APPENDIX A
FAUNAL COMPENDIA
INTRODUCTION TO FAUNAL SURVEY

Vertebrates identified in the field by sight, calls, tracks, scat, or other signs are cited according to the nomenclature of Collins (1997) for amphibians and reptiles, AOU (1998) for birds, and Jones et al. (1992) for mammals.

FAUNAL COMPENDIUM[1]

LEGEND

STATUS

\+ Presence of animals noted by direct sighting, call identification or observation of tracks, scat or other signs. Species without " + " are likely to occur on site.
* Non-native

TERRESTRIAL VERTEBRATES

AMPHIBIANS

PLETHODONTIDAE - LUNGLESS SALAMANDERS

Ensatina eschscholtzi
ensatina
Aneides lugubris
arboreal salamander
Batrachoseps nigriventris
black-bellied slender salamander
Batrachoseps pacificus
Pacific slender salamander

BUFONIDAE - TRUE TOADS

\+ *Bufo boreas*
western toad

HYLIDAE - TREEFROGS

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1 List includes species observed or expected to occur on or in the immediate vicinity of the site.

\+ *Pseudacris regilla*
Pacific treefrog

REPTILES

GEKKONIDAE - GECKOS

Coleonyx variegatus
San Diego banded gecko

IGUANIDAE - IGUANID LIZARDS

\+ *Sceloporus occidentalis*
western fence lizard
\+ *Uta stansburiana*
side-blotched lizard
Phrynosoma coronatum
coast horned lizard

SCINCIDAE - SKINKS

\+ *Eumeces skiltonianus*
western skink
Eumeces gilberti
Gilbert skink

TEIIDAE - WHIPTAIL LIZARDS

\+ *Cnemidophorus tigris*
western whiptail
Cnemidophorus hyperythrus
orange-throated whiptail

ANGUIDAE - ALLIGATOR LIZARDS

\+ *Gerrhonotus multicarinatus*
southern alligator lizard

ANNIELLIDAE - CALIFORNIA LEGLESS LIZARDS

Anniella pulchra
California legless lizard

LEPTOTYPHLOPIDAE - SLENDER BLIND SNAKES

Leptotyphlops humilis
western blind snake

BOIDAE - PYTHONS AND BOAS

Lichanura trivirgata
rosy boa

COLUBRIDAE - COLUBRID SNAKES

\+ *Diadophis punctatus*
ringneck snake
Coluber constrictor
racer
Masticophis flagellum
coachwhip
Masticophis lateralis
California whipsnake
Salvadora hexalepis
western patch-nosed snake
Arizona elegans
glossy snake
\+ *Pituophis melanoleucus*
gopher snake
Lampropeltis getulus
common kingsnake
Thamnophis hammondii
two-striped garter snake
Thamnophis sirtalis
common garter snake
Tantilla planiceps
California black-headed snake
Trimorphodon biscutatus
lyre snake
Hypsiglena torquata
night snake

VIPERIDAE - VIPERS

\+ *Crotalus viridis*
western rattlesnake
Crotalus michtelli
speckled rattlesnake

BIRDS

CATHARTIDAE - NEW WORLD VULTURES

\+ *Cathartes aura*

turkey vulture

ACCIPITRIDAE – HAWKS, KITES, EAGLES

\+ *Elanus leucurus*
white-tailed kite
Circus cyaneus
northern harrier
Accipiter striatus
sharp-shinned hawk
\+ *Accipiter cooperii*
Cooper's hawk
\+ *Buteo jamaicensis*
red-tailed hawk
\+ *Buteo lineatus*
red-shouldered hawk

FALCONIDAE - FALCONS

\+ *Falco sparverius*
American kestrel
Falco columbarius
merlin

PHASIANIDAE - PHEASANTS & QUAILS

\+ *Callipepla californica*
California quail

CHARADRIIDAE - PLOVERS

\+ *Charadrius vociferus*
killdeer

COLUMBIDAE - PIGEONS & DOVES

+* *Columba livia*
rock dove
Columba fasciata
band-tailed pigeon
\+ *Zenaida macroura*
mourning dove

CUCULIDAE - CUCKOOS & ROADRUNNERS

\+ *Geococcyx californianus*

greater roadrunner

TYTONIDAE - BARN OWLS

\+ *Tyto alba*
barn owl

STRIGIDAE - TRUE OWLS

Otus kennicottii
western screech-owl
\+ *Bubo virginianus*
great horned owl

APODIDAE - SWIFTS

\+ *Chaetura vauxi*
Vaux's swift
\+ *Aeronautes saxatalis*
white-throated swift

TROCHILIDAE - HUMMINGBIRDS

\+ *Archilochus alexandri*
black-chinned hummingbird
\+ *Calypte anna*
Anna's hummingbird
\+ *Calypte costae*
Costa's hummingbird
\+ *Selasphorus sasin*
Allen's hummingbird

PICIDAE - WOODPECKERS

\+ *Melanerpes formicivorus*
acorn woodpecker
Melanerpes lewis
Lewis' woodpecker
\+ *Picoides nuttallii*
Nuttall's woodpecker
Picoides pubescens
downy woodpecker
\+ *Colaptes auratus*
northern flicker

TYRANNIDAE - TYRANT FLYCATCHERS

+ *Contopus borealis*
  olive-sided flycatcher
  Contopus sordidulus
  western wood-pewee
+ *Empidonax difficilis*
  Pacific-slope flycatcher
  Empidonax oberholseri
  dusky flycatcher

+ *Sayornis nigricans*
  black phoebe
+ *Sayornis saya*
  Say's phoebe
+ *Myiarchus cinerascens*
  ash-throated flycatcher
+ *Tyrannus vociferans*
  Cassin's kingbird
+ *Tyrannus verticalis*
  western kingbird

HIRUNDINIDAE - SWALLOWS

Tachycineta bicolor
tree swallow
Tachycineta thalassina
violet-green swallow
+ *Stelgidopteryx serripennis*
  northern rough-winged swallow
+ *Hirundo pyrrhonota*
  cliff swallow
+ *Hirundo rustica*
  barn swallow

CORVIDAE - JAYS & CROWS

+ *Aphelocoma coerulescens*
  western scrub-jay
+ *Corvus brachyrhynchos*
  American crow
+ *Corvus corax*
  common raven

PARIDAE - TITMICE

\+ *Parus inornatus*
plain titmouse

AEGITHALIDAE - BUSHTITS

\+ *Psaltriparus minimus*
bushtit

SITTIDAE - NUTHATCHES

Sitta carolinensis
white-breasted nuthatch

TROGLODYTIDAE - WRENS

\+ *Thryomanes bewickii*
Bewick's wren
\+ *Troglodytes aedon*
house wren

MUSCICAPIDAE - KINGLETS, GNATCATCHERS, THRUSHES & BABBLERS

\+ *Regulus calendula*
ruby-crowned kinglet
\+ *Polioptila caerulea*
blue-gray gnatcatcher
\+ *Sialia mexicana*
western bluebird
Catharus ustulatus
Swainson's thrush
\+ *Catharus guttatus*
hermit thrush
\+ *Turdus migratorius*
American robin
\+ *Chamaea fasciata*
wrentit

MIMIDAE - THRASHERS

\+ *Mimus polyglottos*
northern mockingbird
\+ *Toxostoma redivivum*
California thrasher

BOMBYCILLIDAE - WAXWINGS

Bombycilla cedrorum
cedar waxwing

PTILOGONATIDAE - SILKY-FLYCATCHERS

\+ *Phainopepla nitens*
phainopepla

STURNIDAE - STARLINGS

+* *Sturnus vulgaris*
European starling

VIREONIDAE - VIREOS

Vireo solitarius
solitary vireo
\+ *Vireo huttoni*
Hutton's vireo
\+ *Vireo gilvus*
warbling vireo

EMBERIZIDAE- WOOD WARBLERS, TANAGERS, BUNTINGS & BLACKBIRDS

\+ *Vermivora celata*
orange-crowned warbler
\+ *Dendroica petechia*
yellow warbler
\+ *Dendroica coronata*
yellow-rumped warbler
\+ *Dendroica nigrescens*
black-throated gray warbler
\+ *Dendroica townsendi*
\+ Townsend's warbler
Dendroica occidentalis
\+ hermit warbler
Geothlypis trichas
\+ common yellowthroat
\+ *Wilsonia pusilla*
Wilson's warbler
\+ *Icteria virens*
yellow-breasted chat
\+ *Pheucticus melanocephalus*

black-headed grosbeak
+ *Piranga ludoviciana*
western tanager
+ *Guiraca caerulea*
blue grosbeak
+ *Passerina amoena*
lazuli bunting
+ *Pipilo crissalis*
California towhee
+ *Pipilo erythrophthalmus*
spotted towhee
+ *Aimophila ruficeps*
rufous-crowned sparrow
Spizella atrogularis
black-chinned sparrow
Amphispiza belli
sage sparrow
+ *Spizella passerina*
chipping sparrow
Pooecetes gramineus
vesper sparrow
Chondestes grammacus
lark sparrow
+ *Passerculus sandwichensis*
savannah sparrow
Passerella iliaca
fox sparrow
+ *Melospiza melodia*
song sparrow
+ *Zonotrichia atricapilla*
golden-crowned sparrow
+ *Zonotrichia leucophrys*
white-crowned sparrow
+ *Junco hyemalis*
dark-eyed junco
+ *Sturnella neglecta*
western meadowlark

ICTERIDAE - BLACKBIRDS

+ *Euphagus cyanocephalus*
Brewer's blackbird
+ *Molothrus ater*
brown-headed cowbird

\+ *Icterus galbula*
Hooded oriole
\+ *Icterus bullockii*
Bullock's oriole

FRINGILLIDAE - FINCHES

\+ *Carpodacus mexicanus*
house finch
\+ *Carduelis psaltria*
lesser goldfinch
\+ *Carduelis tristis*
American goldfinch

PASSERIDAE - OLD WORLD SPARROWS

***** *Passer domesticus*
house sparrow

MAMMALS

DIDELPHIDAE - NEW WORLD OPOSSUMS

+* *Didelphis virginiana*
Virginia opossum

SORICIDAE - SHREWS

+ *Sorex ornatus*
ornate shrew
Notiosorex crawfordi
desert shrew

TALPIDAE - MOLES

Scapanus latimanus
broad-footed mole

VESPERTILIONIDAE - EVENING BATS[1]

Myotis evotis
long-eared myotis
Myotis thysanodes
fringed myotis

Myotis volans
long-legged myotis
Myotis californicus
California myotis
Myotis leibii
small-footed myotis
Eptisicus fuscus
big brown bat
Lasiurus blossevillii
western red bat
Lasiurus cinereus
hoary bat
Euderma maculatum
spotted bat
Pipistrellus hesperus
western pipistrelle
Plecotus townsendii
Townsend's big-eared bat
Antrozous pallidus
pallid bat

MOLOSSIDAE - FREE-TAILED BATS[2]

Tadarida brasiliensis
Brazilian free-tailed bat
Eumops perotis
western mastiff bat

LEPORIDAE - HARES & RABBITS

\+ *Sylvilagus audubonii*
desert cottontail
Sylvilagus bachmani
brush rabbit
Lepus californicus
black-tailed jackrabbit

SCIURIDAE - SQUIRRELS

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2 The site is within the range of a number of bat species in several families, but it is unlikely that all are present. As their distribution varies according to season, and as the precise habitat requirements of each species are not well known, it is difficult to determine which species are present on the property.

\+ *Tamias merriami*
Merriam's chipmunk
\+ *Spermophilus beecheyi*
California ground squirrel
Sciurus griseus
western gray squirrel

GEOMYIDAE - POCKET GOPHERS

Thomomys bottae
Botta's pocket gopher

HETEROMYIDAE - POCKET MICE & KANGAROO RATS

Chaetodipus californicus
California pocket mouse
Dipodomys agilis
Pacific kangaroo rat

CRICETIDAE - NEW WORLD RATS AND MICE

Reithrodontomys megalotis
western harvest mouse
Peromyscus boylii
brush mouse
\+ *Peromyscus californicus*
California mouse
\+ *Peromyscus maniculatus*
deer mouse
Peromyscus truei
pinyon mouse
\+ *Neotoma fuscipes*
dusky-footed woodrat

MURIDAE - OLD WORLD MICE, RATS, AND VOLES

***** *Rattus rattus*
black rat
* *Mus musculus*
house mouse

CANIDAE - WOLVES & FOXES

+* *Canis familiaris*
domestic dog

\+ *Canis latrans*
coyote
\+ *Urocyon cinereoargenteus*
gray fox

PROCYONIDAE - RACCOONS

Bassariscus astutus
ringtail
\+ *Procyon lotor*
raccoon

MUSTELIDAE - WEASELS, SKUNKS & OTTERS

Mustela frenata
long-tailed weasel
Taxidea taxus
American badger
Spilogale gracilis
western spotted skunk
\+ *Mephitis mephitis*
striped skunk

FELIDAE - CATS

+* *Felis catus*
domestic cat
Lynx rufus
bobcat

EQUIDAE - HORSES

+ *Equus* sp.
domestic horse

CERVIDAE - DEER

\+ *Odocoileus hemionus*
mule deer

APPENDIX A
VASCULAR FLORA

Scientific Name	Common Name
FERN AND FERN-ALLIES	
BLECHNACEAE	DEER FERN FAMILY
Woodwardia fimbriata	Chain Fern
DENNSTAEDTIACEAE	BRACKEN FAMILY
Pteridiuum aquilinum	Western Bracken
DRYOPTERIDACEAE	WOOD FERN FAMILY
Dryopteris arguta	Coastal Wood Fern
EQUISETACEAE	HORSETAIL FAMILY
Equisetum hyemale ssp. affine	Tall Scouring-Rush
POLYPODIACEAE	POLYPODY FAMILY
Polypodium californicum	California Polypody
PTERIDACEAE	BRAKE FAMILY
Adiantum capillus-veneris	Southern Maidenhair
Aspidotis californica	California Lace Fern
Pellaea andromedifolia	Coffee Fern
Pellaea mucronata var. mucronata	Bird's Foot Cliff Brake
Pentagrama triangularis	Goldback Fern
SELAGINELLACEAE	SPIKE-MOSS FAMILY
Selaginella bigelovii	Bigelow's Mossfern
GYMNOSPERMS	
PINACEAE	PINE FAMILY
Pinus coulteri	Coulter Pine (cultivated)
*Pinus halepensis**	Cultivated Pine
ANGIOSPERMS-DICOTS	
ACERACEAE	MAPLE FAMILY
Acer negundo var. californica	Boxelder
AMARANTHACEAE	AMARANTH FAMILY
*Amaranthus albus**	Tumbleweed

Scientific Name	Common Name
ANACARDIACEAE	SUMAC OR CASHEW FAMILY
Malosma laurina	Laurel Sumac
Rhus integrifolia	Lemonadeberry
Rhus ovata	Sugar Bush
Rhus trilobata	Skunkbrush
*Schinus molle**	Peruvian Pepper Tree
Toxicodendron diversilobum	Poison Oak
APIACEAE	CARROT FAMILY
Apiastrum angustifolium	Mock Parsley
Bowlesia incana	American Bowlesia
*Conium maculatum**	Poison Hemlock
Daucus pusillus	American Carrot
*Foeniculum vulgare**	Sweet Fennel
Lomatium lucidium	Shiny Lomatium
Sanicula arguta	Snakeroot
Sanicula crassicaulis	Pacific Sanicle
Sanicula tuberosa	Sanicula
Tauschia arguta	Tauschia
APOCYNACEAE	Indian Hemp Family
*Apocynum cannabinum**	Indian Hemp
*Vinca major**	Periwinkle
ARALIACEAE	GINSENG FAMILY
*Hedra helix**	English Ivy
ASCLEPIADACEAE	MILKWEED FAMILY
Asclepias eriocarpa	Indiant Milkweed
Asclepias fascicularis	Narrow-leaf Milkweed
Sarcostemma cyanchoides ssp. hartwegii	Climbing Milkweed
ASTERACEAE	SUNFLOWER FAMILY
Acourtia microcephala	Acourtia
*Ageratina adenophora**	Ageratina/ Eupatorium
Ambrosia acanthicarpa	Annual Bur Weed
Ambrosia psilostachya	Western Ragweed
Artemisia californica	Coastal Sagebrush
Artemisia douglasiana	Mugwort

