

**STATE-PROTECTED PLANT AND NOXIOUS WEED INVENTORY
ON ASLD LANDS EAST OF SAHUARITA, PIMA COUNTY, ARIZONA**

To: Rosemont Copper
From: WestLand Resources, Inc.
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Project No. 1049.14 CCO3 323

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1. INTRODUCTION

WestLand Resources, Inc. (WestLand), was retained by Rosemont Copper Company to conduct a state-protected plant and noxious weed inventory within a proposed waterline corridor crossing property managed by the Arizona State Land Department (ASLD; the Project Area). The Project Area includes approximately 773.3 acres of ASLD lands east of Green Valley, Pima County, Arizona (Crossing Township 17 South, Range 14 East, Sections 20, 21, and 27-35; Township 18 South, Range 14 East, Sections 1, 2, and 12; and Township 18 South, Range 15 East, Sections 7, 17, 18, 20, and 21, Gila and Salt River Baseline and Meridian; Figure 1).

Given the large size of the Project Area, a full count of all perennial woody species and succulents was not practicable. Therefore, senior WestLand biologists developed a stratified random sampling protocol to complete the native plant inventory. Details of the survey protocol and results are provided below.

2. SITE DESCRIPTION

The Project Area consists of a main line corridor with two spurs (Figures 1 and 2). The main line corridor is 650 feet wide for approximately 1 mile on the western end and at least 500 feet wide along the remainder of the corridor. One of the two spurs is approximately 0.25 mile long, approximately 1 mile from the west end of the main line. The other spur is less than 0.25 mile east of the first spur, and includes approximately 3.56 miles of 150-foot-wide line and lies north of the main line.

The west end of the Project Area is on alluvium immediately east of the Santa Cruz River floodplain. From the western terminus of the main line, the Project Area traverses east and intersects Santa Rita Road. It then follows the north side of the road and goes southeast on alluvial deposits to the edge of the foothills of the Santa Rita Mountains. Near the east edge of the Project Area, the line splits into two alternate routes around a low, isolated hill. The two alternate routes terminate at the edge of ASLD lands.

The Project Area crosses relatively undisturbed lands, but includes dirt roadways and the dirt shoulder along the pavement on Santa Rita Road for approximately 7 miles.

On Brown's (1994) map of biotic communities of the Southwest, the west end of the Project Area is near the boundary of semidesert grassland and the Arizona upland subdivision of the Sonoran desertscrub biotic community, with most or all of the Project Area within semidesert grassland. WestLand field biologists noted that most of the Project Area is within mesquite (*Prosopis velutina*)-cactus scrub. Numerous species of shrubs and sub-shrubs were also present in variable compositions along the Project Area. Relatively small portions of the Project Area cross creosotebush (*Larrea tridentata*) flats and relatively densely vegetated xeroriparian areas with velvet mesquite, blue palo verde (*Parkinsonia florida*), whitethorn acacia (*Acacia constricta*), and other shrubs. On the western half of the Project Area, Lehmann's lovegrass (*Eragrostis lehmanniana*) was widespread and was the dominant groundcover on some plots.

3. METHODS

WestLand developed a stratified random sampling protocol for conducting the native plant inventory within the approximately 773 acres of the Project Area. The objective was to conduct a full inventory on approximately 2 percent of the Project Area. This was accomplished by conducting an inventory of all woody perennial and succulent vegetation within 16 plots spread throughout the Project Area (Figure 2). The total area sampled was 15.4 acres (approximately 2 percent of the Project Area).

Sample plots were 100 feet long and the width of the Project Area (150 feet to 650 feet). The original Project Area included approximately 18,796 feet (3.56 miles) of corridor 150 feet wide on the north end, and approximately 67,640 feet (9.25 miles) of corridor at least 500 feet wide along the remainder. More area was added, as explained below.

