San Francisco Recreation & Park Department

Tree Assessment & Preservation Plan
Glen Canyon Park

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Tree Assessment

Glen Canyon Park
San Francisco CA

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Introduction and Overview

Park Forestry was one of the components of the 2008 Clean and Safe Neighborhood Parks Bond program. Tree risk assessment was part of the Park Forestry component. Glen Canyon Park was identified as having a high priority for tree risk assessment. In addition, one of the capital projects associated with the Bond was the Glen Canyon Park Improvements Project. The City of San Francisco Recreation and Park Department requested that HortScience, Inc. assess the health and structural condition of trees, evaluate the risk posed by the trees, review proposed project plans and provide recommendations for tree preservation.

This report presents the following information:

1. Evaluation of tree health and structural condition.
2. Assessment of the risk of tree failure.
3. Evaluation of impacts from the Glen Canyon Park Improvements Project.
4. Recommendations for action.
5. Guidelines for tree preservation.

Survey Methods

Trees were surveyed in January 2012. The scope of the survey was limited to trees in the following locations:

- Adjacent to city streets.
- Adjacent to private property.
- Within and immediately adjacent to the proposed bond project area.

Each tree was visually assessed from the ground. Trees with significant defects in structure and were considered a risk of falling into a use area were evaluated as follows:

1. Identifying the tree as to species.
2. Attaching a numerically coded metal tag on the trunk of each tree.
3. Recording the tree's location on a map.
4. Measuring the trunk diameter at a point 54" above grade.
5. Noting the number of stems.
6. Evaluating the tree health and structural condition using a scale of 0 – 5:
   - ***5*** - A healthy, vigorous tree, reasonably free of signs and symptoms of disease, with good structure and form typical of the species.
   - ***4*** - Tree with slight decline in vigor, small amount of twig dieback, or minor structural defects that could be corrected.
   - ***3*** - Tree with moderate vigor, moderate twig and small branch dieback, thinning of crown, poor leaf color, moderate structural defects that might be mitigated with regular care.
   - ***2*** - Tree in decline, epicormic growth, extensive dieback of medium to large branches, significant structural defects that cannot be abated.
   - ***1*** - Tree in severe decline, dieback of scaffold branches and/or trunk; most of foliage from epicormic shoots (secondary shoots that arise along the trunk and branches); extensive structural defects that cannot be abated.
   - ***0*** – Tree is dead.
7. Comment on presence of defects in structure, insects or diseases and other aspects of development.
8. Assess tree suitability for preservation as good, moderate or poor.

Survey methods, continued.

9. For trees that possessed a significant structural defect and were in proximity to a use area:
    a. Identify the part of the tree most likely to fail and hit a target within the next year.
    b. Identify the target(s) that would be impacted by that failure (e.g. street, sidewalk, landscaping).
    c. Rate the potential risk using the method described in ***A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas***.
    d. Identify arboricultural treatments to reduce the likelihood of failure and improve tree health, structure, stability and longevity.
10. Noting the character of the planting area: open space, tree lawn, etc.
11. Identifying conflicts with adjacent hardscape focusing on damage to sidewalk and curb.
12. Noting the presence of overhead electrical conductors.
13. Noting the need for clearance from overhead electrical conductors.

Access to some trees was limited by several factors including steep slopes, extensive vine and shrub growth, and the presence of poison oak. Trees that could not be accessed were given a tree number but no tag was attached to the trunk. Where vines prevented visual inspection of the lower trunk and base, it is noted in the ***Tree Assessment Form***.

Description of Trees

Six hundred twenty-seven (627) trees were evaluated, representing 15 species (Table 1, following page). Essentially all of the surveyed trees had been planted as part of landscape development. Only the willow (#626) was native to the San Francisco area and appeared to be indigenous to the site.

Blue gum eucalyptus was the most frequently encountered species. With 423 trees, blue gum represented 67% of all trees evaluation. Blue gums were particularly dominant in the south and west sides of Glen Canyon and along O-Shaughnessy Blvd. As a general rule, blue gums were found in dense plantings (Photo 1).

Photo 1. Blue gums #600 to 623 were part of a dense planting along O'Shaughnessy Blvd. Note extensive growth of vines along the trunks.

Table 1. Tree condition and frequency of occurrence. Glen Canyon Park. Recreation & Park Department. San Francisco CA.

Common name	Scientific name	Tree Health & Structural Condition					No. of Trees
		Dead (0)	Poor (1&2)	Fair (3)	Good (4)	Excell. (5)	
Bailey's acacia	*Acacia baileyana*	--	15	2	1	--	18
Sydney golden wattle	*Acacia longifolia*	--	--	1	--	--	1
Blackwood acacia	*Acacia melanoxylon*	--	34	11	1	--	46
Lawson's cypress	*Chamaecyparis lawsoniana*	--	2	--	--	1	3
Monterey cypress	*Cupressus macrocarpa*	--	7	12	7	2	28
River red gum	*Eucalyptus camaldulensis*	--	6	2	--	--	8
Blue gum	*Eucalyptus globulus*	--	215	145	57	6	423
Silver dollar gum	*Eucalyptus polyanthemos*	--	6	2	--	--	8
Eucalyptus	*Eucalyptus* sp.	--	2	1	--	--	3
Olive	*Olea europaea*	--	--	1	--	--	1
Monterey pine	*Pinus radiata*	3	43	24	3	2	75
Plum	*Prunus* sp.	--	1	--	--	--	1
Willow	*Salix lasiolepis*	--	1	--	--	--	1
Coast redwood	*Sequoia sempervirens*	--	--	1	2	1	4
Siberian elm	*Ulmus pumila*	--	1	5	1	--	7
Total, all trees surveyed		**3**	**333**	**207**	**72**	**12**	**627**

