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July 17, 2015

Shelby Howard
HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

Subject: Bonita Pump Station Project: Tree Risk Evaluation

Dear Shelby Howard:

The following letter report concerns the evaluation of 27 trees within and adjacent to the proposed pump station project in Bonita, California. Due to the proximity of the trees to the proposed pump station, concerns related to the structural integrity of the trees, and a history of tree failure on the site, California Tree Service (CTS) requested that an International Society of Arboriculture (ISA)-Certified Arborist evaluate the trees and their surrounding growing environment and provide recommendations for the short- and long-term management of the trees.

To that end, ISA-Certified and Tree Risk Assessment Qualified (TRAQ) Arborist (Christopher J. Kallstrand, Certified Arborist No. We-8208A) examined the trees by performing a general tree risk assessment on July 15, 2015. The tree assessment focused on collecting information that could be used to determine the trees' current condition and observed risk to help formulate recommendations for short- and long-term tree management. This report summarizes the results of this assessment and provides recommendations for tree management.

ASSIGNMENT

CTS assignment was as follows:

1. Inspect the trees for their general health, structural condition, size, appearance, and pests.
2. Perform a general tree risk assessment of 27 trees located within and adjacent to the proposed pump station located at 3954 Bonita Road in Bonita, California.
3. Evaluate the surrounding growing site factors to determine whether they are contributing to potential tree structural decline.
4. Develop a letter report documenting observations and management recommendations.

Methods

A ISA-Certified and TRAQ Arborist (Christopher J. Kallstrand, Certified Arborist No. We-8208A) mapped and examined the trees by performing a level 2 tree risk assessment on July 15, 2015. The 27 evaluated trees were selected based on tree size, their proximity to the proposed pump station installation project, the frequency of potential "targets" (people, property, or activities that could be injured, damaged, and/or disrupted by tree failure) within the striking distance of an identified tree or tree part. During the level 2 tree risk assessment, an evaluation of tree risk associated with observed tree defects and conditions that affect the likelihood of failure was conducted. Specifically, the trees were evaluated for defects associated with the crown and branches, trunk, roots, and root collar. The tree assessment focused on collecting information that could be used to determine the trees' current health, structural stability, and overall tree risk rating, which guided recommendations for future actions with regard to tree management.

In addition to collecting tree and site attribute information, CTS worked with Dudek & Associates to map the precise locations of the 27 trees using a Trimble Pathfinder Pro XH Global Positioning System (GPS) receiver. The Pathfinder has a horizontal accuracy of 1-meter (1-sigma) using differential code positioning techniques. Since tree canopies can sometimes cause loss of satellite lock by blocking the line-of-sight to satellites, an electronic compass and reflectorless electronic distance measuring (EDM) device was also used in mapping tree locations. The EDM/compass combination operates in concert with the Pathfinder system to position offsets, and offset information is automatically attached to the GPS position data string. Attachment 2 provides the locations of the mapped trees.

Note: No root crown excavations or investigations were performed during the tree assessments. Therefore, the presence or absence of internal rot within the root crown or other hidden inferiorities in individual trees could not be confirmed. It is recommended that any large tree proposed for preservation in an urban setting be thoroughly inspected for internal and subterranean wood rot by a qualified arborist before finalizing preservation plans. Furthermore, no impact analysis was conducted as part of this study.

GENERAL TREE AND SITE CONDITIONS

The project site, located at 3954 Bonita Road, consists of flat to sloped topography. The prevailing wind direction is from the west. The trees on site are partially to fully protected from exposure to wind, so the Santa Ana wind conditions appear to have limited effect on the trees as a result of the trees being in a "grove" setting. Tree species observed during the site evaluation included, but are not limited to, sugar gum eucalyptus (*Eucalyptus cladocalyx*), Peruvian pepper (*Schinus molle*), and palo verde (*Parkinsonia aculeate*). In addition to the 27 evaluated trees, an additional 77 trees were observed on and immediately adjacent to the site, with a majority occupying the surrounding

slope. The trees are generally in fair health and fair to poor structural condition. Many of the trees throughout the site are re-sprouts from the previous removal of trees. Soil conditions throughout the site appeared to be adequate to support the trees and existing vegetation. No irrigation was observed on or immediately adjacent to the site. Construction activities associated with the Willow Street Bridge project were underway at the time of the assessment; however, the bridge construction work is not related to the proposed pump station work that is part of the assessment.

In summary, 27 trees were evaluated throughout the study area. The 27 evaluated trees were all sugar gum eucalyptus. The evaluated trees include single- and multi-stemmed trees with diameters at breast height ranging from 6 to 39 inches. On average, the trees are approximately 53 feet tall and have crown widths that reach up to 55 feet across at their widest point. Tree maintenance appears to have been deferred for the last several years.

Potential targets in the area should trees or tree parts fail include (1) occasional (the target is present infrequently or irregularly): pedestrians, parked automobiles, and moving automobiles; and (2) constant (the target is present at all times or nearly all times): structures, hardscaping, proposed structures, and power lines.

The trees are in fair health and fair to poor structural condition, with varying maladies affecting their overall structural rating. Many of the observed maladies and health issues are characteristic of the tree species, or are the result of no tree maintenance, and/or from growing in a grove setting. Two pests, the red gum lerp psyllid (*Glycaspis brimblecombei*) and eucalyptus long-horned borer (*Phoracantha semipunctata*), were observed on site. The observed pests were found to be at low density levels (few individuals observed) and did not pose a significant threat to the trees. Furthermore, the presence of one small wood-boring beetle was noted on several trees throughout the site. Attachment 1 provides a detailed summary of individual tree attributes, Attachment 2 provides individual tree locations, and Attachment 3 provides photographs of the site and individual trees evaluated.

TREE RISK ASSESSMENT

In addition to evaluating the general tree and site characteristics, a focused tree risk assessment was conducted for each of the 27 trees. The tree risk assessments evaluated site history, tree health and species profiles, load factors, and tree defects and conditions affecting the likelihood of failure in the crown and branches, trunk, and roots/root collar for 27 trees. The following sections provide a summary of those findings, and Attachment 1 provides a detailed summary of individual tree attributes, Attachment 2 presents individual tree locations, and Attachment 3 provides photographs of the site and individual trees evaluated.

Growing Environment: The subject trees range in size from small to large, and are all open grown trees located on flat and sloped topography. Of the 27 trees, 13 trees are located immediately adjacent to Bonita Road, and the remaining 14 are located on the slopes behind

the proposed pump station. The trees are generally surrounded by exposed soil, dense leaf litter, and/or non-native grasses. The soil conditions appeared to be adequate in volume and were not saturated, shallow, or overly compacted. Of the 27 trees, 13 have pavement and/or concrete over a portion of their root systems. Based on crown width/size and knowledge of specific tree rooting habits, the estimated total percentage of pavement over the root systems ranges from 5% to 30%.

Site History: Site history was evaluated and includes factors such as wind exposure, site changes, common weather, and failure history. Wind exposure for all 27 trees ranges from partial to full protection. In general, the prevailing wind direction is from the west, with common occurrences of high wind events from Santa Ana wind conditions. One site change, soil removal, was observed immediately adjacent to tree #1. The trees on and immediately adjacent to the site have a history of branch, stem, and whole tree failure. Branch and stem failure appeared to be a result of local wind conditions, species profiles, and excessive canopy weight, while whole tree failures were a result of local wind conditions, species profiles, excessive canopy weight, and root rot. Attachment 1 provides a detailed overview on a tree-by-tree basis.

Crown and Branches: The tree crowns reach approximately 20 to 85 feet in height and range from 10 to 55 feet across at their widest points. On average, the trees have live crown ratios of approximately 38% (the ratio of the height of the live crown to the height of the entire tree) and are composed of larger- and smaller-diameter scaffold branches. The scaffold branches for all 27 trees vary with regard to their evaluated “weak” or “strong” attachments. Many trees exhibit evidence of deferred or never having received maintenance. Examples of weak attachment points include co-dominant stems (two main branches that originate at the same point on the main trunk and create a weak union that is more prone to failure over time) and epicormic sprouts (shoots growing from previously dormant buds beneath the bark that result from exposure to light following pruning events) that have grown to large size, and included bark (bark that is embedded in a union between branch and trunk, or between co-dominant stems) from acute attachment angles. Conversely, stronger attachments consisted of accommodating attachment angles with no included bark and sound branch architecture.

Additional maladies observed within the crowns included co-dominant form with multiple leaders, crossed branches and poor branch attachments, previous scaffold branch failure in the canopy, overextended branches, and dead twigs/branches. At the time of the inspection, these issues were considered no higher than moderate in terms of associated risk. Of the 27 trees evaluated, 9 trees are considered to be in poor structural condition, 6 in fair to poor condition, and 12 in fair condition. With the exception of select individual branches throughout the trees exhibiting weak attachment points, all but 9 trees are considered to be in fair crown and branch structural condition. The 9 remaining trees are considered to be in poor crown and branch

structural condition due to cracked limbs, hanging branches, dead branches, high occurrences of weak attachment points, and multiple occurrences of previous branch failures. Details for the individual crown and branch assessments are provided in Attachment 1. Note that the crown and branch evaluations were limited at times by dense interior canopies or obstructions that limited viewing. Aerial crown evaluations of the trees were beyond the scope of this project.

Trunk: The trees' trunks range from 6 to 39 inches in diameter at breast height and include multiple occurrences of co-dominant stems, basal wounding, one occurrence of a fruiting body, and evidence of cankers/galls/burls. Tree lean (from vertical) ranged from 0° to 35°. Of the 27 trees, 7 trunks are considered to be in poor structural condition, and the remaining 20 are considered to be in fair to good structural condition.

Roots and Root Collar: All of the roots and root collars were buried and not visible for inspection. Root collar depths varied from 1 to 4 inches. Root collars were commonly buried by soil and/or deep leaf and litter layers. It was noted that the roots of tree 1 may have been damaged by construction activities to the southwest. Furthermore, it was noted that all of the observed whole tree failures were a result of substantial root rot. As such, it is anticipated that additional trees throughout the site and/or immediately adjacent to the whole tree failures may have varying levels of root rot. Photograph 74 and 75 of Attachment 3 provide a close up view of the observed root rot.

Risk Categorization: The ISA Basic Tree Risk Assessment Form was used to evaluate the potential risk to the trees. Potential targets of tree failure (whole tree, branch, trunk, or root) include pedestrians, parked automobiles, moving automobiles, powerlines, and proposed site improvements. Potential targets ranged from within the trees' canopies to within 1 times the height of the tree. Any specific target may or may not be associated with all of the trees on site and may only be associated with one individual tree. The frequency of the targets ranges from constant (buildings, utilities, and power lines) to occasional (pedestrians and automobiles). Potential target distances ranged from 1 to 90 feet away from the trunk of the tree. Details are provided in the tree risk evaluation matrix in Attachment 1.

