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Berkeley, CA  
February 7, 2006

Mr. John Roberts  
John Northmore Roberts & Associates  
2927 Newbury St Suite B  
Berkeley, CA 94703

Dear Mr. Roberts,

This letter is to report on my reconnaissance of the Crocker Lake site in Hillsborough, CA. I visited the site with you, other consultants, and members of the Hillsborough community on January 25, 2006. This report will address the conditions of vegetation on the site, identify issues related to the vegetation, and make general recommendations for the prioritization of vegetation management.

### **Site Conditions**

The Crocker Lake site is a long-narrow watershed surrounding and including Crocker Lake. The long axis of the watershed is oriented from southwest to northeast resulting in slopes that are northwest facing and southeast facing. These slopes are moderately steep (20 to 50%) with limited areas exceeding 50%. The orientation and steepness of the slopes result in two distinct microclimates. The northwestern slope is characterized by cooler temperatures and greater retention of soil moisture due to reduced evaporation of water from the soil. The southeastern slope is warmer and will lose more soil moisture due to greater evaporative stress. In pre-settlement times much of the upper portions of the watershed on the north west facing slope supported oak woodlands dominated by coast live oak (*Quercus agrifolia*). An excellent example of this original woodland is located near the entrance to the site off of Darrell Road. The southeast-facing slope originally supported grassland and was being grazed by livestock until the 1950s. Much of this original grassland has since been invaded by a combination of native and exotic shrubs and trees.

The general gradient of the valley floor in which the dam was constructed to impound the lake had a gradient of about 3 to 5%. This low gradient has allowed for the development of a delta at the upper end of the lake. Here sediments have been deposited to build a relatively flat surface. This delta has a braided stream running through it and supports a willow-dominated riparian woodland.

The geology of this part of the San Francisco Peninsula is dominated by the Franciscan formation that is locally composed of sandstone interbedded with igneous rock. Outcrops resulting from quarrying of sandstone were observed on the site. Soils developing on rocks in the Franciscan formation often have a tendency for slumping and other forms of downhill movement. Recent soil slumps and evidence of older landslides were observed on the site. A variety of exotic herbaceous weeds and shrubs are becoming established on more recent soil slumps where mineral soil has been exposed.

Small area of exotic trees and succulents were planted in the watershed by Mrs. Crocker. These include such species as blue gum eucalyptus (*Eucalyptus globulus*), red iron bark eucalyptus (*Eucalyptus sideroxylon*), Italian stone pine (*Pinus pinea*), Canary Island date palm (*Phoenix canariensis*), and olive (*Olea europaea*). Two native California tree species, Monterey pine (*Pinus radiata*) and Monterey cypress (*Cupressus macrocarpa*), were also planted as individuals or in small groves. Additionally, small areas were planted with century plant (*Agave americana*), dracena (*Cordyline australis*), and other succulents.

Much of the grassland areas originally occurring on the site have been invaded by French broom (*Genista monspessulana*) and Bailey acacia (*Acacia baileyana*). Other noxious-invasive plants observed on the site include English holly (*Ilex aquifolium*), English ivy (*Hedra helix*), oleander (*Nerium oleander*), and giant periwinkle (*Vinca major*), and forget-me-not (*Myosotis sylvatica*).

### **Vegetation Management Issues**

A number of issues relating to the vegetation on the site were noted during the reconnaissance. These are discussed in the following paragraphs and include fire hazard, invasion of exotic species, mortality of Monterey pines, general condition of oak woodlands, dynamics of the willow-dominated riparian woodland, relationship between siltation of the lake and vegetative cover, maintenance and enhancement of small groves of redwood (*Sequoia sempervirens*) and California buckeye (*Aesculus californica*), maintenance of areas planted with exotic species, and disposal of trees on the site as a part of road maintenance and other site management activities.

#### **(1) Fire Hazard**

The primary vegetation management issue facing on the site is the fire hazard resulting from the structure and composition of the vegetation adjacent to the private property surrounding the site. As noted above, much of the southeast-facing slope has been invaded by French broom and bailey acacia. These are relatively flammable plants, which now provide both a horizontally and vertically continuous fuel. The pattern of primarily exotic fuels could carry fire upslope to the adjacent residences or downslope into the interior of the site from structural fires on private property. Recently adopted state fire regulations require the establishment of a 100-foot-wide defensible space zone between structures and wildland vegetation. These mandated defensible space zones provide fire fighters room to assemble equipment and forces to defend structures from fire. Breaking up of the continuity and reduction of the quantity of fuels (both living and dead) in defensible space zones can reduce the rate of spread of fires and the heat energy released by the fires. A site-specific fuel reduction plan and its implementation should be considered of highest priority for the site.