Four plots 100-feet long by 150-feet wide covered approximately 2 percent of the northern, 150-foot-wide corridor area. To determine the four plot locations, the corridor was divided into four equal segments (4,699 feet each). The number of feet were laid out (1 to 4,699) on each segment, starting at the west (or north) end of the segment. A random number between 0 and 4,599 was drawn separately for each of the four segments, representing the number of feet from the beginning of the segment that the western (or northern) end of the plot was placed.

The same principal was used to determine placement of sample plots on the corridor where the width was at least 500 feet. Ten plots were required to sample approximately 2 percent of that area, and each of the ten segments was 6,764 feet in length.

After the sampling was completed along the original corridor, two more segments were added. A new segment on the west side of the original corridor was approximately 5,900 feet long and 650 feet wide, and a new segment on the east end of the original corridor was approximately 4,300 feet long by at least 500 feet wide. One sample plot of 100 feet long by the corridor width was added to each of the two segments to sample approximately 2 percent of the areas. Sample plot locations were determined the same way as on the original waterline area.

A comprehensive inventory of woody perennial and succulent plants was completed within each sample plot. Plant species were categorized according to Arizona state protection status. To determine protection status, we referenced the most current list of Highly Safeguarded, Salvage Restricted, Salvage Assessed, and Harvest Restricted protected plants under the Arizona Native Plant Law (A.R.S. Chapter 7, Article 1, 3-903) from the Arizona Department of Agriculture (ADA) website.¹ The total linear feet of any columnar cacti found within plots was recorded. Results of the inventory were then extrapolated to estimate the total number of each plant species within the Project Area, and the total linear feet of columnar cacti.

To extrapolate the total number of plants of each species and the total linear footage of columnar cacti within the Project Area, a multiplier was applied to the inventory numbers. The multiplier was calculated by determining the proportion of the Project Area sampled and dividing the proportion into 1 ($1/(15.37 \text{ acres}/773.3 \text{ acres}) = 773.3/15.37$). The resulting multiplier was 50.31.

WestLand personnel also recorded any noxious weeds that were found within the Project Area. The noxious weed species included those on the ADA list of “prohibited, regulated and restricted noxious weeds.”

¹ <http://www.azda.gov/ESD/protplantlist2.htm>

4. RESULTS

4.1. Plant Inventory

The inventory of woody perennial plants and succulents for the Project Area is provided in Tables 1 and 2. Table 1 includes those species with protected plant status. Table 2 includes the species that do not have protected plant status. The tables include the number of plants of each species counted within the sample plots, and the extrapolated totals. The sample plots total approximately 2 percent of the Project Area.

Table 1. Inventory Data for Arizona Protected Plants within 16 Plots of the Rosemont Copper Company's ASLD Lands Project Area.

Protection Status	Common Name	Scientific Name	Total Counted	Total Extrapolated
Highly Safeguarded	--			
Salvage Restricted	Palmer agave	<i>Agave palmeri</i>	4	201
	Saguaro	<i>Carnegiea gigantea</i>	90	4,528
	Beehive cactus	<i>Coryphantha vivipara</i>	7	352
	Sotol	<i>Dasyilirion wheeleri</i>	4	101
	Hedgehog cactus	<i>Echinocereus fasciculatus</i>	45	2,264
	Barrel cactus	<i>Ferocactus wislizeni</i>	73	13,735
	Ocotillo	<i>Fouquieria splendens</i>	4	201
	Graham pincushion	<i>Mammillaria grahamii</i>	29	1,459
	Pencil cholla	<i>Opuntia arbuscula</i>	24	1,207
	Engelmann's prickly pear	<i>Opuntia engelmannii</i>	2,232	112,292
	Chainfruit cholla	<i>Opuntia fulgida</i>	377	18,967
	Christmas cholla	<i>Opuntia leptocaulis</i>	58	2,918
	Purple prickly pear	<i>Opuntia santa-rita</i>	16	805
	Cane cholla	<i>Opuntia spinosior</i>	213	10,716
	Staghorn cholla	<i>Opuntia versicolor</i>	14	704
Soaptree yucca	<i>Yucca elata</i>	1	50	
Salvage Assessed	Blue palo verde	<i>Parkinsonia florida</i>	68	3,421
	Velvet mesquite	<i>Prosopis velutina</i>	1,015	51,065
Harvest Restricted	Velvet mesquite (see Salvage Assessed)			

Table 2. Inventory Data for Woody Perennial Plants with No Arizona Protected Plant Status within 16 Plots of Rosemont Copper Company's ASLD Lands Project Area.

