Joshua Tree Survey

of a 68.8-acre lot on the NE C/O Mesa Linda Ave. and Mojave Dr.
City of Victorville, San Bernardino County, California

Prepared for:

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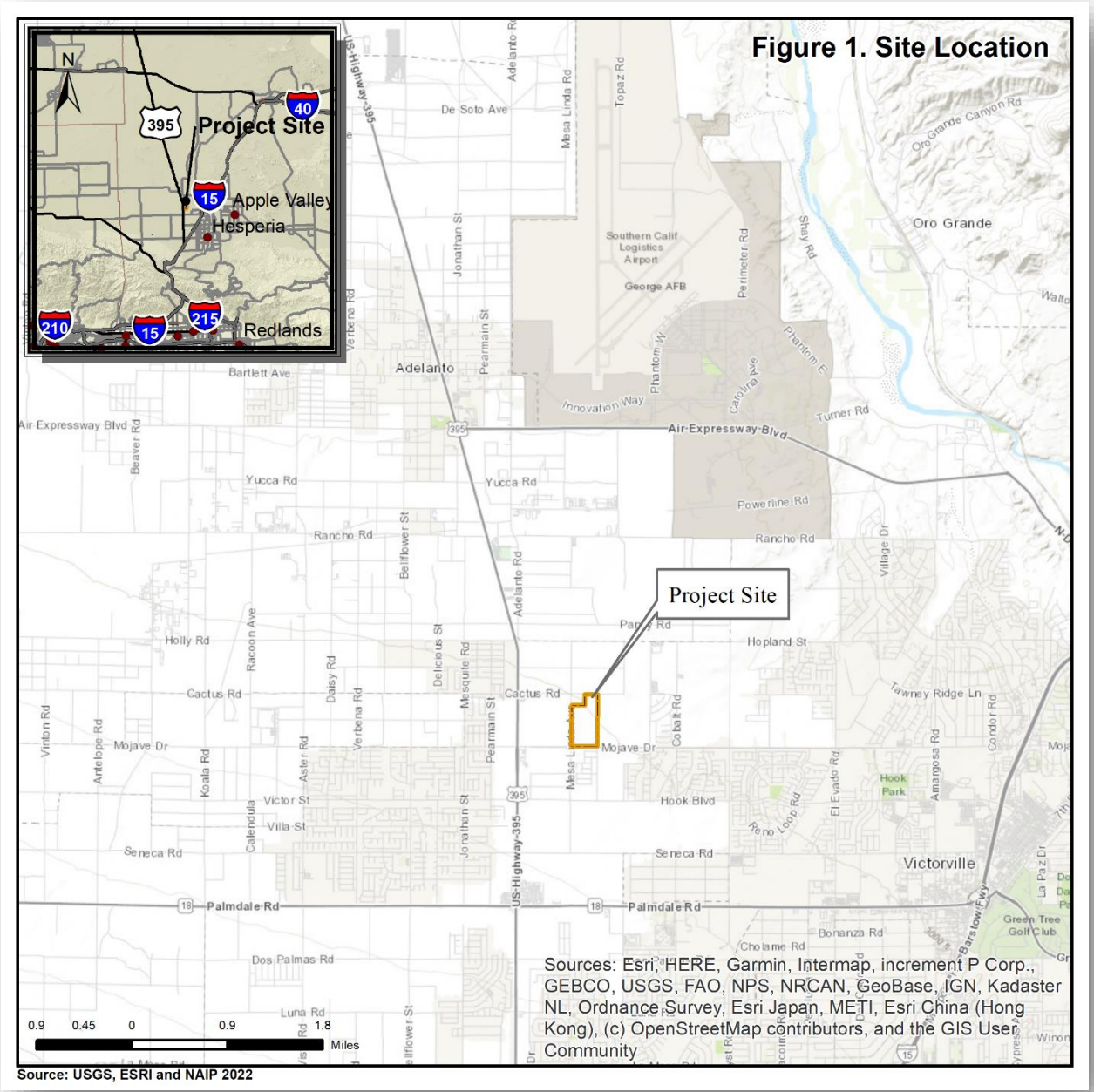
SECTION 1: INTRODUCTION

1.1 - Project Location

This Joshua Tree Survey and Report have been prepared at the request of ELMT Consulting to ascertain the general health of Joshua trees and their local natural environment within an approximate 68.8-acre project site (Site). The Site is located approximately 0.51-mile mile east of Hwy 395 and 4.1 miles west of Interstate 15 in the City of Victorville, CA in the County of San Bernardino. It is specifically located on the NE C/O Mojave Dr. and Mesa Linda Ave. (see Figure 1 below).



1.2 - Project Description

The proposed project is to construct a large industrial warehouse complex, complete with an industrial building, landscaping and hardscaping (including parking lots and associated infrastructure).

1.3 - Scope of Survey

The purpose of this Joshua tree survey is to determine the health of each Joshua tree onsite and record specific details on its stature and primary method of reproduction so they may be preserved in place, relocated, or mitigated for in the event they are poor candidates for preservation. The health assessment included, but was not limited to; recording total diameter at breast height (DBH), canopy spread, tree height, apparent decay, pest or predation damage, and other signs of potential hazards. A limited seedbank analysis was also performed as part of this study identifying the presence of seed production as well as the potential for seed dispersal and recruitment. Typically, a potential risk assessment is also conducted when assessing trees, but no trees within the site are slated to be preserved in place. All documentation in this report is in compliance with standards and requirements published by the International Society of Arboriculture (ISA). This report includes recommendations and mitigation measures meant to satisfy all applicable ordinances and state regulatory guidelines.

The author has endeavored to prepare this survey in accordance with industry standards, International Society of Arboriculture (ISA) guidelines, and in compliance with the new California Department of Fish and Wildlife's requirements resulting from the Joshua tree's CESA candidacy.

1.4 - Regulatory Framework and Protection

Recently, the narrative regarding western Joshua trees (*Yucca brevifolia)* and their preservation has significantly changed in the eyes of the State of California as Western Joshua Trees (WJTs) have been determined as a *candidate* for a Threatened or Endangered species, and additional steps must be taken in order to comply with new regulations (see Section 1.3.1 below).

1.4.1 - State Regulation

On October 21, 2019, the California Fish and Game Commission (Commission) received a petition from the Center for Biological Diversity to list the WJT as *Threatened* under the California Endangered Species Act (CESA). California Fish and Game Code Section 2073.5 requires that the California Department of Fish and Wildlife evaluate the petition and submit a written evaluation with a recommendation to the Commission, which was received at the Commission's April 2020 meeting.

On September 22, 2020, the Commission determined that Threatened listing may be warranted pursuant to Fish and Game Code (FGC) Section 2074.2 of the, and therefore western Joshua tree became a *Candidate* species and the Department undertook a one-year status review.

