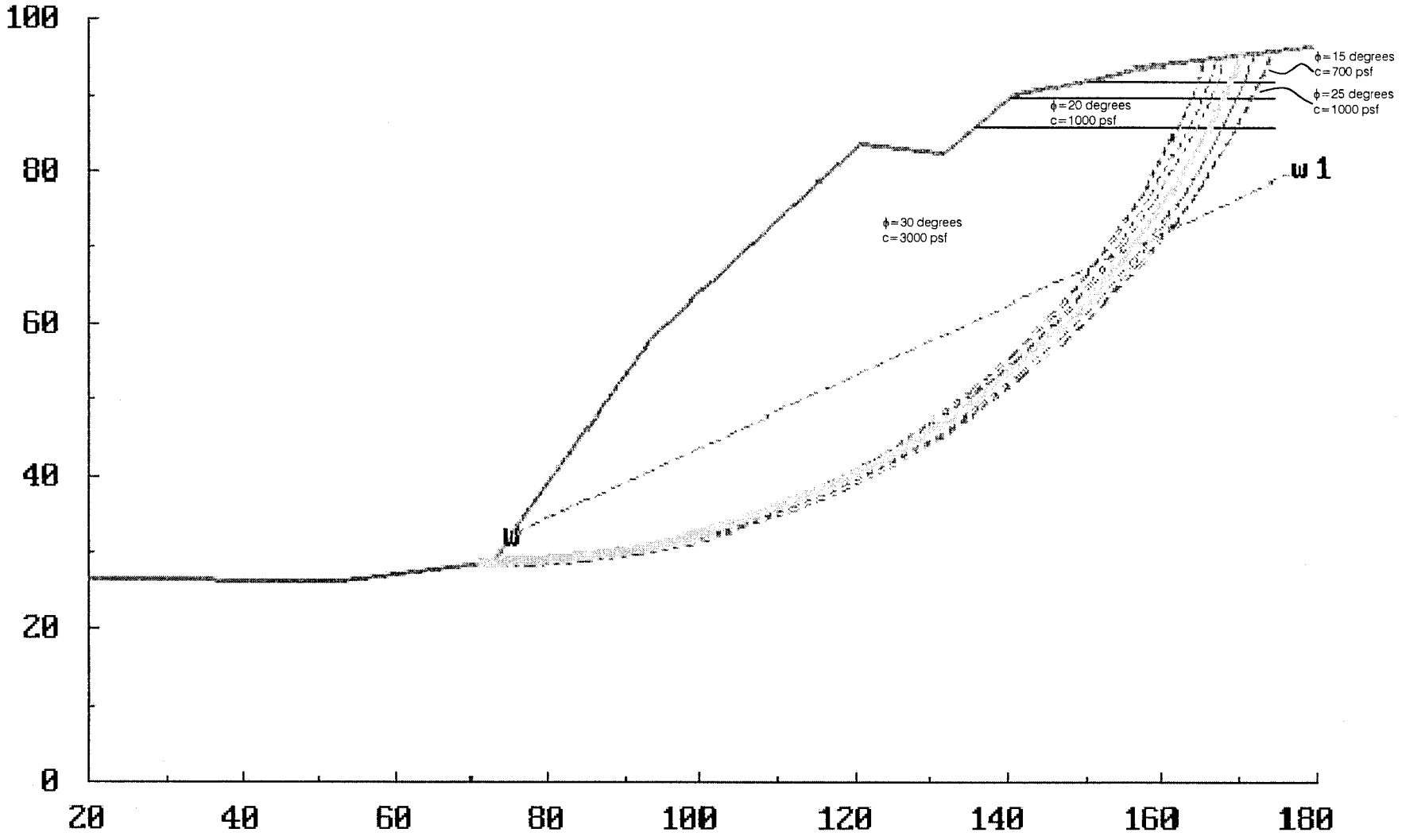
Keith A. Colorado
Civil Engineer - 69011

One copy submitted to Client
One copy - Mark Johnson, California Coastal Commission
Two copies – Mr. Bob Merrill, California Coastal Commission

EEO/KAC/LRH/ces

Attachments: Stability analysis and other, previous site data

PIETY STATIC
10 most critical surfaces, MINIMUM BISHOP FOS = 3.164



APPROXIMATE SCALE
(FEET)

0 10 20 40

BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 528-6108

Job No.: 11798.2
Appr.: KAC
Date: 02/15/06

SLOPE STABILITY STATIC
PLANNED PIETY RESIDENCE
47021 Pirates Drive
Gualala, California

