



SANTA FE COUNTY OPEN SPACE AND TRAILS PROGRAM  
***SAN PEDRO OPEN SPACE MANAGEMENT PLAN***

***APPENDICES***  
FINAL DRAFT  
SEPTEMBER 13, 2016



**Ecotone**

	# (Term and Priority)	Project or Management Activity	Objective or Purpose	Location Code	Actor	Timeline	Recurring (R) or Not Recurring (NR)		Labor and Cost Estimates	Funding Source
<b>MAINTENANCE</b>	1.1	Communication & outreach with neighbors and stakeholders; integrate feedback in planning	Holistic & Inclusive Management	Entire property	SFC-M (Crew) and Planning staff	ST-MT-LT	R		Annually (or more often)	GF
	1.2	Inspection and repair of fences and boundary markers	Public Safety / Access Management / Cultural Resource Protection	N, E, and S sides only: approx. 7,500 lf (1.44 miles)	SFC-M (Crew)	ST-MT-LT	R		Annually: 3 days for 2-person crew (48 h/y)	GF
	1.3	Fence closures on East side	Public Safety / Access Management	3 or 4 openings on east boundary: 20-25 lf	SFC-M (Crew) or volunteers	ST	NR		One-time investment in posts and wire: possibly around \$500 in material and 2 days for 2-person crew (32 h)	GF
	1.4	Fence adjustments for wildlife	Ecological Health	Entire property (N, E, and S sides only): approx. 7,500 lf (1.44 miles)	Contractor or SFC-M (Crew)	ST	NR		5 days for 2-person crew (80 h); Costs TBD: Based on proposal (one-time investment); possibly around \$5,000 depending on material and labor costs and special features	GF, CIP
	1.5	Thinning out juniper and other shrubs that have encroached into grassland; and spreading branches for soil cover and erosion control	Ecological Health	SP-GRA-P	SF County Fire Crew	ST-MT-LT	R		3-5 days/year for 1 sawyer and a swamper (80 h/y)	GF, CIP, grant
	1.6	Cutting and removal of shrubs that have overgrown grassland in central-northeastern area alongside cultural site	Ecological Health	SP-CUL	SF County Fire Crew	ST	NR		3 days for 1 sawyer and a swamper (48 h)	GF, CIP, grant
	1.7	Annual woodland thinning, based on stewardship plan: cutting and removal of dead, dying, leaning, and low-vigor trees; and spreading branches for soil cover and erosion control	Ecological Health	SP-WOO	SF County Fire Crew	ST-MT-LT	R		5 days/year for one sawyer and one swamper (80 h/y)	GF, CIP, grant
	1.8	Inspection of arroyo banks for woody debris and bank erosion	Public Safety / Ecological Health	SP-ARR	SFC-M (Crew)	ST-MT-LT	R		0.5 days/year, annually (4 h/y)	GF
	1.9	Headcut stabilization and erosion control	Public Safety / Ecological Health	SP-GRA-P, SP-ARR (4 or 5 locations)	Contractor or SFC-M (Crew)	ST	NR		After year-2, based on cost proposal (probably up to \$50,000)	CIP or GF

	# (Term and Priority)	Project or Management Activity	Objective or Purpose	Location Code	Actor	Timeline	Recurring (R) or Not Recurring (NR)		Labor and Cost Estimates	Funding Source
	1.10	Managed grazing (oversight)	Ecological Health / Grazing	SP-GRA-P	Contractor	ST-MT-LT	R		Annually in the first 3-5 years; after that every 5 years (approx. up to \$5,000/y)	CIP
	1.11	Inspection of roads, trails, stiles, signage, benches, trash cans, etc.	Education / Infrastructure Effectiveness	Entire property	Contractor or SFC-M (Crew)	ST-MT-LT	R		Once trails and signs are installed (approx. up to \$5,000/y)	CIP or GF
	1.12	Weed management	Ecological Health	SP-GRA-P	Contractor	ST-MT-LT	R		When necessary, based on cost proposal	CIP
	2.1	Bank erosion stabilization	Public Safety / Ecological Health	SP-ARR	SFC-M (Crew) or contractor	MT	R		When necessary, based on cost proposal	GF or CIP
<b>IMPROVEMENTS</b>	1.1	Placement of boundary markers, property recognition signs, and a bulletin board	Education (identification of SPOS as open space property)	On property boundary along SR 344	SFC-M (Crew) or contractor	ST	NR		TBD, based on plan and bid	GF or CIP, grant
	1.2	Fencing of hazardous mine pits	Public Safety / Cultural Resource Protection	Selected priority mine pits	SFC-M (Crew) or contractor, AML	ST	NR		TBD, based on plan and bid	GF or CIP, grant
	1.3	Fence upgrades, incl. closure of gaps on east boundary and perimeter fence improvements	Public Safety / Access Management / Ecological Health / Grazing	Around entire property	SFC-M (Crew) or contractor	ST	NR		TBD, based on plan and bid	GF or CIP
	1.4	Water harvesting and wildlife drinkers	Ecological Health (wildlife roaming)	SP-WOO: (woodland edges)	SFC-M (Crew) or contractor	ST-MT	NR		TBD, based on plan and bid	GF or CIP, grant
	1.5	Large headcut and arroyo bank stabilization (large projects that SFC-M crew cannot do)	Public Safety / Ecological Health / Cultural Resource Preservation	Selected areas: SF-GRA-P, SP-ARR, SP-CUL	Contractor	ST-MT	NR		TBD, based on plan and bid	CIP, grant
	2.1	Fence upgrades for managed grazing	Ecological Health / Grazing (grassland improvement)	SP-GRA-P	SFC-M (Crew) or contractor	MT	NR		TBD, based on plan and bid	GF or CIP, grant
	2.2	Simple trail loop development, including stiles and benches	Access Management / Education / Infrastructure	Selected locations and mostly on established old trail alignments in SP-WOO	SFC-M (Crew) or contractor	MT	NR		TBD, based on plan and bid	GF or CIP, grant
	2.3	Mine site protection and rehabilitation	Public Safety / Cultural Resource Protection	Entire property	AML, contractor	MT	NR		TBD, based on plan and bid	CIP, grant
	2.4	Cultural resource protection measures	Cultural Resource Protection	Entire property	Contractor	MT	NR		TBD, based on plan and bid	CIP, grant