On December 24th, 2020, the California department of Fish and Wildlife (CDFW) made a special order (CDFW Special Order 749.12) that detailed the adoption by the California Fish and Game commission of

an emergency regulation authorized under section 2084 of the Fish and Game code, which allowed limited "take" of western Joshua trees during candidacy. The *take* is authorized only to the extent that the actions comport to regulations adopted by the identified local governments (County of San Bernardino, Cities of Palmdale, and Yucca Valley) and with avoidance minimization and mitigation outlined in the Commission's regulation and consistent with Chapter 1.5, Endangered Species, of the Fish and Game Code.

In March of 2022, CDFW released, "Status Review of Western Joshua Tree (*Yucca brevifolia*) to the Fish and Game Commission" (Review). The Review found that, "There will be a substantial reduction in areas with suitable climate conditions for western Joshua tree by the end of the 21st century. This reduction in suitable area is expected to have negative effects on the abundance of western Joshua tree and is substantial cause for concern. Nevertheless, WJT is currently abundant and widespread, which lessens the overall relative impact of the threats to the species, and substantially lowers the threat of extinction within the foreseeable future." The Review concluded, "The Department recommends that the Commission find that the recommended action to list western Joshua tree as a threatened species was *not warranted*." The Fish and Game Commission met in October of 2022 and made the determination that more time was needed to acquire data and information for long-term protection of Joshua trees. The next meeting is scheduled for February of 2023.

1.4.2 - Regional Regulation (County of San Bernardino)

Desert Native Plant Protection (Code 13.33.040)

San Bernardino County Code states that it is unlawful for any person to "removal and harvesting" any desert native plants except under a Plant Removal Permit in compliance with County Ordinance 88.01.050.

1.4.3 - Local Regulation (City of Victorville)

According to Victorville's Municipal Code (VMC or Code), the City preserves and protects Joshua trees within its City boundary. An excerpt from the Code is provided below.

Purpose and intent (VMC 13.33.010)

It is determined by the city council that proper and necessary steps be taken in order to protect and preserve, to the greatest extent possible, Joshua trees in all areas of the city so as to preserve the unique natural desert environment throughout the city and for the health, safety and welfare of the community.

Prohibition of removal and enforcement (VMC 13.33.040)

It is unlawful for any person to cut, damage, destroy, dig up, or harvest any Joshua tree without the prior written consent of the director of parks and recreation or his designee. A violation of this section is a misdemeanor punishable by up to six months in jail and/or a five-hundred-dollar fine.

SECTION 2: EXISTING CONDITIONS AND HABITAT CHARACTERISTICS

2.1 - Site and Vicinity Characteristics

The elevation of the site is approximately 3,009 feet above mean sea level, and it is relatively flat, slopping gently to the northeast. The site is bound to the south by Mojave Dr., to the west by Mesa Linda Ave., to the east by Onyx Rd., and to the north by Cactus Rd. The only adjacent property developed is the residential community to the south. The remaining three side is native, undeveloped habitat. A large western portion of the project area has been cleared of vegetation leaving the Joshua trees intact.

2.2 - Project Site Soils

The underlying strata consists of Quaternary alluvium and marine deposits from the Pliocene and Holocene consisting of alluvium, lake, playa, and terrace deposits that are unconsolidated or semi consolidated, and mostly non-marine in origin. The soils onsite consist of loose, sandy loam that are composed of alluvial deposits, derived from granite and/or sedimentary rock.

Below are specific soil types and characteristics as described by the National Resource Conservation Service.

Map Unit Symbol	Map Unit Name	Percent of AOI	Percent
105	105—BRYMAN LOAMY FINE SAND. 2 TO 5 PERCENT SLOPES **Setting** • *Landform: Fan remnants* • *Parent material: Alluvium derived from granite sources* **Typical profile** • *H1 - 0 to 9 inches: loamy fine sand* • *H2 - 9 to 43 inches: sandy clay loam* • *H3 - 43 to 60 inches: sandy loam*	66.7	96.9
112	112—CAJON SAND, 0 TO 2 PERCENT SLOPES **Setting** • *Landform: Alluvial fans* • *Parent material: Alluvium derived from granite sources* **Typical profile** • *H1 - 0 to 7 inches: sand* • *H2 - 7 to 25 inches: sand* • *H3 - 25 to 45 inches: gravelly sand* • *H4 - 45 to 60 inches: stratified sand to loamy fine sand*	2.1	3.1
Totals for Area of Interest		**68.8**	**100.0**

** `National Resource Conservation Service map Unit Symbols and descriptions.*

2.3 - Site Conditions

The site is completely open and accessible to the public and appears to be regularly accessed given the amount of debris, yard waste, and trash disposed of on and in the vicinity of the site. A large area of vegetation has recently been cleared leaving several Joshua trees intact onsite (see Plate 1 below).

Plate 1. This is a view to the northeast from the southwestern corner of the site.

2.4 - Local Flora and Plant Communities

During the survey, it was noted that the site was almost completely composed of creosote bush scrub alliance with low density Joshua tree woodland (see Section 5.1 below). Most of the property was rather monotypic consisting of creosote, Annual bursage (*Ambrosia acanthicarpa)*, Cheesebrush (*Ambrosia salsola),* western Joshua trees (*Yucca brevifolia),* as well as Prickly Russian thistle (*Salsola tragus).*

Plate 2. This is a southern view within the eastern boundary of the site at creosote scrub.

SECTION 3: SURVEY DETAILS AND OBSERVATIONS

3.1 - Survey Methodology

Prior to the field survey, research was conducted that included the City of Victorville and California Department of Fish and Wildlife's websites; this was to review current Joshua tree protection guidelines and survey requirements. An aerial photograph was used as a visual guide during the assessment. For ease during the fieldwork, a handheld Global Positioning System (GPS) device and GPS-enabled smartphone with digitized project boundaries (.kmz files imported into GoogleEarth) were used to identify the precise location of each subject tree relative to the site boundary. In addition, a Bushnell target range finder was used to assure all Joshua trees within 186-feet of the project boundary were assessed.

The fieldwork associated with this Joshua tree survey took place on September 10th and 11th, 2022 at approximately 10:00 hours each day. The survey was conducted by George Wirtes, as ISA Certified and ASCA Registered Consulting Arborist (#738). The reconnaissance was performed by vehicle and by foot to provide 100% visual coverage of the entire property. To assess the 186-foot radius (theoretical seedbank) around each tree and its elements, a 93-foot radius transect was surveyed by foot around each tree (mid-way point within the protected buffer) allowing complete visual coverage and enabled a rapid assessment of the number of burrows within the buffer.