PLATE
1

EXHIBIT 23.
Smuggler's Cove Subdivision House Size Comparisons

	A	C	G	I	J	K	L	M	N	O	W
1	APN	NAME	Bluff Parcel?	2-story?	LOT SIZE (acres)	LOT SIZE (sf)	TOTAL HOUSE SIZE (sf)	House Ground Cvg (sf)	Garage	House G.C. + Garage sf	Notes
2	144-290-01	Piety, Pannelli (applicant)	Y	N	0.61	26,653	2,275	2,275	719	2,994	
3	144-290-02	Church	Y		0.51	22,202				0	no address, no improvements
4	144-290-03	White	Y	Y	0.32	13,000	1,698	1,350	400	1,750	
5	144-290-04	Hemphill	Y	N	0.39	17,102	1,366	1,366	232	1,598	
6	144-290-05	Thomas	Y	N	0.34	14,709	1,840	1,840	354	2,194	
7	144-290-06	Ellerin	Y	N	0.36	15,562	1,608	1,608		1,608	
8	144-290-07	Andersen	N	N	0.23	10,000	1,000	1,000		1,000	
9	144-290-08	Maupin	Y	N	0.25	9,800	1,500	1,500	300	1,800	
10	144-290-09	Glasser	Y	N	0.32	13,943	1,680	1,680	400	2,080	
11	144-290-10	Young	Y	N	0.25	10,997	1,127	1,000	180	1,180	
12	144-290-11	Barkela	Y	N	0.19	8,422	1,151	1,151		1,151	
13	144-290-12	Shaver	Y	N	0.34	14,758	1,282	1,282	384	1,666	
14	144-290-13	Watson	Y	Y	0.29	12,842	1,224	850		850	
15	144-290-14	Thorburn	N		0.34	14,746				0	no improvements
16	144-290-15	Kim	N	N	0.3	13,187	1,056	1,056	480	1,536	
17	144-290-16	Buechner	N	N	0.32	14,036	1,675	1,275	480	1,755	
18	144-290-17	Pucek, Oba	N	N	0.32	14,098	1,050	1,050	180	1,230	
19	144-290-18	Castle, Borovoy (formerly Zollinger, appellant)	Y	N	0.46	20,101	1,440	1,440		1,440	
29			Average Parcel Size[1]:		0.31			Avg. House G.C.+ Garage[2]		1,523	
30											
31								Average total house sizes in subdivision[3]:		1,380	
32								Average house ground cover sizes in subdivision[4]:		1,297	
33								Average garage sizes in subdivision[5]:		339	
34								Average house g.c. plus average garage g.c.[6]:		**1,636**	
35											

36 Notes:
37 (1) Average size calculated using the average lot size, in acres, of all developed parcels within the subdivision.
38 (2) Calculated by adding area of house ground cover (g.c.) and garage for each parcel, then using the average of this total amount for all developed parcels within subdivision.
39 (3) Calculated using average of total house sizes from Column L, for developed parcels (includes 2nd story or split level in some instances).
40 (4) Calculated using average of house ground cover sizes from Column M (excludes consideration of 2nd story or split level that does not affect ground footprint).
41 (5) Calculated using average garage size for those parcels with garages.
42 (6) Calculated by adding cell O32 (average house ground cover size) and O33 (average garage size) to achieve building footprint consistent with surrounding development (Commission Recommended size for proposed project)
43

EXHIBIT NO. 23
APPLICATION NO.
A-1-MEN-05-037
(PIETY & PANELLI)
SMUGGLER S COVE HOME SIZE COMPARISONS

EXHIBIT NO. 24
APPLICATION NO.
A-1-MEN-05-037
(PIETY & PANELLI)
SMUGGLER'S COVE
SUBDIVISION CC&Rs

RESTRICTIONS AND COVENANTS
SMUGGLER'S COVE SUBDIVISION

WE, FRED P. TREMBLAY and ANNA BELLE TREMBLAY, husband and wife, fee owners of the real property described in Exhibit A attached hereto and made a part hereof by reference, and known as Smuggler's Cover Subdivision, hereby make the following declarations as to limitations, restrictions and uses to which the lots and/or tracts constituting said subdivision may be put, hereby specifying that said declarations shall constitute covenants to run with all of the land, as provided by law, and shall be binding on all parties and all persons claiming under them, and for the benefit of and limitations upon all future owners in said Subdivision, this declaration of restrictions being designated for the purpose of keeping said Subdivision desirable, uniform and suitable in architectural design and use as herein specified:

1. No building or structure intended to be used for any purpose except that of a dwelling house, or appurtenances thereto, shall be erected or placed on any lot in the above described Subdivision.