	# (Term and Priority)	Project or Management Activity	Objective or Purpose	Location Code	Actor	Timeline	Recurring (R) or Not Recurring (NR)		Labor and Cost Estimates	Funding Source
	3.1	Installation of interpretive education signs	Education (public awareness, understanding, appreciation, care)	Selected locations	Contractor	LT	NR (or phased)		TBD, based on plan and bid	CIP, grant
	3.2	Development of trail hub facilities, including parking, gates, trails, signage	Access Management / Education / Infrastructure (regional trail hub and local recreational opportunities)	Selected locations	Contractor	LT	NR (or phased)		TBD, based on plan and bid	CIP, grant
<b>PLANNING</b>	1.1	Develop and implement protocols for maintenance work, team coordination, on-going fund identification acquisition	All management goals (effective management)	Entire property	Planning staff	ST-MT-LT	R		TBD (25 h/y)	GF
	1.2	Develop monitoring plan and collection of base-line data	All management goals (effective management)	Entire property	Planning staff	ST	NR		TBD (80 h/y)	GF
	1.3	Develop basic signage plan	Education	Entire property	Planning & Projects staff	ST	NR		TBD (30 h/y)	GF
	1.4	Plan fencing for hazardous mine sites and protection for cultural resource sites	Public Safety / Cultural Resource Protection	SP-CUL	Planning & Projects staff	ST	NR		TBD (30 h/y)	GF
	1.5	Plan and implement community stewardship structure and events	Holistic & Inclusive Management	Entire property	Planning & Community Services staff	ST-MT-LT	R		TBD (250 h/y)	GF
	1.6	Research and plan water harvesting techniques, wildlife drinkers	Ecological Health	SP-WOO	Planning & Projects staff	ST	NR		TBD (30 h/y)	GF
	1.7	Develop grassland management plan (including fencing, weed control, juniper management, managed grazing, and revegetation)	Ecological Health / Grazing	SP-GRA-P	Planning & Projects staff	ST	NR		TBD (40 h/y)	GF
	1.8	Develop woodland stewardship plan (20-year rotation)	Ecological Health	SP-WOO	Planning & Projects staff	ST	NR		TBD (30 p/y)	GF
	1.9	Launch managed grazing pilot program	Ecological Health / Grazing	SP-GRA-P	Planning & Projects staff	ST	NR		TBD (20 h/y)	GF

	# (Term and Priority)	Project or Management Activity	Objective or Purpose	Location Code	Actor	Timeline	Recurring (R) or Not Recurring (NR)		Labor and Cost Estimates	Funding Source
PLANNING	1.10	Plan and design headcut stabilization and arroyo bank erosion control	Public Safety / Ecological Health / Cultural Resource Preservation	SP-GRA-P, SP-ARR, SP-CUL	Planning & Projects staff	ST	NR	TBD (20 h/y)	GF	
	1.11	Plan fence upgrades and property fencing for phase-2	Public Safety / Ecological Health / Grazing	Entire property	Planning & Projects staff	ST	NR	TBD (20 h/y)	GF	
	1.12	Plan preliminary trail alignment (coordinate w/cultural resource review)	Access Management / Cultural Resource Protection	Selected areas: SP-WOO, SP-CUL, SP-GRA-P	Planning & Projects staff	ST	NR	TBD (20 h/y)	GF	
	1.13	Oversee managed grazing program	Grazing	SP-GRA-P	Planning & Projects staff	ST-MT-LT	R	TBD (40 h/y)	GF	
	2.1	Develop interpretive education program with educational and research opportunities	Education	Entire property	Planning staff	MT	NR	TBD (40 h/y)	GF	
	2.2	Update and manage grazing program	Grazing	SP-GRA-P	Planning staff	MT	NR	TBD (40 h/y)	GF	
	2.3	Guide and coordinate headcut stabilization, erosion control work on the grasslands	Public Safety / Ecological Health	SP-GRA-P	Projects staff	MT	NR	TBD (20 h/y)	GF	
	2.4	Oversee ongoing woodland thinning and removal of trees encroaching on the grasslands	Public Safety / Ecological Health	SP-GRA-P	Planning & Projects staff	MT-LT	R	TBD (40 h/y)	GF	
	2.5	Coordinate (for SF County) the mine sites rehabilitation and protection program	Public Safety / Cultural Resource Protection	SP-CUL	Planning & Projects staff	MT	NR	TBD (20 h/y)	GF	
	2.6	Plan and lead trail hub and Recreation Master Plan process; incl. funding for plan, design, implementation	Access Management / Education / Infrastructure	Entire property	Planning staff	MT	NR	TBD (160 h/y)	GF	
	2.7	Coordinate implementation of pilot project of initial trails	Access Management / Education / Infrastructure	Entire property	Projects staff	MT	NR	TBD (80 h/y)	GF	
	3.1	Guide implementation of phase-1 interpretive education program	Education	Entire property	Planning & Projects staff	LT	NR	TBD (80 h/y)	GF	
	3.2	Guide the implementation of phase-1 Trail Hub and Recreation Master Plan, incl. parking, trails, signage, etc.	Education	Entire property	Planning & Projects staff	LT	NR	TBD (160 h/y)	GF	

# Santa Fe County Open Space Management Planning Initiative

## Field Characterizations for the San Pedro Open Space Property

Santa Fe County, New Mexico

An Existing Conditions and Inventory Report

February 19, 2016



View south from northern grasslands across the full length of the San Pedro Open Space

# Ecotone

Conservation Planning for Landscapes in Transition

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## INTRODUCTION

This report provides an overview of field characterizations, including existing conditions and a list of key assessment (research) projects to be addressed at a later date for the San Pedro Open Space property in San Pedro, in Santa Fe County, New Mexico. The report describes the findings of the second phase – Inventory and Assessment – of the 2015 Santa Fe County Open Space Management Planning Initiative for the SPOS property.