Common Name	Scientific Name	Total Counted	Total Extrapolated
Mallow	<i>Abutilon</i> sp.	33	1,660
White-ball acacia	<i>Acacia angustissima</i>	40	2,012
White-thorn acacia	<i>Acacia constricta</i>	335	16,854
Catclaw acacia	<i>Acacia greggii</i>	175	8,804
Rayless goldenhead	<i>Acamptopappus sphaerocephalus</i>	13	654
Ragweed	<i>Ambrosia</i> sp.	2	101
Watson Dutchman's pipevine	<i>Aristolochia watsonii</i>	1	50
Sagebrush	<i>Artemisia</i> sp.	128	6,440
Four-wing saltbush	<i>Atriplex canescens</i>	36	1,811
Desert broom	<i>Baccharis sarothroides</i>	9	453
Hairyseed bahia	<i>Bahia absinthifolia</i>	6	302
Desert marigold	<i>Baileyia multiradiata</i>	3	151
Chuckwalla's delight	<i>Bebbia juncea</i>	10	503
Brickellbush	<i>Brickellia</i> sp.	10	503
Fairy duster	<i>Calliandra eriophylla</i>	258	12,980
Desert hackberry	<i>Celtis pallida</i>	73	3,673
Drummond clematis	<i>Clematis drummondii</i>	5	252
Warnock condalia	<i>Condalia warnockii</i>	7	352
Croton	<i>Croton</i> sp.	5	252
Dalea	<i>Dalea</i> sp.	35	1,761
Rayless encelia	<i>Encelia frutescens</i>	5	252
Longleaf jointfir	<i>Ephedra trifurca</i>	90	4,528
Turpentinebush	<i>Ericameria laricifolia</i>	9	453
Spreading fleabane	<i>Erigeron cf divergens</i>	9	453
Wright buckwheat	<i>Eriogonum wrightii</i>	49	2,465
Arizona blue-eyes	<i>Evolvulus arizonicus</i>	124	6,238
Arizona cotton	<i>Gossypium thurberi</i>	14	704
Broom snakeweed	<i>Gutierrezia sarothrae</i>	84	4,226
Haplopappus	<i>Haplopappus</i> sp.	2	101
Burweed	<i>Isocoma tenuisecta</i>	960	48,298
Slender janusia	<i>Janusia gracilis</i>	12	604
Ratany	<i>Krameria</i> sp.	88	4,427
Creosotebush	<i>Larrea tridentata</i>	367	18,464
Wolfberry	<i>Lycium</i> sp.	37	1,861
Lacy tansyaster	<i>Machaeranthera pinnatifida</i>	4	201
Tansyaster	<i>Machaeranthera</i> sp.	85	4,276
Wait-a-minute bush	<i>Mimosa biuncifera</i>	2	101
Four o'clock	<i>Mirabilis</i> sp.	10	503
Desert tobacco	<i>Nicotiana trigonophylla</i>	1	50
Four o'clock	<i>Physalis</i> sp.	12	604
Slender poreleaf	<i>Porophyllum gracile</i>	8	402
Paperflower	<i>Psilostrophe cooperi</i>	4	201
Desert senna	<i>Senna covesii</i>	4	201

Table 2. Inventory Data for Woody Perennial Plants with No Arizona Protected Plant Status within 16 Plots of Rosemont Copper Company's ASLD Lands Project Area.