2. No more than one single family residence shall be placed or constructed upon any lot in the above described Subdivision, except on Lots #13, #14, and #15.

3. There shall not be erected or placed on any lot any residence which shall have a ground floor space of less than 1,000 square feet, exclusive of any portion thereof used for a garage or an outside porch.

4. (a) No building shall be erected, placed or altered on any lot until the construction plans and specifications and a plan showing the location of the structure have been submitted to and approved by the Architectural Control Committee as to the quality of workmanship and materials, harmony of external design with existing

structures, and as to location with respect to topography and finished grade.

(b) The Architectural Control Committee shall be FRED P. TREMBLAY, ANNA BELLE TREMBLAY, and W. DOUGLAS RINGSTROM.

(c) Prior to parting with all ownership of property within said Subdivision, FRED P. TREMBLAY will appoint a new Architectural Control Committee consisting of three property owners within said Subdivision in the place and stead of the committee above named. Such appointment shall be made by a document in writing duly acknowledged and shall be recorded in the office of the County Recorder of the County of Mendocino.

(d) In the event that such appointment has not been made when FRED P. TREMBLAY has parted with all interest in said Subdivision, as above provided, an Architectural Control Committee for three shall be appointed from property owners within said Subdivision by a majority of such owners; appointment shall be conclusively established by a document stating the fact of such appointment, signed and acknowledged by a majority of such property owners, and duly recorded in the office of the County Recorder of the County of Mendocino. Thereafter, vacancies in said committee shall be filled in like manner.

5. The approval or disapproval of said Architectural Control Committee as required in these covenants shall be in writing. In the event the committee or its designated representative fails to approve or disapprove within sixty (60) days after plans and specifications have been submitted to it, or in any event, if no suit to enjoin the constructions have been commenced prior to completion thereof, written approval shall not be required and the related covenants shall be deemed to have been fully complied with.

6. Restrictions and covenants herein contained shall run with the land and shall be binding upon all owners and all persons claiming

under them for a period of twenty-five (25) years from the date this instrument is recorded. After which time said restrictions and covenants shall be extended automatically for successive periods of ten (10) years each until an instrument signed by the majority of the then owners of the lots in said Subdivision has been recorded agreeing to change said restrictions and covenants in whole or in part.

7. Enforcement shall be by proceedings at law or in equity against any person or persons violating or attempting to violate any of these covenants, but failure by any person or persons entitled so to enforce any measure or provision hereof, upon violation thereof, shall not estop or prevent enforcement thereafter, or be deemed a waiver of the right to do so.

In the event that any action brought for the purpose of enforcing any of the provisions herein contained, is successful, the plaintiff shall be entitled to a reasonable attorney's fees, the amount thereof to be fixed by the Court and included in any judgment rendered in such action.

8. The various measures and provisions hereof are declared to be severable and invalidation of any one of these covenants at all in no way affect any of the other provisions hereof.

9. No structure or building shall be erected or maintained in the Subdivision of more than sixteen (16) feet in height above the ground level at the highest corner of the house location. Chimneys may extend above the sixteen (16) foot limit.

Lots #13, #14, and #15 are excepted from the height restrictions of this paragraph.

10. No building shall be erected or placed on any lot nearer than twenty (20) feet to any street. No building shall be erected or placed nearer than ten (10) feet to any interior lot line. For the

purpose of this covenant, eaves, steps and open porches shall be considered as part of a building. ~~On Lot #1 no structure, including the main structure, garages, out buildings or any other structures shall be placed, built, or maintained more than seventy (70) feet from the front property line fronting on Pirates Drive.~~

11) There shall not be allowed within the prescribed area designated as set-back area, any containers, tanks or bottled gas, gasoline pr any flammable or combustible liquids, including all hydrocarbons which may be kept in liquid or gaseous state, nor shall there be kept any liquid, solid, or gaseous material known to be of a flammable nature such as paints, etc., within said set-back area. Any such containers, such as bottled gas, must be enclosed so as not to be visible from the street or any other lot.