The purpose of the (Phase-2) Inventory and Assessment research is to collect more in-depth data on selected issues to have the minimally needed information to proceed with Master Planning, to develop Maintenance Plans and to complete Management Plans for the SPOS property. Findings of the Inventory and Assessment phase will also play a directing role in structuring community input for Master Planning for the community of SPOS stakeholders.

### Research Topics and Methods

The Ecotone project team conducted the research for this project phase from October through December 2015. The research scope focused on selected issues identified in phase-1. A summary of the selected research issues during the Inventory and Assessment phase is listed at the top of the Findings section.

Research activities included two terrain visits at the Open Space property, supported by web- and literature research, and fact-checking and interviews with experts. The project team collected detailed terrain data along a series of grassland vegetation transects and documented specific observations through photography and GPS documentation of the locations of the issues observed. Terrain assessments included specific assessments of fuel loads on the ground to quantify fire hazard in wooded areas. Project team members also conducted formal and informal meetings and fact-checking with experts, such as staff from the EMNRD Abandoned Mine Land Program (AML) (regarding mine hazard conditions at SPOS) and County fire staff (regarding woodland thinning at SPOS).

The project team also developed a set of goals and guidelines for land suitability planning which was used in the assessment of the suitability of various forms of land use (Appendix A).

While this report focuses on findings, it also includes some conceptual conclusions and recommendations. Detailed maintenance and ecological restoration recommendations will be formulated in Phase 3 of the Open Space Management Planning initiative and included in the final Management Plan.

## FINDINGS OF EXISTING CONDITIONS: SAN PEDRO OPEN SPACE – SAN PEDRO

### Scope of Research

Table 1: Listing of Phase-2 Research Topics

#	Research Topics
1a	Coordination with AML regarding abandoned mine management
1b	Coordination with BLM regarding trail connections and public safety issues
2a	Id opportunities, conditions and needs regarding access easements
2b	Id geophysical suitability for access points, parking, etc.
3	Woodland inventory and fire and erosion risk assessment
4	Grassland inventory and weed, fire and erosion risk assessment
5	Id wildlife crossing and free roaming improvement needs
	<b>TOTAL</b>

### Summary of Findings, Conclusions and Recommendations

#### Coordination with Resource Management Agencies

##### 1a: Coordination with AML regarding Abandoned Mine Management

Maria Lohmann of Santa Fe County and Jan-Willem Jansens of Ecotone met with John Kretzmann and Lloyd Moiola of the EMNRD Abandoned Mine Land Program (AML) to identify possibilities for AML support with identifying hazard levels of mine areas on the San Pedro Open Space. During this meeting AML staff offered to request the BLM hazard assessment team to conduct a mine site hazard reconnaissance on the SPOS. This reconnaissance work will be coordinated with Tamara Stewart (archaeology contractor for Santa Fe County) and will be completed by the end of 2015. AML staff will also be made available if the reconnaissance outcomes require any further hazard assessments and rankings on the SPOS (Figure 1). AML staff also committed to sharing ArcGIS shape files on mine sites for the BLM area once they become available. The map information will help Santa Fe County understand where certain hazardous mine areas are on BLM land and it might help with planning of trail connections.

The mine safety process is still in the procedural planning phase. BLM is currently compiling an Environmental Assessment (EA) for the BLM parcels regarding abandoned mine reclamation and construction of protective structures. The EA is expected to be completed by the summer of 2016. Starting in November 2015, an archaeological survey will be undertaken across the BLM properties, with a final report due in the spring of 2016. AML expects that many mine features and sites will be eligible for listing on the National Register. The cultural and historical importance of the mine sites and the problem that there are hundreds of mine sites and also

hundreds of ongoing private mine claims together make this project very complicated and time consuming.

The timeline between the completion of assessments in mid-2016 and the completion of mine closures (i.e., construction of mine protection infrastructure) may take 4 to 5 years. BLM grants for construction will expire in 4 years (late 2019). AML expects that BLM will prioritize the protection of mine sites on the western side of the BLM properties because of the severity of hazards on the mine sites in that area.



Figure 1. One example of the numerous mine exploration pits that are scattered across the SPOS property. (Photo by Jan-Willem Jansens)

#### 1b: Coordination with BLM regarding Trail Connections and Public Safety Issues

No communication with BLM staff took place during the Research Phase (phase 2) of the Open Space Management Plan project for SPOS. However, it became clear from conversations with AML staff who have been in frequent contact with BLM that it would take until late 2019 before certain parts of the BLM area would be safe for access. The planning and implementation of a

trail system on BLM land may take another four to five years, because it would require a full NEPA process. The timeline means that trailhead development and developing trail connections to access BLM lands on the SPOS would not be relevant until around 2024. Santa Fe County would also not issue any financing opportunities through a general obligation bond issue for such investments until 2020.

### [Access and Parking Opportunities](#)

#### 2a: Opportunities, Conditions and Needs regarding Access Easements

A special access easement is in place across private land on the far southwestern corner of the SPOS. However, the easement offers access to a meadow area that has limited potential for trailhead development. Concerns about this access point include drainage problems and viewshed impacts, as well as a relatively long distance to future trail connections on BLM land. Other access easements seem to exist along Hwy 344 which are more beneficial for future access needs.