Scientific Name	Common Name
Artemisia dracunculus	Tarragon
Baccharis pilularis	Chaparral Broom
Baccharis salicifolia	Mule Fat
Brickellia californica	California Brickelbush
Brickellia nevinii	Nevin's Brickelbush
*Carduus pynocephalus**	Italian Thistle
*Centaurea melitensis**	Tocalote
*Centaurea solstitialis**	Yellow Star Thistle
Chaenactis artemisiaefolia	Artemisia-Leaved Pincushion
Chaenactis glabriuscula var. glabriuscula	Yellow Pincushion
*Chamomilla suaveolens**	Pineapple Weed
*Chrysantheum parthenium**	Feverfew
Cirsium occidental	Cobweb Thisle
*Conyza bonariensis**	Conyza
Conyza canadensis	Horseweed
*Cotula australis**	Cotula
Encelia californica	California Encelia
Ericameria pinifolia	Pine Goldenbush
Erigeron foliosus var. foliosus	Leafy Daisy
Eriophyllum confertiflorum	Golden Yarrow
Filago californica	California Fluffweed
*Filago gallica**	Narrow-Leaved Filago
Gnaphalium bicolor	Bicolored Cudweed
Gnaphalium californicum	California Everlasting
Gnaphalium canescens ssp. beneolens (= G. beneolens)	Everlasting
*Gnaphalium luteo-album**	Weedy Cudweed
Gutierrezia californica	California Matchweed
Hazardia squarrosa ssp. grindelioides	Saw-Toothed Goldenbush
*Hedypnois cretica**	Crete Hedypnois
Helianthus annuus	Common Sunflower
Helianthus gracilentus	Sunflower
Hemizonia fasciculata	Fascicled Tarweed
Heterotheca grandiflora	Telegraph Weed
Heterotheca sessiliflora ssp. fastigiata	Camphor Weed
*Hypochoeris glabra**	Smooth Cat's Ear
*Lactuca serriola**	Prickly Lettuce
Lessingia filaginifolia var. filaginifolia	California Aster
Malacothrix saxatilis var. tenuifolia	Cliff Malacothrix
*Picris echioides**	Bristly Ox Tongue
Rafinesquia californica	California Chicory

Scientific Name	Common Name
Senecio flaccidus var. douglasii (=S. douglasii)	Groundsel/Ragwort
*Senecio mikanioides**	German-Ivy
*Senecio vulgaris**	Common Groundsel
*Sonchus oleraceus**	Common Sow-thistle
Stebbinsoseris heterocarpa	Derived Microsersis
Stephanomeria cichoriacea	Stephanomeria
Stephanomeria virgata	Tall Wreath-Plant
Stylocline gnaphalioides	Everlasting Next Straw
Uropappus lindleyi	Silver Puffs
BETULACEAE	BIRCH FAMILY
Alnus rhombifolia	White Alder
BORAGINACEAE	BORAGE FAMILY
Amsinckia menziesii	Fireweed
Cryptantha clevelandii	Clevelands' Cryptantha
Cryptantha intermedia	Common Cryptantha
Cryptantha micromeres	Popcorn Flower
Cryptantha microstachys	Popcorn Flower
Cryptantha muricata	Prickly Cryptantha
Pectocarya linearis var. ferocula	Slender Pectocarya
Pectocarya peniciliiata	Pectocarya
Plagiobothrys collinus var. fulvescens (=P. californicus var. f.)	Popcornflower
Plagiobothrys nothofulvus	Rusty Popcornflower
BRASSICACEAE	MUSTARD FAMILY
*Brassica nigra****	Black Mustard
Cardamine californica	Milkmaids
Cardamine oligosperma	Toothwort
Erysimum capitatum	Western wallflower
Guillenia lasiophylla	California Mustard
Hirschfeldia incana (= Brassica geniculata)*	Shortpod Mustard
Lepidium nitidum	Peppergrass
Lepidium virginicum var. virginicum	Peppergrass
*Lobularia maritima**	Sweet Alyssum
*Sisymbrium irio**	London Rocket
*Sisymbrium officinale**	Hedge Mustard
*Sisymbrium orientale**	Sisymbrium
Thysanocarpus laciniatus	Southern Fringe-Pod

Scientific Name	Common Name
CACTACEAE	CACTUS FAMILY
Opuntia littoralis	Coastal Prickly Pear
CAMPANULACEAE	BELLFLOWER FAMILY
Triodanis biflora	Venus Looking-glass
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY
Lonicera subspicata var. *denudata*	Honeysuckle
Sambucus mexicana	Mexican Elderberry
Symphoricarpos mollis	Spreading Snowberry
CARYOPHYLLACEAE	PINK FAMILY
Cerastium glomeratum *****	Mouse-ear Chickweed
*Polycarpon tetraphyllum**	Four-leaved Allseed
*Silene gallica**	Common Catchfly
Silene laciniata ssp. major	Southern Pink
Silene multinervia	Many-Nerved Catchfly
*Spergula arvensis**	Stickwort/ Starwort
*Spergularia bocconii**	Boccone's Sand-Spurrey
*Stellaria media**	Common Chickweed
Stellaria nitens	Shining Chickweed
CHENOPODIACEAE	GOOSEFOOT FAMILY
Chenopodium ambrosioides *****	Mexican Tea
Chenopodium berlandieri	Pit-seed Goosefoot
Chenopodium californicum	California Goosefoot
*Salsola tragus**	Russian Thistle
CISTACEAE	ROCK-ROSE FAMILY
Helianthemum scoparium	California Rock-Rose
CONVOLVUACEAE	MORNING-GLORY FAMILY
Calystegia macrostegia ssp. *intermedia*	Short-Lobed Morning-Glory
CRASSULACEAE	STONECROP FAMILY
Crassula connata (= C. erecta)	Pygmy-weed
Dudleya lanceolata	Lance-leaved Dudleya
CUCURBITACEAE	GOURD FAMILY

Scientific Name	Common Name
Marah macrocarpus	Wild Cucumber
CUSCUTACEAE	DODDER FAMILY
Cuscuta californica	California Dodder
DITISCACEAE	DATISCA FAMILY
Datisca glomerata	Durango root
ERICACEAE	HEATH FAMILY
Arctostaphylos glandulosa ssp. *mollis*	Manzanita
Arctostaphylos glauca	Manzanita
EUPHORBIACEAE	SPURGE FAMILY
Chamaesyce melanadenia (=Euphorbia m.)	Prostrate Spurge
Chamaesyce polycarpa	Small-Seed Sandmat
Eremocarpus setigerus	Dove Weed
*Ricinus communis**	Castor Bean
Stillingia linearifolia	Stillingia
FABACEAE	LEGUME FAMILY
Acacia **sp.***	Wattle
Amorpha californica	False Indigo
*Cytisus striatus**	Broom
Lathyrus vestitus var. laetiflorus	Chaparral Sweet Pea
Lotus purshianus var. purshianus	Spanish Lotus
Lotus salsuginosus ssp. salsuginosus	Alkali Lotus
Lotus scoparius	Deerweed
Lotus strigosus (=L. tomentellus)	Hairy Lotus
Lotus wrangelianus (=L. subpinnatus)	Chile Hosackia/Trefoil
Lupinus bicolor	Miniature Lupine
Lupinus concinnus	Bajada Lupine
Lupinus hirsutissimus	Stinging Lupine
Lupinus sparsiflorus var. sparsifolius	Coulter's Lupine
Lupinus succulentus	Lupine
Lupinus truncatus	Collar Lupine
*Medicago polymorpha**	California Burclover
*Melilotus alba**	White Sweetclover
*Melilotus indicus**	Yellow Sweet Clover
*Robinia pseudo-acacia**	Locust Tree
*Senna artemisioides**	Australian Senna

Scientific Name	Common Name
Spartium junceum	Spanish broom
*Trifolium hirtum**	Rose Clover
Vicia villosa ssp. Varia	Hairy vetch
FAGACEAE	OAK FAMILY
Quercus agrifolia var. *agrifolia*	Coast Live Oak
Quercus agrifolia var. oxyadenia	Interior Coast Live Oak
Quercus berberidifolia	Scrub Oak
Q. berberidflia X Q. durata	Hybrid Scrub Oak
Quercus durata var. gabrielensis	Leather Oak
GARRYACEAE	SILK TASSEL FAMILY
Garrya veatchii	Silf tassel bush
GERANIACEAE	GERANIUM FAMILY
*Erodium botrys*****	Long-beaked Filaree
*Erodium cicutarium**	Red-stemmed Filaree
*Erodium moschatum**	White-Stemmed Filaree
*Geramnium rotundifolium**	Round-Leaf Geranium
GROSSULARIACEAE	GOOSEBERRY FAMILY
Ribes aureum	Golden Currant
Ribes malvaceum	Chaparral Currant
Ribes speciosum	Fuchsia-Flowered Gooseberry
HYDROPHYLLACEAE	WATERLEAF FAMILY
Emmenanthe pendulaflora	Whispering Bells
Eriodictyon crassifolium	Thick-leaved Yerba Santa
Eucryta chrysanthemifolia	Common Eucrypta
Nemophila menziesii	Baby Blue Eyes
Phacelia cicutarium	Caterpillar Phacelia
Phacelia distans	Common Phacelia
Phacelia minor	Wild Canterbury Bells
Phacelia ramosissima	Phacelia
Pholistoma auritum var. auritum	Blue Fiesta Flower
JUGLANDACEAE	Walnut Family
Juglans californica var. *californica*	Southern California black walnut

Scientific Name	Common Name
LAMIACEAE	MINT FAMILY
*Lamium amplexicaule*****	Common Henbit
*Marrubium vulgare**	Horehound
*Mentha spicata**	Spearmint
Salvia apiana	White Sage
Salvia columbariae	Chia
Salvia mellifera	Black Sage
Scutellaria tuberosa	Skull Cap
Stachys bullata	Hedge Nettle
Trichostema lanatum	Woolly Bluecurls
Trichostema lanceolatum	Vinegar Weed
LAURACEAE	LAUREL FAMILY
Umbellularia californica	California Bay
MALVACEAE	MALLOW FAMILY
Malacothamnus fasciculatus	Chaparral Mallow
*Malva parviflora**	Cheeseweed
MORACEAE	MULBERRY FAMILY
*Ficus caricsa*****	FIG FAMILY
*Morus alba**	Mulberry
MYRTACEAE	MYRTLE FAMILY
*Eucalyptus spp.**	Eucalyptus
NYCTAGINACEAE	FOUR O'CLOCK FAMILY
Mirabilis californica	California Wishbone Bush
OLEACEAE	OLIVE FAMILY
Fraxinus dipetala	Flowering Ash
*Olea europaea**	European Olive
ONAGRACEAE	EVENING PRIMROSE FAMILY
Camissonia bistorta	Southern Sun Cup
Cammissonia californica	False Mustard
Camissonia micrantha	Small Primrose
Clarkia ungiculata	Elegant Clarkia
Epilobium brachycarpum	Epilobium

Scientific Name	Common Name
Epilobium canum	California Fuschia
OROBANCHACEAE	BROOM-RAPE FAMILY
Orobanche bulbosa	Chaparral Broom-Rape
OXALIDACEAE	OXALIS FAMILY
*Oxalis pes-caprae**	Bermuda Buttercup
PAEONIACEAE	PEONY FAMILY
Paeonia californica	Peony
PAPAVERACEAE	POPPY FAMILY
Eschscholzia californica	California Poppy
Dendromecon rigida	Bush poppy
Papaver californicum	Fire Poppy
PLANTAGINACEAE	PLANTAIN FAMILY
Plantago erecta	California Plantain
*Plantago lanceolata**	English Plantain
*Plantago major**	Common Plantain
PLATANACEAE	SYCAMORE FAMILY
Platanus racemosa	Western Sycamore
POLEMONIACEAE	PHLOX FAMILY
Allophyllum divaricatum	False gilia
Eriastrum sapphirinum	Sapphire Eriastrum
Gilia angelensis	Los Angeles Gilia
Leptodactylon californicum	Chaparral Phlox
Navarretia hamata	Southern Hooked Navarretia
POLYGONACEAE	BUCKWHEAT FAMILY
Chorizanthe staticoides	Turkish Rugging
Eriogonum elongatum var. elongatum	Long-stemmed Buckwheat
Eriogonum fasciculatum var. foliolosum	Interior Flat-Top Buckwheat
*Polygonum arenastrum**	Common Knotweed
Pterostegia drymarioides	Pterostegia
*Rumex crispus**	Curly Dock
PORTULACACEAE	PURSLANE FAMILY

Scientific Name	Common Name
Calindrinia ciliata	Red Maids
Calyptridium monandrum	Common Calyptridium
Claytonia parviflora ssp. parviflora (=Montia perfoliata var. utahnesis)	Claytonia
Claytonia perfoliata	Common Miner's Lettuce
PRIMULACEAE	PRIMROSE FAMILY
*Anagallis arvensis******	Scarlet Pimpernel
RANUNCULACEAE	BUTTERCUP FAMILY
Clematis lasiantha	Pipestem Virgin's Bower
Delphinum cardinale	Scarlet Delphinum
Delphinium parryi ssp. parryi	Parry's Larkspur
Ranunculus hebecarpus	Pubescent Buttersup
RHAMNACEAE	BUCKTHORN FAMILY
Ceanothus crassifolius	Hoaryleaf Ceanothus
Ceanothus oliganthus	Green-Leaf Ceanothus
Rhamnus californica var. californica	California Coffeeberry
Rhamnus crocea	Spiny Redberry
Rhamnus ilicifolia	Holly-leaf Redberry
ROSACEAE	ROSE FAMILY
Adenostoma fasciculatum	Chamise
Cercocarpus betuloides	California Mountain Mahogany
Heteromeles arbutifolia	Toyon
Potentilla glandulosa ssp. glandulosa	Sticky Cinquefoil
Prunus ilicifolia	Holly-Leaved Cherry
Rubus ursinus	California Blackberry
RUBIACEAE	MADDER FAMILY
Galium angustifolium ssp. *angustifolium*	Chaparral Bedstraw
Galium aparine	Goose Grass
Galium porrigens	Climbing Bedstraw
SALICACEAE	WILLOW FAMILY
Populus balsamifera ssp. trichocarpa (=P. trichocarpa)	Black Cottonwood
Salix exigua (=S. hindsiana)	Narrow-Leaf Willow
Salix gooddingii	Goodding's Black Willow
Salix lasiolepis	Arroyo Willow
Salix lucida ssp. Lasiandra	Shining Willow

Scientific Name	Common Name
SCROPHULARIACEAE	FIGWORT FAMILY
Antirrhinum coulterianum	Coulter's Snapdragon
Antirrhinum kelloggi	Antirrhinum
Antirrhinum multiflorum	Snapdragon
Castilleja foliolosa	Felt Paintbrush
Keckiella cordifolia	Heart-Leaved Bush Penstemon
Mimulus aurantiacus	Bush Monkey Flower
Mimulus brevipes	Slope Semaphore
Mimulus cardinalis	Scarlet Monkey-Flower
Penstemon spectabilis	Showy Penstemon
Scrophularia californica	California Figwort
*Verbascum virgatum**	Woolly Mullein
SIMAROUBACEAE	SIMAROUBA FAMILY
*Ailanthus altissima**	Tree of Heaven
SIMMONDSIACEAE	JOJOBA FAMILY
Simmondsia chinensis	Jojoba
SOLANACEAE	NIGHTSHADE FAMILY
Datura wrightii	Jimson Weed
*Nicotiana glauca**	Tree Tobacco
Solanum douglasii	Douglas' Nightshade
Solanum xanti	Purple Nightshade
ULMACEAE	ELM FAMILY
Ulmus minor	English Elm
URTICACEAE	NETTLE FAMILY
Hesperocnide tenella	Dwarf Nettle
Parietaria hespera	Parietaria
VISCACEAE	MISTLETOE FAMILY
Phoradendron villosum	Hairy Mistletoe
ZYGOPHYLLACEAE	CALTROP FAMILY
*Tribulus terrestris**	Puncture Vine

