APPENDIX E

TREE SURVEY REPORT

Tree Survey Report

SANDRA-HAYNE STORMWATER IMPROVEMENT PROJECT
HILLSBOROUGH, SAN MATEO COUNTY, CALIFORNIA

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Date: August 2019

WRA Project No: 27171-2

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

LIST OF ACRONYMS

City	City of Hillsborough
DBH	diameter at breast height
GPS	Global Positioning Systems
Project	Sandra Hayne Stormwater Improvements
Tree Ordinance	City of Hillsborough Municipal Code
WRA	WRA, Inc.

LIST OF PREPARERS

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1.0 INTRODUCTION

1.1 Purpose of Assessment

On September 10, 2018 and July 16, 2019, WRA, Inc. (WRA) conducted an arborist survey at the Sandra-Hayne Stormwater Improvements Project (Project), located at the intersection of Sandra Road and Hayne Road in Hillsborough, San Mateo County, California. The surveys were conducted by ISA-Certified Arborist, Gavin Albertoli (ISA #WE-12027A), for the purpose of identifying and documenting the presence of "trees" as defined by Chapter 14.04, "Tree Removal" of the City of Hillsborough (City) Municipal Code (Tree Ordinance) within the proposed Project Area.

1.1 Project Area Description

The Project Area is an approximately 0.62-acre area consisting of both downstream and upstream reaches of Cherry Creek from Sandra Road (Appendix B, Figure 1). The Project Area is located west of Black Mountain Road, south of Pinehill road, north of Lookout road terminus, and approximately 0.6 mile east of Interstate 280.

1.2 Regulatory Background

City of Hillsborough Tree Ordinance

The City recognizes the value of preserving existing trees to prevent soil erosion, protect against flood hazards and risk of landslides, counteract the pollutants in the air, maintain the climatic balance, decrease wind velocities, and preserve the health and welfare of citizens. Chapter 14.04, "Tree Removal" of the City's Tree Ordinance regulates the protection of certain trees on public and private properties within City limits in order to retain as many trees as possible. The Tree Ordinance protects both "groves" and "trees" as defined below.

- Grove means a group of at least five woody plants of the same type with a diameter of six inches or more measured at four feet, six inches above natural grade.
- Tree means any woody plant which has a trunk diameter of 12 inches or more measured at four feet six inches above natural grade.

Removal of a tree is defined as any major surgery of the trunk of a tree which shall in effect destroy the tree. All tree removals on any vacant unimproved land need approval from the City engineer or his or her authorized representative and an approved tree removal permit through the City's Building Department.

2.0 METHODS

On September 10, 2018, the Project Area was traversed on foot to inventory all trees as defined per the Tree Ordinance. The Project Area was altered in July 2019 to include an additional area in the southeastern portion of the Project Area and an additional survey was conducted in the newly added area on July 16, 2019. During the two surveys, WRA's ISA-Certified Arborist surveyed the entire Project Area and recorded relevant tree information for each surveyed tree. Locations of all trees surveyed within the Project Area were mapped using Global Positioning Systems (GPS) software and devices. Additionally, data regarding the species, diameter at breast height (DBH), estimated crown radius, estimated height, health, condition, and structure ratings were collected.

2.1 Tree Inventory

All trees greater than or equal to 12 inches DBH in the Project Area were inventoried. Locations of trees were recorded using a handheld GPS unit with sub-meter accuracy. DBH was calculated for surveyed trees by measuring the trunk diameter at 4.5 ft. above grade. DBH for multi-stem trees was calculated by measuring each individual stem and calculating the sum total of stem diameters. In cases where multi-stem trees had more than five main stems, only the five largest stems were measured. In cases where an irregular buttress or bulge occurred at two feet above ground or DBH, measurements were taken above or below the irregular feature in order to best represent the size of the tree.

Four trees within the Project Area (Tree #'s 15, 20, 21, and 22) were surveyed in a separate survey conducted by EKI Environment & Water, Inc. (EKI). Trees surveyed by EKI do not have associated species, dripline, height, condition, health, or structure data. Trees surveyed by EKI are listed in Appendix A and Appendix B with an asterisk.