Condition of blue gums ranged from poor (215) to fair (145) to good (57) and excellent (6) (Photo 2). Trees varied from young and semi-mature in development. Trunk diameters ranged from 6” to 90”. Tree #625 was 90” in diameter; #1 was 89”. Twenty-two (22) blue gums were 50” or larger. In general, tree condition improved with trunk diameter. This is not surprising as small diameter trees were more likely to have been overtopped and suppressed.

Photo 2. Located in the center of the park, near the pre-school facility, blue gum #625 was 90” in diameter and in fair condition.

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Seventy-five (75) Monterey pines were present, located primarily on the east side of the property. Pines were mature in development with trunk diameters ranging from 8: to 42" (tree #44). Three Monterey pines (#41, 539 and 555) were dead. Overall condition was poor with 43 of 75 trees in that group (Photo 3). Only two pines, #501 and 502, were in excellent condition. Both were located at the end of Crags Court.

Photo 3. Pines #41 – 57 were generally in poor condition with small high crowns and leaning trunks.

Forty-six (46) blackwood acacias were evaluated. This species was often found in conjunction with blue gum, particularly at the Bosworth St. parking area. Trunk diameters ranged from 6" to 31" (#516). Overall condition was poor (34 of 46 trees).

Twenty-eight (28) Monterey cypresses were present, ranging in trunk diameter from 8" to 78" (#545). Condition varied widely from poor to excellent. Cypresses #113 and 599 were semi-mature in development and in excellent condition.

There was also 18 Bailey's acacia, 15 of which were in poor condition. Trunk diameters ranged from 7" to 14". Almost all trees of this species were immediately adjacent to the Recreation Center.

No other species was represented by more than 8 trees. Included in this group were:

- 8 river red gums were mature in development and in poor condition.
- 8 silver dollar gums ranging from 9" to 19" were present, concentrated in
- 7 Siberian elms in the southeast corner of the park, near Elk Street.
- 4 coast redwoods located behind residences on Turquoise Way. Trees were 21" to 27" in diameter and in generally good condition.
- 3 Lawson's cypress located on the south side of the Recreation Center. Tree #69 was in excellent condition.
- 3 eucalyptus (species unknown) were present. Tree #3 and 594 were mature but in poor condition. Tree #596 was in fair condition.
- Sydney golden wattle #60 was in fair condition and mature in development.
- Olive #70 was in fair condition and mature in development.
- Plum #74 was in poor condition.

Almost all of the assessed trees had one (540 trees) or two (50) stems. Among the remaining trees, 26 had 3 stems while 9 had 4. Two trees had 6 stems: 1) Bailey's acacia #66 and blue gum #577. These were very different trees as the Bailey acacia was a large shrub and its largest stem was 7". In contrast, blue gum #577 was a very large tree. Its largest stem was 28".

All trees at Glen Park were growing in open space conditions. Even trees near the sidewalk and streets were planted in open areas rather than tree lawns. As a result conflicts with hardscape were infrequent and limited to the following:

- Blue gum #410. Minor damage to the sidewalk near the Recreation Center.
- Monterey pine #500. Severe displacement of the street in the area of Crags Court.
- River red gum #595. Severe displacement of the parking area off O'Shaughnessy Blvd.
- Eucalyptus #596. Severe displacement of the parking area off O'Shaughnessy Blvd.

I did not observe any conflicts between the assessed trees and overhead wires.

Description of individual trees is found on the enclosed ***Tree Assessment Form***. Tree locations are found on the ***Tree Assessment Map***. Both are included as **Attachments**

In September 2012, Recreation and Park Department staff noted that trees #25, 36 and 37 had been removed. This change has been incorporated into the ***Tree Assessment Form***.

Suitability for Preservation

Trees that are preserved on development sites must be carefully selected to make sure that they may survive development impacts, adapt to a new environment and perform well in the landscape. Our goal is to identify trees that have the potential for long-term health, structural stability and longevity. Evaluation of suitability for preservation considers several factors:

- **Tree health**
  Healthy, vigorous trees are better able to tolerate impacts such as root injury, demolition of existing structures, changes in soil grade and moisture, and soil compaction than are non-vigorous trees.

- **Structural integrity**
  Trees with significant amounts of wood decay and other structural defects that cannot be corrected are likely to fail. Such trees should not be preserved in areas where damage to people or property is likely.

- **Species response**
  There is a wide variation in the response of individual species to construction impacts and changes in the environment. For example, olive and elm are relatively tolerant of construction impacts while eucalyptus and pines are sensitive.