#### 2b: Geophysical Suitability for Access Points, Parking, etc.

Ecotone assessed and mapped terrain suitability for several uses of the SPOS (Figure 2). The suitability of access points, parking, trails, or a park are determined by suitability goals and criteria described in Appendix A.

#### **Access Points**

Only a few good access opportunities exist that have safe lines of sight on Hwy 344 and few engineering and earth moving requirements. The best access opportunities are located across from the east side of an existing pullout on the south side of Hwy 344 (Figure 3).

#### **Low-Impact Park Facilities**

For reasons of cost minimization, safety, terrain suitability, and user experience optimization, the development of a small recreational park is most suitable in the southern triangular area (south of the east-west running arroyo). However, the NRCS Ecological Site Description for soils on the SPOS (based on the WebSoil Survey) indicates that the suitability of the southern triangular area below the large arroyo on the open space property has suitability limitations for trail, park and playground development related to flooding (sheet flow in the grassland and the presence of arroyos), dustiness due to erosion sensitive soil conditions, steep slopes, and gravel content in the soil. All of these limitations can be mitigated or avoided for park development in this area. For example, the large arroyo on the north side of the triangular area a steep slope and an arroyo in the southeastern corner will need to be avoided (Figure 4). Additionally, with careful planning and appropriate safety precautions, a trail system could potentially run along a few old mine pits for purposes of interpretive education, while the majority of the pits can be avoided.

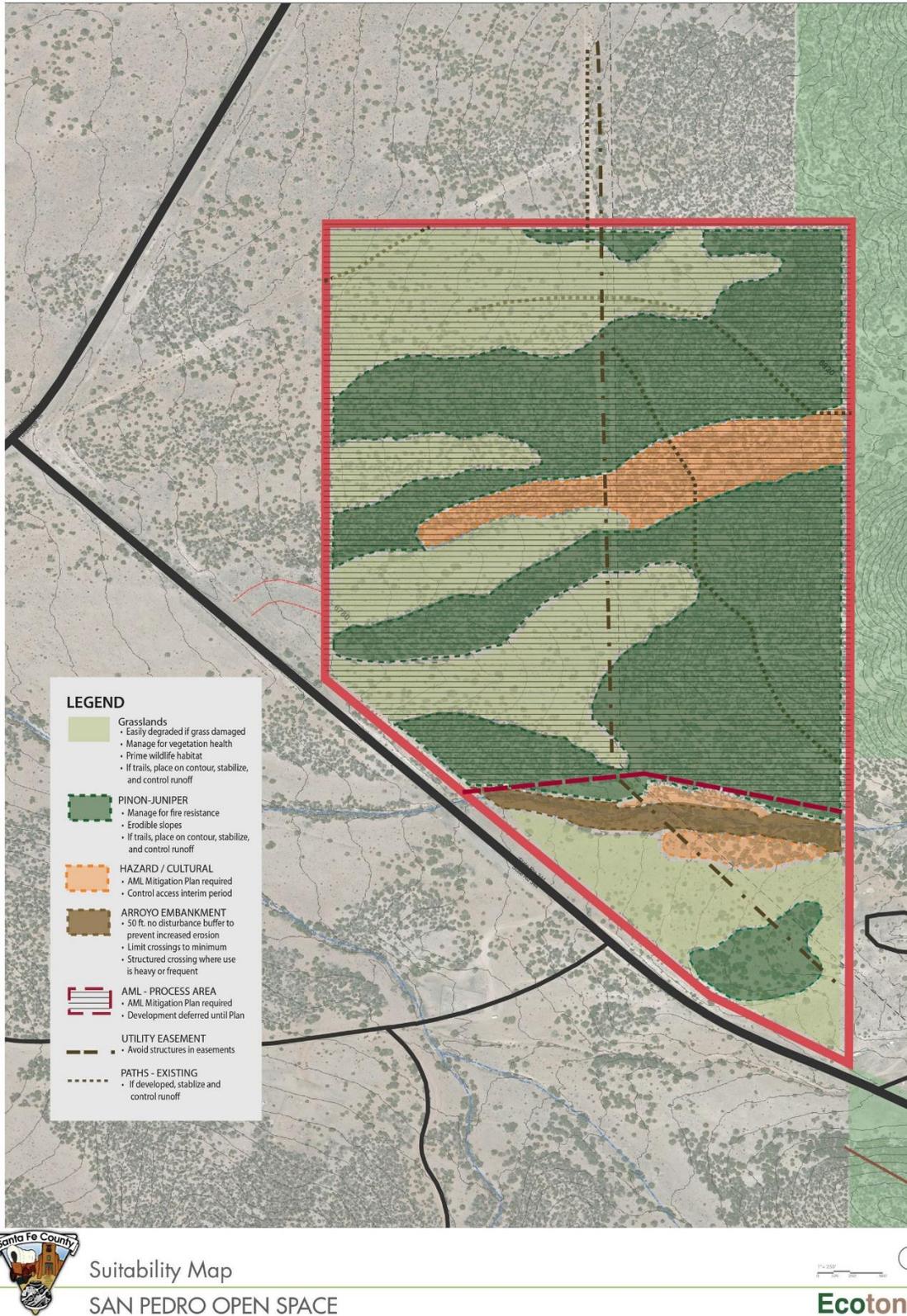


Figure 2. San Pedro Open Space – Land Suitability Map.



Figure 3. View (left of highway) of one of the better access points to the property from Hwy 344, across from an existing pullout. (Photo by Jan-Willem Jansens)

Spatial development of the park may be most suitable in the far eastern part and on the edges of the space, leaving the central and western grassland space of the area undeveloped to maintain the scenic and ecological quality of the grasslands, optimize drainage of the terrain, optimize views from the eastern higher areas to the west and south, and minimize the visual impact of the park on the surrounding rural scenery.