Common Name	Scientific Name	Total Counted	Total Extrapolated
Fanpetals	<i>Sida</i> sp.	33	1,660
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>	165	8,301
Wirelettuce	<i>Stephanomeria pauciflora</i>	1	50
Trixis	<i>Trixis californica</i>	26	1,308
Desert zinnia	<i>Zinnia acerosa</i>	223	11,219
Graythorn	<i>Ziziphus obtusifolia</i>	5	252

4.2. Linear Footage for Columnar Cacti

Saguaros (*Carnegiea gigantea*) were the only columnar cacti found within the sample plots. Table 3 provides the number of saguaros counted within the sample plots, the total linear footage of the counted plants, and the extrapolated totals for the entire Project Area. Ninety saguaros totaling 428.5 linear feet were inventoried within the Project Area sample plots. The extrapolated totals for the entire Project Area are 4,538 saguaros at 21,558 linear feet. The saguaros averaged less than 5 feet in height; only four of the 90 saguaros were 10 feet or taller.

Table 3. Estimated Total Saguaros and Linear Feet of Saguaros within Rosemont Copper Company's ASLD Lands Project Area.

Total Saguaros Counted	Total Saguaros Extrapolated	Total Linear Feet Counted	Total Linear Feet Extrapolated
90	4,528	428.5	21,558

4.3. Noxious Weeds

One species listed by the ADA as a “prohibited, regulated and restricted noxious weed” was observed within three sample plots. Buffelgrass (*Pennisetum ciliare*), listed by the ADA as both prohibited and regulated, was observed within Plot 4 (a small patch), Plot 8 (low numbers), and Plot 15 (approximately 20 plants along a wash). As noted in Section 2 of this report, Lehmann’s lovegrass was widespread on the western half of the Project Area and was the dominant groundcover on some plots within that half. Lehmann’s lovegrass is an exotic grass, but is not on the ADA’s list of prohibited, regulated and restricted noxious weeds.