12. There shall be permitted no trailers, automobiles or other vehicles or machinery on said property which are unlicensed or unregistered and which do not bear current tags or other license identification. At no time shall there be permitted any mechanical work relative to automobiles, trailers, or other vehicles, other than minor adjustments, or care, which might be performed by the average person having no special mechanical skill.

13. No structure of a temporary character, trailer, basement, tent, shack, garage, barn, or other out buildings or any structure other than a dwelling house shall be used on any lot at any time as a residence, either temporary or permanent. Nor shall residence be permitted in any dwelling which has not had final inspection and approval by the County building inspector.

14. No animals or birds or fowl of any kind shall be kept or bred on any lot in the tract for commercial purposes, or otherwise, except that conventional and customary household pets shall be permitted to be kept, but only ion reasonable numbers and of such type as not to

cause any annoyance or nuisance in the neighborhood.

15. No commercial business, noxious, noisy, offensive trade or activity shall be carried on upon any lot nor any street, nor shall anything be done or permitted thereon, which may become an annoyance or nuisance to the neighbors or neighborhood, or the property owners of the said Subdivision.

16. No building of any character shall be permitted to be moved upon any of the lots in said Subdivision. Lots shall be reserved for new construction only.

17. No fence, wall, hedge, or hedge-row or other permanent structure shall be erected, placed, or altered on any lot until building plans, specifications, and site plans showing the location of the structure have been submitted to, and approved in writing by, the Architecture Control Committee as to quality of workmanship and materials, harmony of external design with the existing structures, in the Subdivision, and as to location with respect to topography and finished grade elevation and view obstruction of other lots.

18. When the erection of any residence or other structure is once begun, work therein must be prosecuted diligently and the exterior thereof must be completed within a period of six months after work is begun barring strikes and acts of God.

19. Each Grantee of any conveyance, or Purchaser by any contract or agreement of sale, describing land in said Subdivision, by accepting such deed or contract of sale or agreement of purchase, accepts the same subject to all the covenants, restrictions and agreements set forth herein and agrees to be bound by same.

IN WITNESS WHEREOF the undersigned executed these presents on this 31 day of August, 1966.

Signed: FRED P. TREMBLAY

ANNA BELLE TREMBLAY

Rancho Santa Ana Botanic Garden
1500 North College Avenue, Claremont, CA 91711-3157 . Phone 909-625-8767 . Fax 909-626-7670 . Web www.RSABG.org

SEED STORAGE, CLEANING, AND GERMINATION TESTING FEES

The following rates will be used to bill for seed storage and processing services:

Permanent Conservation Seed Collection*: * Up to one 24 cm x 16 cm foil/plastic laminate 'Kew' storage pouch	$3,000.00
5 Year Temporary Storage Conservation/Research Collection*: * Up to one 24 cm x 16 cm foil/plastic laminate 'Kew' storage pouch or one (1,000 ml) storage bottle * This service is not available without the establishment of a permanent Conservation Collection * Must be funded for a minimum of five years at $150.00 per year	$750.00
Annual storage space (per cu. ft. per year):	$900.00
Seed processing and viability assessment per hour rate:	$60.00

The amount of time it takes to process a seed lot can vary from between 1 – 10+ hours depending on the size of the collection, extent of seed cleaning required, species physiological characteristics, and whether the collection made along maternal lines. Most bulk-sampled collections can be cleaned in 3 to 4 hours. Maternal line sampled collections take longer to process and the cleaning time increases with the number of samples to be processed. A cost estimate can be provided upon request.

Germination testing:
There are no additional fees for the testing of funded Permanent Conservation Seed Collections as the germination testing is included in the storage fee.

Germination testing for temporary storage and research collections: per test ($75.00 p/hr x 4 hrs.)	$300.00
Additional trials (per trial):	$240.00

January 1, 2009

EXHIBIT NO. **25**
APPLICATION NO.
A-1-MEN-05-037
(PIETY & PANELLI)
BOTANIC GARDEN SEED STORAGE FEE SCHEDULE

Rancho Santa Ana Botanic Garden
1500 North College Avenue, Claremont, CA 91711-3157 . Phone 909-625-8767 . Fax 909-626-7670 . Web www.RSABG.org

Seed Conservation Program

Conditions of Acceptance

This correspondence is intended to provide information on the seed bank specifically for those parties seeking to place seed collections into storage at RSABG. The following brief program description outlines: Conditions of acceptance; program funding and storage costs; seed bank storage conditions and collection curatorial practices; documentation information required for accessioning and defining seed collections; general collecting guidelines.