Various parking options exist. Parking could be initially concentrated in the pullout along SR344. Additionally, parking could be developed in one or more small parking areas on site or on pullouts along a loop road on the southern triangular area on the property that could lead to day-camping sites and other facilities.

### Woodland, Grassland and Wildlife Conditions

#### 3: Woodland Inventory and Fire and Erosion Risk Assessment

Approximately 56% (89 acres) of the San Pedro Open Space (SPOS) consists of woodland, dominated by one-seed juniper and piñon. Woodland soils consist largely of the Pedegral – very

cobbly loam (#513 of NRCS Santa Fe County Soil Survey). A small section of steeper woodlands on the far eastern boundary with the BLM lands consists of Cochiti – extremely cobbly loam (#512 of NRCS Santa Fe County Soil Survey).



Figure 4. View across large arroyo delineating a southern triangular area from the larger northern part of the SPOS. Note the mine waste pile, remnants of an old bridge and ruins from structures from around 1900 along the arroyo banks. (Photo by Jan-Willem Jansens)

### **Wildfire Risk**

The woodlands carry about 12.4 tons/acre of woody biomass fuel, which is a moderately high fuel load (Figure 5). However, most of the woodland area is safe regarding wildfire hazard because of a general absence of fine surface fuels (mostly grasses), despite the high levels per acre of woody biomass on the ground. The patchy nature of undergrowth and small litter and the rather discontinuous woody biomass fuel are factors that reduce the likelihood of catastrophic fire igniting in the woodland.



Figure 5. The woodland area includes juniper and pinon trees and large amounts of dead woody material. (Photo by Richard Schrader)

Yet, while the vegetative undergrowth in the woodlands is very sparse, locally, the duff and small plant litter component on the ground is sufficiently large to carry a fire, if such a wildfire were ignited outside the woodland area. Woody fuels on the grasslands are sparse (0.15 tons/acre), but the dense decadent grass vegetation could readily ignite. A fire originating in the grasslands or in the more grassy woodland strips between the grasslands in the central and western part of SPOS, could possibly cause a grassland and brush fire. Western winds could fan such a fire toward the woodlands up the hill and cause a wildfire in the woodlands as well.

### **Erosion**

The Pedegral soils consist of slightly decomposed plant material and very cobbly loam in the topsoil, on top of very cobbly clay loam with deeper layers of coarse sand. Slopes range between 8% and 15%. The cobble content offers great protection of these soils against erosion. Yet, the loam and organic components of the soil are highly erodible when the soil structure is disturbed. The erosion tolerance (i.e., the soil's natural regeneration capacity) is rated at 2

tons/acre/year (t/a/y), which means that the soil is rather fragile and its regeneration capacity is low when disturbed.

The Cochiti soils consist of extremely cobbly loam on very to extremely cobbly clay loam with deeper layers of extremely cobbly sandy loam. Slopes range between 15% and 35%. The high cobble content offers excellent protection against erosion. However, the loam and clay-loam components are readily erodible when exposed. The erosion tolerance is rated at 5 t/a/y, which means that the soil's regeneration capacity is relatively high.

Soil loss in the woodland area is limited to arroyos, steep slopes, and areas with exposed loamy soils. Understory plant cover in the woodland area is sparse. However, the stone and gravel component, combined with patches of deep litter and duff layers along with scattered piles of dead wood provide a high amount of ground cover. At present, the overall soil loss is very low, except in isolated spots and in arroyos (Figure 6). In most of the woodland area, soil loss remains at levels far below the "tolerance" level.



Figure 6. Rill and early gully erosion in a meadow with brush encroachment, looking downhill to the southwest. (Photo by Jan-Willem Jansens)

During a field assessment in November 2015, 49 measurements along 5 transects revealed that the estimated average soil loss per transect site varies between 0.04 tons/acre/year (t/a/y) and 1.28 t/a/y, with a total area average of 0.33 t/a/y. The erosion tolerance for the dominant soil type of the woodland area is 2 t/a/y. So, the erosion is occurring at sustainable / tolerable rates. However, caution is needed for development and land use in certain areas. Disturbance, such as woodland thinning or trail development, by which slash is removed and soil crust and rock layers are removed or damaged, may cause excessive soil loss and gully erosion on slopes over 10% of the loamy soil components. As a rule of thumb for this area, removal of approximately 50% of the vegetation biomass and/or soil cover would lead to soil erosion over the tolerance level. The risk is greatest on the steeper slopes at the eastern boundary of the open space property.

### **Woodland Management**

In the past years of County ownership, the woodland area has not been actively managed. There are also few signs of active management or use of the woodlands from before County ownership. There are occasional signs of historical wood harvesting, some trail corridors, and many signs of soil disturbance related to mining activities that date back at least 100 years.

Under the current conditions, the need for woodland management is low. In the next 3-5 years, removing some dead wood would benefit the lower woodlands and in preparation for the use of the area for trail development. Dead wood is best spread out on bare ground or placed on contour lines to protect exposed soil against erosion. While no woodland thinning is recommended at this time, removal of junipers that have encroached on the grassland would help improve the grasslands by reducing competition for water (Figure 7). Additionally, it would be useful from a wildfire management perspective to remove dead or dying woody plants in the woodland strips between the grasslands.

### **Woodland Suitability for various Uses**

The woodland area is generally suitable for trail development, except in specific places, such as the eastern boundary area, where the terrain is too steep, and in very stony/rocky, or in loamy areas where disturbance of dry soil can lead to dusty conditions and wind and water erosion. In most places, the existing old trail alignments are adequate or even very suitable for new trails. Little to no engineering or slope modifications (cut and fill) would be required for effective trail development in the woodland area. However, until the mine hazards are safeguarded, the woodland area cannot be considered suitable for any recreational (trail development) uses.