## (2) Invasion of Exotic Species

The invasion of the site by exotic species is contributing to the fire hazard and to a long-term decrease in the diversity of native species on the site. The fire hazard associated with invasive species, in particular French broom and Bailey acacia, has been addressed above. The long-term effect of the presence of these invasive species will be the competitive elimination of many native species. Numerous examples of the displacement of native forest and woodland understory species can be observed on the San Francisco peninsula and in the East Bay. English ivy and giant periwinkle can be very aggressive in dominating the understories of riparian woodlands, and French broom successfully outcompetes grassland species as well as understory species in oak woodlands. Forget-me-not is also an effective competitor in the understories of oak woodlands. Bailey acacia invades openings in crown canopies of oak woodland communities, eliminating the opportunity for oak regeneration. Bamboo has also invaded areas of the watershed adjacent to private property. Exotic-invasive species have already contributed to the reduction in the populations of native species at the Crocker Lake site. One can expect to see a further decline in the native species unless an ongoing management program to control the exotic species is adopted. A survey needs to be undertaken to identify areas of higher concentration of invasive exotic species as a first step in developing appropriate management strategies for controlling these species.

## (3) Mortality of Monterey Pines

Several Monterey pine trees that were planted along the southeastern side of the lake have succumbed to pine pitch canker disease. The disease was observed to be active in other Monterey pines on the site. This disease has been quite devastating to Monterey pine on the San Francisco peninsula. There is a high potential that it will continue to kill the remaining Monterey pines on the site. Monterey pine trees are important wildlife trees because of their height and branching pattern. Living Monterey pine trees are highly prized for nesting sites by a number of raptors. Even in their death they provide nesting sites for Great blue heron and several species of hole-nesting species. The dead trunks of these trees are excellent habitat for a number of wood-boring insects that provide food for woodpecker and other birds feeding on the grubs of these insects. The wildlife habitat value of dead Monterey pines extends over a few to several years depending upon the species of bird or mammal using the snags and the length of time the dead trees remain standing. A long-term plan should be developed to establish replacement pines for the dying Monterey pines. Because of the prevalence of the pine pitch canker disease it will be appropriate to plant alternative species such as Bishop pine (*Pinus muricata*) or Canary Island pine (*Pinus canariensis*) which are less susceptible to the disease. This plan should prescribe periodic girdling of trees to provide snags for wildlife.

## (4) Condition of Oak Woodlands

The areas of oak woodland at the Crocker Lake site provide valuable wildlife habitat, control of soil slumping, reduction in fire hazard, and unusual aesthetic values.

The diversity of native species in these oak woodlands contributes both to their habitat value and their visual aesthetics. The following native species were observed in the oak woodland stand on the north-facing slope near the Darrell Road entrance to the property: Coast live oak (*Quercus agrifolia*), California bay-laurel (*Umbellularia californica*), toyon (*Heteromeles arbutifolia*), madrone (*Arbutus menziesii*), spreading snowberry (*Symphoricarpos mollis*), poison oak (*Toxicodendron diversilobum*), California blackberry (*Rubus ursinus*), California figwort (*Scrophularia californica*), California milk maids (*Cardamine californica*), sword fern (*Polystichum munitum*), wood fern (*Dryopteris arguta*), and Goldback fern (*Pentagramma triangularis*). This is an incomplete list of native species due to the limited reconnaissance and the season of observation. As discussed above, exotic species such as forget-me-not, French broom, and Bailey acacia are invading the oak woodlands at Crocker Lake. Control of these species will reduce fire hazard and eliminate competition with native species. A comprehensive management plan for the Crocker Lake site should address the potential for expanding the areas currently supporting oak woodlands. A greater coverage by oak woodlands can contribute to overall reduction in fire hazard, improve slope stability, increased overall wildlife habitat value, and improved aesthetics. Detailed site analysis can identify areas for the expansion of existing oak woodlands and the establishment of new stands. During the field reconnaissance it was apparent that many trees in the oak woodland type exhibited a reduced volume of leaves. This condition may be due to the feeding of oak moths on the foliage of the oak trees or to the onset of sudden oak death disease. Monitoring of tree condition should be part of any long-term vegetation management plan. Defoliation by oak moths is a periodic phenomenon that does not result in oak mortality. Sudden oak death is a serious disease that has recently arisen in California. New state regulation control the movement and disposal of wood or other plant parts from oak trees infected by sudden oak death. These regulations must be incorporated into future vegetation management plans for the site.

##### (5) Riparian Woodland Dynamics

A riparian woodland dominated by arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), and California sycamore (*Platanus racemosa*) has become established on the delta at the upper end of the lake. This is a rather remarkable riparian woodland due to its size and the density of the trees. It provides a habitat for wood rats, which have built a high density of very large nests. Wood rats play an important role in the food chain of the riparian woodland ecosystem and control to some degree the invasion of late-serial-stage tree species.