- **Tree age and longevity**
  Old trees, while having significant emotional and aesthetic appeal, have limited physiological capacity to adjust to an altered environment. Young trees are better able to generate new tissue and respond to change.

- **Species invasiveness**
  Species which spread across a site and displace desired vegetation are not always appropriate for retention. This is particularly true when indigenous species are displaced. The California Invasive Plant Inventory Database (http://www.cal-ipc.org/ip/inventory/weedlist.php?#key) includes blackwood acacia, blue gum, river red gum, and olive in its database.

For more information on suitability for preservation, see Matheny, N. and J. Clark. 1998. *Trees and Development: A technical guide to preservation of trees during land development*. International Society of Arboriculture. Champaign IL.

Each tree was rated for suitability for preservation based upon its age, health, structural condition and ability to safely coexist within a development environment (Table 2).

Table 2. Tree suitability for preservation. Glen Canyon Park. SF Recreation & Park Department. San Francisco CA.

Good	Trees with good health and structural stability that have the potential for longevity at the site. Twelve (12) trees had good suitability for preservation including blue gums #18, 251, 299, 374, 422 and 565; coast redwood #544, Lawson's cypress #69, Monterey cypress #113 and 599; and Monterey pine #501 and 502.
Moderate	Trees in fair health and/or possessing structural defects that may be abated with treatment. Trees in this category require more intense management and monitoring, and may have shorter life-spans than those in the "good" category. One hundred eight (108) trees were rated as having moderate suitability for preservation including 86 blue gums, 10 Monterey cypresses, 3 Monterey pines, 3 Siberian elms, Bailey's acacia #567, blackwood acacia #237 and olive #70.
Poor	Trees in poor health or possessing significant defects in structure that cannot be abated with treatment. These trees can be expected to decline regardless of management. The species or individual tree may possess either characteristics that are undesirable in landscape settings or be unsuited for use areas. Five hundred four (504) trees were rated as having poor suitability for preservation including 331 blue gums, 67 Monterey pines, 45 blackwood acacias, 17 Bailey's acacias, 16 Monterey cypresses, 8 river red gums and 8 silver dollar gums.

We consider trees with good suitability for preservation to be the best candidates for preservation on development sites. We do not recommend retention of trees with low suitability for preservation in areas where people or property will be present. Retention of trees with moderate suitability for preservation depends upon the intensity of proposed site changes.

Tree Risk Assessment

Tree risk assessment is the systematic process of evaluating the potential for a tree or one of its parts to fail and, in so doing, injure people or damage property. All trees have the potential to fail. The degree of risk will vary with the size of the tree, type and location of the defect, tree species, and the nature of the target. Tree risk assessment involves three components:

1. a tree with the potential to fail,
2. an environment that may contribute to that failure, and
3. a person or object that would be injured or damaged (i.e. the target).

Tree Risk Rating System

All of the surveyed trees were assessed using the procedure outlined in *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas* (N. Matheny & J. Clark 1994 (2nd edition. International Society of Arboriculture. Champaign IL). Following a visual inspection of tree health and structural condition, the part of the tree most likely fail within the next year was identified (e.g. branch, stem, or whole tree). The target that would be impacted by this part of the tree was then identified. The risk associated with the tree was evaluated using the following components:

Failure potential (4 points) - identifies the most likely failure and rates the likelihood that the structural defect(s) will result in failure within the next year. The part of the tree most likely to fail was assessed using the following scale:

1 - low - defects are minor (e.g. dieback of twigs, small wounds with good woundwood development)
2 - medium - defects are present and obvious (e.g. lean or bow that has developed over time, cavity encompassing 10-25% of the circumference of the stem, codominant stems without included bark)
3 - high - compounding and/or significant defects present (e.g. severe lean, cavity encompassing 30-50% of the circumference of the stem, multiple pruning wounds with decay along a branch)
4 - severe - defects are very severe (e.g. partial uprooting of leaning tree, decay conks along the main stem, cavity encompassing more than 50% of the stem)

Size of defective part (4 points) - rates the size of the part most likely to fail. Larger parts present a greater potential for damage. Therefore, the size of the failure affects the potential for injury or damage. The scoring system was as follows:

1 - most likely failure less than 6" in diameter
2 - most likely failure 6 - 18" in diameter
3 - most likely failure 18 - 30" in diameter
4 - most likely failure greater than 30" in diameter

Target rating (4 points) - rates the use and occupancy of the area that would be struck by the defective part. For the project areas, the following scoring was employed:

1 - occasional use (e.g. lawn or landscaped area)
2 - intermittent use (e.g. sidewalk, paths or sport facilities)
3 - frequent use (e.g. street parking)
4 - constant use (e.g. playground structure, high volume streets).

The points in each category were added to obtain the overall hazard rating, with 3 being the minimum and 12 being the maximum value.

Risk rating = failure potential + size of defective part + target rating

Among trees at Glen Canyon Park, the most likely failure included branch (318 trees), one stem (103) and the whole tree (206). Among potential targets were residences, 24), parking areas (38), sidewalks (99), city streets (53), and the ball field area (21). Two hundred fifty-six (256) trees had no specific target.