The woodland area is poorly suitable for the development of more intensive recreational uses, such as a park or playground facilities, because of slope steepness, stoniness, shallow depth to a cemented hardpan, and anticipated stormwater runoff. Dustiness can also become a problem with higher intensity uses and development of recreational features and facilities. Mitigation costs of these impediments will likely be high in either the design phase and/or for annual maintenance and periodic repairs.

#### 4: Grassland Inventory and Weed, Fire and Erosion Risk Assessment

##### **Erosion**

The grasslands of San Pedro Open Space consist of two types. The most northern grassland area consists of the Cerrillos-Sedillo complex. These soils are characterized by a soil type that consists of an eolian (wind-originated) top layer of clay-loam on top of alluvial (river-originated) gravelly sandy loams, and another soil type of eolian, very fine sandy loam and loam on alluvial, cobbly and gravelly sandy loam or loam. Slopes range between 1% and 3%. The slowest permeability is moderately slow; generally, these soils are well drained. This soil type is moderately erodible and has a soil tolerance factor of 5 t/a/y (NRCS Santa Fe County Soil Survey).



Figure 7. Woodland vegetation has encroached in many locations onto the grassland area. (Photo by Jan-Willem Jansens)

The more central and southern grasslands of the open space area consist of the Lazarus-Manzano complex. These soils are all alluvial in nature and consist of silt loam on silty clay loam

or gravelly loam. Slopes range between 0% and 3% for the lower Lazarus soil type and 4%-8% for the Manzano soils higher up. For these soils, the slowest permeability is also moderately slow, which means that the soils are generally well drained. Yet, this soil type is highly erodible due to the silty and clayey particle content. The soil tolerance factor is 5 t/a/y (NRCS Santa Fe County Soil Survey).

The grasslands are in many places located in natural drainage swales in the landscape that are slightly lower than the surrounding strips of woodland. The NRCS WebSoil Survey indicates that the grassland ecosystems may experience occasional flooding resulting from storm events. Especially the Manzano soils are reportedly flood prone, which means that significant sheet flow events can occur.

Presently, active soil loss on the grasslands is low and mostly concentrated around several deep, but localized headcuts and arroyos (Figure 8). The cause of these forms of erosion are probably related to the sheet flow occurrences on the Manzano soil type in combination with the historical roads and trails and past mining activities that have disturbed the soil, and the construction of a power line and clearing for a maintenance track. Most arroyos end in sediment plumes which they have deposited on the flatter, downhill terrain of the Lazarus soil type.



Figure 8. A headcut advances into a healthy grassland by eroding soil and removing soil moisture on the advancing edge. (Photo by Richard Schrader)

## Grassland Vegetation Cover and Forage Production

A grassland survey, using sample transects, conducted by the project team in October 2015 revealed that the grasslands are in a varying but relatively healthy condition (Figure 9). The exceptional rainfall of late 2014 and all year 2015 probably influenced these findings. Soil cover and land health findings are displayed in Table 2.