During the survey, CalPacific Sciences documented trunk diameters measured in inches at 4.5 feet above ground level (termed total diameter at breast height (DBH)). The crown-width was estimated by pacing (or range finder), and the height of each subject tree was visually estimated using a tangent height gauge. These data along with other metrics (number of panicles, asexual growths, branches, etc.) were recorded on fieldsheets, and numbered aluminum tags were affixed to trees on the north side at breast height for later reference. Tree status (relative condition, stature, and health) was conducted from ground level with the aid of binoculars as well as a tangent tree height gauge. As indicated earlier, no invasive procedures were performed. Overall health and general appearance of each tree was numerically rated (Health/General Appearance Rating - 1-Excellent, 2-Good, 3-Fair, 4-Decline) based on the aforementioned conditions.

Visual characteristics were recorded on field sheets, and leaf/tissue samples as well as digital photographs were taken as needed to assure accurate identification. To determine transferability, each tree's size and stature were the primary characteristics considered along with its health, degree of damage/predation and lean were also considered when making a final decision.

3.1.2 - Joshua Tree Size Class and Transferability

In accordance with CDFW Section 749.12 Title 14, CCR, the categories of size class are provided below in Table 1.

Table 1 – Joshua Tree Size Class and Transferability

Category	Size	Characteristics
Transferable	Joshua trees in the 1-4 meters (3.3 to 13.2 feet) in height	Overall condition ranges from excellent to fair, no more than three primary branches, little to no damage.
Potentially Transferable*	Joshua trees in the 4-5 meters (13.2 – 16.5 feet) in size range	Possesses an overall good condition, consisting of no more than four primary branches.
Not Transferable	Joshua trees less than one meter (3.3 feet), or greater than 5 meters (16.5 feet) in height	Exhibits more than four branches, in poor health, shows decay/termite or rodent damage

Note: Recent documentation published by the CDFW (September 25, 2020) determined that the optimal range of height for Joshua tree translocation is one to five meters (or 3.3 to 16.4 feet), which would include both, Transferable and Potentially Transferable specimens as defined above.

3.2 - Hazard Risk Assessment

The International Society of Arboriculture (ISA) recommends a Hazard Assessment be included with arborist reports. Such an assessment is an important component of any such report and is important if trees are to be located near public areas such as parks, walkways, residences, and buildings. This tree assessment includes no such risk assessments for the trees surveyed given the proposed development. *It should be noted that Joshua tree possess a certain degree of risk of injury to nearby targets, especially children. This must be taken in consideration when deciding the final location of the translocated trees.*

3.3 - Limitations and Exceptions of this Assessment

This survey was conducted in accordance with industry standards and ethics. This survey was conducted in a manner that draws upon past education, acquired knowledge, training, experience, and research. It was conducted to the greatest extent feasible, and although the information gathered reduces risk of tree failure/decline, it does not fully remove it. No diagnostic testing was performed during this assessment. This survey associated with this Arborist Report included no soil sampling, root excavation, trunk coring/drilling or any other invasive procedure. The determinations of damage due to pest infestation and decay were made solely on outward appearance and inspection of the tree structures. Not all tree defects may be visible from the ground. Epiphytic growth and structures can also obscure defects on the stem, limbs and in the canopy of a tree. Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms subject to attack by disease, insects, fungi and other forces of nature. Many aspects of tree health and environmental conditions are often not detectable (internal

decay, poor root anchoring, etc.). Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time.

The statements made in this report do not take into account the effects of extremes of climate, wind, vandalism, or accident (whether physical, chemical, or fire). In addition, this area is known to have periodic, high velocity Santa Ana winds from transient high-pressure ridges. CalPacific Sciences Corporation cannot therefore, accept any liability in connection with these factors, or where prescribed work is not carried out in a correct and professional manner in accordance with current ISA good practice. The authority of this report ceases at any stated time limit within it, after one year from the date of the survey (if none stated), when any site conditions change, or after pruning (or other activity) not specified in this report.

The goal of this survey was not to diagnose all pathogens noted, but to assess each tree's potential to serve the project long term. It is also to recommend measures to limit risk exposure. The trees assessed within the grading limits of the project were surveyed (as well as the adjacent 186-foot buffer), and decisions and conclusions were based primarily on public safety going forward. Other features of the trees were taken in consideration to draw conclusions. Property owners may choose to accept or disregard the recommendations contained within this report, or seek additional advice. ***To live near trees is to accept some degree of risk. The only way to eliminate all risk is to remove all trees onsite***.

The seedbank analysis associated with this survey relies on what is visually available during the field survey at the time. The survey associated with this report took place in early September when most Joshua trees have already flowered, and dropped fruit. The inspection, that included the observation of fossorial mammal burrows, was conducted in a way that circum-navigated each tree so that burrows may be rapidly quantified with a reasonable degree of reliance. This was not an attempt to enumerate every burrow, but to assess a relative abundance of burrows to estimate potential dispersal of seed by small mammals. The rain on September 10th obscured and contributed to burrow destruction via erosional soil transport.

The survey performed was conducted using a GPS whose data were downloaded and projected on an aerial photograph using ESRI GIS systems. Handheld GPS and its data recorded have a known potential error of up to 3 meters. Thus, the precise location of Joshua trees displayed on the following figures may be inaccurate to this degree, and must be evaluated taking this into consideration.

3.4 - Species Profile

Western Joshua trees (*Yucca brevifolia*) are from the *Agavaceae* family and native to Southern California. It is an iconic species, mostly associated with the Mojave Desert Region, but also occurs in Arizona, Utah, Nevada and northwestern Mexico. Joshua Trees are composed of two distinct varieties, *Yucca b. var. brevifolia* and *Y. b. var. jaegeriana*, with the smaller latter species growing in its most northerly range. The Joshua tree is recognized in several vegetation communities; while often the most visual floral species, it is rarely a true dominant one in terms of abundance. It thrives in Sunset Zones 8 through 24

and in USDA Hardiness Zones of 6 to 10 preferring full-sun exposure, moist to dry soil composed of loam or sand and slightly acidic to highly alkaline soil pH.

This tree species grows at a rate of approximately 12 inches per year, and it can live as many as 150 years. They can grow as high as 40 feet with a trunk circumference of 82 inches with a crown spread of 21 feet; but their typical growth is 15 to 25 feet in height. The branching in older trees is often extensive with rounded open canopies. Joshua trees generally occur on sloped areas within desert grasslands, shrublands mesas, bajadas and terraces. This species prefers soils composed of loose and well-drained soils that consist of loans with a Sandy or gravelly composition. There can exist at elevations between 1,300 feet and 6,500 feet in elevation above mean sea level.

Western Joshua trees can produce both asexually and sexually; this is typically accomplished with the help of the yucca moth, but this tree species can also reproduce asexually via clonal stem or rhizomal sprouting. The relationship between Joshua trees and the yucca moth (*Tegeticula synthetica*) is a case of obligate mutualism where neither the moth nor the Joshua trees can exist without each other.