Risk ratings of the surveyed trees ranged from 3 to 12 (see **Attachments**). Under a normal management regime, trees with the highest rating would be abated first, followed in order of decreasing ratings. The City of San Francisco Recreation and Park Department abates risk for trees ranked 9 or greater, a total of 24 trees. A total of 425 trees received ratings of 6 or less while 111 trees received ratings of 7 and 67 were rated as 8.

Evaluation of the Park Improvements Project

Appropriate tree retention develops a practical match between the location and intensity of construction activities and the quality and health of trees. The results of the general and individual tree surveys were the reference points for tree condition and quality. Impacts from the proposed project were assessed using site, grading and landscape plans prepared by the Department of Public Works (June 2012). Plans depicted the location and extent of proposed work.

The proposed project includes renovation of the Recreation Center, enlargement of children's play area, repair and replacement of existing paving and general improvements to the landscape. The tennis courts would be relocated north of the current location. The staging area on Bosworth Street will be improved. The path from Bosworth Street to the Recreation Center will be enlarged and improved in order accommodate fire engines. Trail connections north of the Recreation Center would also be improved.

Impacts to trees could occur in a variety of ways. First, demolition of existing infrastructure such as pavement may directly damage tree roots and crowns. Second, grading and other construction activities may also damage trees, through both direct mechanical injury and indirectly by altering drainage.

Based on my assessment of the proposed plan and evaluation of the trees, I estimate that 147 of the 627 trees evaluated are either within the proposed limit of work. Of this group, I recommend preservation of 86 trees and removal of 58 (Table 3). Three trees (#25, 36, 37) have been removed and are not included in the following summary. Trees recommended for removal include:

- 6 trees (#62, 63, 64, 65, 68, 70) have good or moderate suitability for preservation but are located within the limit of work and will be impacted by the project
- 43 have poor suitability for preservation and are located within the proposed limit of work. Included in this group are 12 Bailey's acacia, 11 blue gum, and 16 Monterey pines.
- Blue gum #9 received a risk rating of 9.
- 7 trees (#3, 11, 28, 41, 55, 59 and 170) received risk ratings of 8 and were in poor condition.

Table 3. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
1	Blue gum	89	4	Moderate	6	Preserve	Path improvement adj. to tree; prune to clean crown & reduce long laterals
2	Blue gum	36	3	Poor	6	Preserve	
3	Eucalyptus	38	1	Poor	8	Remove	Risk rating of 8 & poor condition
4	Blue gum	26	2	Poor	6	Remove	Edge of grading
5	Blue gum	39	3	Poor	6	Preserve	
6	Blue gum	22,10	2	Poor	5	Preserve	
7	Blue gum	27,12	3	Moderate	6	Preserve	
8	Blue gum	52	4	Moderate	5	Preserve	
9	Blue gum	43	2	Poor	9	Remove	Risk rating ≥9
10	Blue gum	18,11	2	Poor	5	Preserve	
11	Bailey's acacia	8	1	Poor	8	Remove	Risk rating of 8 & poor condition
12	Blue gum	56	3	Poor	7	Preserve	Prune to clean & restructure crown; consider installation of cable system.
13	Bailey's acacia	9	1	Poor	6	Remove	
14	Blue gum	43	3	Poor	5	Preserve	Prune to clean crown & reduce long laterals.
15	Bailey's acacia	10	2	Poor	6	Remove	

Table 3, continued. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
16	Blue gum	17	3	Poor	5	Preserve	
17	Blue gum	7	1	Poor	6	Remove	
18	Blue gum	57	5	Good	5	Preserve	Prune to clean crown & reduce long laterals.
19	Bailey's acacia	13	1	Poor	5	Remove	
20	Blue gum	49	2	Poor	5	Remove	
22	Bailey's acacia	14	1	Poor	7	Remove	
23	Bailey's acacia	8,8	3	Poor	5	Remove	
24	Bailey's acacia	14	1	Poor	7	Remove	
25	Bailey's acacia	17	2	Poor	6	--	Tree had been removed
26	Bailey's acacia	13	2	Poor	6	Remove	
27	Bailey's acacia	14,10,5,3	2	Poor	6	Remove	
28	Blue gum	10	2	Poor	8	Remove	Risk rating of 8 & poor condition
29	Bailey's acacia	11	2	Poor	6	Remove	
30	Blue gum	32	4	Moderate	9	Preserve	Risk rating ≥9; prune to clean & restructure crown; consider installation of cable system.
31	Blue gum	28	3	Poor	8	Remove	
32	Siberian elm	14	3	Moderate	5	Preserve	
33	Bailey's acacia	7	2	Poor	6	Remove	