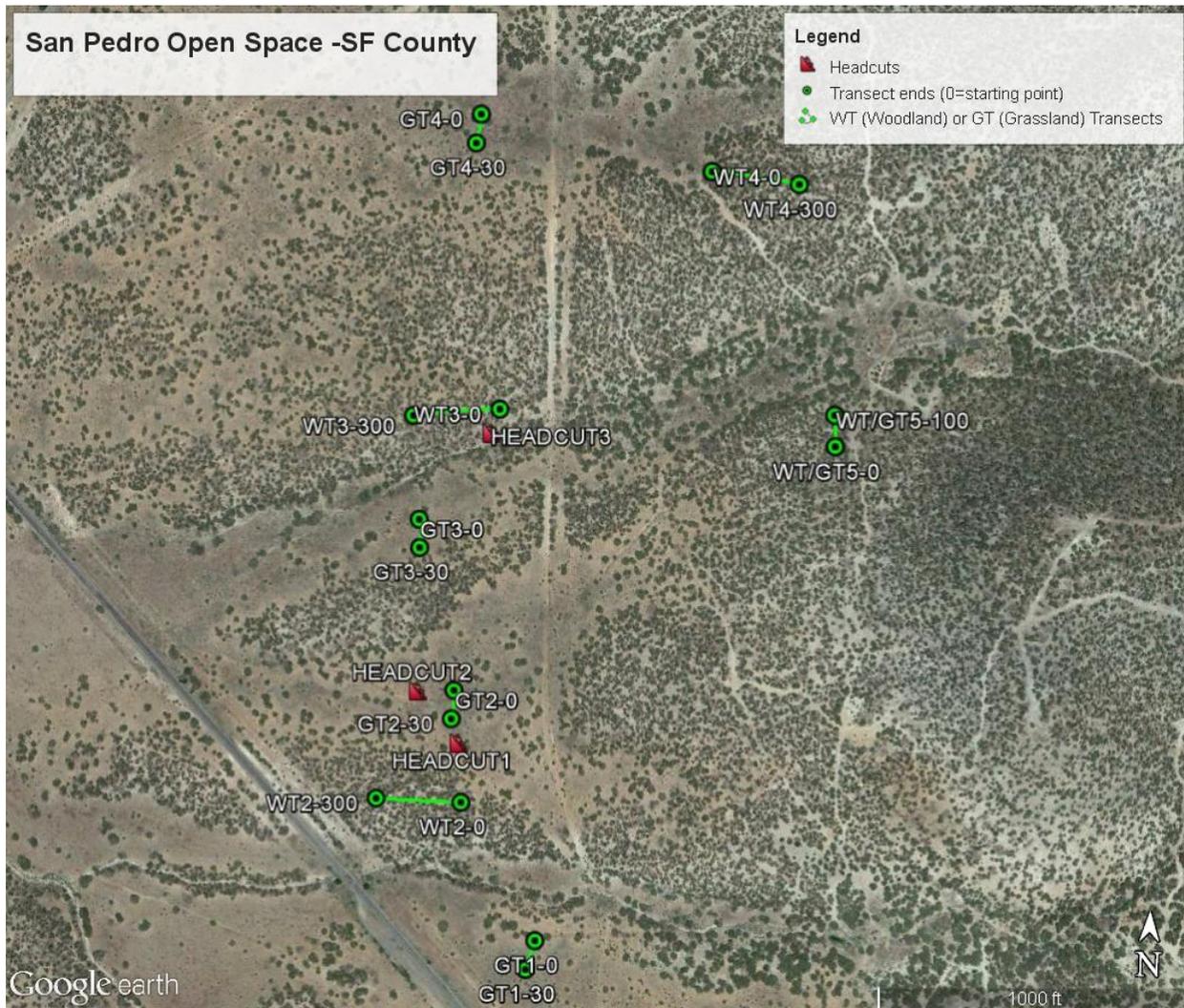


Figure 9. Map of SPOS with indication of vegetation sampling transects.

Field findings show that the northern grasslands (transect #4) are generally in the healthiest condition with more than 90% vegetative ground cover, the lowest percentage of bare ground, high levels of plant litter, and very low levels of soil erosion. However, this plant community also includes high amounts of dead plant material and a relatively wide variety of plant species, many of which are annual or perennial pioneer species of a weedy or unpalatable type. The

plant composition seems to point at some form of past disturbance of the area. The amount of forage plants for grazing in this area is rather low with only 46% of forage species.

The southwestern (transect #2) and central western (transect #3) grassland areas are of moderate (#2) and moderately high (#3) quality (Figure 10). These grassland show 18.4% and 14.4% bare ground, respectively, moderate levels of leaf litter, and low levels of observed soil loss. The plant community includes high levels of blue grama (67% and 73%, respectively), which is very productive for this kind of grassland.

Table 2. Grassland soil cover and vegetation in 5 transects in October 2015

Transect/Site	Plant Cover (%)	Dominant / Subdominant plant species	Bare Grd Total (%)	Leaf litter Total (%)	Water Total (%)	Rock Total (%)	Land Health
LP Transect 1 / southern triangle area	71	blue grama (61%) / broom snakeweed (7%)	28.7	6.5	0	4.1	mod. low
LP Transect 2 / southwestern grassland	78.5	blue grama (67%) / broom snakeweed (5%)	18.4	6	0	0	moderate
LP transect 3 / central western grassland	83.5	blue grama (73%) / one-seed juniper (6%)	14.4	7.2	0	0.3	mod. high
LP transect 4 / northern grassland	92.8	blue grama (26%) sanddrop seed (20%) / broom snakeweed (20%) tree cholla (13%)	11.8	15.6	0	0	high
LP transect 5 / sparse woodland on central eastern boundary (woodland area)	16.3	one-seed juniper (5.5%) pinon pine (3%) / annual forbs (5.5%) perennial grass (1%)	16.8	44.5	0	29.6	low

Please note: plant cover can exceed 100% as plant species can overlap each other.

The grassland in the southern triangular area, south of the large arroyo across the property (transect #1), has a moderately low grassland health, characterized by 25%-30% bare ground, some stoniness, and low levels of soil loss (rills and small gullies). This grassland is well covered with blue grama, some galleta grass, and several brush species.

A transect in the woodland area (transect #5) shows that the woodlands have much less vegetation covering the ground, with much higher levels of stoniness and litter cover, but not necessarily a high level of bare ground. Forage production in the woodland area is very low.

The NRCS WebSoil Survey offers estimations of forage productivity during favorable, normal, and less favorable conditions for the grassland types on the SPOS. Forage productivity estimates for the grassland areas are listed in Table 3.

The forage production estimates confirm that the southern and central western grasslands are the most productive ones with more than 2,600 lbs/a/y during good years, such as 2015. These findings coincide with the signs of natural irrigation by surface flows and the more loamy soil conditions and high cover percentage of high-quality forage plants. The northern grasslands, however, are far less productive, possibly due to a higher percentage of non-palatable species and the somewhat poorer, fine sandy and gravelly soil conditions. Overall, the woodlands are moderately productive, according to the WebSoil Survey, possibly due to grassy patches within the woodlands combined with a relatively high level of organic matter in the top soil and a high water holding capacity in the loamy components in between the cobble matrix of the soil.



Figure 10. View of the central grassland area toward the south (east of transect 3, along the powerline easement). Grasslands are of moderately high forage quality and are dominated by blue grama grass, interspersed with cholla cacti and a variety of shrubs. (Photo by Jan-Willem Jansens)

Table 3. Forage Productivity of Grasslands and Woodlands based on the NRCS WebSoil Survey for the LPOS area.

Transect/Site	Forage in Unfavorable Year (in lbs/acre/year)	Forage in Normal Year (in lbs/acre/year)	Forage in Favorable Year (in lbs/acre/year)
LP Transect 1, 2 and 3: Lazarus-Manzano complex	1022	1817	2611
LP transect 4 / northern grassland: Cerrillos-Sedillo complex	367	700	933
LP transect 5 / woodland: Pedegral very cobbly loam	600	700	1100
Woodland: Cochiti extremely cobbly loam	500	700	900

### Grassland Suitability for Trails and Other Recreational Uses

According to the NRCS WebSoil Survey for this area, the northern grassland area is generally suitable for trails and other recreational uses. Some potential dustiness is the most important suitability limitation. However, this could be mitigated by siting trails so that they are self-draining and keeping trails narrow (12-18 inches) and keeping the surrounding landscape well covered with vegetation.

The central and southern grassland areas are generally suitable for trails or day-camping facilities. However, these grasslands have poor suitability for more intensive recreational uses. Besides some potential dustiness, the greatest concern for active recreational use on the grasslands is the chance of sheet-flow erosion and flooding events. Furthermore, a relatively high gravel content and slope steepness in some places render the grasslands less conducive to the use of the area as a park, playground or sports field. Proper trail siting, so that they are self-draining, keeping trails narrow (12-18 inches), and keeping the surrounding landscape well covered with vegetation will largely help mitigate the cited suitability concerns.