With the exception of six trees, the overall risk associated with the trees evaluated according to the TRAQ method is considered low. The low risk rating is a factor of the potential for tree or tree part failure, the likelihood of impact with a target, and the consequences of failure. The low rating for the site is related to the reduced levels of the likelihood that any specific part would fail, as well as the low to very low likelihood that a target would be present during the potential failure. The trees identified as having moderate or high risk are based on increased likelihood of failure coupled with high-frequency targets (those that are constant or frequent as opposed to rare or occasional). Individual tree part and overall tree risk ratings are presented in Attachment 1.

DISCUSSION AND RECOMMENDATIONS

The evaluated trees located within and adjacent to the proposed pump station project exhibit tree defects and conditions that are typical of the species, and of trees that have had little or no maintenance, or are grown in grove conditions. The combination of the tree species' traits and site characteristics has resulted in tree defects that are more prone to failure with ranges from improbable to imminent. It is the combination of these defects, coupled with the likelihood of impact and the consequences of impact, which results in overall tree risk ratings that range from low to high. Trees found to have low risk ratings generally have unlikely probability of impacting targets and negligible or minor consequences associated with the consequence of failure. Alternatively, trees found to have high risk ratings generally have likely or very likely probability of impact and significant or severe consequences of failure.

In all, 21 trees were classified in the low overall risk rating category, 4 were classified in the moderate tree risk rating category, and 2 were considered to have a high overall tree risk rating. Tree parts associated with moderate and high risk ratings included larger diameter (greater than 3 inches) branches/limbs, extensive trunk and/or basal cavities, and/or extensive canopy decline. Details regarding individual tree risk ratings can be found in Attachment 1. The identified tree defects associated with the overall low risk rating are not to be considered safe under all circumstances since they will remain a risk of failing and impacting a target until mitigated.

Based on the observed overall tree risk ratings, it is recommended that the 7 trees exhibiting evidence of poor structure (14, 15, 17, 20, 22, 25, and 27), four trees exhibiting extensive canopy decline (14, 15, 17, and 20), and trees having a moderate to high overall tree risk rating (22, 25, 27) be removed. Furthermore, it is recommended that the remaining 20 trees exhibiting varying degrees of "weak" branch attachments and poor branch architecture be pruned according to ISA American National Standards Institute (ANSI) A300 tree pruning standards. Following the initial tree pruning, it is recommended that any tree immediately adjacent to the proposed pump station be pruned on a 2 to 3-year pruning cycle. A reduced pruning schedule will aid in structural development and help reduce risk associated with the trees on site. Tree pruning standards are provided in Attachment 4. Removal of the 7 structurally compromised and/or declining trees and removal of the damaged, cracked, and/or dead limbs will reduce the overall residual site risk rating (for the 27 trees evaluated) to low. It should be noted that trees protected from high winds may be exposed to alterations in wind patterns following the removal of trees in the ""grove". Alterations in wind patterns and exposure can result in increased occurrences of tree failure.

In addition to the above recommendations, CTS recommends the following:

1. **Stump Sprouts:** An additional 18 stump sprouting trees were observed throughout the site. The stump sprouts are primarily located along the bottom edge of the slope and immediately adjacent to the proposed pump station. Stump sprouts often have poor structural properties and may pose increased risk as they age. It is recommended that the observed 18 stump sprouts be removed.
2. **Probing:** Due to the site's history of tree failure (root rot), presence of basal damage, borer and woodpecker activity, and the presence of fruiting bodies, the likelihood of internal rot within the site's eucalyptus trees is high. It is recommended that any large (over 12 inches in diameter) eucalyptus that is retained on site and has the potential to impact a target be internally probed for rot. Internal probing often provides an early indicator of potential tree failure and risk. CTS can provide this service and will submit a proposal at your request.
3. **Aerial Inspection:** Due to limitations on visibility from the ground level and the presence of branch failure, it is recommended that all contact points associated with broken, cracked, and or torn limbs be inspected during the pruning process. Should structural inferiorities be found, appropriate mitigation actions should be taken.
4. **Monitoring:** The combination of site history, local weather patterns, eucalyptus species profiles, and the observed tree structure indicates that the trees on site may be prone to failure. In an effort to reduce the risk associated with the trees on site, It is recommended that trees be inspected on an annual basis and following severe wind and/or storm events for signs of health and or structural decline. Trees should be monitored for increased lean, soil lifting/cracking/heaving, declining health, cracked limbs or stems, and pest and disease outbreak. Any observed issues should be mitigated appropriately.

CONCLUDING NOTES

In summary, 7 trees are recommended for removal based on their overall risk and associated health, and 20 trees are recommended for preservation. The 20 retained trees should be pruned according to ISA ANSI A300 tree pruning standards and inspected on an annual basis. Furthermore, based on the potential for root rot, it is recommended that the trees on site be internally probed for rot. Details regarding individual tree preservation and/or removal recommendations are provided in Attachment 1, and further recommendations regarding tree pruning, root pruning, and maintenance are provided in Attachment 4.

This report provides conclusions and recommendations based on an examination of 27 trees and their surrounding environment by an ISA-Certified and TRAQ Arborist. The conclusions and

findings discussed in this report and the associated tree or tree part risk opinions are valid for no longer than 6 months, and only under normal weather conditions. Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. No internal rot probing was conducted for this project to determine presence or absence and general extent of wood rot. Extensive internal, aerial, or subterranean evaluations were not conducted as part of this assessment. Therefore, the full extent of any internal rot conditions of the trunk and roots cannot be fully determined.

The 27 evaluated trees were selected based on tree size, their proximity to the proposed pump station installation project, the frequency of potential "targets" (people, property, or activities that could be injured, damaged, and/or disrupted by tree failure) within the striking distance of an identified tree or tree part. Additional risk associated with the remaining trees on site were not evaluated during this evaluation and may contain inferior structural properties that may or may not increase the risk associated with the trees.

Arborists cannot detect every condition that could possibly lead to the failure of a tree. Trees are living organisms that fail in ways not fully understood. Conditions are often hidden within trees and belowground. This evaluation did not include subterranean, aerial, or extensive internal examination. Arborists cannot guarantee that a tree would be healthy or safe under all circumstances, or for a specified period of time. There are no guarantees that a tree's condition would not change over a short or long period due to climatic, cultural, or environmental conditions. Trees provide many benefits to those who live near them. They also include inherent risk that can be minimized, but not eliminated.

I would be pleased to answer any questions or respond to any comments regarding this tree evaluation. Feel free to contact me at 760-510-8100 or office@caltreeservice.com.