Table 3, continued. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
34	Siberian elm	9	3	Moderate	4	Preserve	
35	Bailey's acacia	7,6,5,4	2	Poor	6	Remove	
36	Bailey's acacia	8	2	Poor	8	--	Tree had been removed
37	Siberian elm	8,6,4	3	Poor	5	--	Tree had been removed
38	Monterey pine	21	1	Poor	7	Preserve	Beehive in tree
39	Blue gum	16,11	3	Poor	5	Remove	
40	Monterey pine	31	2	Poor	6	Remove	
41	Monterey pine	24	0		8	Remove	Risk rating of 8 & poor condition
42	Monterey pine	19	1	Poor	7	Remove	
43	Monterey pine	29	2	Poor	5	Remove	
44	Monterey pine	42	3	Poor	6	Remove	
45	Monterey pine	28	2	Poor	7	Remove	
46	Monterey pine	32	3	Poor	5	Remove	
47	Monterey pine	19	1	Poor	6	Remove	
48	Monterey pine	19	1	Poor	5	Remove	
49	Monterey pine	28	2	Poor	6	Remove	
50	Monterey pine	24	1	Poor	7	Remove	
51	Monterey pine	33	2	Poor	7	Remove	
52	Monterey pine	33	2	Poor	6	Remove	
53	Monterey pine	31	1	Poor	7	Remove	
54	Monterey pine	39	2	Poor	5	Remove	

Table 3, continued. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
55	Monterey pine	39	2	Poor	8	Remove	Risk rating of 8 & poor condition
56	Monterey pine	31	2	Poor	7	Remove	
57	Monterey pine	22	1	Poor	7	Remove	
58	Monterey cypress	31	2	Poor	7	Remove	
59	Monterey cypress	35	2	Poor	8	Remove	Risk rating of 8 & poor condition
60	Sydney golden wattle	9,7,6	3	Poor	5	Remove	
61	Blue gum	30,24	2	Poor	7	Remove	
62	Blue gum	47	4	Moderate	5	Remove	Impacts from improvements project
63	Blue gum	61	4	Moderate	6	Remove	Impacts from improvements project
64	Blue gum	21,16	4	Moderate	5	Remove	Impacts from improvements project
65	Blue gum	31	3	Moderate	6	Remove	Impacts from improvements project
66	Bailey's acacia	7,6,5,5,4,4	3	Poor	5	Remove	
67	Blue gum	26	2	Poor	7	Remove	
68	Blue gum	67	4	Moderate	6	Remove	Impacts from improvements project
69	Lawson's cypress	25	5	Good	8	Preserve	

Table 3, continued. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
70	Olive	15,14,13	3	Moderate	8	Remove	Impacts from improvements project
71	Lawson's cypress	16,8	2	Poor	6	Remove	
72	Lawson's cypress	26	2	Poor	7	Remove	
123	Blue gum	43	3	Moderate	6	Preserve	Prune to clean & restructure crown; consider installation of cable system.
124	Blue gum	18	1	Poor	5	Preserve	
125	Blue gum	29	2	Poor	6	Preserve	
126	Blue gum	20	2	Poor	5	Preserve	
127	Blue gum	16	1	Poor	6	Preserve	
128	Blue gum	30	1	Poor	6	Preserve	
129	Blue gum	22	1	Poor	6	Preserve	
130	Blue gum	28	2	Poor	7	Preserve	
131	Blue gum	24	2	Poor	6	Preserve	
132	Blue gum	27	2	Poor	6	Preserve	
133	Blue gum	32	2	Poor	6	Preserve	
134	Blue gum	14	1	Poor	6	Preserve	
135	Blue gum	19	1	Poor	6	Preserve	
136	Blue gum	10	1	Poor	6	Preserve	
137	Blue gum	19	1	Poor	6	Preserve	
138	Blue gum	12	1	Poor	6	Preserve	

Table 3, continued. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
139	Blue gum	24	2	Poor	6	Preserve	
140	Blue gum	36	1	Poor	7	Preserve	
141	Blue gum	17	1	Poor	7	Preserve	
142	Blue gum	17	1	Poor	6	Preserve	
143	Blue gum	25	2	Poor	6	Preserve	
144	Blue gum	25	2	Poor	6	Preserve	
145	Blue gum	33	2	Poor	6	Preserve	
146	Blue gum	23	3	Poor	5	Preserve	
147	Blue gum	33	2	Poor	6	Preserve	
148	Blue gum	17	2	Poor	6	Preserve	
149	Blue gum	32	4	Moderate	5	Preserve	
150	Blue gum	43	3	Poor	6	Remove	
151	Blue gum	14	1	Poor	6	Preserve	
152	Blue gum	32	2	Poor	6	Preserve	
153	Blue gum	22	2	Poor	6	Remove	Edge of grading
154	Blue gum	30	2	Poor	6	Remove	Edge of grading
169	Blackwood acacia	7	3	Poor	4	Preserve	
170	Blackwood acacia	28	2	Poor	8	Remove	Risk rating of 8 & poor condition
171	Blackwood acacia	9	2	Poor	5	Remove	
172	Blackwood acacia	12	2	Poor	6	Preserve	
173	Blackwood acacia	9	2	Poor	6	Preserve	
174	Blackwood acacia	12	3	Poor	6	Preserve	