Within California, approximately 4.4 million acres have been calculated in which Joshua trees are known to occur. Many factors have contributed to the restrictions in the range of Joshua tree habitat, but primarily it has been impacted by wildfires, invasive species, development, and climate change. Because of this and other factors, the state of California has passed legislation elevating the status of the Joshua tree within the California Endangered Species Act listing it as a Candidate for Threatened or Endangered status in order to preserve it for future generations while allowing for improvements in population growth.

3.5 - Subject Trees and Observations

The WJT specimens onsite are illustrated and described in detail below as well as in Appendix A. During the tree inventory, specific measurements, and parameters of all trees onsite were recorded on tree assessment worksheets; these data have been transferred and summarized in Section 5.1 below.

3.5.1 - Tree Inventory

During the field survey, 30 Joshua tree specimens were inventoried within the project boundary, and an additional two (#924 and #925) were assessed within the 186-foot buffer. These 32 trees were tagged, assessed, and details of the stature were recorded. Figure 2 below shows the location of the trees observed.

3.5.2 - Joshua Tree Reproduction

As previously indicated, a viable Joshua tree woodland contains elements of asexual and sexual reproduction. Successful persistence of Joshua tree woodland depends on many factors, but relies on fruit/seed production, dispersal, as well as successful recruitment or germination within the woodland. Through a process termed obligate mutualism, the yucca moth (*T. synthetica*) is dependent on Joshua trees and vice versa for their continued existence within the woodland.

As part of the survey, flowering/fruiting panicles were quantified and described (active/expended) to document the seed availability within the project site and its availability for dispersal (see Section 4.1 below). This information must be weighed against the background narrative of the persistent drought within the region that has been in place since 2000. It is well documented that Joshua tree fruit production is more plentiful in wetter years (CDFW 2022).

3.6 - Joshua Tree Protected Buffer

Current available literature (CDFW 2022) discusses the primary method of western Joshua tree seed dispersal as "scatter-hoarding behavior of rodents who actively collect seeds from fruits in the canopies of trees and fruits and seeds that have fallen on the ground, and bury seeds within the local area", most of the time within 186 feet of the source tree. White-tailed antelope squirrels (*Ammospermophilus leucurus*) and kangaroo rats (*Dipodomys merriami and D. agilis*) were noted as likely having a large role in this process. Because of these data, CDFW has determined that a buffer of 186 feet surrounding each tree is considered within the tree's associated seedbank, and therefore protected like that of the tree itself See Figure 3 below).

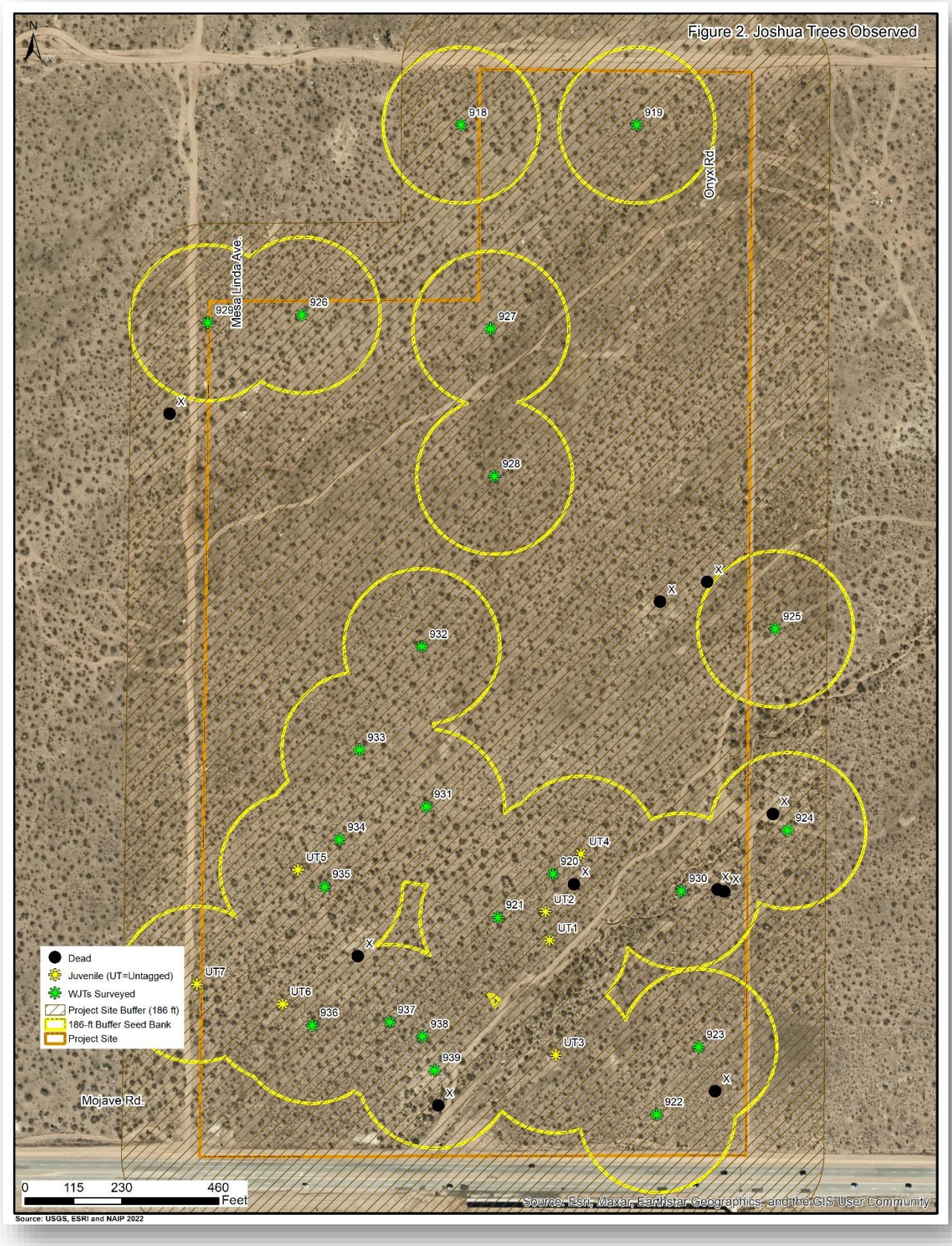


Figure 2. Joshua Trees Observed
N
Onyx Rd.
Mesa Linda Ave.
Mojave Rd.
Dead
Juvenile (UT=Untagged)
WJTs Surveyed
Project Site Buffer (186 ft)
186-ft Buffer Seed Bank
Project Site
0 115 230 460 Feet
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Source: USGS, ESRI and NAIP 2022

3.6.1 - Observations

During the site survey, data and observation were recorded as indicated in Section 3.1 above. The plates below show examples of the notable observations.

Photo Plates

Plate 3. This is a view of boreholes and peridermal cavities in a stem (tree #916).	