Seed collections and Seed Program activities at RSABG are restricted to those that serve to execute and advance the mission of the Garden. The Garden will not accept collections or undertake activities that are felt to be in conflict with the mission of the institution.

The Garden's mission is:

> *Rancho Santa Ana Botanic Garden is devoted to the collection, cultivation, study, and display of native California plants and to graduate training and research in plant systematics and evolution. Through all its programs, the mission of the Garden is to make significant contributions to the appreciation, enjoyment, conservation, understanding, and thoughtful utilization of our natural heritage.*

Funding of Ex-Situ Conservation Collections

As various human impacts on the environment continue to reduce the abundance and distribution of many plant species, even to the point of extinction, seed banking and other back-up conservation strategies are becoming increasingly important conservation tools. Frequently these services are provided by regional botanic gardens. Given that many North American botanic gardens are privately funded non-profit institutions they depend on funding from the private sector to support program operations. In order to protect the botanic garden's resources, financial support for seed banking and other ex-situ conservation services must be incorporated into conservation plans and program budgets. RSABG reserves the rights to deny acceptance, return, or dispose of non-funded seed collections.

Persons or parties sending seed collections to RSABG should be aware that the fees cover processing, packaging, testing and storage only. The Garden cannot guarantee to maintain the viability of the seed collection. Seed re-collection or horticultural re-generation, if required to restore viability of a collection, is not covered under this policy and must be separately funded if required.

Conditions of Acceptance

- Conservation seed collections will be accepted for storage at the RSABG Seed Bank under the following conditions:

- Unless otherwise agreed upon all seed collections deposited at RSABG for storage are accessioned as part of the Garden's collection and become the property of the Garden subject to any applicable state, federal, or international regulations.

- Collections stored at RSABG as part of mitigation, habitat, or species conservation plans must be funded. Financial support of all collections stored at RSA is encouraged. RSABG reserves the right to deny acceptance, return, or dispose of non-funded seed collections.

EXHIBIT NO. 26
APPLICATION NO.
A-1-MEN-05-037
(PIETY & PANELLI)
BOTANIC GARDEN CONDITIONS & COLLECTION & DOCUMENTATION GUIDELINES

- Funding for long-term seed storage is $3,000.00 per accession[1] of seeds which consists of up to one 24 cm x 16 cm foil/plastic laminate 'Kew' storage bag.[2,3]

- Seed cleaning must be separately funded. (see Seed Storage and Processing Fees schedule document)

- A conservation collection is intended to be a permanent collection. The material in these "core" collections are <u>not</u> intended to be used directly for restoration or reintroduction but rather as a source of genetic material to generate seed for in-situ conservation. Material withdrawn from the core collection is to be replaced with material from the re-generated seed collection. Where sufficient quantities exist over the minimum number required for the core collection seed can be made available for viability testing, future recovery efforts, and may be distributed for research projects that will enhance the conservation of the species.

- Long-term seed collections accepted at RSABG are stored without condition. RSA cannot be held financially responsible for loss in seed viability or for loss of or damage to a seed collection. The Garden cannot guarantee to maintain the viability of a seed collection. Seed re-collection or horticultural re-generation, if required to restore viability of a collection, is not guaranteed under these guidelines.

- Seed collections must be legal collections.

- Voucher specimens are necessary for all accessions. When submitting seed collections for storage please include a verifying voucher specimen or indicate the reference number and institution where the specimen resides.

Storage Conditions and Curatorial Practices

Following guidelines set by the International Board for Plant Genetic Resources, Center for Plant Conservation (CPC), and in consultation with the USDA National Center for Genetic Resource Preservation, the Garden provides low humidity and low temperature seed storage for the preservation of plant genetic resources. Facilities presently available include -18° Centigrade freezers as well as all of the equipment necessary to appropriately process, store, and test seeds of California's native plants.

Purpose of the Collection

The primary function of RSABG's Seed Program is the curation and management of the Garden's extensive seed collection. The collection is comprised of over 3,600 accessions representing more than 1,600 California native plant species and cultivars. These collections serve a diverse community in the conservation, research, education, and horticultural fields.

Definition of Collection Types

The seed bank collections stored at RSABG, categorized by their quality, purpose and ultimate use, are defined as follows:

1 ***Documented "conservation" collections*** - consisting of rare, *gene pool representative* germplasm collections that primarily serve to prevent extinction and as a source material for conservation research, restoration, and recovery.