Table 3, continued. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
175	Blackwood acacia	15	3	Poor	5	Preserve	
176	Blackwood acacia	12	2	Poor	6	Preserve	
177	Blackwood acacia	16	3	Poor	5	Preserve	
178	Blackwood acacia	17	2	Poor	5	Preserve	
179	Blackwood acacia	17	3	Poor	4	Preserve	
180	Blackwood acacia	13	2	Poor	4	Preserve	
181	Blackwood acacia	14	2	Poor	5	Preserve	
182	Blue gum	24	2	Poor	6	Preserve	
183	Blue gum	18	2	Poor	6	Preserve	
184	Blackwood acacia	11	2	Poor	5	Preserve	
185	Blue gum	12	2	Poor	4	Preserve	
186	Blue gum	18	3	Poor	4	Preserve	
187	Blackwood acacia	12	2	Poor	6	Preserve	
188	Blue gum	39	2	Poor	5	Preserve	
189	Blue gum	30	3	Poor	5	Preserve	
190	Blue gum	33	2	Poor	5	Preserve	
191	Blue gum	15	2	Poor	6	Preserve	
192	Blue gum	27	4	Moderate	4	Preserve	
193	Blue gum	12	2	Poor	5	Preserve	
194	Blue gum	37	3	Poor	5	Preserve	
195	Blue gum	11	2	Poor	6	Preserve	
196	Blue gum	14	2	Poor	6	Preserve	
197	Blue gum	18	2	Poor	6	Preserve	

Table 3, continued. Proposed action: trees within the limit of work for the Glen Canyon Park Improvements Project. Glen Canyon Park. SF Recreation & Park Dept. San Francisco CA.

Tree No.	Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Suitability for Preservation	Risk Rating (3 to 12)	Proposed Action	Notes
198	Blue gum	21	2	Poor	6	Preserve	
199	Blue gum	22	2	Poor	7	Preserve	
200	Blue gum	33,23,18	3	Poor	6	Preserve	Prune to clean crown; remove 18" stem.
201	Blackwood acacia	7	2	Poor	5	Preserve	
202	Blackwood acacia	9	2	Poor	6	Preserve	
226	Blue gum	22	2	Poor	7	Preserve	
227	Blue gum	10	2	Poor	5	Preserve	
228	Blue gum	13	2	Poor	6	Preserve	
229	Blue gum	10	1	Poor	7	Preserve	
230	Blue gum	15	2	Poor	4	Preserve	
231	Blue gum	8	2	Poor	7	Preserve	
232	Blue gum	14	2	Poor	7	Preserve	
233	Blue gum	20	4	Moderate	7	Preserve	
234	Blue gum	21	2	Poor	7	Remove	
235	Blue gum	26,12	3	Poor	7	Preserve	

Among the 88 trees recommended for preservation in the Recreation Center project area, blue gums #1, 12, 14, 18, 123 and 200 require specific pruning treatment to address defects in structure (see ***Tree Preservation Guidelines***). Monterey pine #38 was in poor condition but has an active beehive. I recommend that the tree be pruned and preserved so long as the beehive is active.

Based on my observations, the key elements of successful tree preservation during renovation of the park include:

1. Protect trees during all phases, from demolition and site clearing through landscape installation. Tree protection fencing should not be relocated, disturbed, or taken down without consulting the Project Arborist.

2. Prepare irrigation plans to that impacts to trees are minimized.

Tree Preservation Guidelines

Glen Canyon Park will undergo a series of landscape improvements. Additional changes may be planned for the future. The following are recommendations for design and construction phases that will assist in successful tree preservation.

Design recommendations

1. Verify the location and tag numbers of all trees within 25' of the proposal construction areas. Include trunk locations and tag numbers on all plans.

2. Route underground services including utilities, sub-drains, water or sewer around the **TREE PROTECTION ZONE**. Where encroachment cannot be avoided, special construction techniques such as hand digging or tunneling under roots shall be employed where necessary to minimize root injury.

3. Use only herbicides safe for use around trees and labeled for that use, even below pavement.

4. Design irrigation systems so that no trenching will occur within the **TREE PROTECTION ZONE**.

Pre-construction and demolition treatments and recommendations

1. Prepare a site work plan which identifies access and haul routes, construction trailer and storage areas, etc.

2. Establish a **TREE PROTECTION ZONE** around each tree to be preserved. For design purposes, the **TREE PROTECTION ZONE** shall be the limit of work as defined on the project plans. No grading, excavation, construction or storage of materials shall occur within that zone.

3. Install protection around all trees to be preserved. Where construction will be within 4' of tree trunks, use hay bales instead of fencing. Any fencing shall be 6' chain link with posts sunk into the ground. No entry is permitted into a tree protection zone without permission of the City's project manager.

4. The demolition contractor shall meet with the Consulting Arborist before beginning work to discuss work procedures and tree protection.

5. Trees to be removed shall be felled so as to fall away from **TREE PROTECTION ZONE** and avoid pulling and breaking of roots of trees to remain. If roots are entwined, the consultant may require first severing the major woody root mass before extracting the trees, or grinding the stump below ground.

6. Trees to be retained may require pruning to provide clearance and/or correct defects in structure (see Table 3). All pruning is to be performed by an ISA Certified Arborist or Certified Tree Worker and shall adhere to the latest editions of the ANSI Z133 and A300 standards as well as the ISA Best Management Practices for Tree Pruning. Pruning contractor shall have the C25/D61 license specification.

Tree protection during construction

1. Prior to beginning work, the contractors working in the vicinity of trees to be preserved are required to meet with the Consulting Arborist at the site to review all work procedures, access routes, storage areas and tree protection measures.

2. Any grading, construction, demolition or other work that is expected to encounter tree roots should be monitored by the Consulting Arborist.