Sincerely,

Christopher J. Kallstran

Certified Arborist No. WE-8208A

Gary McCunn

Certified Arborist No. WE-1612A

ATTACHMENT 1

Tree Risk Assessment Matrices

Attachment 2 - Tree Risk Evaluation Matrices

						Health				Crown & Branches						Trunk							Roots and Root Collar									
Tree Number	Botanical Name	D.B.H (in.)	Height (ft.)	Canopy (ft.)	Potential "Targets"	Vigor	Foliage (Normal/Chlorotic/Necrotic) %	Pests	Overall Health	Live Crown Ratio	Co-dominant Branches	Dead Twigs/ Branches	Weak Attachments	Main Concern	Likelihood of Failure	Co-dominant Stems	Included Bark	Cankers/ Galls/Burls	Conks	Lean %	Main Concern	Likelihood of Failure	Buried Root Collar	Approximate Depth of Buried Collar	Conks	Main Concern	Likelihood of Failure	Overall Tree Risk	Mitigation Options	Advanced Assessment Needed	Pruning Recommendations	Pruning Cycle	Notes
1	*Eucalyptus cladocalyx*	32	60-65	25-30	Parked Automobiles, Moving Automobiles, Pedestrians	Normal	95/5/0	Psyllid	Good	70%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	No main concerns	Improbable	Yes	Yes	No	No	0%	Codominant stem	Improbable	Yes	2 inches	None obs.	Construction activities adjacent to the tree has potential to impact root system	Improbable	Low	Monitor tree and adjacent soil for heaving/lifting	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	Potential root damage may have occurred from active construction activities adjacent to the tree. The tree should be monitored for increased lean and/or soil heaving or lifting.
2	*Eucalyptus cladocalyx*	32	65-70	25-30	Parked Automobiles, Moving Automobiles, Pedestrians	Normal	95/5/1	Psyllid/Borers	Good	45%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	No main concerns	Improbable	Yes	None observed	No	Yes	0%	Large basal wound with active conk	Possible	Yes	2-3 inches	None obs.	Construction activities adjacent to the tree has potential to impact root system	N/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree has a large basal wound, with conk and the presence of borers, on the southwest side. The tree has significant response growth along the outer edges of the wound. Due to the size of the tree, site history, and the presence of the wound, conk, and
3	*Eucalyptus cladocalyx*	7	23	10	Pedestrians, Automobiles	Normal	100/0/0	None obs.	Good	70%	No	None observed	None	No main concerns	Improbable	No	None observed	No	No	0%	No main concerns	Improbable	Yes	2-3 inches	None obs.	No main concerns	N/a	Low	Maintain "light" canopy	No	Maintain "light" canopy	2 years	Small tree with phototrophic growth.
4	*Eucalyptus cladocalyx*	28/26	65-70	50	Pedestrians, Automobiles	Normal	90/8/0	None obs.	Good	75%	Yes	Yes (less than 1%, max diameter is 2 inches)	Waterspouts, "V" attachments, crossed limbs	Poor branch attachments and overextended branch	Possible	Yes	None observed	No	No	2%	No main concerns	Improbable	Yes	10-12 inches	None obs.	No main concerns	N/a	Moderate - Overextended limb	Remove overextended limb	Yes	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	Tree has poor branch architecture and occurrences of deadwood. Pruning should focus on correcting branch arch. , removing over extended limb and deadwood. The removal of the over extended limb would reduce the overall risk to low.
5	*Eucalyptus cladocalyx*	9	25-30	10-12	Pedestrians, Automobiles	Normal	100/0/0	None obs.	Good	35%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Poor branch attachments due to "topping"	Possible	No	None observed	No	No	0%	No main concerns	Improbable	Yes	2- 4 inches	None obs.	No main concerns	N/a	Low	Maintain "light" canopy	No	Maintain "light" canopy	2-years	The tree appears to have been previously "topped". The topping has resulted in poor branch and stem structure. The tree should be pruned to
6	*Eucalyptus cladocalyx*	13	25-30	12	Pedestrians, Automobiles	Normal	100/0/0	None obs.	Good	35%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Poor branch attachments due to "topping"	Possible	No	None observed	No	No	0%	No main concerns	Improbable	Yes	2- 4 inches	None obs.	No main concerns	N/a	Low	Maintain "light" canopy	No	Maintain "light" canopy	2-years	The tree appears to have been previously "topped". The topping has resulted in poor branch and stem structure. The tree should be pruned to
7	*Eucalyptus cladocalyx*	24/11	75-80	40	Pedestrians, Automobiles	Normal	90/10/0	Borers	Good	40%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	No main concerns	Improbable	Yes	None observed	No	No	15%	Large basal wound with borer activity	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree has a large basal wound, with the presence of borers, on the northeast side. The tree has significant response growth along the outer edges of the wound. Due to the size of the tree, site history, and the presence of the wound, conk, and borers it is
8	*Eucalyptus cladocalyx*	24/23	75-80	40	Pedestrians, Automobiles, electrical box, water main	Normal	95/5/0	None obs.	Good	50%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Poor branch attachments	Possible	Yes	yes	No	No	5-10%	Basal wound with borer activity	Possible	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree has a large basal wound, with the presence of borers, on the northeast side. The tree has significant response growth along the outer edges of the wound. Due to the size of the tree, site history, and the presence of the wound, conk, and borers it is
9	*Eucalyptus cladocalyx*	22-Jan	60-65	35-40	Pedestrians, Automobiles, electrical box, water main, proposed pump station	Normal	94/5/1	None obs.	Good	40%	Yes	Yes (less than 1%, max diameter is 2 inches)	Waterspouts, "V" attachments, crossed limbs	Poor branch attachments	Possible	Yes	None observed	No	No	0%	Secondary stem	Possible	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree has a history of large limb failure. One large limb (7 in diam) recently failed. Branches. Stems similar to the failed branch present on the tree. The failure appears to be a result of excessive branch end weight and wind.
10	*Eucalyptus cladocalyx*	12	40-45	20	Pedestrian and automobiles, proposed pump stations	Normal	90/10/0	None obs.	Good	40%	No	None observed	Waterspouts, "V" attachments, crossed limbs	Poor branch attachments	Improbable	No	None observed	No	No	5-8%	Lean	Improbable	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree should be monitored for signs of soil lifting and heaving. Remove deadwood and secondary stems.
11	*Eucalyptus cladocalyx*	22	65-70	30-35	Pedestrian and automobiles, proposed pump station	Normal	95/5/0	None obs.	Good	40%	Yes	Yes (less than 1%, max diameter is 2 inches)	Waterspouts, "V" attachments, crossed limbs	Poor branch attachments	Improbable	Yes	None observed	No	No	0%	No main concerns	Improbable	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	Remove deadwood and clean canopy. Multiple occurrences of dead wood in canopy.
12	*Eucalyptus cladocalyx*	13	55-60	30-35	Pedestrian and automobiles, proposed pump station	Normal	98/2/0	None obs.	Good	40%	Yes	Yes (less than 1%, max diameter is 2 inches)	None	No main concerns	Improbable	Yes	None observed	No	No	1-3%	No main concerns	Improbable	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	Younger, healthy tree with minimal issues. Remove deadwood and correct any architectural issues.
13	*Eucalyptus cladocalyx*	10-11	40-45	25-30	Pedestrian and automobiles, proposed pump station	Normal	95/4/1	None obs.	Good	40%	Yes	Yes (less than 1%, max diameter is 2 inches)	None	No main concerns	Improbable	Yes	None observed	No	No	3-5%	Lean	Improbable	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	Tree has phototrophic growth over the adjacent street. No signs of soil heaving or lifting.
14	*Eucalyptus cladocalyx*	6	25	10	New building/road	Normal	95/4/1	None obs.	Good	10%	No	None observed	None	No main concerns	Improbable	No	None observed	No	No	25%	Lean and re-sprout	Possible	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Remove - See notes	No	Due to tree stem structure and lean the tree is recommended for removal	n/a	The tree is a resprout from a previously removed tree. Current risk is low. However, as the tree ages and grows over the old stump the risk of failure will increase.
15	*Eucalyptus cladocalyx*	6	25	10	New building/road	Normal	95/4/1	None obs.	Good	10%	No	None observed	None	No main concerns	Improbable	No	None observed	No	No	25%	Lean and re-sprout	Possible	Yes	2-3 inches	None obs.	No main concerns	n/a	Low	Remove - See notes	No	Due to tree stem structure and lean the tree is recommended for removal	n/a	The tree is a resprout from a previously removed tree. Current risk is low. However, as the tree ages and grows over the old stump the risk of failure will increase.
16	*Eucalyptus cladocalyx*	30	45-50	35-40	New building/road	Normal	75/20/5	None obs.	Fair to poor	30%	Yes	yes (5-10 % with max diameter @ 2 inches)	Waterspouts, "V" attachments, crossed limbs	Deadwood and lower limbs	Possible	No	None observed	No	No	30%	Lean in upper stem	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Maintain "light" canopy	No	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree has a history of limb failure. Past limb failure occurred near stem lean and may have created a "weak" point. The "weak" point should be inspected during pruning. Should it be found to have cracks and/or breaks the tree should be removed.

Attachment 2 - Tree Risk Evaluation Matrices

						Health				Crown & Branches						Trunk							Roots and Root Collar									
Tree Number	Botanical Name	D.B.H (in.)	Height (ft.)	Canopy (ft.)	Potential "Targets"	Vigor	Foliage (Normal/Chlorotic/Necrotic) %	Pests	Overall Health	Live Crown Ratio	Co-dominant Branches	Dead Twigs/ Branches	Weak Attachments	Main Concern	Likelihood of Failure	Co-dominant Stems	Included Bark	Cankers/ Galls/Burls	Conks	Lean %	Main Concern	Likelihood of Failure	Buried Root Collar	Approximate Depth of Buried Collar	Conks	Main Concern	Likelihood of Failure	Overall Tree Risk	Mitigation Options	Advanced Assessment Needed	Pruning Recommendations	Pruning Cycle	Notes
17	*Eucalyptus cladocalyx*	13	20	25	New building/road	Normal	90/8/2	None obs.	Fair	25%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Weak attachments	Improbable	No	None observed	No	No	20%	Bow shaped trunk	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Remove	No	Remove - See notes	n/a	The tree has a bow shaped structure as a result of phototrophic growth.
18	*Eucalyptus cladocalyx*	36	75-80	50	New building/road	Normal	75/25/0	None obs.	Fair to poor	30%	Yes	Yes (20 % with max diameter 8 inches)	Waterspouts, "V" attachments, crossed limbs	Multiple dead limbs	Probable	No	None observed	No	No	20%	No main concerns	Improbable	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Remove deadwood	Yes - Internal Probing for rot	Remove deadwood and reduce canopy weight	2 years	Large tree on a steep slope. No soil heaving or lifting observed. The tree has multiple dead branches. However, due to an obscured view the level of
19	*Eucalyptus cladocalyx*	14	35-40	25-30	New building/road	Normal	95/5/0	None obs.	Fair	35%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Weak attachments	Possible	No	None observed	No	No	25%	Trunk wound/tear from previous failure	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree has an old wound/ branch tear @ 25 ft. above ground level. The attachment should be closely inspected during pruning activities. Should it be found to have cracks, breaks, or other structural inferiorities the tree should be removed.
20	*Eucalyptus cladocalyx*	6	20	10	New building/road	Normal	95/5/0	None obs.	Fair	15%	No	None observed	None	No main concerns	Improbable	No	None observed	No	No	0%	The tree is a resprout and overgrown old stump.	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Remove - See notes	No	Remove	n/a	The tree is a resprout from a previously removed tree. Current risk is low. However, as the tree ages and grows over the old stump the risk of failure
21	*Eucalyptus cladocalyx*	30	75-80	30-35	New building/road	Normal	98/2/0	Borers	Fair	5%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Weak attachments	Possible	Yes	None observed	No	No	15%	Old stem failure with large wound	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight. Remove limbs/secondary stems that have grown from the previous failure.	Yes - Internal Probing for rot and wound inspection at 15 feet.	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood. Remove limbs/secondary stems that have grown from the previous failure.	2 years	The tree has a history of branch failure. The wound at the site of the previous branch failure should be inspected for rot, breaks, and/or cracks. Should any structural inferiorities be found the tree may require removal.
22	*Eucalyptus cladocalyx*	30/14	70-75	40-45	New building/road	Low	80/20/0	Borers	Poor to very poor	20%	Yes	Yes (75% of the total canopy, max diameter 13 inches)	Waterspouts, "V" attachments, crossed limbs	Dead canopy	Probable	Yes	None observed	No	No	10%	Upper trunk of secondary dead	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	High	Remove	No	Remove	n/a	The tree is a large tree with significant canopy decline and dieback. The tree has a high risk rating and should be removed to mitigate the associated risk.
23	*Eucalyptus cladocalyx*	36	80-85	40-45	New building/road	Normal	100/0/0	None obs.	Good	35%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Weak attachments	Improbable	Yes	None observed	No	No	0%	Extensive woodpecker damage	Improbable	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree is general healthy and has fair structure. The tree has a history of branch failure and signs of woodpecker damage. Due to site history and the presence of woodpecker activity it is recommended that the tree is probed for rot.
24	*Eucalyptus cladocalyx*	38	70-75	30-35	New building/road	Normal	100/0/0	None obs.	Fair	45%	Yes	None observed	Waterspouts, "V" attachments, crossed limbs	Weak attachments	Possible	Yes	None observed	No	No	10%	Stem near old failure	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot. Inspect old failure wounds.	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	Tree has a history of branch failure and should be pruned to minimize branch end weight. Remove stem growth from the previous failure @ 20 ft. above ground level.
25	*Eucalyptus cladocalyx*	38	70-75	35-40	New building/road	Normal	90/10/0	None obs.	Fair	40%	Yes	Yes (45% of canopy, max diameter 8 inches)	Waterspouts, "V" attachments, crossed limbs	Dead limbs	Probable	Yes	None observed	No	No	0%	Dieback in secondary stem	Possible	Yes	3-4 inches	None obs.	No main concerns	n/a	Moderate	Remove	No	Remove	n/a	The tree is a large tree with significant canopy decline and dieback. The tree has a moderate risk rating and should be removed to mitigate the associated risk. Removal of the deadwood would leave an unbalance canopy.
26	*Eucalyptus cladocalyx*	20	65-70	30-35	New building/road	Normal	90/10/1	None obs.	Fair	40%	Yes	Yes (less than 1%, max diameter is 2 inches)	Waterspouts, "V" attachments, crossed limbs	Weak attachments	Improbable	No	None observed	No	No	0%	No main concerns	Improbable	Yes	3-4 inches	None obs.	Root rot in adjacent tree, may have spread	Possible	Low	Minimize canopy and branch weight.	Yes - Internal Probing for rot.	Reduce canopy load. Minimize water sprouts and weak attachments. Remove any deadwood.	2 years	The tree is immediately adjacent to a recent whole tree failure (within 5 feet). The adjacent tree failure was caused by a combination of wind, root, rot and tree size. Due to the proximity of the tree, and the presence of root rot, the tree should be internally
27	*Eucalyptus cladocalyx*	39	65-70	50-55	New building/road/power lines	Low	60/10/30	Borers	Poor to very poor	60%	Yes	Yes (35% of total canopy, Max diameter 9 inches)	Waterspouts, "V" attachments, crossed limbs	Multiple dead limbs	Probable	Yes	Yes	Yes	No	0%	Codominant stem	Improbable	Yes	3-4 inches	None obs.	No main concerns	N/a	Moderate	Remove	No	Remove	n/a	The tree is in poor health and has extensive dieback in the upper canopy. Due to the history of the site, health of the tree and associated risk it is recommended that the tree be removed.