Scientific Name	Common Name
ANGIOSPERMS-MONOCOTS	
ARECACEAE	PALM FAMILY
Washingtonia sp.*	Fan Palm
CYPERACEAE	SEDGE FAMILY
Carex sp.	Nut Sedge
Carex barbarae	Santa Barbara Sedge
Carex spissa	San Diego Sedge
Cyperus eragrostis	Tall Umbrella Sedge
*Cyperus involucratus**	African Umbrella Sedge
IRIDACEAE	IRIS FAMILY
Sisyrinchium bellum	Blue-Eyed Grass
JUNCACEAE	RUSH FAMILY
Juncus macrophyllus	Rush
Juncus textilis	Basket Rush
Juncus xiphioides	Iris-Leaved Rush
LILIACEAE	LILY FAMILY
Bloomeria crocea	Common Goldenstar
Calochortus plummerae	Plummer's Mariposa Lily
Chlorogalum pomeridianum	Wavy-Leaved Soap Plant
Dichelostemma capitatum	Blue Dicks
Lilium humboldtii ssp. ocellatum	Ocellated Humboldt Lily
Yucca whipplei	Our Lord's Candle
Zygadenus fremontii	Death Camas
POACEAE	GRASS FAMILY
Achnatherum coronatum (=Stipa c.)	Giant Needlegrass
Agrostis pallens	Bent Grass
Aristida purpurea var. parishii	Parish Three-Awn
*Avena barbata**	Slender Wild Oat
*Avena fatua**	Wild Oat
*Bromus diandrus**	Ripgut Grass
*Bromus hordeaceus**	Soft Chess
Bromus madritensis ssp. rubens (= B. rubens)*	Red Brome
*Cynodon dactylon**	Bermuda Grass
*Digitaria sanguinalis**	Crab Grass
Distichilis spicata	Salt Grass

Scientific Name	Common Name
*Ehrharta erecta**	Ehrharta
Elymus glaucus	Blue Wildrye
*Festuca pratensis**	Fescue
Hordeum murinum ssp. leporinum (=H. leporinum)*	Foxtail Barley
*Lamarckia aurea**	Goldentop
Leptochloa uninervia	Mexican Sprangletop
Leymus condensatus	Leymus
Melica imperfecta	Coast Range Melic
Muhlenbergia microsperma	Little-Seed Muhly
Muhlenbergia rigens	Deergrass
Nassella lepida	Foothill Needlegrass
Nassella pulchra	Purple Needlegrass
*Pennisetum setaceum**	Fountaingrass
*Piptatherum miliaceum**	Smilo Grass
*Poa annua**	Annual Bluegrass
Poa secunda ssp. secunda	One-Sided Bluegrass
*Polypogon monspeliensis**	Rabbitfoot Grass
*Schismus barbatus**	Mediterranean Grass
*Vulpia myuros**	Rattail Fescue
Vulpia octoflora (=Festuca o.)	Hairy Six Weeks Fescue

APPENDIX A
LICHEN FLORA

Acarospora schleicheri	Rare, on rock.
Caloplaca ulmorum	Rare, on granitic rock.
Candelaria concolor	Infrequent, on *Quercus agrifolia* and *Q. durata*.
Candelariella vitellina	Rare, on moss over rock.
Cladonia chlorophaea	Locally common on soil: roadbanks, rock scree slopes, and in deep canyons beneath shrubs.
Cladonia pyxidata	Uncommon, on soil in chaparral.
Cladonia coniocraea	Rare, in rock crevices in deep canyon.
Diploicia canescens	Rare, on *Quercus agrifolia.*
Flavoparmelia caperata	Rare, single, small thallus on *Quercus durata*.
Hyperphyscia adglutinata	Infrequent, on *Quercus agrifolia* and *Q. durata*.
Lecanora varia	Rare, on shrub branches.
Lepraria lobificans	Uncommon, on soil along roadbanks and under rock ledges.
Psora californica	Rare, on soil.
Physcia adscendens	Uncommon, on oaks, shrubs, and on rock.
Physconia enteroxantha	Rare, poorly developed thallus at base of *Quercus* in unburned chaparral.
Pyrrhospora quernea	Uncommon, on bark of *Ceanothus* in unburned chaparral.
Porpidia thomsonii	Uncommon, on granitic rocks.
Rhinodina cf. sophodes	Rare, on granitic rocks; mostly sterile.
Trapeliopsis cf. wallrothii	Rare, on soil among outcrops; mostly sterile.
Xanthoria fallax	Uncommon, on large oaks.

Infertrile brown or gray crusts on rock occur throughout the site and cannot be identified.

DRAFT

TREE INVENTORY AND
IMPACT ANALYSIS
FOR CANYON HILLS PROJECT
IN THE
CITY OF LOS ANGELES,
LOS ANGELES COUNTY,
CALIFORNIA

June 12, 2003

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3. Tree Inventory Plan
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5. Site Photographs
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A. Factors Evaluated in Determining Tree Health
B. Tree Data
C. Tree Canopy Regression Analysis

D. Optimal Protection Zone Formulas
E. Trunk Formula Method Evaluation Data

1.0 INTRODUCTION

A tree inventory of the Canyon Hills project site (the "project site") and the approximate southwest quarter of the Duke property in the Sunland/Tujunga area of the City of Los Angeles (the "City") was performed pursuant to (1) the Oak Tree Regulations described in Section 46.00 et seq. of the Los Angeles Municipal Code (the "LAMC") and (2) the "Instructions for Filing Tentative Tract Maps" (Items B.11 and B.12) issued by the City's Department of Planning. The Oak Tree Regulations and the Tentative Tract Map filing guidelines require that all oak trees with diameters at breast height (DBH) of eight inches or greater and other trees with DBHs of 12 inches or greater that are located within 100 feet of the proposed limits of disturbance be identified and mapped on a site plan. This inventory documents field surveys performed by Glenn Lukos Associates, Inc. for the purpose of satisfying these regulations and guidelines.

2.0 PROJECT DESCRIPTION

The proposed project is comprised of 280 single-family homes, an equestrian park and preserved open space in the Verdugo Hills area of the City. The Canyon Hills project site occupies 886.93 acres, of which approximately 234.32 acres would be subject to grading as part of project construction. The proposed project would incorporate storm water detention basins that would retain all nuisance runoff, thereby not affecting a change in the seasonally intermittent hydrology of the on-site water courses or off-site, downstream water courses.

The proposed project includes two distinct development areas. As depicted on the project site plan (see Exhibit 3), the development area on the north side of Interstate 210 includes approximately 142 acres of land ("Development Area A"), while the development area on the south side of Interstate 210 includes approximately 52 acres of land ("Development Area B"). The proposed primary access to Development Area A consists of an access road that would begin at the Interstate 210/La Tuna Canyon Road interchange and proceed in a westerly direction parallel to, and directly north of, Interstate 210, terminating at the southeast boundary of Development Area A.

However, the Draft Environmental Impact Report for the proposed project includes an alternative proposal pursuant to which the access road between the Interstate 210/La Tuna Canyon Road interchange and Development Area A would travel across the southwesterly portion of the adjacent Duke Property (the "Duke Access Alternative"). The footprint of the portion of the potential alternative access road on the Duke Property is approximately 6.0 acres. For purposes of this report, the Canyon Hills project site and the portion of the Duke Property described above are collectively defined as the "Study Area."

3.0 LOCATION

The Study Area is located in the Verdugo Mountains in the northern portion of the City near the communities of Sunland and Tujunga [Regional Map - Exhibit 1]. The project site is bisected by Interstate 210 and is bordered at its southern edge by La Tuna Canyon Road, at its eastern edge by open space and existing residential neighborhoods of southern Tujunga, at its northern edge by existing residential neighborhoods of Tujunga and Sunland, and at its western edge by natural open space in the Verdugo Mountains. The Duke Property lies immediately north of La Tuna Canyon Road at its Interstate 210 interchange and is adjacent to the eastern boundary of the project site.

The Study Area is located within: (1) a portion of the unsectioned Tujunga land grant as depicted on the U.S. Geological Survey (USGS) topographic maps Sunland, California [dated 1966 and photo-revised in 1988] and Burbank, California [dated 1966 and photo-revised in 1972]; (2) a portion of Sections 19 and 20, Range 13W, Township 2N as depicted on the Burbank, California quadrangle; and (3) a portion of Sections 23, 24, 25, and 26 Range 14W, Township 2N as depicted on the Burbank, California quadrangle [Vicinity Map - Exhibit 2].

4.0 METHODS

The tree inventory was conducted on June 4, 19, July 1, 10, 12, 16, 17, 19, 23, 24, 25, August 7, 8, 14, 15, 22, December 18, 27, and 30, 2002, and January 30, 31 and February 3, 2003 by Greg Everett, certified arborist (certification number WE-3977A), Rick Riefner, botanist, Dave Moskovitz, botanist, Justin Meyer, biologist, and Jeff Ahrens, biologist, and Martin Rasnick, Regulatory Specialist of Glenn Lukos Associates, Inc. Mr. Everett served as lead arborist for these surveys. Tom Larson, a Registered Consulting Arborist with Dudek and Associates, Inc., also participated in the preparation of this report and has inspected the Study Area.

Prior to commencement of field studies, existing maps and aerial photographs of the Study Area were reviewed to ensure that all areas with potential for supporting trees were examined. The Study Area incorporates a 100-foot-wide buffer zone extending outward from the edge of the development or road alignment footprints. However, two exceptions to the 100-foot-study-area rule exist:

1. The 100-foot buffer zone extended beyond the Canyon Hills property line at the proposed equestrian park site along La Tuna Canyon Road in the southwest portion of the project site. While oak trees were observed up the slope on the neighboring property to the immediate west of the equestrian park site, no authorization to enter the adjoining property was available.

2. At the eastern edge of the project site, several trees located within a poison oak stand were not included in this inventory. These trees are located on steep slope to the east of a streambed proposed for preservation (in the

vicinity of tree numbers 429-452). Their position on a slope that is not subject to grading or other construction disturbances makes a full accounting of the trees unnecessary, especially in light of the access problems associated with poison oak.

While in the field, pursuant to the LAMC, the location of each oak tree with a DBH of eight inches or greater and all other trees with DBHs of 12 inches or greater identified within the Study Area were recorded ("other" trees were limited to western sycamore (*Platanus racemosa*) because no trees in the Study Area other than the sycamore and the coast live oak (*Quercus agrifolia*) were found to have DBHs of 12 inches or greater).

The tree locations were recorded on a hand-held global position system (GPS) device and/or mapped directly on topographic maps. The Universal Transverse Mercator (UTM) coordinates were recorded electronically and duplicated in a notebook in case of the loss of the electronically-stored data. The UTM coordinates of each tree were later mapped by the project engineer using Geographic Information Systems (GIS) technology.

Subsequent to the production of a draft tree inventory map, GLA returned to the Study Area to verify the mapping accuracy of tree locations. The accuracy of the hand-held GPS unit is rated at ±21 to 45 feet. Therefore, tree locations were subject to field verification in order to provide for accurate assessment of both direct and indirect impacts to trees. Using a 200-scale topographic map with two-foot contour intervals and a 200-scale digitally produced aerial photograph, tree locations were either confirmed or corrected. Corrected tree locations were conveyed to the project engineer for remapping. Field verification of tree locations was conducted on December 18, 27 and 30, 2003 by Greg Everett and Rick Riefner.

Each tree encountered was consecutively numbered and tagged to ensure reproducibility and to avoid redundant counting. Numbered, metal tags were attached to each tree on its north side at approximately breast height (approximately 4.5 feet above the ground) using an aluminum nail. Where access to the north side of a tree was difficult either due to steep slopes or the presence of dangerous vegetation (i.e., poison oak [*Toxicodendron diversilobum*]), the tag was placed at or near breast height in a position that would be obvious to a person approaching on foot (due to the consistently difficult terrain, this latter option was frequently employed). Access to several trees was impossible due to either dense poison oak, steep terrain or both. In these instances, estimates of DBH and tree characteristics were recorded and noted as "estimated."

Tree size was measured using a diameter tape providing adjusted figures[1] for diameter measurements when wrapping the tape around an object's circumference. Diameter measurements were taken using protocol provided by the Council of Tree and Landscape Appraisers in the "Guide for Plant Appraisal," published by the

[1] Inches divided by 3.14 (π) provide diameter measurement in inches.

International Society of Arboriculture (Council of Tree and Landscape Appraisers, 2000). The DBH of each tree measurement was taken at a circumference at 4.5 feet above the ground along the trunk axis, with common exceptions. In cases where a tree's trunk was located on a slope, the 4.5-foot distance was approximated as the average of the shortest and longest sides of the trunk (i.e., the uphill side and downhill side of a tree's trunk, respectively) and the measurement was made at the circumference of the trunk at this point. When low branches interfered with a DBH measurement, the measurement was taken at the smallest trunk diameter below 4.5 feet. If branching was so low as to not allow a diameter measurement without interference from the trunk flare, then the measurement was performed at approximately breast height on each stem. In the case of multi-stemmed trees the trunk circumference of each trunk is measured at breast height (i.e., 4.5 feet above the ground).

Pursuant to the "Guide for Plant Appraisal," tree health was evaluated with respect to five distinct components of tree structure: roots, trunk, scaffold branches, small branches, and foliage. Each of these components was graded between 0 and 5, with 5 representing no problems and 0 representing extreme problems. Each component of the tree was assessed with regard to several criteria described in Appendix A. These criteria include factors such as insect, fungal or pathogen damage, mechanical damage, presence of decay, presence of wilted or dead leaves, and wound closure.

Tables 1, 2, and 3, located below in the Results section, provide summaries of the data collected in the field. Tables 1 and 2 provide breakdowns of the trees inventoried by DBH range and associated average overall rating. The DBH ranges or size classes provided herein are offered only for ease of interpreting tree data. The trees inventoried have been placed in three size classes for this purpose: medium, large and extra large. Medium trees have DBHs between 8 and 17 inches (between 12 and 17 for sycamores), large trees have DBHs between 18 and 35 inches, and extra large trees are greater than 36 inches in DBH.

Table 3 provides DBH figures for use in comparing the relative sizes of the trees inventoried. In order to provide a simple, useful comparison of the DBHs for multi-trunk trees and single-trunk trees, the trunk cross-sectional area (TA) represented by each DBH measurement for each stem on a multi-trunk tree is added together to get a composite trunk cross-sectional area or composite trunk area (CTA)(Council of Tree and Landscape Appraisers, 2000). This composite figure is then input into the formula for expressing trunk diameter based on cross-sectional area in order to provide a single figure DBH or composite DBH (CDBH) for any multi-trunk tree. This process is expressed by the following formula applied to a hypothetical three-stemmed multi-trunk tree:

Where $DBH_{stem\ 1} = 3$ inches, $DBH_{stem\ 2} = 4$ inches, and $DBH_{stem\ 3} = 5$ inches; *and*

where $TA = \pi r^2 = 3.14r^2 = 3.14*DBH^2 \div 2^2 = 3.14*DBH^2 \div 4 = 0.785*DBH^2$,

then $TA_{stem\ 1} = 7\ inches^2$, $TA_{stem\ 2} = 13\ inches^2$, and $TA_{stem\ 3} = 20\ inches^2$.

Then $CTA = TA_{stem\ 1} + TA_{stem\ 2} + TA_{stem} = 40\ inches^2$, *and*

where $CDBH = \sqrt{(CTA \div 0.785)}$,

then $CDBH = \sqrt{(40\ inches^2 \div 0.785)} = \sqrt{50.955} = 7.1\ inches$.

Thus, the hypothetical three-stemmed tree has a composite DBH of 7.1 inches. The rationale for this process becomes clear when comparing the alternate approach of directly adding DBH measurements for trunks on a multi-trunk tree to provide a single figure DBH. For example, the three stems on the hypothetical multi-trunk tree described above have a composite cross-sectional area of 40 inches.^{2} If the DBH measurements of all three stems were instead simply added together the result would be a DBH figure of 12 inches for this hypothetical three-stemmed tree, a DBH almost 5 inches greater than the composite DBH of 7.1 inches. The latter approach ignores the importance of cross-sectional area in valuing trees and provides all multi-trunk trees with much greater value, relative to DBH, than would be their actual contribution in terms of mass, foliage, and height. The method used herein results in comprehensible DBH measurements for comparing single-trunk and multi-trunk trees and is adapted from the "Guide for Plant Appraisal" prepared by the Council of Tree and Landscape Appraisers.