A table with all relevant information pertaining to surveyed trees is provided in Appendix A. A tree survey location map is provided in Appendix B. Representative photographs are provided in Appendix C.

2.2 Tree Assessment

General notes on the condition of trees were taken, including health, structure, and overall condition. An assessment of the health, structure, and overall condition of each tree was conducted according to the narratives listed in Table 1.

Table 1. Rating Narratives for Tree Assessment

Health	
Good	Tree is free from symptoms of disease and stress.
Fair	Tree shows some symptoms of disease or stress including twig and small branch dieback, evidence of fungal / parasitic infection, thinning of crown, or poor leaf color.
Poor	Tree shows symptoms of severe decline.
Structure	
Good	Tree is free from major structural defects.
Fair	Tree shows some structural defects in branches but overall structure is stable.
Poor	Tree shows structural failure of a major branch or co-dominant trunk.
General Condition	
Good	Tree shows condition of foliage, bark, and overall structure characteristic of the species and lacking obvious defect, or disease.
Fair	Tree shows condition of foliage, bark, and overall structure characteristic of the species with some evidence of stress, defect, or disease.
Poor	Tree shows condition of foliage, bark, and overall structure uncharacteristic of the species with obvious evidence of stress, defect, or disease.

2.3 Tree Impact Assessment

Any tree directly in the footprint of the Limit of Disturbance was considered to be a potential removal impact. Any tree inside the Project Area but outside of the Limit of Disturbance was considered to be not impacted. All trees meeting the size requirements of the tree ordinance that are within the Limit of Disturbance are listed as a potential removal in Appendix A.

3.0 RESULTS

3.1 Tree Inventory

A total of 29 trees were identified within the Project Area. Non-native species surveyed included Italian stone pine (*Pinus pinea*), fruitless mulberry (*Morus alba*), and Mexican fan palm (*Washingtonia robusta*). Native trees surveyed included coast live oak (*Quercus agrifolia*), arroyo willow (*Salix lasiolepis*), and California laurel (*Umbellularia californica*). The surveyed trees range in size from 12.0 to 55.0 inches DBH. The largest single-trunk tree surveyed was a 55.0-inch Mexican fan palm (#737). Approximate canopy radii averaged from 9 to 35 feet. Approximate height ranged from 25 to 40 feet. The GPS locations of surveyed trees are shown in Appendix B.

3.2 Tree Assessment

The overall condition, health, and structure of trees inventoried during the WRA assessment ranged from poor to good, with the majority of trees ranking fair to good in all three categories. Sixty-eight (68) percent of the trees surveyed within the Project Area ranked good in general condition with most trees displaying no mechanical damage or significant decline in vigor. Sixty (60) percent of the trees ranked good in health with 23 percent ranking fair and 17 percent ranking poor. Maladies commonly observed that affected overall health ranking included slight to moderate leaf necrosis, trunk and scaffold branch rot, and minor symptoms of Sudden Oak Death (*Phytophthora ramorum*). The four coast live oaks that received a poor health ranking displayed slight to moderate symptoms of Sudden Oak Death including stem cankers and dark ooze exuding from cracks in bark.

The majority of trees surveyed ranked fair in structure and displayed strong structural formation and limited structural defects. Two trees ranked poor in structure due to having poor growth forms with excessive lean, narrow stem and branch connections with included bark, and one or more trunk failures. Table 2, below, summarizes the assessment results for all trees surveyed.

Table 2. Tree Assessment Results Summary

Criteria Assessed/Rating	Condition	Health	Structure
Good	17 (68%)	15 (60%)	8 (32%)
Fair	5 (20%)	6 (23%)	14 (56%)
Poor	3 (12%)	4 (17%)	3 (12%)

A complete list of surveyed trees is included in Appendix A. The locations of surveyed trees are shown in Appendix B. Representative photographs of surveyed trees are included in Appendix C.

4.0 SUMMARY AND RECOMMENDATIONS

Approval from the City engineer or his/her representative authority and an approved tree removal permit from the City's Building Department will be required any time a protected tree is removed.

The Project will potentially remove up to 18 trees that are located within the Limit of Disturbance. All 18 trees should be included in the permit, if planned for removal.