ATTACHMENT 2

Tree Locations

DUDEK

Bonita Pump Station - Arborist Evaluation

Attachment 2

Tree Locations

ATTACHMENT 3

Photograph Log

Photograph 1 – View of tree #1

Photograph 2 – View of tree #1 and it's proximity to adjacent construction activities.

Photograph 3 – View of main stem (tree #1)

Photograph 4 – Alternate trunk view (tree #1)

Photograph 5 – View of main stem (Tree #’s 1 and 2)

Photograph 6 – View of tree #’s 1 and 2

Photograph 7 – View of main stems (tree #'s 1 and 2)

Photograph 8 – Close up view of trunk wound with conk (tree #2)

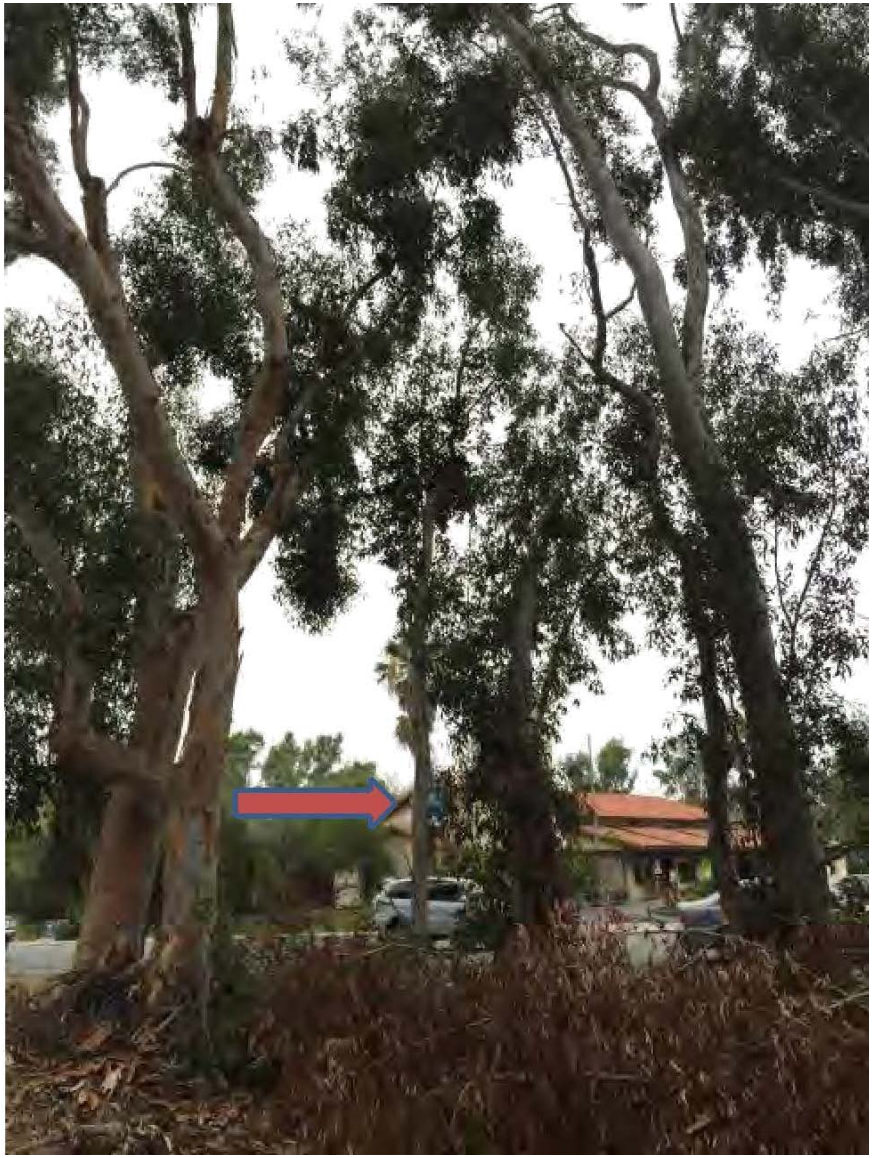
Photograph 9 – View of tree # 3

Photograph 10 – Close up view of trunk (tree #3)

Photograph 11 – View of tree # 4 (red arrow)

Photograph 12 – View of two main stems (tree # 4)

Photograph 13 – View of poor branch structure (tree # 4)



Photograph 14 – View of tree # 5

Photograph 15 – View of topped tree with poor architecture (tree #5)

Photograph 16 – View of tree #6

Photograph 17 – view of topped tree with poor branch architecture (tree #6)

Photograph 18 – Close up view of large basal wound with frass (tree #7)

Photograph 19 – Close up view of frass from borer activity (tree# 7)

Photograph 20 – View of tree # 7

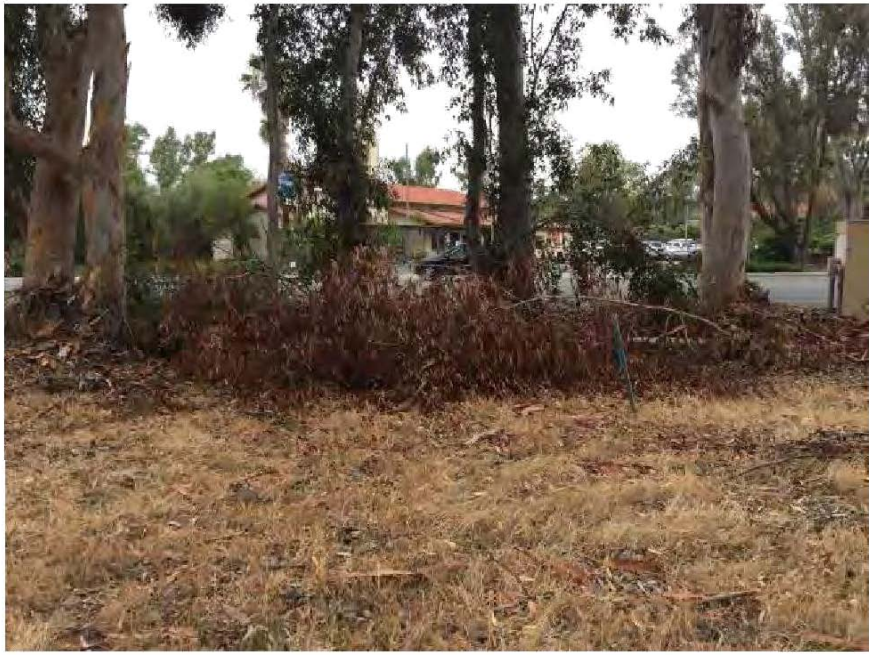
Photograph 21 – View of tree #8

Photograph 22 – View of main stem (tree #8)

Photograph 23 – View of basal wound (tree #8)

Photograph 24 – Close up view of basal wound with borer activity (tree #8)

Photograph 25 – View of tree #9



Photograph 26 – View of recent limb failure (tree #9)

Photograph 27 – View of breaking point of recent failure (tree #9)

Photograph 28 – View of poor branch architecture (tree #9)

Photograph 29 – Close up view of old basal wound (tree #10)

Photograph 30 – View of main stem (tree # 10)

Photograph 31 – View of tree lean over street (tree # 10)

Photograph 32 – View of canopy (tree # 11)

Photograph 33 – View of stem with seam (tree # 11)

Photograph 34 – View of tree #11

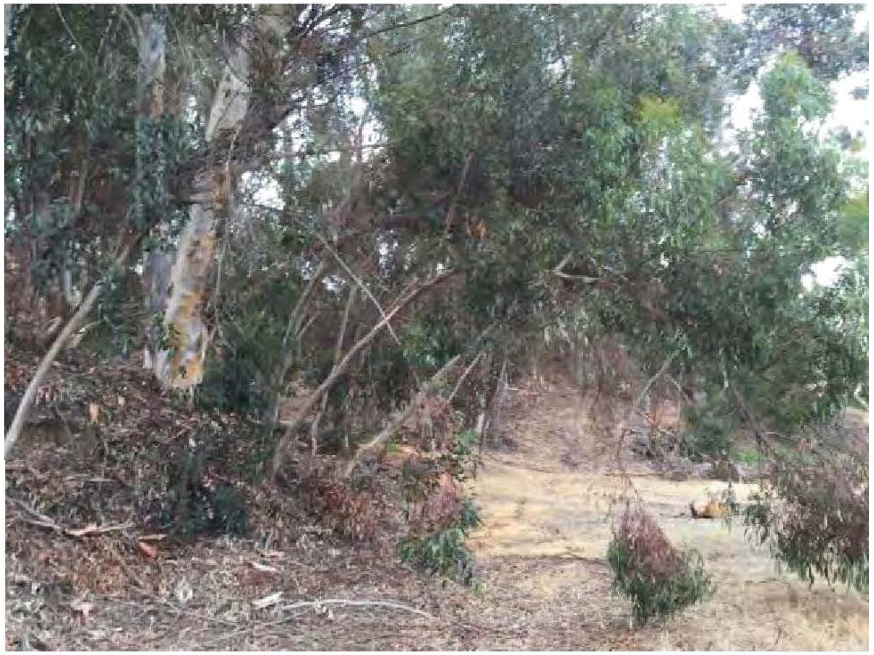
Photograph 35 - View of tree # 12

Photograph 36 – View of canopy (tree #12)

Photograph 37 – View of tree # 13 surrounded by Palo Verde

Photograph 38 – View of tree #14

Photograph 39 – Close up view of resprout and excessive leaf litter and debris (tree # 14)