Table 2 also provides a single figure between 0 and 5 for rating the overall health of each tree, with 5 representing the highest possible value. This figure, the Overall Rating, represents a simple average of the health ratings for the five structural components observed in the field and recorded on the field data sheets (Appendix B provides transcriptions of the field data sheets). The Overall Rating value provides an at-a-glance rating for each tree. Nevertheless, for a more detailed understanding of each tree surveyed, the individual ratings and the notes describing specifics about tree health should be reviewed on the transcribed data sheets (Appendix B).

Canopy diameters were also measured for surveys that took place on July 23, 2002 or later. Canopy diameters for trees inventoried prior to July 23 were later estimated using a formula derived from a regression analysis of oaks and sycamores for which both DBH and canopy measurements were made. The regression analysis and resulting formula allows prediction of canopy diameters based on DBH measurements. The tree inventory data sheets (Appendix B) provide a "Canopy Diameter (measured)" column for the trees subject to field measurement of their canopy diameters and a "Canopy Diameter (estimated)" for trees whose canopy diameters were estimated using the regression analysis (the estimated canopy figures were created subsequent to the field work). Appendix C provides a copy of the Microsoft Excel graphic depiction of the relationship between DBH and canopy diameter and the resulting formulaic relationship for both coast live oaks and western sycamores.

Because the steep terrain made use of a tape measure for measuring canopy diameters very difficult and, in some cases, impossible, tree canopy diameters were typically estimated by "pacing-off" the measurement based on the investigator's knowledge of his stride length or by visually estimating the canopy width. The diameter measurements were always made along an imaginary line intersecting the tree trunk that best approximated the average canopy diameter.

5.0 RESULTS

5.1 Summary

A total of 425 oak trees with DBHs eight inches or greater were identified within the Study Area at the time of the surveys described herein. All of the oak trees identified in the Study Area were coast live oaks (*Quercus agrifolia*). No other trees of the *Quercus* genus subject to Section 46.00 et seq. of the LAMC were identified in the Study Area. Other *Quercus* species identified were limited to the shrubby leather oak (*Quercus durata* var. *gabrielensis*) and California scrub oak (*Quercus berberidifolia*), which are both multi-stemmed shrubs ranging from three to fifteen feet tall.

The only other tree species found in the Study Area with a DBH of 12 inches or greater was the western sycamore (*Platanus racemosa*). A total of 61 sycamores with DBHs 12 inches or greater were identified at the time of the surveys described herein.

A single black walnut (*Juglans californica*) was identified near tree number 216. However, this multi-stemmed immature tree was well below the minimum DBH measurement and therefore did not warrant inclusion in this inventory.

5.2 Study Area Description

The Study Area is characterized by steep terrain punctuated by narrow canyons and drainages. Plant communities associated with the rugged ridgelines and canyons primarily consist of chaparral with limited amounts of coastal sage scrub on the drier south-facing slopes. Steep canyons and the larger drainages support coast live oak woodlands. Two areas represent exceptions to the generally intact, undisturbed natural habitat found in the Study Area: (1) the existing horse corral area at the equestrian park site; and (2) the burned area within and adjacent to the Duke Property. Activities at the existing horse corral have resulted in compaction of the topsoil and degradation or loss of the native plant understory.

The burned area is located north of Interstate 210, within the southwest quarter of the Duke Property and a portion of the project site located approximately 500 to 800 feet from the western edge of the Duke Property. The native understory and sub-shrub vegetation in this area is poorly developed but has begun to recover. The native subshrubs and shrubs are providing continuous ground cover intermittently

throughout the burned area and may be expected to fully recover over an extended period of time.

5.3 Mapping, Data Reduction, and Impact Categories

The location of each tree identified in the Study Area is depicted on the attached maps. Exhibit 3 is a 200-scale depiction of the project site and tree inventory and Exhibit 4 is a detail map providing 100-scale enlargement of portions of the Study Area where a smaller scale is necessary to discern closely-spaced trees. These maps depict the oak trees in shades of green and sycamores in shades of orange, with darker shades of green or orange representing trees of greater DBH. As described in the Methods section, oaks were broken down into three size categories: (1) 8-inch to 17-inch; (2) 18-inch to 35-inch; and (3) 36-inch and greater. Sycamores were broken down into three size categories: (1) 12-inch to 17-inch; (2) 18-inch to 35-inch; and (3) 36-inch and greater. These categories are intended solely to provide the reader with a gross visual means of assessing the relative DBH of the trees depicted on the maps.

Representative photographs depicting these trees are included in Exhibit 5. Table 2, which follows the narrative descriptions below, provides a summary of each tree's composite DBH, number of trunks, its overall rating, as well as its status relative to impacts by the proposed project. Impact Status" is either: (1) "Preserved", indicating trees not subject to direct or indirect impacts from the proposed project and no mitigation measures are required to ensure protection during grading; (2) "Preserved w/MM", indicating trees whose proximity to the grading limits for the proposed project indicate potential for disturbance during grading, thereby requiring implementation of mitigation measures to eliminate or lessen indirect impacts; (3) "Impacted", indicating trees subject to unavoidable removal as part of the proposed project; or (4) “Impacted-Buffer”, indicating trees located within 20 feet of the grading limits for the proposed project and subject to potential impacts (see discussion on page 21 under “Impact Analysis”).

5.4 Results by Species

5.4.1 Coast Live Oak

The coast live oak (*Quercus agrifolia*) is an evergreen tree common to valleys and lower elevation mountain slopes of coastal California, from Mendocino County to northern Baja. This is a slow-growing tree that can, on rare occasions, exceed 200 years of age with the proper cultural conditions. It is not uncommon for trees of this age to reach 75 feet in height with a canopy over 100 feet wide. Its acorn production and large size lend itself well to support of a large number of invertebrate and vertebrate animal species. The dark green leaves are 0.8 to 4 inches long and are oval and convex with spiny margins. The acorns are 0.8 to 1.6 inches long and are elongated into a narrow cone with a pointed tip. The bark is smooth and gray on the outside and reddish on the inside, at the furrows in the bark (Elias, 1989; Pavlik et al., 1991).

The following tables summarize the quantity and average overall health rating of the coast live oaks within the Study Area by the three size categories:

Table 1. Summary of Total Coast Live Oak Survey Data

Size Category	No. of Trees	Average Overall Health Rating
8" – 17"	186	2.9
18" – 35"	224	3.0
36"+	15	3.1
Total	**425**	**2.96** *(weighted avg.)*

Table 1a. Summary of Impacted* Coast Live Oak Survey Data

Size Category	No. of Trees	Average Overall Health Rating
8" – 17"	93	2.9
18" – 35"	131	3.0
36"+	8	3.3
Total	**232**	**2.99** *(weighted avg.)*

**Trees classified as Impacted and Impacted-Buffer*
Note: See Appendix B, Tree Data, for detailed rating information.

Table 1 indicates that across the size categories, the average overall health ratings are similar, with the larger trees exhibiting slightly better overall health ratings. This is to be expected for this Study Area, as larger trees tend to endure fire better than younger trees due to thicker bark, higher scaffold branches, and lesser volumes of fuel beneath their more extensive and dense canopies. Table 1a further distills the survey data to consider only those trees that would be impacted by development, as discussed in Section 5.3 and shown on Table 3, below. Due to natural and anthropogenic impacts that have affected these trees over decades, these coast live oaks received an average overall rating of 2.96 and 2.99, respectively, with no tree receiving a rating higher than 3.8. Past fires have scarred and distorted trunks and lower scaffold branches on a majority of the trees, causing structural defects and compromising tree health. Heart

rot is also believed to be present on many of the oaks as this defect is common to coast live oaks and the presence of the cavities and calluses provide indirect evidence of its presence.

To place the 3.0 health rating in perspective, it is important to recognize the characteristics of trees that warrant higher health ratings of 4.0 to 5.0. These trees are most often found in managed landscapes where the effects of fire, drought, pests, disease, erosion, and vandalism have been eliminated. A tree with a condition rating of 4.0 or higher typically exhibits a balanced, well-spaced branch structure, full, even crown, and a healthy, unscarred tapered trunk. A highly rated tree has experienced no soil loss at its roots and no fill within its dripline. Well managed trees have been judiciously pruned to eliminate co-dominant leaders and narrow angles of attachment and their understory has been carefully managed to maximize the accumulation of leaf litter and the removal of dry vegetation that might carry fire to their trunk or canopy. Finally, a coast live oak of exceptional health may even receive irrigation during drought years where otherwise dry conditions might encourage pest damage or disease. Of course, none of the trees in the Study Area have been subject to such treatment, therefore high ratings would not be expected.
The mid- to low average health rating of the coast live oaks is primarily a manifestation of fire, drought, and age. Fire has affected the aesthetics and physiology of a majority of the coast live oak trees in the Study Area that would be impacted or preserved. Whether visible through recently charred scaffold branches or old trunk cavities, it is obvious that fire is a recurring event in this ecosystem. With respect to the trees that would be preserved, this fire damage may create potential structural issues in the future. Trees numbered 29-40 and 42-62 were recently damaged by fire and are now recovering (i.e., displaying new growth). Most of these trees exhibit damage to their canopies, with most showing at least minor damage to the lower scaffold branches. Because much of the new growth was still relatively immature at the time of the survey, few comments were made in the field notes regarding structural problems. However, it is expected that as many of these trees mature the re-growth of stump and stem sprouts will exhibit common structural defects such as narrow angles of attachment (also known as narrow crotch angles), co-dominant leaders, multiple branch attachments, included (embedded) bark, and stump decay. Pruning of these trees may avert many of these problems; however, such pruning would have to occur within the next two to four years in order to be most effective and would only be recommended or practical if these trees were within or immediately adjacent to public parks or trails where the long-term health and structural integrity of the trees were important due to public safety concerns. Trees with structural problems located away from public use areas do not require remedial pruning because failure (i.e., falling trees or dropped branches) of these remote trees would be very unlikely to cause injury to a person or property. Indeed, such limb drop and the subsequent decay of fallen logs is a natural process and should not be interrupted unless necessary for public safety concerns.

Trees numbered 381 – 410, in the vicinity of La Tuna Canyon Road were also severely fire damaged in the past, perhaps as long as twenty to forty years ago. Eighteen of these trees would be preserved. Almost all of these trees exhibit stump sprouting with

multiple branch attachments, co-dominant leaders and narrow angles of attachment that, while not causing trunk failure now, will undoubtedly increase the potential for failure as the trees develop larger diameters and the amount of included or embedded bark increases.

Many coast live oaks in the Study Area also exhibit cavities on the lower trunk, even in areas where no other outward signs of fire are present. While these cavities may have eliminated as much as 50 percent of the cross-sectional area of the trunk, the presence of the cavities rarely showed a clear association with a declining or unhealthy tree. In fact, a great portion of a tree's trunk can be lost to a cavity without necessarily affecting the vigor of a tree (Harris, 1983). However, structural stability incrementally decreases in proportion to the size of the cavity (Matthew and Breloer, 1999). Cavities do provide opportunity for decay and, absent core sampling or other testing, the presence of decay could not be ruled out for these trees and in fact should be expected.

The capacity for this woodland to productively regenerate is compromised by the terrain, microclimate, and proximity to urban areas. With development nearby, fires are not allowed to run their natural course, which encourages higher fuel loads from non-native vegetation. The Study Area is prone to intensive, hot burning wildfires because of its steep terrain and dense understory vegetation. These intense fires not only cause direct damage to both bark and deeper tissues of mature trees as described above, but also destroy any remnant oak seedlings and saplings. They also encourage the quick re-growth of non-native annuals which out-compete the native perennial herbaceous and woody plants in the oak tree understory.

Within the Study Area's micro-climate, precipitation is concentrated in the winter months; by late spring the annual plants have already begun to wither. The perennial native flora (including coast live oaks) has evolved to maximize growth and reproduction potential over the long, warm, dry growing season. Non-native annuals out-compete the more slow growing natives and effectively strip moisture from the upper soil horizons by the early spring. The native flora is able to take advantage of a wider range of pollinators (insect species populations typically fluctuate in differing cycles from the late winter to the early summer) and must maximize benefit from any unseasonal late spring and summer rains and fog drip. The young coast live oaks are very susceptible to this competition as the fast growing annuals can more effectively compete for limited moisture and limited sunlight in the oak forest understory. The result is a decreasing rate of regeneration of oaks and the concomitant skewing of the oak population to older, less vigorous trees. Eventually, these less vigorous trees suffer declining productivity (i.e., depressed acorn production over the long term and slower growth rates) and the overall health of any given stand of trees declines. Drought only exacerbates these phenomena, further serving to degrade the overall health of Southern California coast live oaks.

5.4.2 Western Sycamore

The western sycamore (*Platanus racemosa*) is a deciduous tree that grows along stream banks. This is a rapidly growing tree that can live well over 200 hundred years. It can grow to 100 feet tall and exhibits a spreading form with an open, generally rounded crown. Its height lends itself to nesting opportunities for birds; however, its fruit provides only a minor food source. The leaves are 4.7 to 10 inches long and wide with three to five lobes about half the length of the leaf. The leaves are light green and hairy on the upper surface. Its bark is generally smooth and mottled with gray, white, and tan colors (Elias, 1989).

61 western sycamores with DBHs of twelve inches or greater were identified within the study area. All but a few of these trees exhibit minor to severe damage from past fires. Consequently, many of the western sycamores throughout the study area exhibit significant cavities on their trunks or dieback of the lower canopy. Like the coast live oaks, some sycamores appear to have experienced loss of as much as 50 percent of their cross-sectional area at or below breast height due to fire damage. Unlike the oaks, however, the lack of vigor in many of the sycamores suggests that, at least of the time of the inventory, many of these trees have not fully recovered from the fire and appear to be in decline. As with the oaks, no attempt was made to probe for evidence of decay; however, unobserved decay is likely as many of the sycamores exhibit low health ratings.

Table 2 describes the quantity and average overall health rating of the 61 western sycamores by the three size categories. Table 2 indicates that over the three size categories, the overall health ratings were more varied than for the coast live oaks, with the smallest size category (12" – 17") exhibiting an overall health rating of 2.8, the middle category (18" – 35") exhibiting an overall rating of 3.0, and the two trees greater than 36" averaging 3.3. The lower average overall rating for the smallest sycamores supports the qualitative observation that the sycamores are less tolerant of fire damage than similar sized coast live oaks.

Table 2. Summary of Western Sycamore Survey Data

Size Category	No. of Trees	Average Overall Health Rating
12" – 17"	38	2.8
18" – 35"	21	3.0
36"+	2	3.3
Total	**61**	**2.9**

5.5 Summary Table

Table 3 provides a summary of the 486 trees (comprised of 425 coast live oaks and 61 western sycamores) subject to Section 46.00 et seq. of the LAMC and the Tentative Tract Map filing guidelines. The reader will note that Table 3 lists a total of 522 trees. However, 36 of those trees were determined to have DBH measurements less than the 8-inch or 12-inch standards prescribed for oaks or other trees, respectively. For the purpose of positive identification, references to the undersized trees have not been deleted from Table 3. Instead, under the Species Name column, the undersized tree's species name has been replaced with the word "*NO*" to indicate its failure to meet the DBH standard. It should also be noted that this tree inventory captures tree DBH measurements and health ratings at a moment in time. With few exceptions, the trees will continue growing and their health may vary over time.