2 ***Documented collections*** - collections designated to serve general research, education and horticultural programs at RSABG as well as at other institutions through the Garden's electronic website Index Seminum and seed exchange program. Samples of wild collected State or Federally listed threatened or endangered plant species are not released unless approved by the appropriate regulatory authorities.

3 ***Undocumented collections*** - collections of unknown wild parentage and seed from plants cultivated and harvested at RSABG on a regular basis that serve horticultural, educational, and gift shop programs.

Collection and Documentation Guidelines

Seed collections sent to RSABG should adhere to the following general guidelines and be submitted with the following information and documentation:

Ethics and legalities: Collections must be made with permission of any land owner or land management agency and adhere to the guidelines set by any applicable local, state, or federal laws. This includes obtaining any required permits and adhering to the conditions set by the permit(s). Copies of any required permits and/or agency authorization must accompany the seed collection.

Purpose: Include a statement of rationale or purpose for seed banking the species i.e., program donation for institutional use, conservation collection, back-up collection to safeguard material used for restoration or reintroduction projects. Collections to be stored at RSABG as part of mitigation, habitat, or species conservation plans need to have a copy of the mitigation agreement sent as part of the collection documentation.
Documentation: Detailed field information is critical to accession, define, and document a collection. Information on the population size, number of individuals sampled, even if estimated, and sampling strategy employed is very important. Where possible also include latitude and longitude coordinates, NDDB element occurrence number and a photocopy of a USGS topographic map with the collection site identified. A copy of the Garden's Field Record Form can be downloaded from the Seed Program website. Field Record Form.pdf

Seed generated from plants in cultivation need to have similar documentation including but not limited to: lineage data, e.g. where the parent material came from, number of maternal individuals represented in the seed collection, and must be referenced to a vouchered wild collection.

For rare plant collections, collectors are encouraged to submit a Natural Diversity Data Base, (NDDB) Native Species Field Survey Form to the California Department of Fish and Game. For general information on the Natural Diversity Data Base contact the California Department of Fish and Game, 1416 Ninth Street, 12th Floor, Sacramento, CA 95814 or call (916) 653-9767. A copy of the form can be downloaded from the CNDDB website.

Proper sampling: For high quality "conservation collections" sampling of a population should be made in a manner that optimizes capturing the genetic diversity of a population without harming the plant population's long term viability. In general this necessitates even sampling from as many individuals in a population as practical. It is typical for different individuals within a population to produce more seeds than others therefore it is important not to bias a collection in favor of these unusually productive individuals. Where it is necessary, these larger samples should be kept separate from the main collection.

Collecting and storing seed along maternal lines increases a collection's research value and enables determination of the number of parental individuals contributing to any re-generated seed collections.

How much: The size of the seed collection will ultimately depend on the purpose of the collection, collection timing, the size of the plant population, the quantity and quality of seeds that each plant produces and the taxa itself. For high quality conservation collections, in general, we recommend sending a minimum of 2,500 seeds per population from 35-50 individuals randomly sampled throughout the population's distribution. Obviously situations exist where this size of a collection would not be practical or could negatively impact the population.

Occasionally a collection will have to be made from very small and/or unproductive populations. In these instances a smaller percentage of the seeds will have to be collected with the hopes of recollecting in the future or with the plans to germinate and grow some of the plants to maturity to multiply the seed collection.

Quality: It is important to note in the field whether the seeds that are being collected have viable embryos. Many instances occur where a high percentage of seed consist of only an empty seed coat or have been heavily parasitized. In this situation a larger seed collection would be necessary. It is critical that fully ripened mature seed is collected as these will have the highest viability, the most vigor, and greatest longevity in storage.

Temporary Storage and Shipping: Most "orthodox" seeds should be air dried and packaged in well sealed "breathable" paper bags or envelopes for shipment. Post harvest care of the seeds is critical. Every effort should be made to keep the seeds under moderate (room) temperature and relatively low humidity. Make certain that all collection bags and envelopes are well labeled. The collection should be sent for processing and storage as soon as possible.

For more specific information on seed collecting and storage see the pdf documents on seed collecting and storage that are available on the Seed Program website. www.rsabg.org – Seed Conservation Program

[1] Seed collections from genetically distinct populations will generally be considered separate accessions and thus require separate funding.

[2] Collections made along "maternal lines" will be kept separate but placed into one 'Kew' bag under one institutional accession number.

[3] Additional charges may be imposed for larger collections.