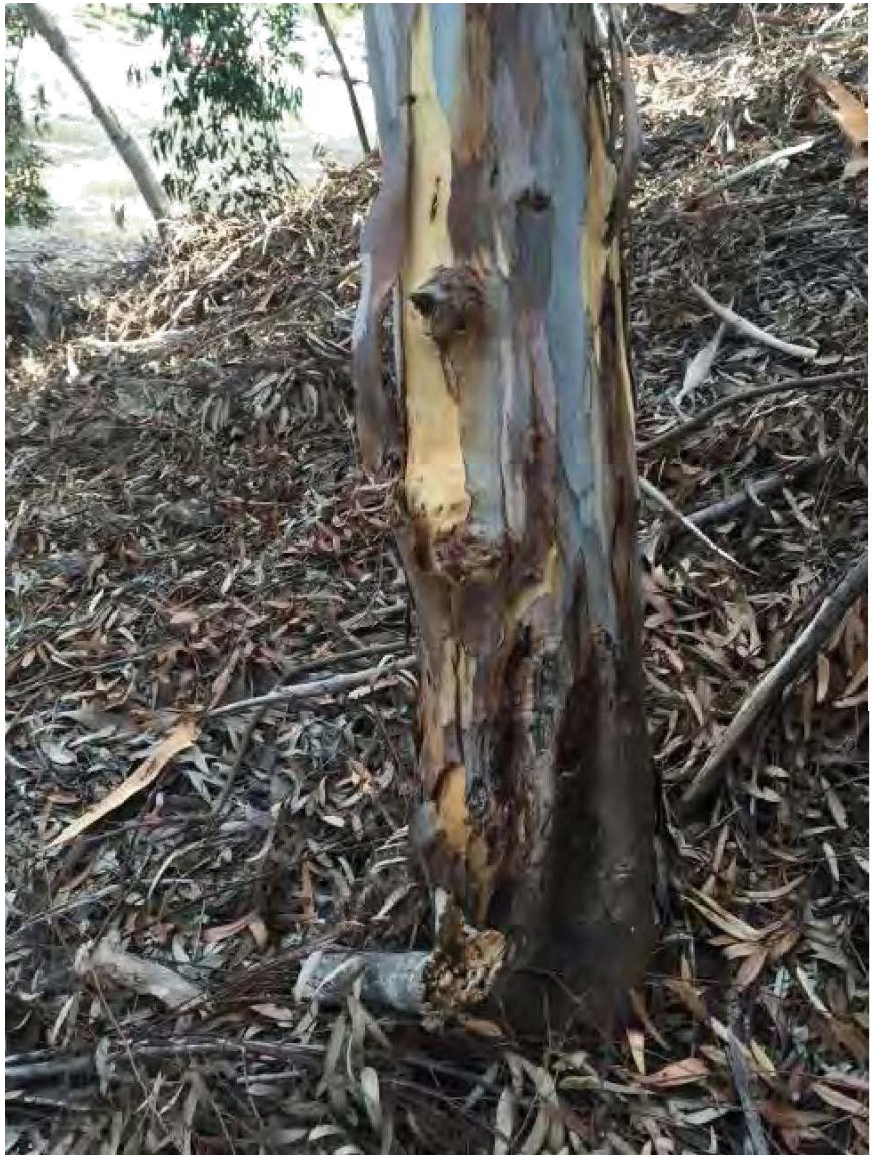
Photograph 40 – View of tree # 15

Photograph 41 – View of tree # 16

Photograph 42 – View of dieback in canopy (tree #16)

Photograph 43 – view of main stem on steep slope (tree #16)

Photograph 44 – View of previous branch failure and dead wood (tree # 16)



Photograph 45 – view of main stem (tree # 17)

Photograph 46 – View of tree # 17

Photograph 47 – View of tree # 18 exhibiting branch dieback

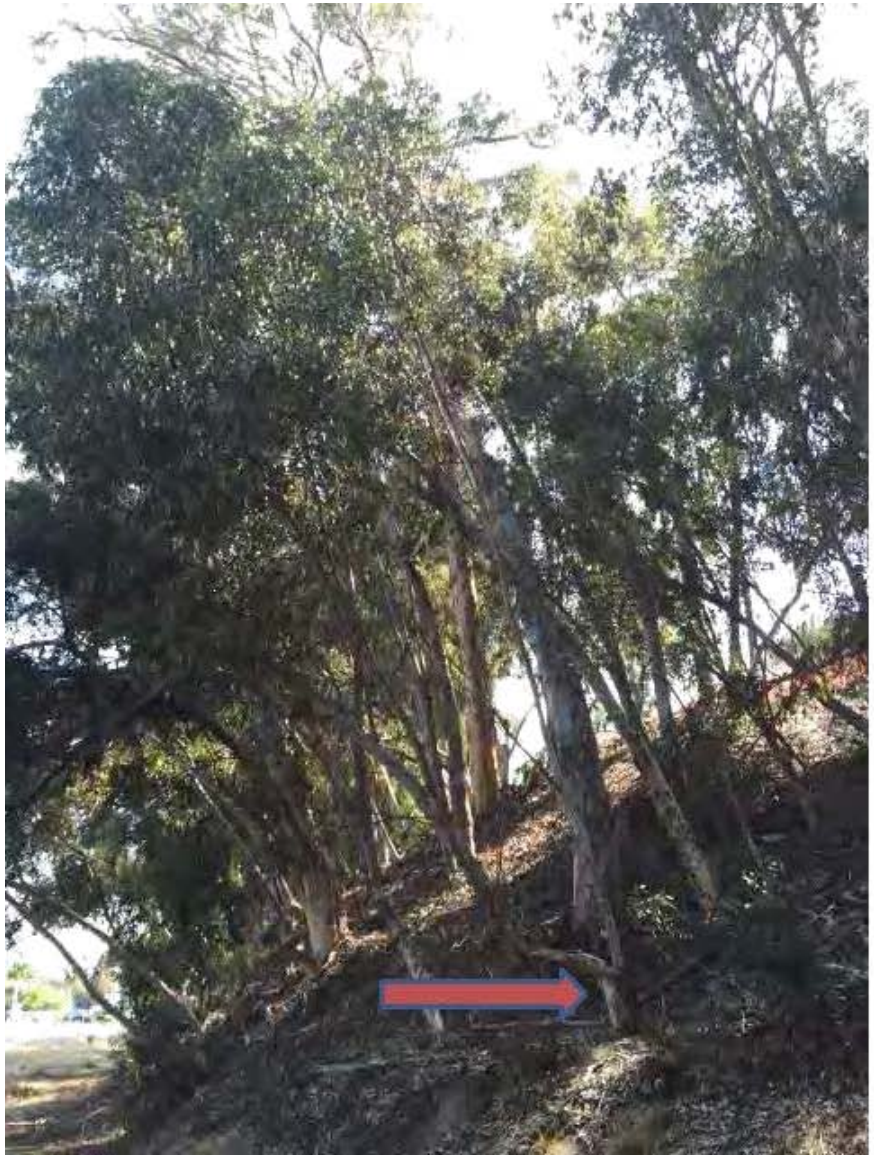
Photograph 48 – View of main stem on steep slope (tree # 18)

Photograph 49 – View of main stem (tree #'s 18 and 19)

Photograph 50 – View of damage trunk (tree # 19)

Photograph 51 – Close up view of re-sprout (tree # 20)

Photograph 52 – View of tree # 20



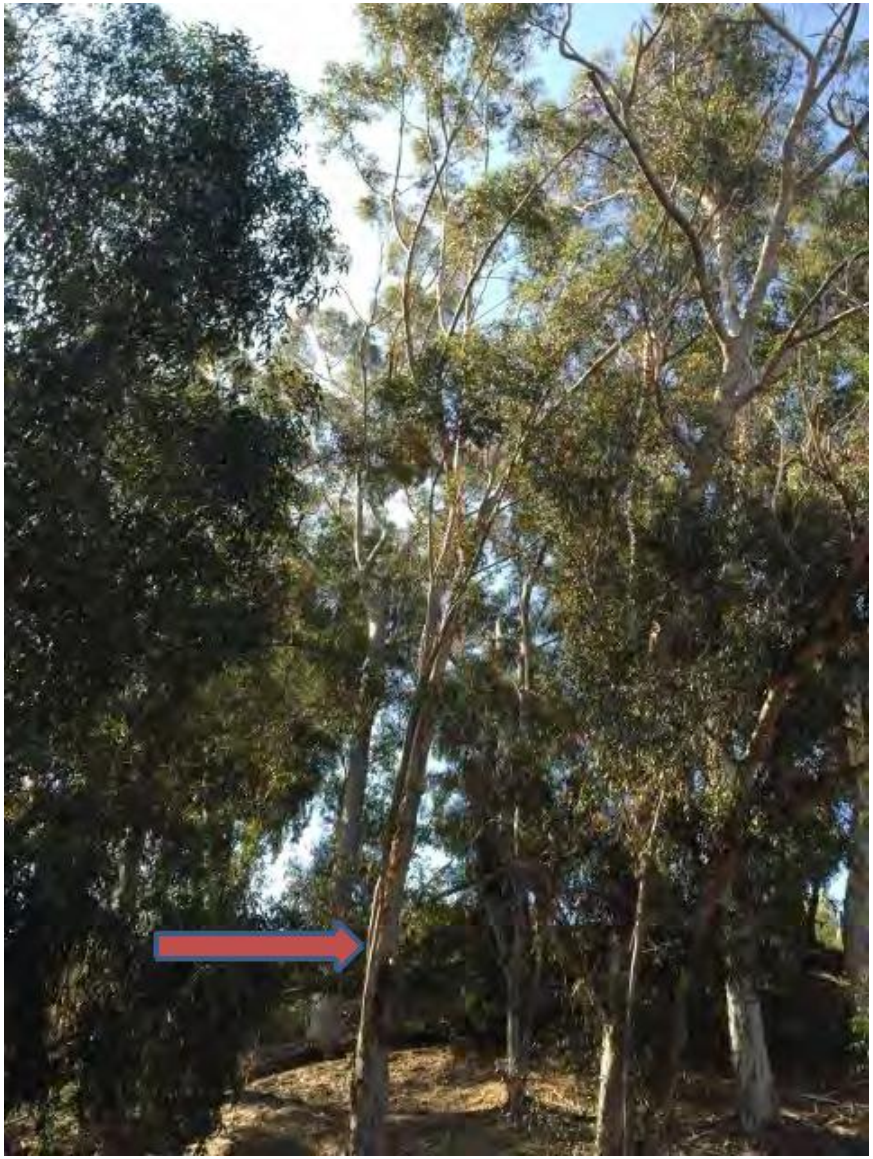
Photograph 53 – View of tree # 20

Photograph 54 – Close up view of borer damage (tree # 21)

Photograph 55 – Close up view of basal wound with borer damage (tree #21)