Plate 4. This is a view of epicormic, clonal growth at the base of a dead WJT (tree #919).	

Plate 5. This is a view of a diseased stem with basal epicormic growth (tree UT 2).	
Plate 6. This is a view of a peridermal exfoliation (tree # 921).	

Plate 7. This is a view of a juvenile in decline (UT 3).	
Plate 8. This is a view of a large cavity in the stem of a tree (#926).	

Plate 9. This is a view of an expended fruiting panicle (#926).	
Plate 10. This is a view of extensive internal decay within a stem (#935).	

Plate 11. This is a view of a nest within the canopy of a tree (tree #936).	
Plate 12. This is a view of a WJT with a lean and offset canopy mass (tree #939).	

SECTION 4: SEED BANK ASSESSMENT

4.1 - Seed Availability

During the field survey, 33 expended (last year's blooming season or older) panicles and two recently active panicle were observed within the canopies of the 32 Joshua trees assessed. This illustrates the potentially limited viability of the associated seed bank as seed viability rapidly decreased after the first year (CDFW 2022).

4.1.1 - Burrows and Excavations Observed

As part of this assessment, a rapid burrow enumeration was performed within the vicinity of each tree, estimating the number of burrows within the associated, protected buffer (see Section 3.1 above). The plates below illustrate examples of burrows as well as soil excavations, likely done by small, fossorial mammals.

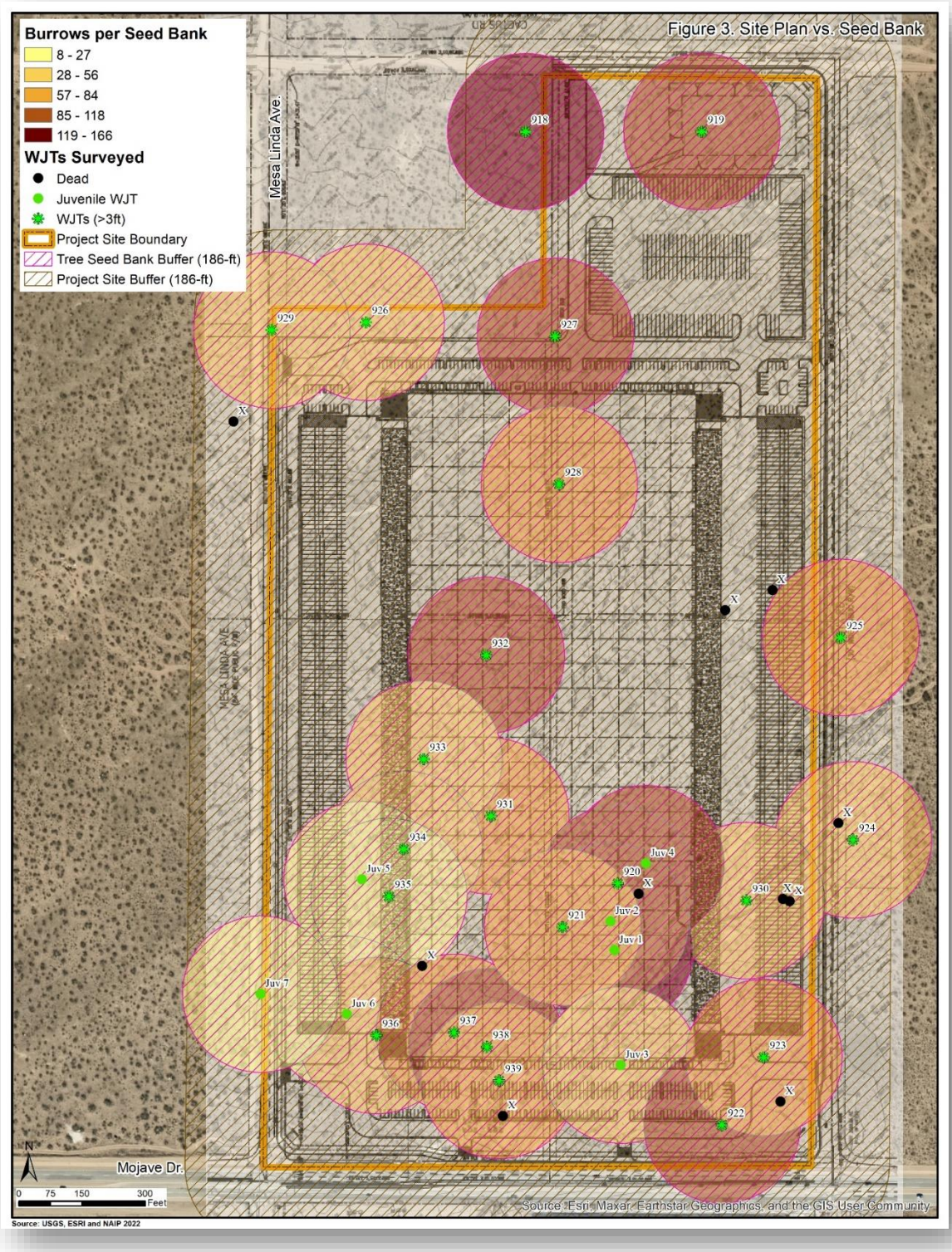
Plate 13. This is a view of a possible kangaroo rat burrow (tree buffer #916).	

Plate 14. This is a view of a possible kangaroo rat burrow complex (tree #917).	
Plate 15. This is a view of a possible seed cache excavations and nearby burrows (tree #930).	

Plate 16. This is a view of a possible kangaroo rat burrow complex (tree #932).	
Plate 17. This is a view of burrow complex occupied by a white-tailed antelope ground squirrel (*Ammospermophilus leucurus*) (tree #939).	

4.1.2 - Burrows and Excavations Observed

The burrows quantified during the rapid assessment are presented below in Figure 3. The side banks are shaded according to burrow abundance within the associated seed bank.



4.1.3 - Local Disturbance

As indicated in Section 2.3 as well as Figures 2 and 3 above, the site contains habitat that has significant areas of disturbance; this is localized along Mesa Linda Rd. where all vegetation (except WJT) has been removed (See Plate 1 above in Section 2.3). The site is also unfenced and easily accessed by pedestrian and vehicular traffic as well as stray dogs and cats. These factors directly affect seed production, availability as well as seed dispersal within the site.

SECTION 5: FINDINGS AND RECOMMENDATIONS

5.1 - Conclusion

As indicated in Section 3.5 above, the project site contains 30 Joshua trees, and another two occur within the extended 186-foot buffer around the site. Of these, six WJTs are juveniles with a height of $\leq$ 3.5 feet (UT1-7). The stand of trees ranged in height from 1.5-28 feet (see Table 2 below) with a canopy range from approximately 3.1 to 104 ft^2.