Table 3. Summary of Tree Inventory Data

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
1	*Quercus agrifolia*	Preserved	28	1	3.6
2	*Quercus agrifolia*	Preserved	17	3	3.4
3	*Quercus agrifolia*	Impacted	20	1	2.4
4	*Quercus agrifolia*	Preserved	26	2	3.0
5	*NO*				
6	*Quercus agrifolia*	Preserved	11	1	3.6
7	*Quercus agrifolia*	Preserved	22	1	3.4
8	*Quercus agrifolia*	Impacted	32	3	3.0
9	*Quercus agrifolia*	Preserved w/MM	14	1	2.0
10	*Quercus agrifolia*	Preserved	23	1	3.4
11	*Quercus agrifolia*	Preserved	21	2	3.4
12	*Quercus agrifolia*	Preserved	16	1	3.4
13	*Quercus agrifolia*	Preserved	15	1	3.2
14	*Quercus agrifolia*	Preserved	38	6	3.8
15	*Quercus agrifolia*	Preserved	43	2	3.8
16	*Quercus agrifolia*	Preserved	9	1	3.2
17	*Platanus racemosa*	Preserved	18	2	2.4
18	*Platanus racemosa*	Preserved	13	1	3.6
19	*Quercus agrifolia*	Preserved	22	1	3.8
20	*Quercus agrifolia*	Preserved	20	1	3.8
21	*Quercus agrifolia*	Preserved	8	1	2.2
22	*Quercus agrifolia*	Preserved	16	2	3.8
23	*Quercus agrifolia*	Impacted	27	1	3.8
24	*Quercus agrifolia*	Preserved	20	1	3.2
25	*Quercus agrifolia*	Preserved w/MM	22	1	3.8
26	*Quercus agrifolia*	Preserved	14	1	3.2
27	*NO*				
28	*NO*				
29	*Quercus agrifolia*	Impacted-Buffer	20	1	2.4
30	*Quercus agrifolia*	Impacted	18	1	2.4

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
31	*Quercus agrifolia*	Preserved	13	1	2.4
32	*Quercus agrifolia*	Preserved	23	1	2.4
33	*Quercus agrifolia*	Preserved	21	1	2.4
34	*Quercus agrifolia*	Preserved	22	1	2.4
35	*Quercus agrifolia*	Preserved	29	1	2.6
36	*Quercus agrifolia*	Preserved	20	2	2.4
37	*Platanus racemosa*	Preserved	14	1	2.2
38	*Quercus agrifolia*	Preserved	23	1	2.2
39	*Quercus agrifolia*	Preserved	47	1	2.0
40	*Platanus racemosa*	Preserved	16	1	2.0
41	*NO*				
42	*Platanus racemosa*	Preserved	19	5	2.2
43	*Platanus racemosa*	Preserved	16	4	2.2
44	*Quercus agrifolia*	Preserved	8	1	2.0
45	*Quercus agrifolia*	Preserved	23	2	1.6
46	*Quercus agrifolia*	Preserved	21	3	2.2
47	*Quercus agrifolia*	Preserved	16	1	2.2
48	*Quercus agrifolia*	Preserved	19	3	2.2
49	*Quercus agrifolia*	Preserved	21	1	2.2
50	*Platanus racemosa*	Preserved	21	1	2.4
51	*Quercus agrifolia*	Preserved	28	1	2.4
52	*Quercus agrifolia*	Preserved	29	1	2.2
53	*Quercus agrifolia*	Preserved	30	2	2.8
54	*Quercus agrifolia*	Preserved	33	1	2.8
55	*Quercus agrifolia*	Preserved	10	1	2.4
56	*Quercus agrifolia*	Preserved	17	1	2.6
57	*Quercus agrifolia*	Preserved	14	1	2.6
58	*Quercus agrifolia*	Preserved	17	1	2.2
59	*Quercus agrifolia*	Preserved	30	2	2.2
60	*NO*				
61	*Quercus agrifolia*	Preserved	10	2	2.2
62	*Quercus agrifolia*	Preserved	25	2	3.0
63	*Quercus agrifolia*	Impacted	12	2	3.6
64	*Quercus agrifolia*	Impacted	15	3	3.6
65	*Quercus agrifolia*	Impacted	25	1	3.0
66	*Quercus agrifolia*	Impacted	26	4	3.2
67	*Quercus agrifolia*	Impacted	17	1	3.6
68	*Quercus agrifolia*	Impacted	8	1	2.2
69	*Platanus racemosa*	Impacted	14	1	2.2
70	*Platanus racemosa*	Impacted	13	1	2.2
71	*Quercus agrifolia*	Impacted	28	4	2.8
72	*Quercus agrifolia*	Impacted	9	1	2.2
73	*Quercus agrifolia*	Impacted	12	1	3.8
74	*Quercus agrifolia*	Impacted	8	1	3.4
75	*NO*				
76	*NO*				
77	*Quercus agrifolia*	Impacted	9	1	3.4
78	*NO*				

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
79	*NO*				
80	*Quercus agrifolia*	Impacted	9	2	3.2
81	*Quercus agrifolia*	Impacted	22	1	3.2
82	*Quercus agrifolia*	Impacted	20	1	3.4
83	*Quercus agrifolia*	Impacted	24	1	2.8
84	*Quercus agrifolia*	Impacted	22	2	2.6
85	*Quercus agrifolia*	Impacted	15	1	2.6
86	*Quercus agrifolia*	Impacted	31	3	2.6
87	*Quercus agrifolia*	Impacted	34	4	2.8
88	*Quercus agrifolia*	Impacted	21	1	3.6
89	*Quercus agrifolia*	Impacted	12	1	3.6
90	*Quercus agrifolia*	Impacted	8	1	2.8
91	*Platanus racemosa*	Impacted	18	2	2.6
92	*Quercus agrifolia*	Impacted	27	2	3.6
93	*Quercus agrifolia*	Impacted	27	2	3.4
94	*Quercus agrifolia*	Impacted	21	2	2.8
95	*Quercus agrifolia*	Impacted	25	8	3.6
96	*Quercus agrifolia*	Impacted	18	1	2.6
97	*NO*				
98	*Quercus agrifolia*	Impacted	30	1	3.8
99	*Quercus agrifolia*	Impacted	18	1	3.6
100	*Quercus agrifolia*	Impacted	12	1	3.8
101	*Quercus agrifolia*	Impacted	19	1	3.6
102	*Quercus agrifolia*	Impacted	28	2	3.2
103	*Quercus agrifolia*	Impacted	34	1	3.8
104	*Quercus agrifolia*	Impacted	14	1	3.6
105	*Quercus agrifolia*	Preserved	20	4	3.2
106	*Quercus agrifolia*	Preserved	9	4	2.4
107	*Quercus agrifolia*	Impacted-Buffer	8	2	2.6
108	*Quercus agrifolia*	Preserved w/MM	31	3	3.8
109	*Quercus agrifolia*	Preserved w/MM	15	1	3.4
110	*Platanus racemosa*	Impacted	13	1	3.8
111	*Quercus agrifolia*	Impacted	17	2	2.8
112	*Quercus agrifolia*	Impacted	20	1	3.8
113	*Quercus agrifolia*	Impacted	20	1	3.6
114	*Quercus agrifolia*	Impacted	14	1	3.4
115	*Quercus agrifolia*	Impacted-Buffer	29	1	3.4
116	*Quercus agrifolia*	Impacted	17	1	3.0
117	*Quercus agrifolia*	Impacted	27	1	3.4
118	*Quercus agrifolia*	Impacted	21	2	2.4
119	*Quercus agrifolia*	Impacted	19	1	2.6
120	*Quercus agrifolia*	Impacted	21	3	2.8
121	*Quercus agrifolia*	Impacted	23	1	3.2
122	*Quercus agrifolia*	Impacted	9	1	3.6
123	*Quercus agrifolia*	Impacted	32	3	3.4
124	*Quercus agrifolia*	Impacted	23	2	2.4
125	*Quercus agrifolia*	Impacted	30	2	3.8
126	*Quercus agrifolia*	Impacted	15	2	2.6

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
127	*Quercus agrifolia*	Impacted	15	2	3.2
128	*Quercus agrifolia*	Impacted	16	2	3.2
129	*Quercus agrifolia*	Impacted	16	1	3.2
130	*Quercus agrifolia*	Impacted	15	1	3.2
131	*NO*				
132	*Quercus agrifolia*	Impacted	12	3	2.2
133	*Quercus agrifolia*	Impacted	16	1	1.2
134	*Quercus agrifolia*	Impacted-Buffer	21	3	2.8
135	*Quercus agrifolia*	Impacted-Buffer	17	3	3.0
136	*Quercus agrifolia*	Preserved	16	1	3.6
137	*Quercus agrifolia*	Preserved	22	3	3.8
138	*Quercus agrifolia*	Preserved	17	1	3.4
139	*Quercus agrifolia*	Preserved	15	1	3.4
140	*Quercus agrifolia*	Preserved	27	2	3.0
141	*Quercus agrifolia*	Preserved	29	2	3.0
142	*Quercus agrifolia*	Preserved	14	1	3.2
143	*Quercus agrifolia*	Preserved	13	2	3.2
144	*Quercus agrifolia*	Preserved	10	1	3.4
145	*Quercus agrifolia*	Preserved	23	3	3.6
146	*Quercus agrifolia*	Preserved	13	1	3.4
147	*Quercus agrifolia*	Impacted	19	2	3.4
148	*Quercus agrifolia*	Impacted	31	2	3.4
149	*Quercus agrifolia*	Impacted-Buffer	14	1	2.4
150	*Quercus agrifolia*	Preserved	19	1	2.6
151	*Quercus agrifolia*	Impacted	17	1	3.4
152	*Quercus agrifolia*	Impacted	29	1	3.6
153	*Platanus racemosa*	Impacted	23	4	3.2
154	*NO*				
155	*NO*				
156	*Platanus racemosa*	Impacted	13	1	3.4
157	*Platanus racemosa*	Impacted	13	1	3.2
158	*Quercus agrifolia*	Impacted	37	2	3.8
159	*Quercus agrifolia*	Impacted	40	2	3.8
160	*Platanus racemosa*	Impacted	12	1	3.2
161	*Quercus agrifolia*	Impacted	12	1	3.0
162	*Quercus agrifolia*	Impacted	18	1	3.6
163	*Quercus agrifolia*	Impacted	30	1	3.8
164	*NO*				
165	*Quercus agrifolia*	Preserved	17	3	3.6
166	*Quercus agrifolia*	Preserved	10	1	3.8
167	*Quercus agrifolia*	Preserved	9	1	2.8
168	*NO*				
169	*Quercus agrifolia*	Preserved	16	3	2.6
170	*Quercus agrifolia*	Preserved	15	1	3.0
171	*Quercus agrifolia*	Preserved	12	1	3.2
172	*Quercus agrifolia*	Preserved	18	2	3.2
173	*Quercus agrifolia*	Impacted	17	1	3.6
174	*Platanus racemosa*	Impacted	21	1	3.6

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
175	*Quercus agrifolia*	Impacted	17	1	3.2
176	*Quercus agrifolia*	Impacted	19	1	3.8
177	*Quercus agrifolia*	Preserved w/MM	10	1	3.8
178	*Quercus agrifolia*	Preserved w/MM	14	2	3.0
179	*Quercus agrifolia*	Impacted	34	4	3.8
180	*Quercus agrifolia*	Impacted	20	1	3.8
181	*Quercus agrifolia*	Impacted	23	1	3.4
182	*Platanus racemosa*	Impacted	22	1	3.6
183	*Quercus agrifolia*	Impacted	29	1	3.0
184	*Quercus agrifolia*	Impacted	19	1	3.8
185	*Quercus agrifolia*	Impacted	24	1	3.8
186	*Quercus agrifolia*	Impacted	13	1	3.8
187	*Quercus agrifolia*	Impacted	23	2	3.8
188	*Quercus agrifolia*	Impacted	27	3	2.8
189	*Quercus agrifolia*	Impacted	19	1	3.4
190	*Quercus agrifolia*	Impacted	36	4	3.6
191	*Quercus agrifolia*	Impacted	13	1	3.8
192	*Quercus agrifolia*	Impacted	8	1	3.2
193	*Quercus agrifolia*	Impacted	25	2	3.0
194	*Quercus agrifolia*	Impacted	24	1	3.8
195	*Quercus agrifolia*	Impacted	25	1	3.8
196	*Quercus agrifolia*	Impacted	21	1	3.6
197	*Platanus racemosa*	Impacted	15	1	3.6
198	*Quercus agrifolia*	Impacted	8	1	3.2
199	*Quercus agrifolia*	Impacted	24	1	3.6
200	*Quercus agrifolia*	Impacted	23	1	3.2
201	*Quercus agrifolia*	Impacted	33	1	3.8
202	*Quercus agrifolia*	Impacted	17	1	3.6
203	*Platanus racemosa*	Impacted	22	1	3.8
204	*Quercus agrifolia*	Impacted	12	1	3.6
205	*NO*				
206	*Quercus agrifolia*	Impacted	11	1	3.6
207	*Quercus agrifolia*	Impacted	15	2	3.6
208	*Platanus racemosa*	Impacted	17	1	3.8
209	*Platanus racemosa*	Impacted	16	1	3.0
210	*Quercus agrifolia*	Impacted	24	1	3.6
211	*Platanus racemosa*	Impacted	15	1	2.6
212	*Quercus agrifolia*	Impacted	29	1	2.4
213	*Quercus agrifolia*	Preserved w/MM	22	2	3.0
214	*Quercus agrifolia*	Impacted	34	1	3.6
215	*Quercus agrifolia*	Impacted	25	1	3.4
216	*Quercus agrifolia*	Impacted	15	1	3.2
217	*Quercus agrifolia*	Impacted	16	1	3.4
218	*Quercus agrifolia*	Impacted	15	1	3.2
219	*Quercus agrifolia*	Impacted	13	1	3.4
220	*Platanus racemosa*	Preserved w/MM	14	1	3.6
221	*Quercus agrifolia*	Preserved w/MM	8	1	3.2
222	*NO*				

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
223	*Quercus agrifolia*	Preserved w/MM	21	1	3.8
224	*Quercus agrifolia*	Impacted	16	1	3.4
225	*NO*				
226	*Quercus agrifolia*	Impacted	19	1	3.6
227	*Quercus agrifolia*	Impacted	10	2	3.8
228	*Quercus agrifolia*	Impacted	11	1	3.8
229	*Quercus agrifolia*	Impacted	11	2	2.4
230	*Quercus agrifolia*	Preserved	9	1	2.6
231	*Quercus agrifolia*	Preserved	18	1	2.8
232	*Quercus agrifolia*	Preserved	22	1	3.4
233	*Platanus racemosa*	Preserved	15	1	2.6
234	*Quercus agrifolia*	Preserved w/MM	11	1	1.6
235	*Quercus agrifolia*	Preserved w/MM	25	2	2.4
236	*Quercus agrifolia*	Impacted-Buffer	14	2	2.4
237	*NO*				
238	*Platanus racemosa*	Impacted	16	1	2.8
239	*Quercus agrifolia*	Impacted-Buffer	24	1	3.0
240	*Quercus agrifolia*	Impacted	13	2	2.6
241	*Quercus agrifolia*	Impacted-Buffer	28	1	3.2
242	*Quercus agrifolia*	Impacted	22	2	3.6
243	*Quercus agrifolia*	Preserved w/MM	18	2	2.8
244	*Quercus agrifolia*	Preserved	17	1	3.6
245	*Quercus agrifolia*	Preserved	28	3	3.4
246	*Quercus agrifolia*	Preserved	16	1	3.6
247	*Quercus agrifolia*	Preserved	19	1	3.0
248	*Quercus agrifolia*	Preserved	16	2	3.2
249	*Quercus agrifolia*	Preserved	23	3	3.6
250	*Quercus agrifolia*	Impacted	18	1	3.8
251	*Quercus agrifolia*	Impacted	9	1	2.4
252	*Quercus agrifolia*	Impacted	48	4	3.4
253	*Quercus agrifolia*	Impacted	19	2	2.0
254	*Quercus agrifolia*	Preserved w/MM	15	2	2.0
255	*Quercus agrifolia*	Impacted-Buffer	25	5	2.4
256	*Quercus agrifolia*	Impacted	16	1	2.0
257	*Quercus agrifolia*	Impacted	16	2	2.0
258	*Quercus agrifolia*	Impacted	27	3	2.6
259	*Quercus agrifolia*	Impacted	20	2	1.8
260	*Quercus agrifolia*	Impacted	30	4	2.2
261	*Quercus agrifolia*	Impacted	21	2	2.4
262	*Quercus agrifolia*	Impacted	22	3	2.0
263	*Quercus agrifolia*	Impacted	25	1	2.2
264	*Quercus agrifolia*	Impacted	20	1	2.0
265	*Quercus agrifolia*	Impacted	30	3	1.8
266	*Quercus agrifolia*	Impacted	13	2	1.8
267	*Quercus agrifolia*	Impacted	14	1	2.2
268	*Quercus agrifolia*	Impacted	12	1	2.6
269	*Quercus agrifolia*	Impacted	21	1	2.6
270	*Quercus agrifolia*	Impacted	23	1	2.6