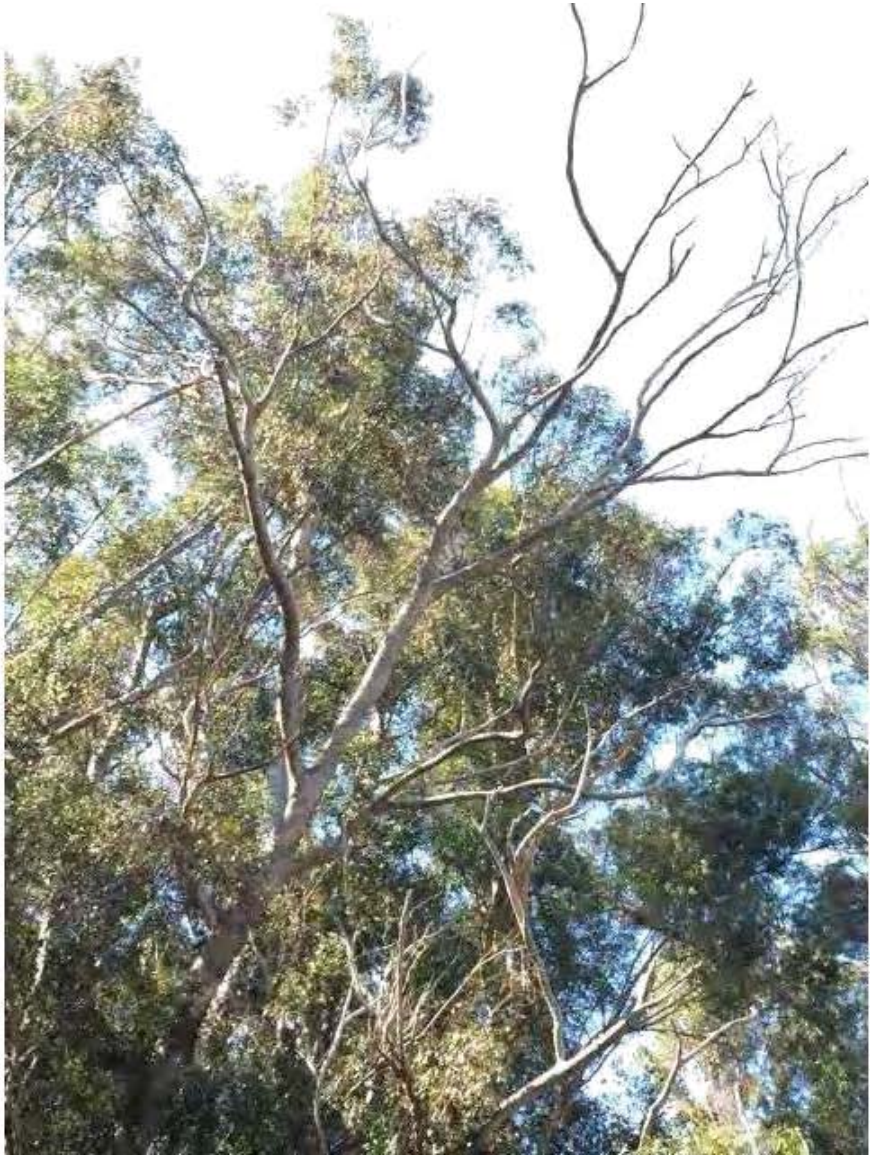
Photograph 56– View of basal wound (tree # 21)

Photograph 57 – View of stem failure and poor branch structure (tree 21)



Photograph 58 – View of tree # 21

Photograph 59 – View of tree # 22



Photograph 60 – View of dead canopy (tree # 22)

Photograph 61 – View of main stem (tree # 22)

Photograph 62 – View of tree # 23

Photograph 63 – View of main stem with woodpecker damage (tree # 23)

Photograph 64 - View of main stem with woodpecker damage (tree # 23)

Photograph 65 – View of previous branch failure (tree # 23)

Photograph 66 – View of tree # 24

Photograph 67 – View of main stem (tree # 23)

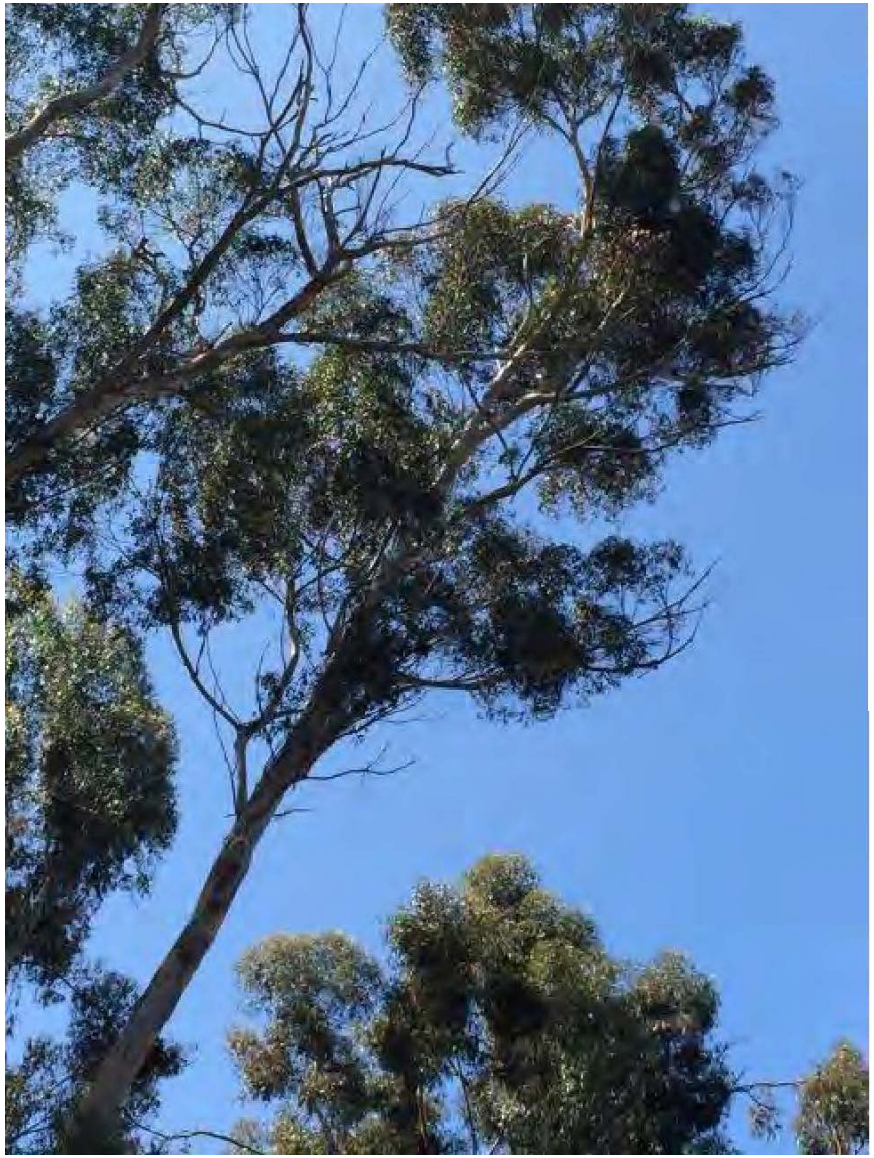
Photograph 68 – View of previous branch failure (tree # 23)

Photograph 69 – View of branch failure (tree #24)

Photograph 70 – View of tree # 25

Photograph 71 – View of canopy decline (tree #25)

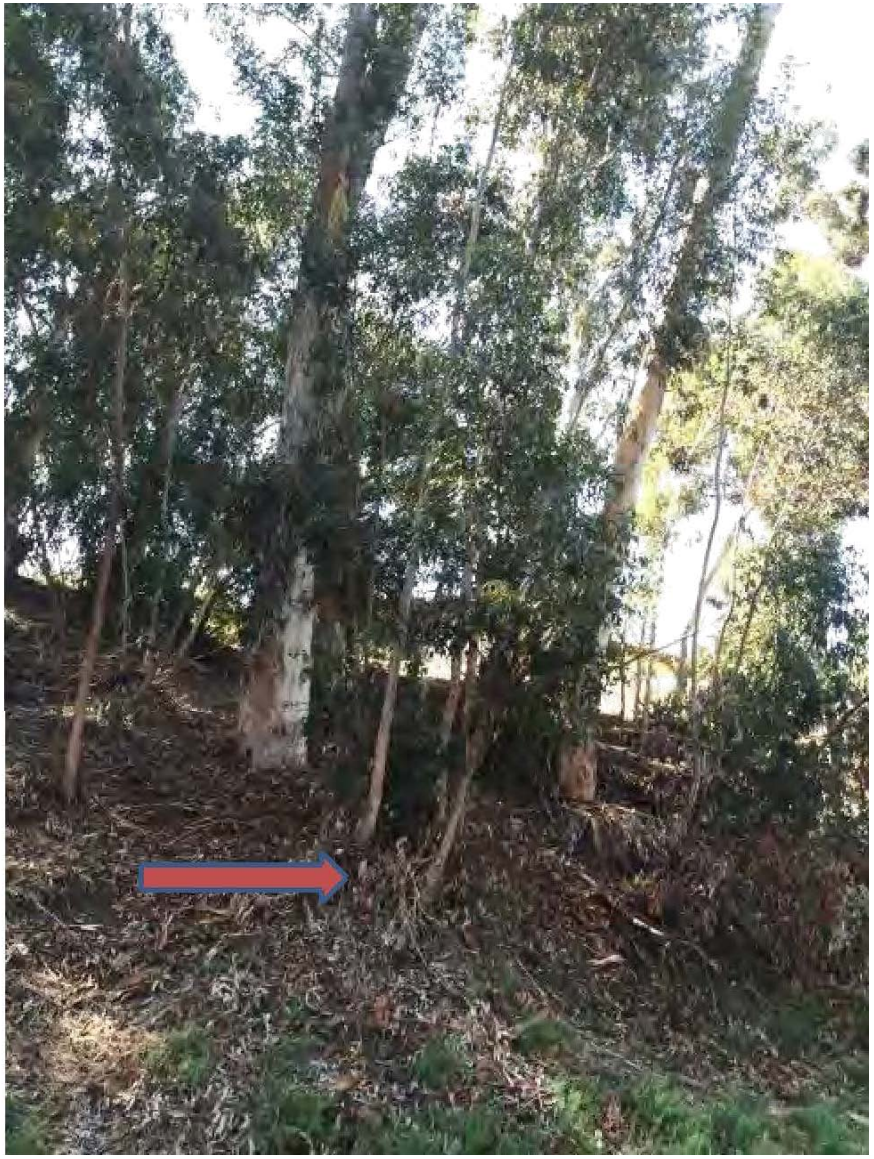
Photograph 72 – View of tree # 26 exhibiting lean



Photograph 73 - View of deadwood in canopy (tree # 26)