The trees assessed ranged from juvenile to mature with 12 containing observable panicles (33 expended, 2 recently active). The trees onsite were in relatively good health with the exception of a few showing signs of diseased, internal decay, bore holes, and distress. Yellowed foliage, crown dieback, stem decay, and limited herbivory were noted as well.

Based on their health and stature, it appears that as many as 20 of the 32 trees may be candidates for relocation (see Table 3 below). The western Joshua tree density for the site was 0.44 trees per acre.

Table 2. WJT Metrics Summary

Tree Tag #	Total DBH (inches)	Stems	Branches	Fruiting Panicles	Expended Panicles	Height (feet)	Canopy Spread (sq. ft.)	Health*	Transferable
915	5	1	1	0	0	7	10	1.0	Y
916	16	1	1	0	12	28	104	1.0	N
917	NA	1	1	0	0	3.5	3	1.0	Y
918	8	1	2	2	2	9	10	1.0	Y
919	5.5	2	1	0	0	3.5	7	1.0	Y**
UT 1	NA	1	1	0	0	3.5	3	1.0	Y
UT 2	NA	1	1	0	0	2.5	13	1.0	N
920	10	1	4	0	4	12	44	3.5	N
921	11	1	4	0	4	12	3	2.0	Y
UT 3	NA	1	1	0	0	2.5	3	2.5	N
922	7	1	1	0	0	6.5	4	1.0	Y
923	8	1	2	0	1	11.5	20	1.5	Y
924	5	1	1	0	0	6	13	2.0	Y
925	NA	1	1	0	0	4	3	1.0	Y
926	19	1	2	0	2	10	33	1.5	Y
927	20	1	2	0	2	13	44	1.0	Y
928	8	8	1	0	0	10	3	2.5	N
929	8	1	1	0	0	8	10	1.5	N
930	NA	1	1	0	0	4	3	1.0	Y
UT 4	NA	1	1	0	0	3	5	1.0	Y
931	9	1	2	0	1	15	16	1.5	Y**
932	9	1	2	0	0	13	5	1.5	Y
933	9	1	3	0	0	15	50	1.5	Y**
934	9	1	1	0	1	13	10	1.5	Y
UT 5	NA	1	1	0	0	2.5	3	1.0	N
935	5	2	2	0	0	8	13	2.5	N
UT 6	NA	1	1	0	0	1.5	3	2.5	N
UT 7	NA	1	1	0	0	2	3	1.5	N
936	12	1	3	0	2	18	104	3.5	N
937	6	1	1	0	1	10	3	2.0	Y
938	6	1	1	0	0	6	3	1.5	Y
939	12	1	2	0	1	9	20	4.0	N
Average	**9.4**	**1.3**	**1.6**	**0.1**	**1.0**	**8.5**	**17.8**	**1.7**	

* General health was assessed using the following scale: 1-Excellent, 2-Good, 3-Fair, 4-Poor/in decline

** Potentially transferable

Table 3. Joshua Tree Transferability Summary

Classification	(35-ac)
Transferable – Joshua trees in the 1-4 meters (3.3 to 13.2 feet) in height, Overall condition range from excellent to fair, no more than three primary branches, little to no damage.	**17 (53.1%)**
Potentially Transferable- Joshua trees in the 4-5 meters (13.2 – 16.5 feet) in size range, possesses an overall good condition, consisting of no more than four primary branches.	**3 (9.4%)**
Non-transferable- Joshua trees less than 1 meter or greater than 5 meters (16.5 feet) in height, exhibits more than four primary branches, in poor health, shows decay/termite or rodent damage.	**12 (37.5%)**
Total	**32**

5.2 - Discussion

With the exception of the disturbed area along the western margin of the site, the vegetation within the project area is fairly monotypic creosote scrub with intermittent Joshua trees. The trees within the site are appear to reproduce primarily sexually with several instances noted of recruitment (juveniles) from the underlain seedbank. The stand is producing fruit, but this appears to be severely reduced this year. Elements for seed dispersal are readily present as evidenced by the active burrows. Asexual or clonal reproduction was rare and limited to basal and stem epicormic sprouting and not from below-ground rhizomes.

With the exception of a few trees, the stand is relatively young with the absence of trees with extensive branching canopies, lateral meristems, or multiple stems. Given the general health of the stand (good to excellent), as many as 62.5% of the trees are candidates for relocation. Those trees that are not relocation candidates typically fall outside the size requirement, are distressed, or possess extensive branching or lean.

5.3 - Recommendations

Recommendation 1 - CDFW Consultation and Incidental Take Permit

The site contains numerous Joshua trees; these specimens and their associated seed bank (extending out 186 feet from each tree) are protected under state law. The project will clearly impact WJTs and their associate protected seedbank, impacting approximately 37.5 acres (of seedbank). CDFW recommends they be involved if ground-disturbing activity is scheduled to take place within 300 feet of any Joshua tree, and an incidental take permit (ITP) may be required if disturbance is to occur within 186 feet of a specimen.

Consultation with CDFW for Section 2081 subdivision (b) of the Fish and Game Code allows CDFW is needed to authorize "take" of species listed as endangered, threatened, or candidate or a rare plant if that take is incidental to otherwise lawful activities and if certain conditions are met. These authorizations are commonly referred to as an ITP. Under Section 2081 subdivision (b), impacts of taking include all impacts on the species that result from any act that would cause the proposed taking. An ITP must be attained if

the Joshua tree specimen will be removed as part of the project prior to any ground-disturbing activity. This action must also be considered in accordance with requirements of the City of Victorville's Planning Department and any applicable permits must be acquired.

Recommendation 2 – Preserve in Place

The Joshua tree specimens onsite provide foraging and nesting habitat to the local fauna and are treated as a threatened or endangered species while their candidacy is being evaluated. Preserving in place, to the greatest degree feasible, will maintain their contribution to the local ecology.

To this end, the impacts of construction can be severely detrimental to trees within a project site or those adjacent to the work area. If preserved, measures must be taken to mitigate such impacts and maximize the potential success of tree survival during the process (See Appendix C below). In addition, recently published CDFW Regulatory action dictates that the area within a 40-foot radius of this tree must be marked and protected if this tree is to be preserved in place (San Bernardino County 2020).

Recommendation 3 – WJT Relocation and Monitoring Plan

If approved by CDFW as a viable mitigation, and upon completion of an ITP and approval by the City of Victorville's with required permitting, WJT relocation is a potential option.

The candidates for relocation must be carefully selected by a "qualified desert native plant specialist" based on stature and health. Tree excavation must be done carefully and enough of the root ball must be left intact to maximize the tree's success following transplantation. The extracting of existing trees for the purpose of transplanting must be done very carefully using a tree spade to avoid adversely impacting the roots of the specimen. Any shredded roots must be carefully pruned with sterilized pruning shears. Use of backhoes, boxing of trees, and bare root moving are unacceptable methods of moving Joshua Trees. A root ball may extend out as far as the tree is tall, or even further.