The depth to the water table and the surface flooding of the site by the overflow of the braided stream running through the area are key factors in both the establishment and maintenance of this woodland. Any plan to dredge Crocker Lake should consider the potential impacts of dredging on the depth to the water table and the incision of the braided stream in the delta. The unique nature of the riparian woodland suggests that it be set aside as a preserve and that no trail system be developed within its boundaries.

## (6) Lake Siltation and the Vegetation

Continued siltation of Crocker Lake will eventually result in its filling in. Dredging of the lake is an immediate action to reverse several decades of siltation. Vegetation management should also be part of any plan to address the siltation issue. Maintenance of tree cover on the slopes above the lake will maximize slope protection and reduce the rate of siltation in the future. Immediate action needs to be taken on some of the recent soil slumps to control the movement of these slumps toward the lake and to control erosion of the exposed soil. Trees can effectively de-water soil slumps and provide stability in some cases. Small groves of California buckeye were noted on older soil slumps on the southeast-facing slope above the lake. This fast-growing species should be considered for planting on more recent slumps. California blackberry is also recommended for planting to de-water the slumps. These measures should be taken in concert with detailed site analysis to identify sources of water that are contributing to soil slumping. It was evident during the reconnaissance that storm water runoff was being directed onto the slopes above the lake at many locations. An obvious link appeared to exist between some of the recent soil slumps and drainpipes delivering water from adjacent private property.

## (7) Maintenance of Small Groves of Native Trees

Small groves of California buckeye and redwood were observed on the site. These add to the diversity of the vegetation types and wildlife habitats on the site. The buckeye groves appear to be of natural origin while the redwoods appeared to have been planted. The site is not very distant from native stands of redwood so the redwood may also be of natural origin. Maintenance and enhancement of these stands should be considered in a management plan for the site. Necessary maintenance activities include the control of exotic invasive species. Enhancement involves the expansion of the areas of existing stands, introduction of native understory species not now present in these existing stands, and the establishment of additional stands.

## (8) Maintenance of Planted Exotic Species

A number of interesting tree groves and areas of succulents were planted by Mrs. Crocker to enhance the visual aesthetics of the site and provide shaded areas for picnicking. These planted areas are of historic value. They also add unique visual and wildlife habitat value to the Crocker Lake site. Many of these planted areas are in need of maintenance to control the invasion of unwanted exotic species. A detailed survey of these planted areas should be undertaken as a beginning step in the development of a management plan to maintain and protect these special areas.

## (9) Disposal of Tree Material

At several locations on the site, areas were observed where cut-up portions of trees had been pushed onto the slope as a way of disposing of material resulting from road maintenance and windthrown trees. The pushing of this type of material onto slopes

below roads contributes to the fire hazard by concentrating fuels in arrangements that lead to their drying out. When material of this nature is buried in fill slopes beneath roads, the decay of the wood can lead to slope failure and the loss of sections of the road. Considerable tree material will be generated by the cutting of Bailey acacia as well as a large volume of brush when areas of French broom are cleared. Disposal of this material should not be allowed to exacerbate the fire hazard problem or slope stability. Whenever possible, material of this nature should be chipped and the chips spread evenly over appropriate areas. Wood chips can be very effective in controlling surface erosion, but they can also smother native plants. Trunks of trees too large for chipping can be scattered over a site where they will provide localized habitat feature of values to a number of animal species. Small piles of brush and logs can also serve as escape cover for a number of birds and small mammals. The visual impacts of brush piles and logs should be considered during the development of vegetation management plans.

### **Prioritizing Management Activities**

In the above paragraphs I have addressed individual management needs relating to each of the issues discussed. All of these issues should be brought together in a comprehensive vegetation strategy for the Crocker Lake site in order to maximize the effectiveness of vegetation management and address the overlap in certain management activity to increase the efficiency of management activities. Any overall vegetation management plan should address the priority of the management activities proposed. A preliminary order of priority in addressing the management issues discussed above is as follows.

- (1) Fire hazard reduction
- (2) Control of siltation from areas of recent soil slumps
- (3) Control of invasive-exotic plan species
- (4) Enhancement and expansion of oak woodlands and groves of California Buckeye and Redwood
- (5) Attention to the effects of lake dredging on the dynamics of the riparian woodland
- (6) Replacement of dead and dying Monterey pines
- (7) Alternative means of disposing of fallen and cut trees and brush on the site
- (8) Maintenance of areas of planted exotic species

Please let me know if you need further elaboration on any aspects of this report.

Sincerely,

Joe R. McBride