3. If injury should occur to any tree during construction, it should be evaluated as soon as possible by the Consulting Arborist so that appropriate treatments can be applied.

4. Fences have been erected to protect trees to be preserved. Fences are to remain until all site work has been completed. Fences may not be relocated or removed without permission of the City's Project Manager.

5. Construction trailers, traffic and storage areas must remain outside fence areas at all times.

6. No materials, equipment, spoil, waste or wash-out water may be deposited, stored, or parked within the **TREE PROTECTION ZONE** (fenced area).

7. Any additional tree pruning needed for clearance during construction must be performed by a qualified arborist and not by construction personnel.

8. All trees shall be irrigated on a schedule to be determined by the Consulting Arborist. Each irrigation shall wet the soil within the **TREE PROTECTION ZONE** to a depth of 30".

9. Any roots damaged during grading or construction shall be exposed to sound

Summary and Recommendations

The primary management challenges for the surveyed areas of Glen Canyon Park are related to mature trees located in dense plantings. Tree age is particularly problematic for Monterey pines which are largely at the end of their anticipated life-span of 80 to 100 years. As they age, pines become increasingly susceptible to insects like red turpentine beetle and diseases such as pine pitch canker. Species such as blackwood and Bailey's acacia are likely to either die or fail as the age.

In contrast, tree age is less critical in blue gum where growing conditions have stratified the population by size and condition. Blue gums in the area of the Recreation Center and along O'Shaughnessy Blvd. have been topped in the past, resulting in resprouts that are now large and often poorly attached to the trunk.

Based on my observations, I recommend the following:

1. For the 147 trees in the area of the Park Improvements Project, preserve 86 and remove 58 (Table 3). Note that trees #25, 36 and 37 which were located within the project's limit of work have been removed.

2. For the 480 trees located elsewhere in the park (Table 4, following page):
    a. Remove 13 trees with risk ratings of 9 or greater.
    b. Remove 26 trees that received risk ratings of 8 and are in poor condition.
    c. Remove approximately 20 trees in the area of blue gum #592, located on a very steep slope on the west side of O'Shaughnessy Blvd.
    d. Prune 9 trees with a risk rating of 9 or greater.
    e. Prune tress #292 and 441.

3. The Recreation & Park Department's Trail Improvement project for Glen Canyon Park will address pruning of blue gum #625.

4. Accelerate Park's reforestation program. There are several opportunities for reforestation particularly near the Recreation Center.

In summary, the proposed project presents an opportunity to enhance the existing landscape by removing those trees which are either declining and/or at risk of falling, and replacing them with new trees that will benefit park users in the future.

HortScience, Inc.

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Table 4. Proposed action: trees outside the Parks Improvement Project area. Glen Canyon Park. SF Recreation & Park Department. San Francisco CA.

Tree No.	Location		Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Risk Rating (3 to 12)	Proposed Action	Notes
161	Rec Ctr	W.	Blue gum	22	2	8	Remove tree	Poor condition
166	Rec Ctr	W.	Blue gum	38	2	9	Remove tree	Risk rating ≥9
281	Rec Ctr	S.	Blue gum	25	2	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
287	Rec Ctr	S.	Blue gum	11	2	8	Remove tree	Poor condition
288	Rec Ctr	S.	Blue gum	26	2	8	Remove tree	Poor condition
292	Rec Ctr	S.	Blue gum	22	3	8	Prune to clean crown & reduce long lateral over street.	O'Shaughnessy
389	Rec Ctr	SE., at Elk	Silver dollar gum	20	2	8	Remove tree	Poor condition
390	Rec Ctr	SE., at Elk	Silver dollar gum	23	2	9	Remove tree	Risk rating ≥9
393	Rec Ctr	E.	Silver dollar gum	21	2	9	Remove tree	Risk rating ≥9
402	Rec Ctr	S.	Blue gum	32	3	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
404	Rec Ctr	S.	Blue gum	14,13,6	2	9	Remove tree	Risk rating ≥9

Table 4, continued. Proposed action: trees outside the Parks Improvement Project area. Glen Canyon Park. SF Recreation & Park Department. San Francisco CA.

Tree No.	Location		Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Risk Rating (3 to 12)	Proposed Action	Notes
410	Rec Ctr	S.	Blue gum	34	3	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
414	Rec Ctr	S.	Blue gum	40	3	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
420	O'Shaughnessy	W. of Bosworth	Bailey's acacia	11	1	8	Remove tree	Poor condition
421	O'Shaughnessy	W. of Bosworth	Bailey's acacia	13,12,10,6	2	7	Remove tree	Poor condition
422	O'Shaughnessy	W. of Bosworth	Blue gum	40	5	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
434	Bosworth	N. of houses.	Blue gum	17	2	8	Remove tree	Poor condition
435	Bosworth	N. of houses.	Blue gum	23	2	6	Remove tree	Poor condition
437	Bosworth	N. of houses.	Blue gum	31	2	8	Remove tree	Poor condition
438	Bosworth	N. of houses.	Blue gum	43	2	8	Remove tree	Poor condition
441	Bosworth	N. of houses.	Blue gum	46	4	6	Prune to clean crown & reduce long laterals	Bosworth residences

Table 4, continued. Proposed action: trees outside the Parks Improvement Project area. Glen Canyon Park. SF Recreation & Park Department. San Francisco CA.