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
271	*Quercus agrifolia*	Impacted	13	5	2.8
272	*Quercus agrifolia*	Impacted	23	2	2.0
273	*Quercus agrifolia*	Impacted	24	1	2.4
274	*Quercus agrifolia*	Impacted	40	3	3.0
275	*Quercus agrifolia*	Impacted	26	3	2.6
276	*Quercus agrifolia*	Impacted	25	4	2.2
277	*Quercus agrifolia*	Impacted	20	1	2.2
278	*Quercus agrifolia*	Impacted	13	1	2.0
279	*NO*				
280	*Quercus agrifolia*	Impacted	20	1	2.0
281	*Quercus agrifolia*	Impacted	19	3	1.4
282	*Quercus agrifolia*	Impacted	24	2	1.2
283	*Quercus agrifolia*	Impacted	14	1	2.0
284	*Quercus agrifolia*	Impacted	19	2	2.0
285	*Quercus agrifolia*	Preserved	8	1	1.4
286	*Quercus agrifolia*	Impacted	33	2	2.4
287	*Quercus agrifolia*	Impacted	39	1	2.6
288	*Quercus agrifolia*	Impacted	17	1	3.0
289	*Quercus agrifolia*	Impacted	23	1	2.6
290	*Platanus racemosa*	Impacted	12	2	2.2
291	*Quercus agrifolia*	Impacted-Buffer	8	4	1.6
292	*Quercus agrifolia*	Preserved	19	6	2.0
293	*Quercus agrifolia*	Impacted	15	1	1.8
294	*Quercus agrifolia*	Impacted	11	1	2.2
295	*Quercus agrifolia*	Impacted	25	1	2.8
296	*Platanus racemosa*	Impacted	12	3	2.8
297	*Quercus agrifolia*	Impacted	24	1	2.8
298	*Platanus racemosa*	Impacted	13	2	2.6
299	*Quercus agrifolia*	Impacted	14	1	2.0
300	*Quercus agrifolia*	Impacted	44	1	2.4
301	*Quercus agrifolia*	Impacted	34	1	3.6
302	*Platanus racemosa*	Impacted	16	2	3.4
303	*Quercus agrifolia*	Impacted	25	1	3.6
304	*NO*				
305	*Platanus racemosa*	Impacted-Buffer	14	1	3.8
306	*Quercus agrifolia*	Preserved	37	2	3.8
307	*Quercus agrifolia*	Preserved	8	1	3.8
308	*Quercus agrifolia*	Preserved	24	3	3.6
309	*Quercus agrifolia*	Preserved	16	1	2.8
310	*Quercus agrifolia*	Preserved w/MM	28	3	3.8
311	*Quercus agrifolia*	Preserved	23	2	3.2
312	*Quercus agrifolia*	Impacted	19	1	3.4
313	*Quercus agrifolia*	Impacted	21	1	3.0
314	*Quercus agrifolia*	Impacted	20	1	2.0
315	*Quercus agrifolia*	Impacted	11	1	2.6
316	*Platanus racemosa*	Impacted	13	3	3.2
317	*Quercus agrifolia*	Impacted	19	1	2.8
318	*Quercus agrifolia*	Impacted	27	1	3.2

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
319	*Quercus agrifolia*	Impacted	28	1	3.6
320	*Quercus agrifolia*	Impacted	20	2	3.4
321	*Quercus agrifolia*	Impacted	12	1	2.6
322	*Quercus agrifolia*	Impacted	16	2	2.6
323	*Quercus agrifolia*	Impacted	13	2	3.2
324	*Quercus agrifolia*	Impacted	21	1	3.2
325	*Quercus agrifolia*	Impacted-Buffer	19	1	3.4
326	*Quercus agrifolia*	Impacted	21	1	3.6
327	*Quercus agrifolia*	Impacted	19	1	2.8
328	*NO*				
329	*Quercus agrifolia*	Impacted	32	4	3.6
330	*Quercus agrifolia*	Impacted	23	1	3.2
331	*Quercus agrifolia*	Impacted	21	1	3.2
332	*Quercus agrifolia*	Impacted	13	2	2.4
333	*Quercus agrifolia*	Impacted	13	2	1.8
334	*Quercus agrifolia*	Impacted	11	1	1.8
335	*Quercus agrifolia*	Impacted	18	1	3.6
336	*Quercus agrifolia*	Impacted	13	2	3.2
337	*Quercus agrifolia*	Impacted	17	2	2.4
338	*Quercus agrifolia*	Impacted	9	1	3.0
339	*Quercus agrifolia*	Impacted	12	2	3.2
340	*Quercus agrifolia*	Impacted	20	2	2.6
341	*Quercus agrifolia*	Impacted	31	1	3.2
342	*Quercus agrifolia*	Impacted	12	1	2.8
343	*Quercus agrifolia*	Impacted	18	1	3.0
344	*Quercus agrifolia*	Impacted	12	1	3.4
345	*Quercus agrifolia*	Impacted	14	1	3.0
346	*Quercus agrifolia*	Impacted	12	1	2.6
347	*Quercus agrifolia*	Impacted	29	3	3.2
348	*Quercus agrifolia*	Impacted	8	2	3.2
349	*Quercus agrifolia*	Impacted	12	2	3.6
350	*Quercus agrifolia*	Impacted	29	1	3.2
351	*Quercus agrifolia*	Impacted	20	1	2.8
352	*Quercus agrifolia*	Preserved	18	1	3.2
353	*Quercus agrifolia*	Impacted	19	1	1.8
354	*Quercus agrifolia*	Impacted	24	2	2.6
355	*Quercus agrifolia*	Impacted	32	4	3.0
356	*Quercus agrifolia*	Preserved	14	1	3.0
357	*Quercus agrifolia*	Preserved	33	1	3.0
358	*Quercus agrifolia*	Preserved	9	1	3.2
359	*Quercus agrifolia*	Preserved	26	3	3.2
360	*Quercus agrifolia*	Preserved	15	1	3.8
361	*Quercus agrifolia*	Preserved	11	1	3.8
362	*Quercus agrifolia*	Preserved	33	2	3.8
363	*Quercus agrifolia*	Preserved	21	4	3.4
364	*Quercus agrifolia*	Preserved	10	1	3.8
365	*Quercus agrifolia*	Preserved	8	1	1.6
366	*Quercus agrifolia*	Preserved	19	2	3.8

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
367	*Quercus agrifolia*	Preserved	14	1	3.8
368	*Quercus agrifolia*	Preserved	11	1	3.8
369	*NO*				
370	*Quercus agrifolia*	Preserved	21	3	2.4
371	*Quercus agrifolia*	Preserved	16	2	3.6
372	*Quercus agrifolia*	Impacted	38	4	3.4
373	*Quercus agrifolia*	Impacted	31	1	3.6
374	*Quercus agrifolia*	Preserved	41	4	3.2
375	*Quercus agrifolia*	Preserved	11	1	3.2
376	*Quercus agrifolia*	Impacted	29	1	3.8
377	*Quercus agrifolia*	Preserved	22	2	2.4
378	*Platanus racemosa*	Preserved	16	2	3.2
379	*Platanus racemosa*	Preserved	22	1	3.6
380	*NO*				
381	*Quercus agrifolia*	Preserved	21	1	3.6
382	*Quercus agrifolia*	Preserved	25	5	3.0
383	*Quercus agrifolia*	Preserved	16	1	2.8
384	*Quercus agrifolia*	Preserved	11	1	3.0
385	*Quercus agrifolia*	Impacted-Buffer	12	3	3.4
386	*Quercus agrifolia*	Preserved w/MM	17	3	3.4
387	*Quercus agrifolia*	Preserved w/MM	17	1	3.6
388	*Quercus agrifolia*	Preserved w/MM	8	1	3.0
389	*Quercus agrifolia*	Preserved w/MM	8	2	3.6
390	*Quercus agrifolia*	Preserved	8	5	3.0
391	*Quercus agrifolia*	Preserved w/MM	8	2	2.8
392	*NO*				
393	*Quercus agrifolia*	Preserved w/MM	11	1	2.6
394	*Quercus agrifolia*	Preserved	14	1	2.8
395	*Quercus agrifolia*	Preserved	8	2	3.8
396	*Quercus agrifolia*	Preserved	9	1	2.6
397	*NO*				
398	*Quercus agrifolia*	Preserved	13	3	3.4
399	*Quercus agrifolia*	Preserved	15	1	3.4
400	*Quercus agrifolia*	Preserved	13	1	2.8
401	*Quercus agrifolia*	Preserved	14	3	3.4
402	*NO*				
403	*Quercus agrifolia*	Impacted-Buffer	12	5	3.0
404	*Quercus agrifolia*	Impacted-Buffer	10	2	3.6
405	*Quercus agrifolia*	Impacted	10	1	3.2
406	*Quercus agrifolia*	Impacted	9	2	3.8
407	*Quercus agrifolia*	Impacted-Buffer	13	2	3.4
408	*Quercus agrifolia*	Impacted	11	1	3.0
409	*Quercus agrifolia*	Impacted	12	1	3.4
410	*Quercus agrifolia*	Impacted	18	1	2.6
411	*Quercus agrifolia*	Preserved w/MM	17	1	2.6
412	*Quercus agrifolia*	Preserved	13	1	2.8
413	*Quercus agrifolia*	Preserved	12	1	3.0
414	*Quercus agrifolia*	Preserved w/MM	29	2	3.4

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
415	*Platanus racemosa*	Impacted-Buffer	28	1	3.8
416	*Platanus racemosa*	Impacted	30	2	3.8
417	*Quercus agrifolia*	Impacted	26	2	3.8
418	*Quercus agrifolia*	Impacted	18	2	3.4
419	*Quercus agrifolia*	Preserved	33	2	3.8
420	*Quercus agrifolia*	Impacted	9	1	2.6
421	*Quercus agrifolia*	Impacted	14	1	3.0
422	*Quercus agrifolia*	Preserved w/MM	23	2	2.6
423	*Quercus agrifolia*	Impacted-Buffer	33	1	3.4
424	*Quercus agrifolia*	Impacted	20	1	3.2
425	*Quercus agrifolia*	Preserved w/MM	29	1	2.0
426	*Quercus agrifolia*	Preserved w/MM	24	2	2.2
427	*Quercus agrifolia*	Preserved w/MM	34	3	2.0
428	*Quercus agrifolia*	Impacted-Buffer	24	4	3.0
429	*Platanus racemosa*	Preserved w/MM	16	1	2.6
430	*Quercus agrifolia*	Impacted-Buffer	16	1	2.4
431	*Quercus agrifolia*	Preserved w/MM	29	2	2.6
432	*Platanus racemosa*	Preserved w/MM	17	2	2.4
433	*Quercus agrifolia*	Preserved	22	1	2.0
434	*NO*				
435	*NO*				
436	*Quercus agrifolia*	Preserved	28	2	2.4
437	*Quercus agrifolia*	Preserved	29	1	2.6
438	*Quercus agrifolia*	Preserved	16	1	2.6
439	*Quercus agrifolia*	Preserved	20	1	2.0
440	*NO*				
441	*Platanus racemosa*	Preserved	12	2	2.0
442	*Quercus agrifolia*	Preserved	24	2	2.4
443	*Quercus agrifolia*	Preserved w/MM	28	2	2.4
444	*Quercus agrifolia*	Preserved	14	1	2.4
445	*Platanus racemosa*	Impacted-Buffer	13	2	2.2
446	*Quercus agrifolia*	Preserved w/MM	18	1	2.4
447	*Platanus racemosa*	Impacted-Buffer	17	5	2.6
448	*Quercus agrifolia*	Impacted	19	1	2.6
449	*Platanus racemosa*	Impacted-Buffer	14	3	2.8
450	*Quercus agrifolia*	Preserved w/MM	17	1	2.0
451	*Platanus racemosa*	Preserved	12	2	2.8
452	*Platanus racemosa*	Preserved w/MM	16	3	2.8
453	*Platanus racemosa*	Preserved	17	3	2.2
454	*Quercus agrifolia*	Preserved	23	1	2.6
455	*Quercus agrifolia*	Preserved	11	1	2.8
456	*Quercus agrifolia*	Preserved	11	1	2.0
457	*Quercus agrifolia*	Preserved	26	2	1.4
458	*Quercus agrifolia*	Preserved	21	2	1.4
459	*Quercus agrifolia*	Preserved	9	1	1.2
460	*Platanus racemosa*	Preserved	13	1	2.0
461	*NO*				
462	*NO*				

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
463	*NO*				
464	*Platanus racemosa*	Preserved	19	5	2.2
465	*Platanus racemosa*	Preserved	24	5	2.4
466	*Quercus agrifolia*	Preserved	21	2	2.8
467	*Platanus racemosa*	Preserved	12	2	2.2
468	*Quercus agrifolia*	Preserved	36	1	2.4
469	*Quercus agrifolia*	Preserved	23	1	1.8
470	*Quercus agrifolia*	Preserved	39	2	2.2
471	*Quercus agrifolia*	Preserved	14	1	2.6
472	*Quercus agrifolia*	Preserved	27	2	2.6
473	*Quercus agrifolia*	Preserved	27	2	2.6
474	*Quercus agrifolia*	Preserved	27	3	2.2
475	*Quercus agrifolia*	Preserved w/MM	33	3	3.0
476	*Quercus agrifolia*	Impacted-Buffer	13	1	1.6
477	*Quercus agrifolia*	Preserved	15	1	2.8
478	*Quercus agrifolia*	Impacted	19	1	2.0
479	*Quercus agrifolia*	Impacted	19	1	2.8
480	*Quercus agrifolia*	Impacted	17	1	2.6
481	*Quercus agrifolia*	Preserved	23	2	1.8
482	*Quercus agrifolia*	Preserved	21	1	2.4
483	*Quercus agrifolia*	Preserved	11	1	2.6
484	*Quercus agrifolia*	Preserved	10	1	3.0
485	*Quercus agrifolia*	Preserved	23	3	1.0
486	*Quercus agrifolia*	Preserved	14	1	1.2
487	*NO*				
488	*Platanus racemosa*	Preserved	16	5	2.8
489	*Platanus racemosa*	Preserved	34	5	3.4
490	*Platanus racemosa*	Preserved	14	2	1.6
491	*Platanus racemosa*	Preserved	25	3	2.4
492	*Platanus racemosa*	Preserved	26	3	2.4
493	*Platanus racemosa*	Preserved	20	2	2.8
494	*Platanus racemosa*	Preserved	33	7	2.6
495	*Quercus agrifolia*	Preserved	9	1	2.2
496	*Quercus agrifolia*	Preserved	23	3	3.6
497	*Quercus agrifolia*	Preserved	10	3	2.4
498	*Quercus agrifolia*	Preserved	26	2	3.4
499	*Quercus agrifolia*	Preserved	18	1	3.0
500	*Quercus agrifolia*	Preserved	20	2	3.2
501	*Quercus agrifolia*	Preserved	30	1	3.8
502	*Quercus agrifolia*	Preserved	27	4	3.6
503	*Quercus agrifolia*	Preserved	32	3	3.4
504	*Quercus agrifolia*	Preserved	19	3	3.0
505	*Quercus agrifolia*	Preserved	17	2	2.8
506	*Quercus agrifolia*	Preserved	10	1	2.8
507	*Quercus agrifolia*	Preserved	12	1	2.8
508	*Platanus racemosa*	Preserved	17	2	2.8
509	*Platanus racemosa*	Preserved	18	3	2.8
510	*NO*				

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
511	*NO*				
512	*Quercus agrifolia*	Preserved	20	1	2.6
513	*Quercus agrifolia*	Preserved	20	2	3.0
514	*Quercus agrifolia*	Preserved	17	1	1.6
515	*Quercus agrifolia*	Preserved	11	1	3.0
516	*Quercus agrifolia*	Preserved	33	4	2.6
517	*Platanus racemosa*	Preserved	56	4	3.4
518	*Platanus racemosa*	Preserved	30	3	3.0
519	*Quercus agrifolia*	Preserved	14	1	3.0
520	*Platanus racemosa*	Preserved	22	5	3.0
521	*Quercus agrifolia*	Preserved	21	1	3.0
522	*Platanus racemosa*	Preserved	38	5	3.0

6.0 IMPACTS

6.1. Impact Analysis

Exhibits 3 and 4 depict (1) the "Limits of Grading" line, (2) the "20-Foot Wide Disturbance Area," and (3) the limits of the "Minimum Tree Inventory Area" used to determine the tree impacts described in Table 3. Trees whose trunks are located within the Limits of Grading line are identified as "Impacted" in Table 3. Impacted trees would be subject to removal and would require replacement pursuant to Section 46.02(c) of the LAMC.