To maximize success of survival, transplanting trees should occur during the cooler months of October through March. A three-to-five-year monitoring plan (Plan) is recommended following the successful relocation of any WJT (once it is approved by state and local authorities with appropriate permitting). A successful Plan will outline specific details on the removal, staging, and installation of WJT. It will also outline specific success criteria that must be met as well as mitigation for any WJT specimens lost during the Plan's timeframe.

Recommendation 4 – Purchase of Off-Site Joshua Tree Woodland Mitigation

As part of a mitigation package, the purchase of Joshua tree woodland acreage as part of a long-term conservation area can be an effective way to preserve quality Joshua tree woodland that is relatively pristine

for future generations. *Typical mitigation ratio for developed woodland for WJT density such as that onsite is 1.5:1 for every acre disturbed.* This option is at the discretion of the City of Victorville's Planning Department and at the discretion of CDFW as a means to satisfy obligations of the incidental take permit. A compensatory mitigation requirement may also be required to be deposited into a CDFW Western Joshua Tree Mitigation Fund.

Recommendation 5 - Migratory Bird Treaty Act

Pursuant to the Migratory Bird Treaty Act (MBTA) and CDFG Code, removal of any trees, shrubs, or any other potential nesting habitat should be conducted outside the avian nesting season. The nesting season generally extends from early February through August, but can vary slightly from year to year based upon seasonal weather conditions.

SECTION 6: QUALIFICATIONS OF ARBORIST

George J. Wirtes, III is a trained biologist and a Certified Arborist with the International Society of Arboriculture (CH-08084), and a San Bernardino County Certified Desert Native Plant Expert. Mr. Wirtes was certified in November of 2005 and has conducted numerous tree assessments for residential and commercial properties that involve sensitive species that include Joshua trees and California native oak species. and other tree species. Most notably, Mr. Wirtes has created or contributed to Joshua tree preservation and oak regeneration plans within the Counties of Riverside and San Bernardino. Mr. Wirtes' education includes a Bachelor of Science in Biology and a Master of Science in Environmental Science from California State University at Fullerton.

I qualify as a desert native plant specialist as outlined in CDFW Section 749.12 Title 14, CCR, I certify that the details stated herein this report are true and accurate:

George Wirtes, MS
ISA Certified Arborist, RCA #738, CH-08084

SECTION 7: REFERENCES

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Appendix A – Joshua Tree Metrics

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
915	7	1	0	0	1		2	9.6	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 1	Pups	Transferrable
5					5	1	2	0	Yes
Tree Comments:		Juvenile, good health and vigor, juvenile leaves					Conclusion	Preserve	
Burrows:	46	1-4 " in diameter							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
916	28	1	0	12	1		6	103.8	3-4
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	4 + 6	Pups	Transferrable
16					16	38	7	0	No
Tree Comments:		Branch failure, in decline, borers					Conclusion		Preserve
Burrows:	143	1-4" in diam.							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
917	3.5	1	0	0	1		1	3.1	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
NA							1	0	Yes
Tree Comments:		Juvenile, young leaves					Conclusion		Preserve
Burrows:	64	1-4" in diam.							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
918	9	1	0	2	2		3	9.6	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 2	Pups	Transferrable
8					8	2	0	0	Yes
Tree Comments		Good form and vigor, expended panicles					Conclusion		Preserve
Burrows	154	Multiple complexes							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
919	3, 2.5	2	0	0	1		1	7.1	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 1	Pups	Transferrable
NA					0	2	2	0	Potentially
Tree Comments		Two stems from epicormic basal sprouting, good form and vigor, one dead stem					Conclusion		Preserve
Burrows	107	1-5" in diameter							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
UT 1	3.5	1	0	0	1		1	3.1	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
NA					0	1	1	0	Yes
Tree Comments		Young leaves					Conclusion		Preserve
Burrows	166	1-5" in diameter							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
UT 2	2.5	1	0	0	1		0	12.6	2-3
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 1	Pups	Transferrable
NA					0	2	5	0	No
Tree Comments		Leaning, fair to poor health, poor structure					Conclusion		Preserve
Burrows	107	1-5" in diam, complexes present							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
920	12	1	0	4	4		0	56.7	3-4
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	12	5 + 4	Pups	Transferrable
10					10	8	8	7	No
Tree Comments		Leaning, fair to poor vigor					Conclusion		Remove
Burrows	118	1-4" in diam, complexes present							

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
921	12	1	0	4	4		2	44.2	2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 6	Pups	Transferrable
11					11	15	5		Yes
Tree Comments		Young leaves, exfoliating bark							
Burrows	80			1 burrow complex			Conclusion:		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
UT 3	2.5	1	0	0	1		1	3.1	2-3
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
6					6	1	1	0	
Tree Comments		Yellowed leaves							
Burrows	51			1-4" in diam.			Conclusion		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
922	6.5	1	0	0	1		1	3.1	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
7					7	1	1	0	Yes
Tree Comments		Good form and vigor							
Burrows	104			complexes present			Conclusion		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
923	11.5	1	0	1	2		2	19.6	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	3 + 3	Pups	Transferrable
8					8	2	2	0	
Tree Comments		Good form and vigor							
Burrows	75						Conclusion		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
924	6	1	0	0	1		0	12.6	2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	0 + 2	Pups	Transferrable
5					5	1	6	0	Yes
Tree Comments		Good form and vigor							
Burrows	44			complexes present, '1-4" in diam.			Conclusion		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
925	4	1	0	0	1		1	3.1	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
NA					0	1	1		Yes
Tree Comments		Juv., Good health and vigor							
Burrows	81			complexes present, '1-5"			Conclusion		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
926	10	1	0	2	2		3	33.2	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	3 + 3	Pups	Transferrable
19					19	7	4	0	Yes
Tree Comments		Young leaves, fruit present							
Burrows	52			2-5" in diam			Conclusion		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
927	13	1	0	2	2		4	44.2	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	3 + 4	Pups	Transferrable
20					20	9	4	0	Yes
Tree Comments		Good health and vigor, trash and debris strewn around							
Burrows	115			2-6, complexes present			Conclusion		Preserve

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
928	10	1	0	0	1		1	3.1	2-3
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
8					8	0	1	0	No