Photograph 74 – View of whole tree failure with root rot

Photograph 75 – Close up view of root rot on recent failure



Photograph 76 – View of stump sprout tree with poor structure

Photograph 77 – View of damage stump sprout from large limb failure

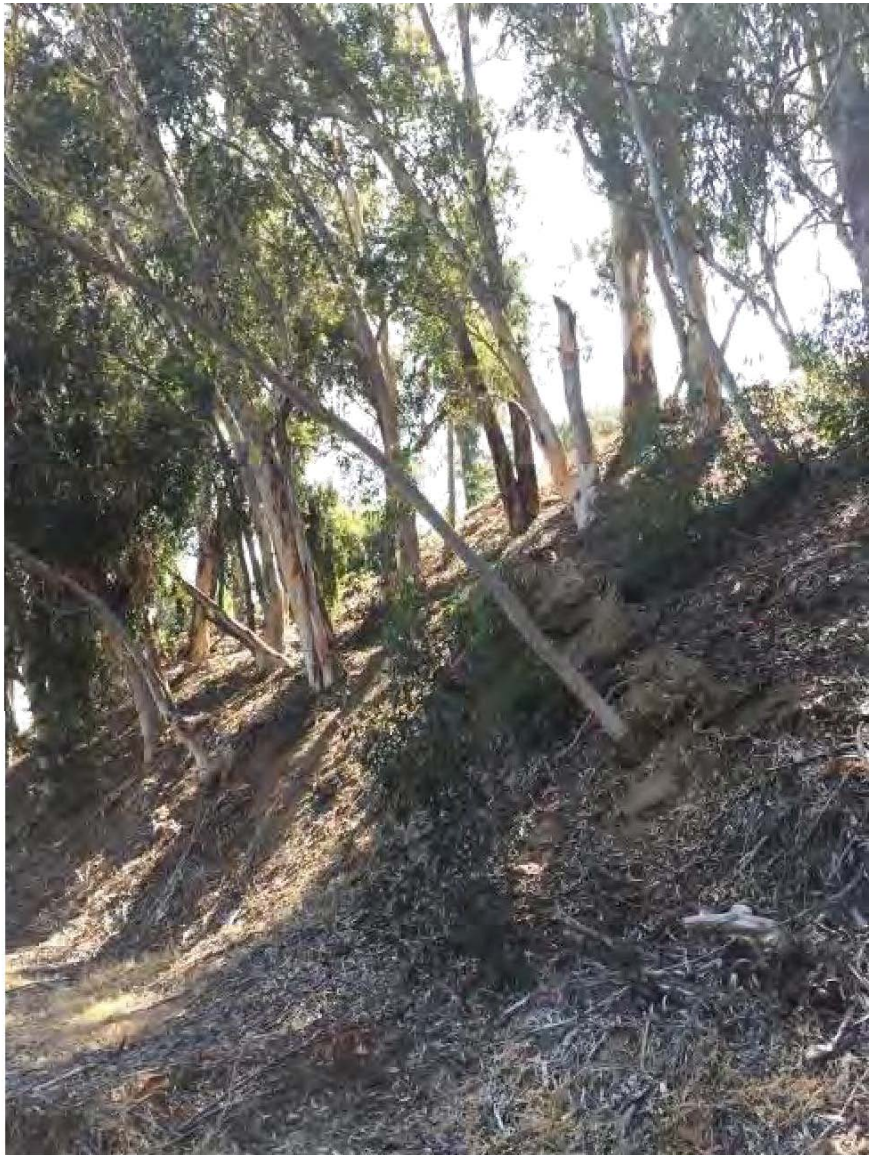
Photograph 78 – View of damage stumped sprout from recent large limb failure

Photograph 79 – Overview of tree #’s 1 - 13

Photograph 80 – Overview of tree #’s 21 - 26

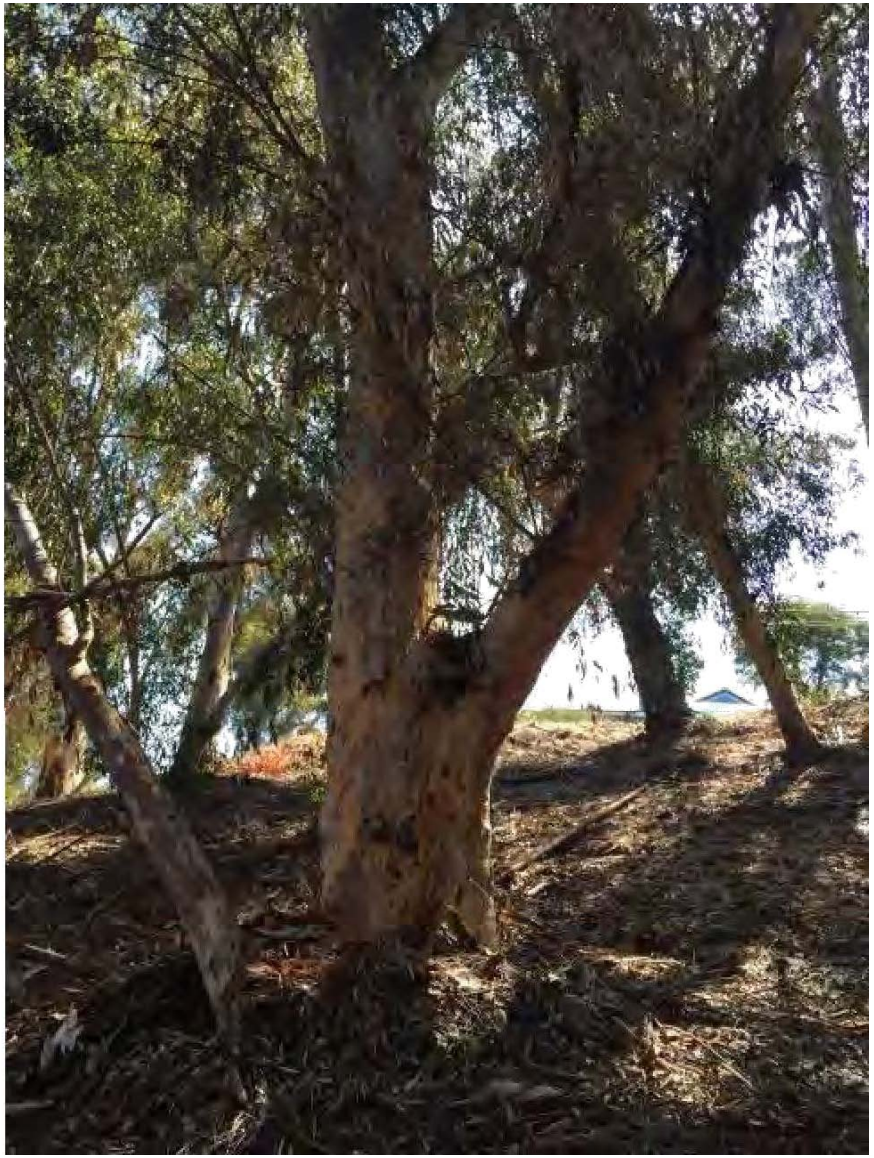
Photograph 81 – Overview of tree #’s 14 - 20

Photograph 82 – View of additional trees on steep slope. Large dead limb overhanging open area.



Photograph 83 – View of additional trees on steep slope

Photograph 84 – View of additional trees on steep slope



Photograph 85 – View of tree # 27

Photograph 86 – View of declining canopy (tree # 27)

Photograph 87 – View of tree # 27

Photograph 88 – View of recent failure with long horned beetle damage

Photograph 89 – View of recent tree failure

ATTACHMENT 4

Pruning and Maintenance Recommendations

Attachment 4 – Pruning and Maintenance Recommendations

Maintenance Recommendations

The following recommendations address long-term management of the trees. Trees recommended for pruning should follow ANSI A300 pruning standard. **Because of the** moderate to **high level of vehicular traffic and moderate pedestrian traffic near these trees, maintenance will need to be performed regularly. The primary objective should be to reduce hazards while promoting a natural appearance.**

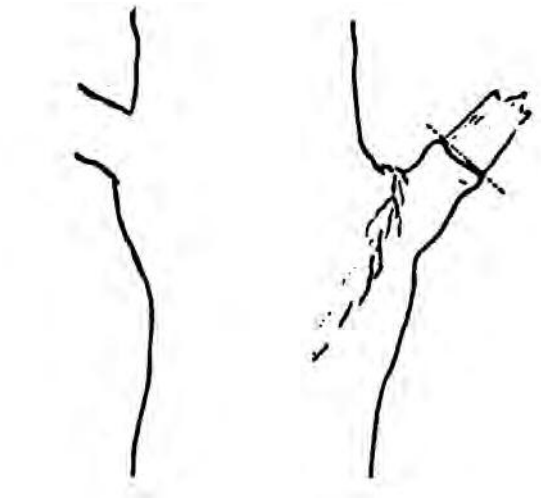
Pruning

Pruning should be performed primarily to reduce hazards and improve health and aesthetics. Pruning should promote a natural appearance. Avoid a manicured or sheared look. The ISA pruning guidelines should always be followed.

Of special concern are branches overhanging roadways and sidewalks**. These branches should be checked frequently for structural integrity, disease, etc. Lower branches interfering with safe clearance should be removed. Higher, heavy branches overhanging the road should be removed if structurally unsound or they should be lightened through proper thinning. Since trees have been known to unexpectedly drop branches, it is important to reduce the weight and provide greater airflow through limbs. After windstorms there is likely to be tree litter on the roadway that can interfere with safe traffic. The road should be inspected and any obstructions removed after each windstorm.**

The primary goal of pruning is to preserve the health, structural integrity, beauty, and longevity of the plant. Pruning should not be regarded as a means to alter the trees' natural character but rather as a means to compliment the natural form. If not performed properly, topping, stub cutting, and topiary pruning can create defects, reduce structural integrity, increase stress, lead to harmful insect and disease infestation, lower the tree's value, and waste both time and money.

As a rule, not more than 15% of the total foliage should be removed at anyone time. Removing too much of the canopy upsets the crown-to-root ratio and seriously affects the tree's food supply. A 20-year old tree has developed 20 years' worth of leaf surface area. This leaf surface is needed to manufacture sufficient food to feed and support 20 years worth of branches, roots and trunks. Severe pruning cuts off a major portion of the tree's food-making potential and depletes the tree's stored reserves. It is an open invitation for slow starvation.



<u>Dead, diseased or broken branches.</u> Remove the branch just *below* the diseased area. Cut *outside* the callus tissue that has begun to form (see Figure 1).

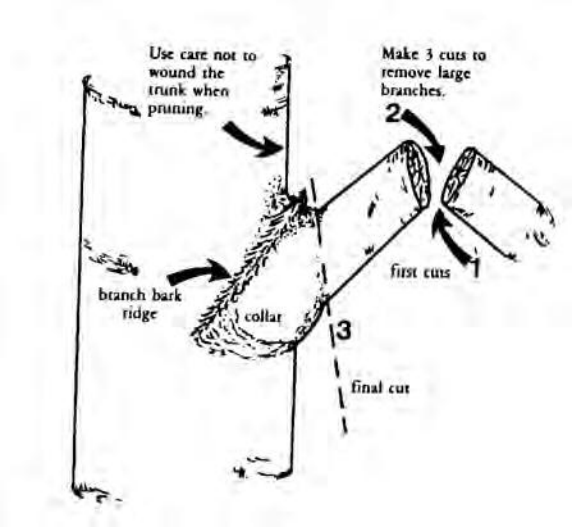
<u>Branches that obstruct</u> Remove or redirect branches so that they do not obstruct pedestrian or vehicular traffic along the roadway, and signs.