In order to avoid and minimize damage to existing trees which are not proposed for direct impact by Project activities, the following measures should be implemented during construction:

- All construction activity (grading, filling, paving, landscaping etc.) shall respect the root protection zone (RPZ) around all trees within the vicinity of the Project Area that are to be preserved. The RPZ should be a distance of 1.0 times the dripline radius measured from the trunk of the tree. Exception to this standard could be considered on a case-by-case basis, provided that it is demonstrated that an encroachment into the RPZ will not affect the root system or the health of the tree, and is authorized by an ISA-Certified Arborist or comparable specialist.
- Temporary protective fencing shall be installed around the dripline of existing trees prior to commencement of any construction activity conducted within 25 feet of the tree canopy. The fence shall be clearly marked to prevent inadvertent encroachment by heavy machinery.
- Drainage will not be allowed to pond around the base of any tree.
- An ISA-Certified Arborist or tree specialist shall be retained to perform any necessary pruning of trees during construction activity.
- Should any utility lines encroach within the tree protection zone, a single, shared utility conduit shall be used where possible to avoid negative impact to trees.
- Roots exposed, as a result of construction activities shall be covered with wet burlap to avoid desiccation, and should be buried as soon as practicable.
- Construction materials or heavy equipment shall not be stored within the root protection zone of preserved trees.
- Only an ISA-Certified Arborist or comparable specialist will make specific recommendations as to where any existing trees can safely tolerate some level of fill within the drip line.
- Trenching within RPZ shall be done under the field supervision of an ISA-Certified Arborist and shall be hand dug as much as possible in addition to using auger or drill.
- Construction materials shall be properly stored away from existing trees to avoid spillage or damage to trees.

5.0 REFERENCES

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (eds.). 2012. The Jepson Manual: Vascular Plants of California, second edition. University of California Press, Berkeley, California.

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[Hillsborough] Town of Hillsborough. February 28, 2018. Chapter 14.04, "Tree Removal" (Tree Ordinance) of the Hillsborough Municipal Code. Available online at: https://library.municode.com/ca/hillsborough/codes/code_of_ordinances.

Appendix A

Tree Survey Table

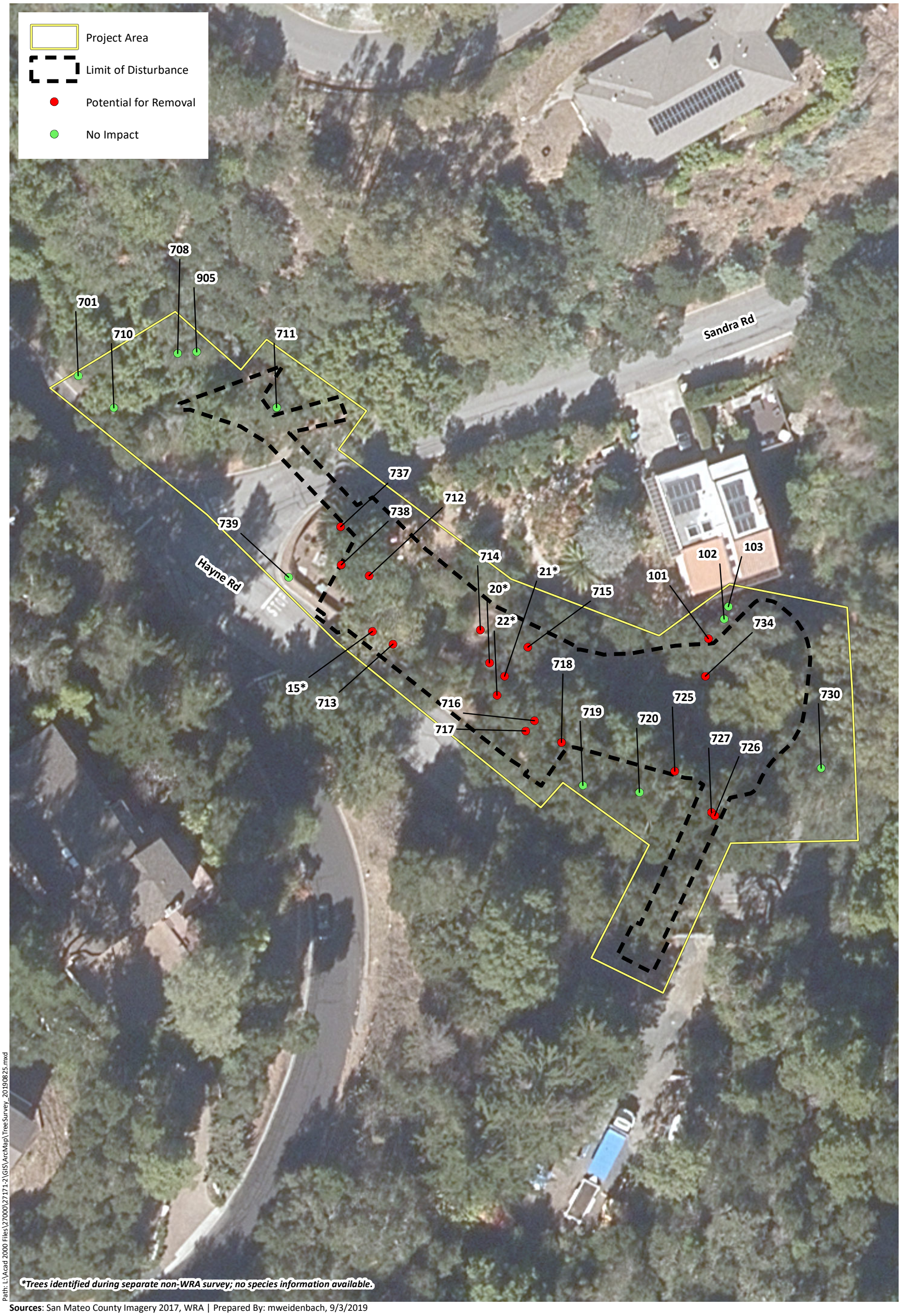
Appendix A. Sandra Hayne Tree Survey Table