Trees with trunks that are located beyond the limits of grading, but within 20 feet of the grading line (i.e., within the "20-Foot Wide Disturbance Area"), are potentially subject to removal or substantial impact during grading operations.[2] These trees are categorized as "Impacted-Buffer" in Table 3. Although these trees are catalogued as impacted in this analysis, all reasonable efforts will be made in the field to preserve or minimize impacts when possible. Such impact minimization efforts might include wrapping of trunks with protective material, pruning of branches to limit opportunities for contact with equipment or use of gravel or wood chip mulch to minimize the compacting effect of heavy equipment.

Trees that are located outside of the 20-Foot Wide Disturbance Area, but with Optimal Protection Zones (as defined below) located within 50 feet of the outer edge of the 20-Foot Wide Disturbance Area, are identified as "Preserved-MM" (i.e., preserved, but possibly requiring implementation of mitigation measures to eliminate or reduce indirect construction impacts). The Optimal Protection Zone (OPZ) is an analytical tool used to predict the actual extent of root penetration into the soil surrounding a tree

[2] For the purpose of defining impacts to trees within the 20-foot Wide Disturbance Area, a substantial impact is considered to be unavoidable damage that would lead to the direct decline and death of the tree. Substantial impacts might include, but are not limited to, removal or compaction of large areas of the root zone and loss of bark and cambium layer due to contact with construction equipment.

for the purpose of identifying potential impacts and appropriate mitigation measures. The OPZ is calculated based on the species' tolerance to impacts, the age of the tree, and the tree's DBH (Matheny and Clark, 1998). This calculation acknowledges that a mature tree is more intolerant of disturbance than a young tree and therefore should be afforded greater protection from construction impacts. A tree designated as "Preserved-MM" would likely require implementation of mitigation measures in the field in order to ensure avoidance or at least minimization of construction-related impacts. Trees located within 50 feet of the outer edge of the 20-Foot Wide Disturbance Zone are strong candidates for such mitigation measures. These mitigation measures are discussed below.

6.2 Permanent Impacts

6.2.1 Proposed Project

Table 4 summarizes the impacts by species and by property location. 232 coast live oaks and 27 western sycamores would be impacted by implementation of the proposed project, as depicted on Exhibits 3 and 4 and described in Table 3. Overall, a total of 259 trees would be impacted.

Table 4. Proposed Project Tree Impacts

Common Name	Canyon Hills Project Site		Duke Property		Total Proposed Impacted
	Within Grading Limits	Within 20' Wide Disturbance Area	Within Grading Limits	Within 20' Wide Disturbance Area	
Coast Live Oak	211	19	1	1	**232**
Western Sycamore	22	5	0	0	**27**
Total	**233**	**24**	**1**	**1**	**259**

6.2.2 Duke Access Alternative

Table 5 summarizes the impacts by species and property location for the Duke Access Alternative. 202 coast live oaks and 24 western sycamores would be impacted by implementation of the Duke Access Alternative. Overall, a total of 226 trees would be impacted in the Study Area with implementation of the Duke Access Alternative. As reflected in the comparison between Tables 4 and 5, the Duke Access Alternative would impact 30 less coast live oaks and 3 less western sycamores than would the proposed project. Table 6 summarizes the change in impact status for 37 trees with implementation of the Duke Access Alternative. Table 6 represents a subset of Table 3, but with the modified "Status" of the affected trees.

Table 5. Duke Access Alternative Tree Impacts

Common Name	Canyon Hills Project Site		Duke Property		Total Proposed Impacted
	Within Grading Limits	Within 20' Wide Disturbance Area	Within Grading Limits	Within 20' Wide Disturbance Area	
Coast Live Oak	179	19	2	2	**202**
Western Sycamore	19	5	0	0	**24**
Total	**198**	**24**	**2**	**2**	**226**

Table 6. Summary of Tree Inventory Data for Trees with Impact Status Changes in the Duke Access Alternative

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
46	*Quercus agrifolia*	Impacted-Buffer	21	3	2.2
47	*Quercus agrifolia*	Impacted	16	1	2.2
63	*Quercus agrifolia*	Preserved	12	2	3.6
64	*Quercus agrifolia*	Preserved	15	3	3.6
65	*Quercus agrifolia*	Preserved	25	1	3.0
66	*Quercus agrifolia*	Preserved	26	4	3.2
67	*Quercus agrifolia*	Preserved	17	1	3.6
68	*Quercus agrifolia*	Preserved	8	1	2.2
69	*Platanus racemosa*	Preserved	14	1	2.2
70	*Platanus racemosa*	Preserved	13	1	2.2
71	*Quercus agrifolia*	Preserved	28	4	2.8
72	*Quercus agrifolia*	Preserved	9	1	2.2
73	*Quercus agrifolia*	Preserved	12	1	3.8
74	*Quercus agrifolia*	Preserved	8	1	3.4
77	*Quercus agrifolia*	Preserved	9	1	3.4
80	*Quercus agrifolia*	Preserved	9	2	3.2
81	*Quercus agrifolia*	Preserved	22	1	3.2
82	*Quercus agrifolia*	Preserved	20	1	3.4
83	*Quercus agrifolia*	Preserved	24	1	2.8
84	*Quercus agrifolia*	Preserved	22	2	2.6
85	*Quercus agrifolia*	Preserved	15	1	2.6
86	*Quercus agrifolia*	Preserved	31	3	2.6
87	*Quercus agrifolia*	Preserved	34	4	2.8
88	*Quercus agrifolia*	Preserved	21	1	3.6
89	*Quercus agrifolia*	Preserved	12	1	3.6
90	*Quercus agrifolia*	Preserved	8	1	2.8
91	*Platanus racemosa*	Preserved	18	2	2.6
92	*Quercus agrifolia*	Preserved	27	2	3.6
93	*Quercus agrifolia*	Preserved	27	2	3.4
94	*Quercus agrifolia*	Preserved	21	2	2.8
95	*Quercus agrifolia*	Preserved	25	8	3.6

Tree Number	Species name	STATUS	Effective DBH	No. of Trunks	Overall Rating
96	*Quercus agrifolia*	Preserved	18	1	2.6
98	*Quercus agrifolia*	Preserved	30	1	3.8
99	*Quercus agrifolia*	Preserved	18	1	3.6
100	*Quercus agrifolia*	Preserved	12	1	3.8
101	*Quercus agrifolia*	Preserved	19	1	3.6
102	*Quercus agrifolia*	Preserved	28	2	3.2
103	*Quercus agrifolia*	Preserved	34	1	3.8
104	*Quercus agrifolia*	Preserved	14	1	3.6

6.3 Preservation within the Project Site

It is estimated that approximately 1,017 coast live oaks and 106 western sycamores located on the project site would not be impacted in anyway by the proposed project. This estimate of non-impacted trees is based on FORMA Systems' analysis of the relationship between the density of coast live oaks and western sycamores within the 11 vegetation communities located within the grading limits and the 20-Foot Wide Disturbance Area. Exhibits 7a and 7b provide breakdowns of the "Development Area Impacts" by vegetation community and relate those impacts to the number of coast live oaks and western sycamores identified within each of the impacted vegetation communities. This relationship allows calculation of a "Computed Trees/Acre" figure for each vegetation community (i.e., the number of trees impacted within each vegetation community divided by the acreage of each impacted vegetation community equals the "Computed Trees/Acre"). This figure is then multiplied by the "Project Site Acres Not Impacted" for each of the 11 vegetation communities on the remainder of the project site (i.e., 652.61 acres). This calculation yields the estimated number of coast live oaks (1,017) and western sycamores (106) on the project site (under the heading "Extrapolated Trees Outside Impact Area" in Exhibits 7a and 7b).

Exhibits 7a and 7b also provide estimates of the "Percent of Total Trees Impacted by the Development." It is estimated that less than 19 percent of the coast live oaks and western sycamores within the project site and subject to the City's jurisdiction would be impacted by the proposed project. Conversely, more than five times as many trees would be preserved within the project site as would be impacted by the proposed project. Table 7 provides a summary of the impact figures and estimates of preserved trees for the proposed project.

Table 7. Summary of Impact Figures and Estimate of Preserved Trees

Species	Impacted	20-Foot Wide Disturbance Area	Preserved	Totals*
Quercus agrifolia	212	20	1,017	1,249**
Platanus racemosa	22	5	106	133
Total	**234**	**25**	**1,123**	**1,382**

*The total figures are taken from Exhibits 7a and 7b.

**This figure is two greater than the total figure of 1,247 provided in Exhibit 7a because the 1,249 figure includes the two trees within the Duke Property that would be impacted as part of the proposed project. These two trees were not included in the calculations provided in Exhibit 7a.

7.0 MITIGATION

The project's mitigation effort includes avoidance, minimization and compensation for proposed impacts to trees subject to Section 46.00 et seq. of the LAMC. The project developer could also pursue tree relocation subject to the discussion provided below. These aspects of the proposed mitigation are described below, as is the proposed means for determining the value of the trees that would be impacted.

7.1 Avoidance and Minimization of Impacts

There are 31 coast live oaks and four western sycamores with Optimal Protection Zones within 50 feet of the 20-Foot Wide Disturbance Area (see Table 3 for trees identified as "Preserved w/MM"). Without implementation of mitigation measures, these trees might be subject to indirect impacts or even direct impacts. However, the ultimate decision to implement any or all mitigation measures described below will be made by the project arborist in consultation with the project engineer.

The following mitigation measures are recommended to minimize impacts to trees whose OPZs are determined to overlap or closely approach the outer edge of the 20-Foot Wide Disturbance Area: (1) identification of the tree's OPZ in the field and staking of this zone in a half-circle adjacent to the development edge by the project arborist (Appendix D provides the formulas necessary to calculate the OPZ of a coast live oak or western sycamore); (2) installation of protective fencing around the perimeter of the tree's OPZ or at the edge of the limit of the 20-Foot Wide Disturbance Zone, whichever is closer to the trunk (see Exhibit 6 illustration); and (3) placement of four-inches of wood-chip mulch over the ground surface within the OPZ where that zone extends beyond the protective fencing and into the 20-Foot Wide Disturbance Area. This latter measure may be necessary to limit the compacting effect of heavy equipment on topsoil within the root zone of protected trees (Matheny and Clark, 1998).

The protective fencing shall be temporary and shall be removed upon the completion of ground-disturbing activities. The fence shall be a chain link fence with posts placed no

greater than ten feet on center. The project arborist shall identify all trees requiring temporary fencing and shall verify that the fences are in place prior to commencement of grading operations within 50 feet of the OPZ of any tree not scheduled for removal or not identified as "impacted" in the permit issued by the City. Where appropriate, the four-inch mulch layer shall be placed under the supervision of the project arborist and shall be placed upon first encroachment of grading equipment into the OPZ. Exceptions to the fencing or mulching requirements may be made where preserved tree locations make unintended impacts sufficiently unlikely due to the presence of steep terrain or other physical barrier.

Should any protected tree's branches overlap the outer edge of the 20-Foot Wide Disturbance Area and require pruning in order to allow grading to proceed, the pruning shall be performed or supervised by the project arborist or a certified arborist.

The 20 trees (tree numbers 236, 238-242, 385, 403-410, 415-418, 423 and 424) located beneath the footprint of the two proposed bridge crossings of La Tuna Canyon have each been categorized as impacted. These trees may be impacted by the construction of the two proposed bridge crossings. However, minimization of impacts to these trees may be possible depending on the precise method of bridge construction, which has not been determined yet.

The project arborist shall follow or accompany the survey crews prior to the commencement of grading in order to confirm impacts to trees scheduled to be impacted and to confirm avoidance of trees scheduled for preservation. Should any adjustments to the total impact figures be necessary, the project arborist shall notify the project proponent and the project developer, which shall notify the City of the revision.

7.2 Relocation

While the transplanting of mature, naturalized coast live oaks and western sycamores has been successful in limited instances, relocation of large, mature oak trees is generally fraught with problems and low success rates (Dagit and Downer, 1998). For this reason, it is not believed that the transplantation of mature coast live oaks or sycamores is a viable means of mitigating project impacts. Nevertheless, should the City insist that relocation be considered, it is recommended that healthy trees with DBHs of less than 12 inches, located on level terrain be considered as prime candidates. Trees located on steep slopes or on rocky outcrops are generally not suitable for relocation due to practical problems associated with boxing these trees when slopes hinder access or rocks hinder excavation. The identification of trees suitable for relocation should be done in coordination with the rough grading activities at the project site.

7.3 Avoidance and Minimization During Project Design

The Canyon Hills project has been designed to cluster development within the eastern one-third of the 886.93-acre project site, adjacent to existing residential development, and to minimize fill placement within the canyons within the project site. Several

iterations of site design reduced fill within canyons and increased avoidance of protected trees, streambeds and wetlands. The site design was increasingly sensitive to existing topography and, as evidenced in the proposed project design, grading for roads and home lots was designed to minimize cut, which in turn minimizes the need to place fill in adjacent canyons. Project planners estimate that total earthwork volumes have been reduced by as much as 75 percent relative to early site designs, which proposed traditional cut and fill grading over a majority of the project site. Clustering of home lots and site-sensitive road design have minimized impacts to natural open spaces, streambeds and riparian habitats, coast live oaks and western sycamores.

An estimated 1,017 coast live oaks and 106 western sycamores would be preserved versus proposed impacts to 232 coast live oaks and 27 western sycamores (the number of impacted coast live oaks and western sycamores would decrease to 202 and 24, respectively, if the Duke Access Alternative was approved). Furthermore, the preserved oaks would be located in near-pristine chaparral, riparian and coastal sage scrub communities, landscapes that enhance their value as wildlife habitat. These facts represent evidence of an initial effort at mitigating project impacts through the minimization and avoidance of impacts to oak trees and native plant communities.

7.4 Site-Sensitive Landscape Design

The proposed project design integrates the development and common planting areas into the natural landscape, thereby lessening the visual impact a 280-home residential development might otherwise have on the surrounding community. The planting plan incorporates a diversity of sizes of replacement oaks and sycamores, 15-gallons, 24-inch boxes, 36-inch boxes, and larger into a landscape palette that would include other chaparral, coastal sage scrub, and Mediterranean-type plants most suited to the arid Southern California climate. Accompanying plantings may include, among others, toyon (*Heteromeles arbutifolia*), scrub oak (*Quercus berberidifolia*), sage (*Saliva* spp.), sagebrush (*Artemisia* spp.), succulents (*Agave* and *Yucca*), and California lilac (*Ceanothus* spp.). Of course, these plantings will be designed in accordance with the Los Angeles Fire Department's regulations.

The placement of the replacement coast live oaks into a landscape that incorporates the similar climate-adapted Southern California heritage landscape will serve to enhance the long-term survival of all the coast live oak plantings and will also enhance the wildlife values of those oaks.[3] Well-designed and appropriate irrigation and irrigation scheduling will also enhance the establishment of coast live oaks, as well as the supporting plants, thereby ensuring resiliency during droughts and maximum fire retardation.