Tree Comments		Canopy dieback								
Burrows	78			2-6" in diam.				Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
929	1	1	0	0	1			2	9.6	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 1		Pups	Transferrable
8					8	2		2	0	No
Tree Comments		Good form and vigor								
Burrows	36			Complexes present, '2-5" in diam.				Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
930	4	1	0	0	1			1	3.1	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1		Pups	Transferrable
NA					0	1		1	0	Yes
Tree Comments		Good form and vigor								
Burrows	56			Complexes present, 2-5 in. in diam.				Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
UT 4	3	1	0	0	1			1	4.9	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 2		Pups	Transferrable
NA					0	1		1	1	Yes
Tree Comments		Clonal growth, good form and vigor								
Burrows	102							Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
931	15	1	0	1	2			1	15.9	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 3		Pups	Transferrable
9					9	3		3	0	Potentially
Tree Comments		Good form and vigor								
Burrows	79			Complexes present				Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
932	13	1	0	0	2			1	4.9	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1		Pups	Transferrable
9					9	3		2	0	Yes
Tree Comments		Exfoliating stem, good form and vigor								
Burrows	99							Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
933	15	1	0	0	3			2	50.2	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	3 + 4		Pups	Transferrable
9					9	8		7	0	Potentially
Tree Comments		Good form and vigor, clusters of ants on stem								
Burrows	47	Cleared vegetation to west						Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
934	13	1	0	1	1			2	9.6	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 1		Pups	Transferrable
9					9	24		2	0	Yes
Tree Comments		Good form and vigor								
Burrows	40	Cleared vegetation to west						Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
UT 5	2.5	1	0	0	1			1	3.1	1
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1		Pups	Transferrable
NA					0	1		1	0	No
Tree Comments		Good form and vigor, juvenile								
Burrows	8							Conclusion	Preserve	
Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches			Canopy Vectors	Canopy Area (sq. feet)	Health Rating
935	8	2	0	0	2			1	12.6	2-3

DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	3 + 2	Pups	Transferrable
5	5				10	2	2	25	No
Tree Comments		Codominant stems, decay cavity in stem, nurse plant							
Burrows	22						Conclusion	Preserve	

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
UT 6	1.5	1	0	0	1		1	3.1	2-3
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
NA					0	1	1	0	No
Tree Comments		Young leaves							
Burrows	24						Conclusion	Preserve	

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
UT 7	2	1	0	0	1		1	3.1	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
NA					0	1	1	0	No
Tree Comments		Young leaves, good form and vigor							
Burrows	27			Disturbed to east			Conclusion	Preserve	

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
936	18	1	0	2	3		4	103.8	3-4
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	6 + 5	Pups	Transferrable
12					12	15	8	0	No
Tree Comments		Nest visible, canopy dieback							
Burrows	43						Conclusion	Remove	

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
937	10	1	0	1	1		0	3.1	2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 0	Pups	Transferrable
6					6	2	2	0	Yes
Tree Comments		Good form and vigor, nurse plant adjacent to tree							
Burrows	84						Conclusion	Preserve	

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
938	6	1	0	0	1		1	3.1	1-2
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	1 + 1	Pups	Transferrable
6					6	1	1	0	Yes
Tree Comments		Good form and vigor							
Burrows	110						Conclusion	Preserve	

Tree Tag #	Height (feet)	Stems	Active Panicles	Expended Panicles	Primary Branches		Canopy Vectors	Canopy Area (sq. feet)	Health Rating
939	9	1	0	1	2		0	19.6	4
DBH1	DBH2	DBH3	DBH4	DBH5	Total DBH	Terminal meristems	2 + 2	Pups	Transferrable
12					12	6	6	0	No
Tree Comments		Lean, some dieback							
Burrows	75	White-tailed antelope squirrel noted near tree					Conclusion	Remove	

Appendix B – Specimen Photoplates

Tree #915

Tree #916

Tree #917

Tree #918

Tree #919

Tree #920

Tree #921

Tree #922

Tree #923

Tree #924

Tree #925

Tree #926

Tree #927

Tree #928

Tree #929

Tree #930

Tree #931

Tree #932

Tree #933

Tree #934

Tree #935

Tree #936

Tree #937

Tree #938

Tree #939

Tree Juv1

Tree UT 2

Tree UT 3

Tree UT4

Tree UT 5

Tree UT 6

Tree UT 7

Appendix C - Tree Protection during Construction

Building/grading near trees requires that they are healthy at the start of the project for the stand to recover well. Some older trees have little tolerance for root damage or other stress factors. Younger, more vital trees are more tolerant of changes in their surroundings. However, each change in soil compaction, irrigation, under plantings, and other conditions takes some of an older tree's strength and vigor and further diminishes its health. The main stresses and risks of construction are:

- Soil compaction
- Lack of water or changes in the site hydrology
- Change of grade in the root zone
- Physical damage to tree roots and structure
- Dumping of potentially toxic construction wastes
- Lack of pest control and other care
- Dust
- Human error

Mature trees take a long time to heal from, or respond to, injury. It could take 10 years for some trees to make a visible improvement in health after construction impacts occur. On the other hand, it could take 10 years for a tree to visibly start declining after cutting roots, compacting the soil, or raising the grade. The following measure must be taken for any trees that are to be preserved onsite (or as dictated by the City's guidelines).

1. Dripline fencing (Orange polyethylene construction fencing, no less than 4 feet in height) must be placed a minimum of 12 feet around any tree or groups of trees.

2. Dripline fencing must be erected so that it is visible and structurally sound enough to deter construction equipment, foot traffic, and the storing of equipment under tree canopies. Fencing will be secured to 6-foot-tall, heavy-gauge T-bar line posts pounded in the ground a minimum of 18 inches and spaced a minimum of 8 feet on-center. Fencing will be attached to the T-bar posts with minimum 14-gauge wire fastened to the top, middle, and bottom of each post. Tree protection signs will be attached to every fourth post. The contractor will maintain the fence to keep it upright, taut, and aligned at all times.

3. Raising or lowering the grade in the root zone of trees can be fatal or ruin the health of trees for years to come. Grade change and soil compaction force out the oxygen and literally press the life out of the soil. A retaining wall can be used to minimize the amount of the root zone that is affected, but it is essential that the footing not be continuous. Gravel and aeration pipes should be placed inside the retaining wall before the fill is placed. Consult with a qualified civil engineer for proper design calculations.

4. Trenching within the protection zone must be avoided wherever possible. Most of the roots are in the top 1 to 2 feet of soil, and trenching can sever a large percentage of roots. Where trenching is necessary in areas that contain roots from preserved trees, contractors should use trenching

techniques that avoid critical root structures; this includes a root pruner or air-spade to limit root impacts. It is recommended that the desert native plant specialist be present to ensure that all pruning cuts are clean to minimize tearing, ripping, or fracturing of the root system.

5. Oil from construction equipment, cement, concrete washout, acid washes, paint, and solvents are toxic to tree roots. Signs should be posted on the fencing around trees notifying contractors of the fines for dumping. Portable latrines that are washed out with strong detergents can damage the fine roots of the trees. Portable latrines should not be placed near trees, nor where frequent and regular foot traffic to them will compact the soil below the trees.

Construction creates large amounts of dust. Trees to be preserved will need to be kept clean. Dust reduces photosynthesis within the leaves of trees. Strict dust control measures must be implemented during construction to minimize this impact, and an occasional rinsing with a solution of water and insecticidal soap will help control pests.