Tag ID	Species	Common Name	Multi-stem	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Total DBH (inches)	Ordinance Status	Potential Impact	Dripline (feet)	Height (feet)	Condition	Health	Structure
701	*Quercus agrifolia*	coast live oak	No	13.5	0.0	0.0	0.0	0.0	13.5	Tree	No Impact	15	25	Good	Good	Fair
905	*Quercus agrifolia*	coast live oak	No	12.2	0.0	0.0	0.0	0.0	12.2	Tree	No Impact	9	26	Poor	Poor	Fair
708	*Umbellularia californica*	California laurel	No	16.1	0.0	0.0	0.0	0.0	16.1	Tree	No Impact	25	30	Good	Good	Fair
710	*Quercus agrifolia*	coast live oak	Yes	15.1	16.4	0.0	0.0	0.0	31.5	Tree	No Impact	20	25	Fair	Fair	Poor
711	*Quercus agrifolia*	coast live oak	No	17.1	0.0	0.0	0.0	0.0	17.1	Tree	No Impact	20	35	Good	Fair	Fair
712	*Morus alba*	fruitless mulberry	Yes	7.9	6.6	7.1	5.5	0.0	27.1	Tree	Potential for Removal	15	25	Good	Good	Good
713	*Quercus agrifolia*	coast live oak	No	15.8	0.0	0.0	0.0	0.0	15.8	Tree	Potential for Removal	25	25	Good	Good	Fair
714	*Quercus agrifolia*	coast live oak	No	13.1	0.0	0.0	0.0	0.0	13.1	Tree	Potential for Removal	30	25	Poor	Poor	Poor
715	*Quercus agrifolia*	coast live oak	Yes	12.5	13.4	9.6	0.0	0.0	35.5	Tree	Potential for Removal	25	30	Fair	Poor	Fair
716	*Umbellularia californica*	California laurel	Yes	8.3	2.4	2.3	0.0	0.0	13.0	Tree	Potential for Removal	25	30	Good	Good	Good
717	*Quercus agrifolia*	coast live oak	Yes	14.8	16.3	23.0	0.0	0.0	54.1	Tree	Potential for Removal	35	40	Fair	Fair	Fair
718	*Umbellularia californica*	California laurel	Yes	12.1	9.0	0.0	0.0	0.0	21.1	Tree	Potential for Removal	20	30	Good	Good	Fair
719	*Quercus agrifolia*	coast live oak	Yes	18.7	8.1	7.2	0.0	0.0	34.0	Tree	No Impact	20	30	Good	Good	Good
720	*Quercus agrifolia*	coast live oak	No	19.8	0.0	0.0	0.0	0.0	19.8	Tree	No Impact	25	35	Poor	Poor	Fair
725	*Umbellularia californica*	California laurel	Yes	4.5	5.7	2.5	8.4	7.3	28.4	Tree	Potential for Removal	20	30	Good	Good	Fair
726	*Quercus agrifolia*	coast live oak	No	17.3	0.0	0.0	0.0	0.0	17.3	Tree	Potential for Removal	20	35	Good	Good	Fair
727	*Quercus agrifolia*	coast live oak	No	18.7	0.0	0.0	0.0	0.0	18.7	Tree	Potential for Removal	20	35	Good	Good	Good
730	*Quercus agrifolia*	coast live oak	Yes	24.6	11.7	0.0	0.0	0.0	36.3	Tree	No Impact	25	35	Good	Good	Good