Tree No.	Location		Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Risk Rating (3 to 12)	Proposed Action	Notes
488	Crags Ct.	W. behind houses	River red gum	12,12,9,5	2	8	Remove tree	Poor condition
496	Crags Ct.	cul de sac	Monterey pine	22	2	8	Remove tree	Poor condition
521	Police facility	S	Monterey pine	26	2	8	Remove tree	Poor condition
525	Turquoise	S.	Blue gum	32	2	8	Remove tree	Poor condition
535	Turquoise	S.	Monterey pine	18,17	2	9	Remove tree	Risk rating ≥9
538	Turquoise	S.	Monterey pine	29	2	9	Remove tree	Risk rating ≥9
540	Turquoise	S.	Monterey pine	22	1	9	Remove tree	Risk rating ≥9
560	Turquoise	S.	Monterey pine	26	2	8	Remove tree	Poor condition
563	O'Shaughnessy	E.	Blue gum	33	4	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
564	O'Shaughnessy	E.	Blue gum	48	3	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
566	O'Shaughnessy	E.	Blue gum	20	2	8	Remove tree	Poor condition
570	O'Shaughnessy	E.	Blue gum	18	2	9	Remove tree	Risk rating ≥9
592	O'Shaughnessy	W. steep slope	Blue gum	25	3	9	Remove tree	Risk rating ≥9
594	O'Shaughnessy	W. @ Del Vallle	Eucalyptus	16	2	8	Remove tree	Poor condition

Table 4, continued. Proposed action: trees outside the Parks Improvement Project area. Glen Canyon Park. SF Recreation & Park Department. San Francisco CA.

Tree No.	Location		Species	Trunk Diameter (in.)	Condition 0=dead 5=excell.	Risk Rating (3 to 12)	Proposed Action	Notes
601	O'Shaughnessy	E.	Blue gum	65	3	9	Prune to clean crown & reduce long lateral over street.	Risk rating ≥9
602	O'Shaughnessy	E.	Blue gum	14	2	8	Remove tree	Poor condition
604	O'Shaughnessy	E.	Blue gum	12	2	8	Remove tree	Poor condition
605	O'Shaughnessy	E.	Blue gum	16	2	8	Remove tree	Poor condition
606	O'Shaughnessy	E.	Blue gum	14	2	8	Remove tree	Poor condition
607	O'Shaughnessy	E.	Blue gum	55	2	10	Remove tree	Risk rating ≥9
608	O'Shaughnessy	E.	Blue gum	18	2	8	Remove tree	Poor condition
610	O'Shaughnessy	E.	Blue gum	25,15	2	8	Remove tree	Poor condition
612	O'Shaughnessy	E.	Blue gum	17	2	8	Remove tree	Poor condition
613	O'Shaughnessy	E.	Blue gum	38	2	10	Remove tree	Risk rating ≥9
614	O'Shaughnessy	E.	Blue gum	12	2	8	Remove tree	Poor condition
615	O'Shaughnessy	E.	Blue gum	40,19,11	3	9	Remove tree	Risk rating ≥9
617	O'Shaughnessy	E.	Blue gum	25	2	9	Remove tree	Risk rating ≥9
619	O'Shaughnessy	E.	Blue gum	32,28,12,10	2	8	Remove tree	Poor condition
625	Glen Park	Trail	Blue gum	90	3	7	Noted in Trail project report as prune to clean crown & reduce long laterals.	
627	Glen Park	Trail	Blue gum	29,28,25	3	9	Prune to remove 25" stem	Risk rating ≥9

ATTACHMENTS

Pruning Specifications

Tree Assessment Form

Tree Risk Ratings

Tree Assessment Map

Pruning Specifications
Glen Canyon Park
San Francisco Recreation & Park Department

Qualifications
An I.S.A. (International Society of Arboriculture) Certified Arborist or Tree Worker is to be present at all times during pruning. Contractor must have a State of Calif. Contractor's License for Tree Service (C61-D49) and provide proof of workman's compensation and general liability insurance.

Objectives
The following are general objectives:

1. Clean the crown of diseased, crossing, weak, dead, dying and otherwise structurally unsound branches to 1" diameter.

2. Reduce the risk of failure by thinning small diameter (<2") branches on horizontal and bowed scaffold limbs.

3. Reduce the length and weight of heavy horizontal branches by thinning and reducing small (<4") laterals.

4. Reduce the risk of failure of leaning trees by reducing the size of the crown on the lean side.

Specifications

1. All pruning shall be in accordance with the *Best Management Practices for Pruning* (International Society of Arboriculture, 2002) and adhere to the most recent editions of the American National Standard for Tree Care Operations (Z133.1) and Pruning (A300).

2. Interior branches shall not be stripped out.

3. No more than 20% of live foliage shall be removed on any one branch or throughout the entire tree.

4. Trees shall not be climbed with spurs.

5. Branch removal or reduction cuts (thinning cuts) are to be employed rather than heading cuts. Trees shall not be topped or headed back.

6. Do not raise canopies by removing lower branches.

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