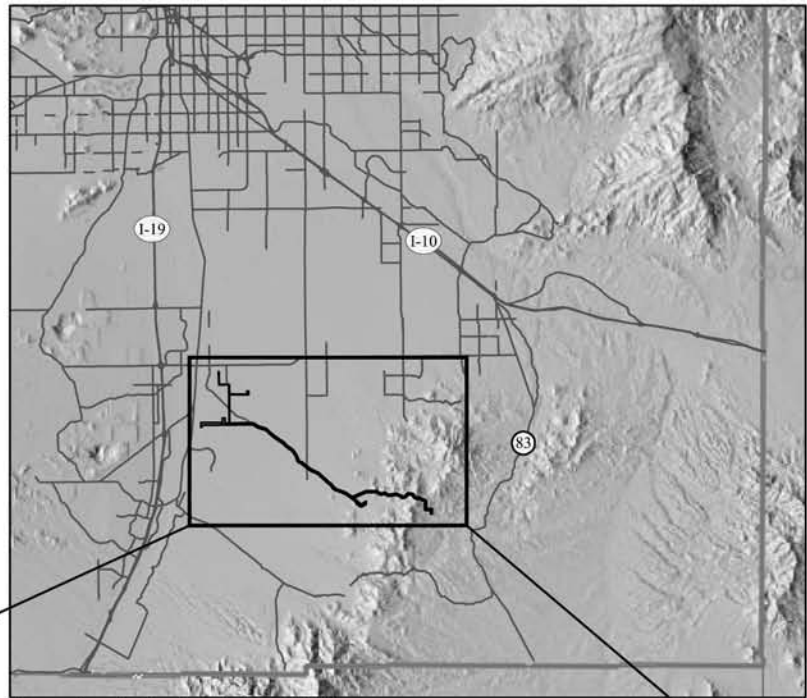
FIGURES

ARIZONA

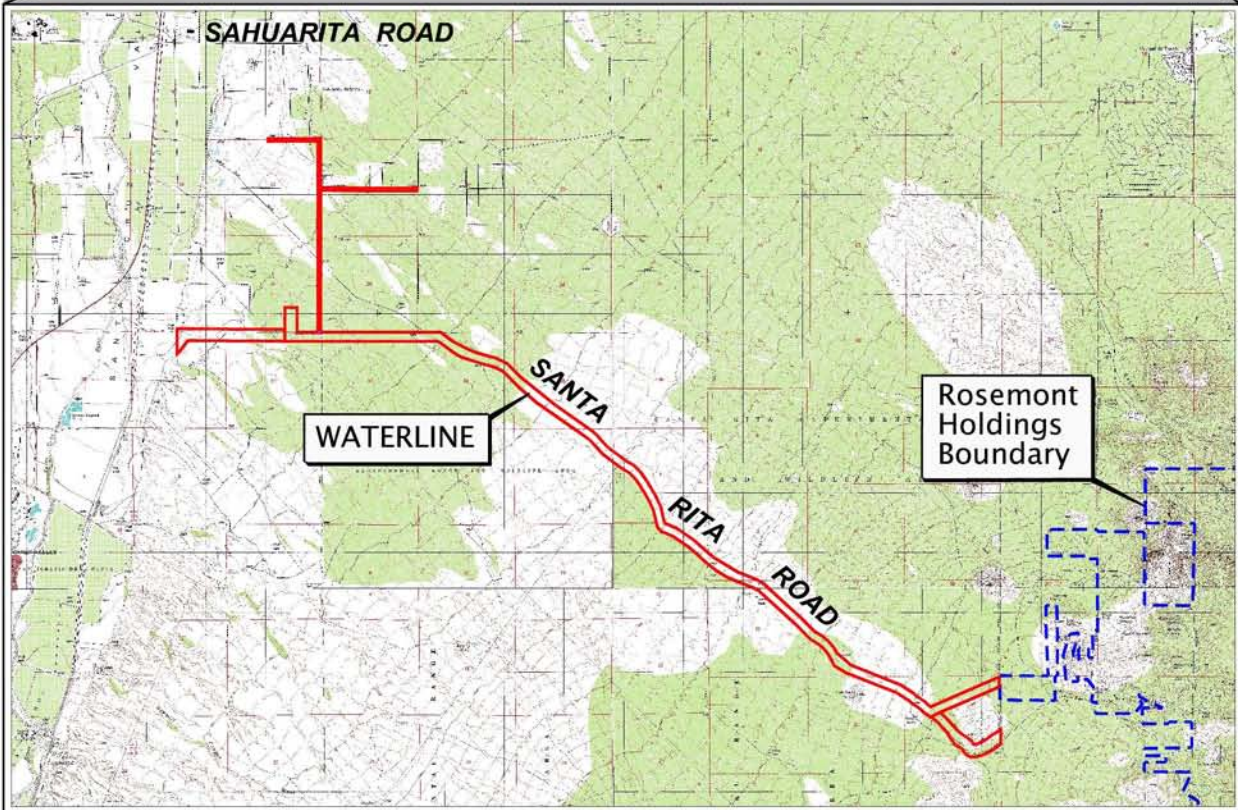
SOUTHEAST PIMA COUNTY



PROJECT LOCATION



Approximate Scale 1 Inch = 10 Miles



0 1 mi 2 mi.
 APPROX. SCALE: 1" = 2 Miles

Waterline Project Location Within State Lands:
 T.17S., R.14E., Portion Sections 20,21, & 27-35,
 T.18S., R.14E., Portion Sections 1,2 & 12,
 T.18S., R.15E., Portion Sections 7,17 & 18, 20 & 21,
 Pima County, Arizona

ROSEMONT COPPER
WATERLINE
ASLD Lands Plant Inventory

Vicinity Map
 Figure 1

ROSEMONT COPPER
WATERLINE
ASLD Lands Plant Inventory
Aerial Overview
Figure 2


WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, AZ 85712 (520) 208-9585