734	*Salix lasiolepis*	arroyo willow	No	15.0	0.0	0.0	0.0	0.0	15.0	Tree	Potential for Removal	20	25	Fair	Fair	Fair
737	*Washingtonia robusta*	Mexican fan palm	No	55.0	0.0	0.0	0.0	0.0	55.0	Tree	Potential for Removal	17	30	Good	Good	Good
738	*Washingtonia robusta*	Mexican fan palm	No	47.0	0.0	0.0	0.0	0.0	47.0	Tree	Potential for Removal	15	25	Good	Good	Good
739	*Pinus pinea*	Italian stone pine	No	41.0	0.0	0.0	0.0	0.0	41.0	Tree	No Impact	35	35	Good	Good	Good
101	*Quercus agrifolia*	coast live oak	No	13.1	0.0	0.0	0.0	0.0	13.1	Tree	Potential for Removal	27	25	Fair	Fair	Poor
102	*Quercus agrifolia*	coast live oak	No	21.9	0.0	0.0	0.0	0.0	21.9	Tree	No Impact	20	35	Good	Fair	Fair
103	*Quercus agrifolia*	coast live oak	No	19.1	0.0	0.0	0.0	0.0	19.1	Tree	No Impact	20	35	Good	Good	Fair
15*				36.0	0.0	0.0	0.0	0.0	36.0	Tree	Potential for Removal					
20*				18.0	0.0	0.0	0.0	0.0	18.0	Tree	Potential for Removal					
21*				12.0	0.0	0.0	0.0	0.0	12.0	Tree	Potential for Removal					
22*				12.0	0.0	0.0	0.0	0.0	12.0	Tree	Potential for Removal					

* Trees identified during separate non-WRA survey; no species, dripline, height, condition, health, or structure information available.

Appendix B

Tree Survey Map



Path: L:\Acad 2000 Files\27000\27171-2\GIS\ArcMap\TreeSurvey_20190825.mxd

Sources: San Mateo County Imagery 2017, WRA | Prepared By: mweidenbach, 9/3/2019

Tree Survey Map

Sandra-Hayne Culvert Replacement Project
San Mateo County, CA

0 25 50 Feet

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Appendix C

Representative Photographs

Photograph 1. Tree #726, 17.3” DBH coast live oak (*Quercus agrifolia*) and Tree #727, 18.7” DBH coast live oak (*Quercus agrifolia)* in the southern portion of the Project Area adjacent to Hayne road.

Photograph 2. Tree #717, 54.1” DBH coast live oak (*Quercus agrifolia*) in the southern portion of the Project Area adjacent to Hayne road.

Photograph 3. Tree #719, 34” DBH coast live oak (*Quercus agrifolia*) in the southern portion of the Project Area adjacent to Hayne road.

Photograph 4. Tree #730, 36.3” DBH coast live oak (*Quercus agrifolia*) in the southern portion of the Project Area adjacent to Hayne road.