[3] High water consumptive plantings adjacent to coast live oak plantings can cause root rot in the coast live oaks, therefore drought-tolerant plantings can improve the long-term survival of the coast live oaks.

7.5 Determination of Minimum Replacement Standards

The City's ordinance regarding the "Preservation of Oak Trees" at Section 46.02(c)1 of the LAMC requires that a permittee replace an oak approved for removal or relocation "within the same property boundaries by at least two trees." Section 46.02(c)1 continues:

> *Each replacement tree shall be at least a 15-gallon, or larger, specimen in size, measuring one inch or more in diameter one foot above the base, and be not less than seven feet in height measured from the base. The size and number of replacement trees shall approximate the value of the tree to be replaced.*

The replacement standards provided in this Section suggest that they were not intended to address mitigation for larger properties with wildland oaks in natural settings. While the mitigation program described below satisfies this replacement standard, the simple, straightforward replacement of a targeted tree by two or more 15-gallon or larger trees is generally best suited to scenarios where the impacted oaks are easily viewable by or accessible to the public and aesthetic concerns are paramount. In this case, the replacement of a lost tree's aesthetic contribution by provision of some number of container stock is achievable, especially over time. But this is not the issue with respect to the wildland oaks at the project site. The positions of the oaks and sycamores in deep canyons and remote hillsides make them less of a community benefit and almost exclusively a wildlife resource. This wildlife resource cannot be replaced by the planting of container stock in a park or urban setting. Rather, the replacement of the entire habitat must be undertaken by the restoration of the lost community, in this case oak woodland, riparian forest, and mixed chaparral plant communities.

Consequently, the in-kind replacement of the wildland oaks at the project site is best satisfied through the establishment of varied sizes of replacement oaks, ranging from acorns to large boxed specimens, in association with planting of other native plant species known to naturally coexist with coast live oak or sycamores, on hillsides, in open space areas, and in fuel modification areas adjacent to natural open spaces. Large boxed specimens, in 24-inch to 60-inch boxes, are appropriate where immediate visual statements of the landscape heritage are appropriate, such as at entry points and in common areas throughout a development. Smaller-sized container stock, including seedlings, one-gallon, and five-gallon stock, is appropriate in less visually critical areas, such as slope plantings, detention basin plantings, and private residential lots. Direct seeding of acorns is most appropriate in either non-irrigated or limited access sites where habitat enhancement is the key concern. Most if not all of these plantings would be associated with other native plant restoration efforts.

The goal of the mitigation program proposed herein is creation of a landscape that maximizes the compensation for lost habitat values while fully addressing the need to provide a community landscape that reflects the natural heritage of the Verdugo

Mountains. This program would be superior to one that simply responded to arbitrary replacement ratios without concern for an overall landscape theme and wildlife benefit.

7.6 Mitigation Plan

The planting program, summarized in Table 8, provides for planting of 1,770 coast live oak trees, 181 western sycamores, and thousands of other container stock associated with oak woodlands, chaparral, coastal sage scrub, and riparian forests. These plantings would serve to more than compensate for the losses of 232 coast live oaks and 27 western sycamores. These replacement plants represent nearly 8:1 replacement of coast live oaks and nearly 7:1 replacement of western sycamores. Strictly relative to 15-gallon and larger stock, the replacement program described in Table 8 provides nearly 5:1 replacement of coast live oaks and greater than 4:1 replacement of western sycamores. The plantings would occur within entry points, common areas, road right-of-ways, perimeters of detention basins, common slopes, flood control facilities, fuel modification managed slopes, and private residential lots. Table 8 provides a synopsis of the planting plan based on container stock size and quantity of tree plantings.

TABLE 8. Conceptual Tree Planting Program

Planting Area	Tree Species	Type	Quantity	Approximate Value Installed
Entry Points	Coast live oak	36" box	6	$3,600.00
		48" box	6	$10,800.00
		60" box	3	$12,000.00
Common Areas	Coast live oak	24" box	170	$38,250.00
		36" box	35	$21,000.00
Road Right-of-Ways	Coast live oak	15 gal	405	$34,425.00
		24" box	110	$24,750.00
Detention Basins	Coast live oak	1 gallon	30	$240.00
		5 gallon	10	$270.00
		15 gallon	20	$1,700.00
	Western sycamore	1 gallon	20	$160.00
		5 gallon	20	$540.00
		15 gallon	50	$4,250.00
Slopes	Coast live oak	1 gallon	75	$600.00
		5 gallon	25	$675.00
Flood Control	Coast live oak	1 gallon	25	$200.00
		5 gallon	15	$405.00
		15 gallon	20	$1,700.00
	Western sycamore	1 gallon	15	$120.00
		5 gallon	15	$405.00
		15 gallon	61	$5,185.00
Fuel Modification Areas	Coast live oak	acorns	100	$600.00
		seedlings	100	$600.00
		1 gallon	100	$800.00
		5 gallon	25	$675.00
		15 gallon	40	$3,400.00
Private Lots	Coast live oak	15 gallon	250	$21,250.00
Equestrian Trail	Coast live oak	acorns	100	$600.00
		seedlings	100	$600.00
Total - all sizes of stock			**1,951**	**$189,800.00**
Total - 15 gallons and larger (minimum sizes required by City)			**1,176 ***	**$182,310.00**

***Includes 1,065 coast live oaks in 15-gallon or larger stock and 111 western sycamores in 15-gallon stock.

It is estimated that the proposed planting program would provide approximately $189,800 of tree stock, ranging from acorns to 60-inch boxes. This figure includes $182,310 in tree stock of 15-gallon or greater in size and approximates the value of the trees to be replaced. In contrast, Section 7.7.1, below, describes the value of the trees to be replaced as $182,298 under the Fair Market Value method. This tree planting would be only a part of the overall landscape palette, which, as described above, would also include plantings of native plantings and climate-adapted plantings. The costs for these non-tree plantings are not provided in Table 8.

All tree plantings would be subject to a five-year monitoring effort by an independent certified arborist. This monitoring effort would consider growth, health, and condition of the subject trees in order to evaluate the project's success. This monitoring effort might result in recommendation of remedial actions should any of the tree plantings exhibit poor or declining health.

7.7 Valuation of Trees Proposed for Impact

The determination of the "value of the tree to be replaced" may be made in one of at least three different approaches: (1) relationship to "fair market value" of the property; (2) direct replacement of lost tree canopy area; or (3) implementation of the Council of Landscape Appraisers Trunk Formula Method as endorsed by the International Society of Arboriculture for use in residential or commercial properties. Each of these approaches has, at one time or another, been endorsed by the City of Los Angeles. For the purposes of this exercise, the total number of trees to be impacted is assumed to be 262.

7.7.1 Fair Market Value

The value of a tree must have some tangible association with the fair market value of the land itself—the trees on a property cannot be valued higher than the property itself and in fact must be valued less than the land itself, assuming that the land has some inherent value absent the trees, which is an unarguable fact.

In 1987, Diamond, Standiford, Passof and LeBlanc found that the maximum increased value that ideal[4] densities of blue oak (*Quercus douglasii*) could affect on gently sloped (5-10%) terrain was 27 percent (Diamond et al., 1987). This study evaluated the assessments of 30 real estate agents and appraisers specializing in acreage sales with respect to hypothetical properties in Ukiah and Santa Rosa located five miles from shopping and schools. The study found that the near-urban property in Santa Rosa increased a maximum of 22 percent when vegetated with an average of 40 oaks per acre and the rural property in Ukiah appreciated 27 percent when vegetated with an average of 40 oaks per acre (both relative to an unvegetated hypothetical baseline property). Lesser or greater densities of oaks were found to cause less, but still positive, appreciation of land values. Using this study as a benchmark and based on

[4] "Ideal" is described in terms of the aesthetic and amenity-related benefits oak trees have on property values.

the assumption that the project site is most similar to the near-urban property evaluated in Santa Rosa,[5] the value of the coast live oaks on the Canyon Hills project site would serve to improve the land value no more than 22 percent over what it might be were no trees present.

The project applicant estimates that the current "as-is" fair market value of the Canyon Hills project site is $14,657 per acre (i.e., $13,000,000 for the 886.93-acre project site). Based on this fair market value, it is estimated that the 259 oaks and sycamores that would be removed or could be significantly impacted in connection with the proposed project should have an average value of no more than $182,298, or $704 per tree. This figure is calculated by first determining the maximum per acre value of the trees, then multiplying that per acre value by the total acreage considered to be the trees' "Area of Occupation."

The maximum per acre value of the trees is determined by first identifying the value of the project site if no trees were present. This exercise assumes that the trees at the project site extend maximum appreciation to the value of the land, which is assumed to be 22 percent. The first step in this exercise is the determination of "V" or the value of an acre of the property without trees:

$$V + (V \times 22\%) = \$14{,}657 \text{ (estimated per acre fair market value)}$$
or
$$V \times 1.22 = \$14{,}657$$
or
$$V = \$14{,}657/1.22$$
or
$$V = \$12,\ 014$$

Therefore $12,014 is the value of an acre of the project site if no trees were present.

Then, subtracting the "value of an acre of the property if no trees were present" from the fair market value with trees gives us the per acre increase in land value that could be ascribed to the presence of trees:

$14,656 - $12,014 = $2,642

$2,642 is then multiplied by the total land area determined to be the "Area of Occupation" of the trees to be removed in order to identify the fair market value of the trees: $2,642 x Area of Occupation in acres = fair market value of the trees proposed to be removed. Quantifying the Area of Occupation requires identification of some unit of land within the larger 886.93-acre project site deemed to be the Area of Occupation.

[5] The 22-percent figure associated with the Santa Rosa study subject is used here since the project site is not rural. Ukiah is located approximately 50 miles north of Santa Rosa, which lies at the northern end of the greater San Francisco/Oakland metropolitan area.

Because the 259 trees that would be impacted by the proposed project are typically clustered in the bottom of canyons or along north or east-facing slopes or canyons, it is not appropriate to consider the entire 886.93-acre project site or the 234.32 acre area that would be graded or subject to significant disturbance to be the Area of Occupation because there is currently no visual access to many of the impacted trees and portions of the project site are not located within the same sub-watershed as the impacted trees. For this reason, a more objective means of defining Area of Occupation is appropriate. Exhibit 8 depicts an acre-square grid overlaid upon the entire project site. The Area of Occupation is defined as the acre-square grid units that include one or more impacted trees. The grid units are 208 feet on each side and the beginning point of the grid was Range 13 West, Township 2 North, Section 30.

Exhibit 8 indicates that 69 acre-square grid units support at least one impacted coast live oak or western sycamore. This equates directly to an Area of Occupation of 69 acres. This figure appears logical as it results in an average of 3.75 trees per acre, which in turn is less dense than some surveyed portions of the Study Area, but denser than other areas where only one or two trees were found to occupy a hillside or narrow canyon.

Therefore, the fair market value of the impacted trees is $2,642 x 69 acres = $182,298. This dollar figure examined with respect to the 259 trees proposed for removal suggests that each tree, on average, is valued at $704 ($182,298/259).

7.7.2 Canopy Replacement

The relationship between the canopy area of a tree scheduled for removal and the canopy area of its replacement container stock also provides a means of placing a value on the impacted tree. The replacement of tree canopy using 20-year growth projections is a method of tree valuation sometimes employed by the City. In this approach, the total area of impacted tree canopy is used as a target for the replacement container stock growth after 20 years. The 259 impacted trees provide approximately 352,966 square feet of canopy, or 8.10 acres.[6] Based on the growth predictions provided in Table 9 below, a list and value for the replacement stock has been developed, as shown in Table 10 below. The growth predictions are based on the estimates of the growth of coast live oak container stock in Southern California provided by Tom Larson, a Registered Consulting Arborist with over 30 years experience in the Southern California tree industry.

[6] This figure is calculated using the canopy measurements for all 262 trees scheduled to be impacted. The formula for the area of a circle (πr^2) is used to estimate total canopy area and each tree is assumed to have a circular canopy.

Table 9. 20-Year Growth Predictions for Coast Live Oak Container Stock

Stock Size	Height (feet)	Canopy Spread (feet)	Canopy Area (square feet)
1 gallon	25	15	177
5 gallon	26	17	227
15 gallon	26	18	254
24-inch box	26	19	284
36-inch box	27	20	314
48-inch box	27	21	346
60-inch box	28	22	380

Table 10 prescribes a variety of container stock for use in replacing lost tree canopy. Sufficient stock is prescribed to match the area of impacted canopy after 20 years. No one or five-gallon stock is used in this calculation because the City's ordinance requires 15-gallon stock or larger. However, one and five-gallon stock may be used in the mitigation program, as described above. The numbers of container stock described in Table 9 are weighted in favor of the smaller 15-gallon containers due to the constraints imposed by the project site. Steep terrain will restrict plantings along street right-of-ways by virtue of the lack of available level planting areas. Broad, level planting areas are necessary to excavate holes suitable for receiving large container stock (i.e., 24-inch boxes or greater). The 36-, 48- and 60-inch boxed trees would be used in high-visibility planting sites such as subdivision entry points and primary intersections.

Table 10. Cost and Quantity of Container Stock for Canopy Replacement Method

Stock Type	Percent of Total Planting	Cost to Purchase and Plant per Unit	Units	Predicted Canopy Area at 20 Years (ft^2)	Total Cost
1 gallon	0%	$8	0	0	$0.00
5 gallon	0%	$27	0	0	$0.00
15 gallon	70%	$85	971	247,089	$82,535.00
24-inch box	25%	$225	311	88,177	$69,975.00
36-inch box	4%	$600	45	14,137	$27,000.00
48-inch box	0.70%	$1,800	7	2,425	$12,600.00
60-inch box	0.30%	$4,000	3	1,140	$12,000.00
Total	**100.00%**	**NA**	**$1,337.00**	**$352,968.00**	**$204,110.00**

Given the variety of replacement container stock described in Table 10, the replacement value for container stock necessary to replace the impacted canopy within 20 years is valued at $204,110.

7.7.3 Trunk Formula Method

The International Society of Arboriculture endorses the Trunk Formula Method of appraising trees (Council of Tree and Landscape Appraisers, 2000). The Trunk Formula Method is used to appraise the monetary value of trees considered too large to replace with reasonably available field grown or nursery stock. Instead, replacement value is based on the cost of the largest commonly available transplantable tree and its cost of installation. The "Guide for Plant Appraisal" indicates that the value of appraised trees "should be reasonably and closely dependent upon the value of the land they occupy." The Guide goes on to state that an estimate of a property's total value is often critical in making the determination of the landscape or trees value. For this reason, the ultimate resulting value of a tree or trees generated by inputs into the many variables of the Trunk Formula Method may be moderated by the actual appraised value of the property. The trunk Formula Method is expressed in this simple formula:

Appraised Value = Basic Tree Cost x Species Rating x
Condition Rating x Location Rating

Each of the variables listed in this formula have many inputs and are described in great detail in the "Guide for Plant Appraisal."

By application of the Trunk Formula Method, the 259 trees that may be removed or subject to significant disturbance have been valued at $332,260. Appendix E provides a tree-by-tree breakdown of the Trunk Formula Method's application to these trees. However, because the Fair Market Value method described in Section 7.7.1, above, is based on the actual known value of the project site, the actual value of the 259 trees should be closer to or equal to the $182,298 figure expressed in that evaluation. The need for this adjustment is made clearer by the fact that the "Guide for Plant Appraisal" is designed for use in appraising trees and landscapes in inhabited settings, such as residences, institutions and commercial landscapes.

7.8 Relationship Between Proposed Mitigation and Estimated Value of Trees Proposed for Removal

The three tree valuation methods described above are provided to assist in the determination of the appropriate mitigation value. These valuations range from $182,298 to $332,260. However, the Fair Market Value method is the valuation method more closely linked to actual, real-world values and is therefore considered to be the most accurate. Nevertheless, it is useful to consider that the Canopy Replacement method results in a figure ($204,110) that is only 12% greater than the $182,298 figure provided by the Fair Market Value method. And, as mentioned above, the Trunk Formula Method's figure ($332,260) must be adjusted to reflect actual land

values since, pursuant to the "Guide for Plant Appraisal," the tree values must reflect actual land values.

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