<u>Heavy foliage overhanging the road.</u> Reduce the canopy density by thinning selected branches that hang over the road from the inside. This will open up the tree, allowing wind to pass through.

Types of Cuts

<u>Internodal:</u> Cuts made between nodes on a branch stimulate regrowth just below the cut. Internodal cutting is useful on young trees to direct growth in a desired direction. This cut should <u>only</u> be used on branches less than a 1-inch diameter. If used on larger branches, weak, upright water-sprout growth will develop.

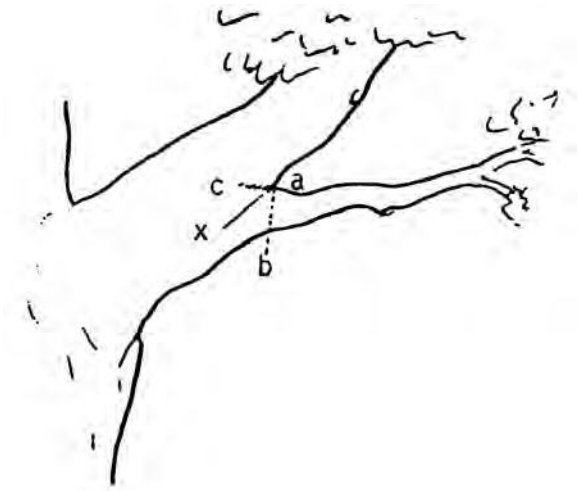
<u>Larger Branches:</u> For larger branches it is essential to remove the entire limb back to the branch collar. Do not leave stubs; stubs are entries for rot-causing fungi. Refer to Figure 2.



1. Cut the branch five to ten inches from the collar. This reduces the weight so the final cut will not tear. For heavy limbs, make a notch on the underside first.

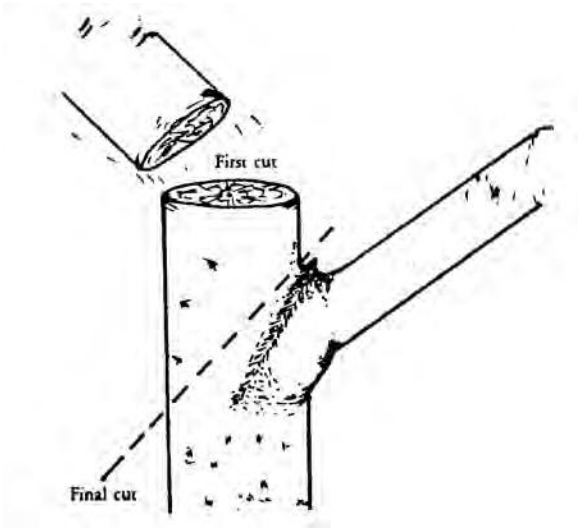
2. Locate the branch bark collar and bark ridge. The collar is the enlarged portion at the point of attachment. It is a natural defense area and should <u>never</u> be removed. The bark ridge runs from the crotch into the trunk (or limb).

3. Make a final cut as close as possible to the branch collar without injuring or removing it. All cuts should be made with sharp and disinfected tools.



4. If the collar cannot be located, the angle of the final cut to the trunk line (angle BAX) should approximate the angle of the branch bark ridge to the trunk line (angle CAX). Refer to Figure 3.

5. Do not paint the cuts. Wound dressings do not stop rot; they interfere with the natural healing process. A ring of living tissue will form around a correct cut after one growing season.



<u>Terminal Branches:</u> Shorten an upright branch/leader by cutting it back to a lateral growing in a suitable direction. This lateral will become the new leader. See Figure 4.

1. Select the desired lateral. It should be at least one-third the diameter of the terminal.

2. Stub cut the terminal 5-10 inches before the lateral.

3. Make a final cut <u>outside</u> the desired lateral's bark ridge. Do not remove or cut into the branch bark ridge. Do not paint the cut.

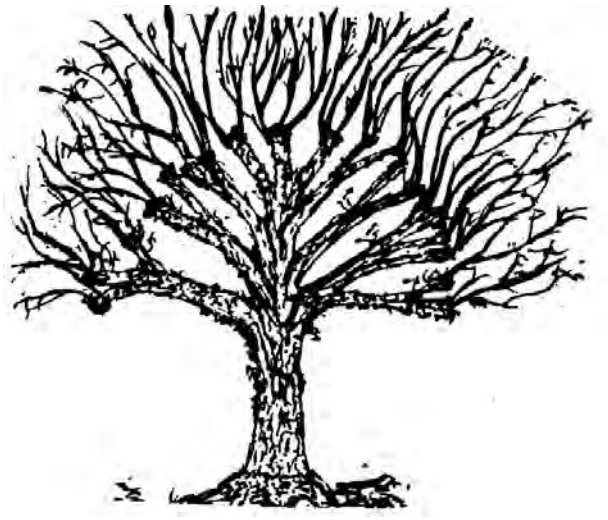
Proper pruning enables trees to heal quicker and more completely. This reduces infection and decay, lengthens the life of trees, and increases its beauty and value. Unnecessary or improper pruning is a waste of money and can be very harmful to a valuable resource.

Topping

Pruning generally should not be done to reduce the overall height of the trees or to keep all trees at some arbitrary height or spread. Topping is the drastic removal or cutting back of large branches. The tree is pruned like a hedge or rose bush and main branches are cut to stubs. Topping injures trees severely and is generally not an acceptable practice. (See Figure 5)

Topping disturbs the crown-to-root ratio and severely depletes the trees food-making potential. It is an open invitation for the trees' slow starvation. Large branch stubs seldom close or callus leaving the stubs vulnerable to insects and decay. Limited topping may be necessitated on trees affected by canopy dieback and is acceptable in these instances.

Topping stimulates the regrowth of structurally unsound, dense upright branches. These water sprouts are weak and more susceptible to disease and insects.



Since water sprout regrowth is generally rapid, a topped tree will grow back to its original height faster and denser than a properly thinned tree. Thus, topping at best, is only a temporary solution.

Topping disfigures the tree. The stubs, broom-like sprout growth, and pruning cuts are unsightly and mutilate its natural beauty.

If it is very obvious the tree has just been pruned, it has probably been pruned incorrectly.

Timing and Frequency of Pruning

Using a general rule, prune when the tree is naturally under the least amount of stress. Avoid pruning during the hot summer months as this increases the chance for sunburn damage. Sunburn areas are an open wound to disease and decay. Trees will produce water sprouts in reaction to the new light intensity in an effort to protect itself from scalding. This growth will often create more work during the next pruning cycle.

Because these trees are well established and generally mature, routine pruning should be performed on a three year pruning cycle. Any significant hazardous condition should be corrected immediately, regardless of the cycle or time of year.

Root Pruning

Protection of Existing Facilities: All utilities shall be carefully uncovered if located within the lines of excavation prior to starting root pruning to verify location. In the event utility conflicts exist, the Owner shall either arrange for utility owners to relocate the utility or adjust the proposed excavation. The Contractor's attention is directed to the utility notification service provided by UNDERGROUND SERVICE ALERT (USA). USA member utilities shall provide the Contractor with the location of their substructures in the area when the Contractor gives at least 48 hours notice to the Underground Service Alert by calling 1 (800) 227-2600. The Contractor is responsible for contacting utility companies directly to determine the location of their substructures. The site constraints must be considered throughout the prosecution of the root pruning operation.

Equipment: Contractors shall use only approved equipment during the root pruning operation. The contractor shall have, or be able to acquire through rental, root pruning (Dosko root pruner or equivalent) equipment to carry out root pruning operations. This equipment must be able to cleanly sever roots to a depth of eighteen (18) inches. Root pruning in areas inaccessible to root pruning machine shall be done by hand with approved tools.

Root Pruning: Except where specifically approved in writing beforehand, all root pruning shall be executed just inside and abutting the final grading or footing limit for each tree. No Pruning cuts shall be made within this distance. All pruning shall be conducted under supervision by an ISA Certified Arborist and shall adhere to ISA standards. All pruning cuts shall be clean and sharp, to minimize ripping, tearing, and fracturing of the root system. After proper pruning, cover exposed roots within thirty (30) minutes to minimize desiccation. Trenches shall be backfilled with site soil only. Root removal of greater than 20% of the total root system and/or the removal of structural buttress roots may result in tree decline and/or structural stability. As such, any tree requring root removal of greater than 20% of the total root system and/ or the removal of structural butress roots should be removed and mitigated according to approved replacement plans.

Tree Guying Subsequent to Root Pruning: Upon review of on-site root pruning, a ISA Certified Arborist shall determine if existing trees subject to root pruning should be guyed or otherwise stabilized. Contractor shall retain a qualified tree service company to complete tree guying and stabilization in accordance with National Arborist Association standards as referenced in Section 5.00.

Reference Standards and Guidelines: Contractor shall comply with applicable requirements and recommendations of the most current versions of the following standards and guidelines. Where these conflict with other specified requirements, the more restrictive requirements shall govern.

1. ANSI Z133.1-1988: American National Standard for Tree Care Operations
2. ANSI A300-1994: Standard Practices for Trees, Shrubs and Other Woody Plant Materials
3. NATIONAL ARBORIST ASSOCIATION STANDARDS: Pruning, Cabling and Bracing, Fertilization
4. GUIDE FOR PLANT APPRAISAL-8TH EDITION: Authored by the Council of Tree and Landscape Appraisers; published by the International Society of Arboriculture

5.1.3 Maintenance after Root Pruning

Irrigation: The first irrigation shall occur within 48 hours of root pruning. A soil probe shall be used to inspect and understand soil moisture and root absorption conditions. Do not irrigate if soil moisture is greater than 30% of soil moisture holding capacity. Contractors shall keep an eighteen (18) inch area around tree trunks dry at all times. Constantly moist rootball soils increase the risk for crown rot and other detrimental root and vascular diseases. Trees in turf grass areas must have their soil moisture levels monitored more closely.

Monitoring and Plant Health Care Program: An ISA Certified Arborist shall inspect the root pruned trees to ensure the integrity and continued survival of the impacted trees until construction operations commence. Monitoring visits shall be completed monthly. The Plant Health Care Program will include managing soil moisture, improving soil fertility, observing the trees' planting environment for stress factors, and inspecting the trees for early signs of disease and pest populations. Information acquired during monitoring will allow for the safest and best strategies for controlling pests and disease. Following each monitoring visit, a report summarizing site conditions, observations, tree health, and recommendations for promoting tree health shall be submitted.