Trail development in the grassland area needs to be planned in ways that avoid trail proximity to sites with severe headcut and gully erosion. In some places, old trail alignments could be upgraded to be incorporated in new trails. However, the development of trails and other recreational features in the grassland areas will have to wait until the open space area has been cleared to avoid cultural resources and hazards related to historical mining features.

### Grassland Management

In the years of County ownership, the grassland area has not been actively managed. There are some signs of grazing of the grassland prior to County ownership, expressed by the profusion of invasive plant species such as cholla cactus, broom snakeweed, and occasionally mullein. Also

wolfberry, a few large barberry shrubs, and chamisa indicate some form of past human occupation and soil disturbance. Additionally, there are some signs of historical wood harvesting, some historical trail and road corridors, and the remains of water and erosion management structures. A large arroyo in the southern part of the property and a gully originating from a mining location to the northeast on BLM land toward the southwest of the Open Space property provide signs of soil disturbance related to past mining activities.

The November 2015 field survey found a high content of standing dry and dead plant biomass, along with a local profusion of cacti, shrubs, and juniper which are indicative of a grassland that has not been grazed for several years. Grazing is possible and advisable, if managed well, to reduce wildfire in the grasslands, avoid degradation of plant diversity and cover, avoid encroachment of less palatable and weedy plant species, and prevent soil loss.

A vegetation management regime could help reduce the amount of dead biomass (which could be more than 2600 lbs/a/y in productive years, as indicated above, based on the NRCS WebSoil Survey), which constitutes a large amount of fine fuels that can carry fire and suppresses natural plant regeneration. The goal of active vegetation management would be to optimize the presence, cover percentage, and diversity of native, perennial grassland vegetation.

Perhaps the most desirable form of vegetation management for this land would be a combination of managed, restorative grazing and the removal of woody plants that have encroached into the grassland. Managed grazing would help remove and recycle standing plant material and plant litter and increase opportunities for the regeneration of native, perennial vegetation. The thinning (by hand – i.e., with a chainsaw) of junipers and other shrubs in the grasslands would reduce competition for water and space and enhance the regeneration of native grasses.

#### 5: Wildlife Crossing and Free Roaming Improvement Needs

The SPOS is part of a regional wildlife corridor between the Sangre de Cristo Mountains and the Sandia and Manzano Mountains, across the Galisteo Basin and San Pedro valley. The SPOS is habitat to mountain lion, bobcat, black bear, mule deer, and other large wildlife species, as well as to smaller mammals, such as rodents, and to associated predators, such as raptors and snakes.

Wildlife habitat and corridor qualities on the SPOS are limited due to the absence of sources of open water. This reduces the area to the functions of winter and night shelter, foraging, and roaming grounds. Healthy grass cover for ungulates such as deer and antelope is beneficial. The variation between open land and denser vegetation offers opportunities for shelter, nesting, and bedding for various animals.

Ambient conditions are generally favorable for the presence of wildlife. The area is generally calm and remote; there is little vehicular traffic and no off-road vehicle use; night lighting is

very limited. Disturbances include some distant shooting noise and potentially occasional hunting. Fencing along SR344 limits road crossing opportunities for some animals (Figure 11). Simple fence modifications, such as removing the fourth strand (increasing the distance between the ground and bottom strand to 16-18 inches) and putting smooth wire on the bottom and top strands of fences would make the fences more wildlife-friendly.



Figure 11. The 5-strand barbed-wire fence with smaller opening between the lower strands prevents most wildlife from freely roaming into and from the SPOS property. (Photo by Jan-Willem Jansens)

## KEY ASSESSMENT PROJECTS

1. Research and develop guidelines for establishment of a local stewardship team.
2. Study and improve the safety aspects of the shooting area on BLM for uses on SPOS.
3. Conduct a characterization assessment of the hazard levels of the various mine pit areas on the SPOS (whether the mine sites are considered not hazardous and could be incorporated in the master planning process or whether some or all need further examination and potential reclamation and protective measures before the area can be included in master planning for public use); research what protection is needed before trails can be built.
4. Develop a detailed woodland and grassland stewardship plan with 20-year rotation for maintenance work (treating 8 ac/yr: 4-5 acres of woodland and 3-4 acres of grassland): thinning, spreading dead wood and branches in order to improve soil cover and reduce wildfire risk.
5. Research restorative grazing possibilities, needs for fencing improvements, an entrance area and gate, and water facilities, as well as appropriate contracting mechanisms and potential contractors to work with. Development of a restoration grazing plan and RFP.
6. Research, planning and design for appropriate headcut stabilization and erosion control.
7. Research and planning for preliminary trail system development, including parking (possibly on the existing highway pullout), a gate (entrance location), benches, and (interpretive) signage.
8. Identify the interpretive value of the archaeological sites identified in the recent cultural resources survey. Develop an interpretive education program / plan.
9. Research and master planning for a park and expanded trail system.
10. Research and planning for water harvesting features and wildlife and horse drinkers.
11. Study and plan the most suitable and desirable trail connections to BLM land from SPOS property.

## APPENDIX A – ALL OPEN SPACE PROPERTIES: LAND SUITABILITY GOALS

### Primary Goals for Land Suitability Assessment and Master Planning include:

- a. Minimization of Upfront Development Costs and Complexities
  - Length and area of disturbance: costs of road development, paving, fencing
  - Engineering and earth moving requirements: topography, cut&fill, bridges
  - Soil suitability, drainage, vegetation disturbance/removal
  
- b. Minimization of Mitigation and Restoration Costs due to Resource Disturbance
  - Disturbance of cultural and historical sites
  - In appropriate use (waste) of, disturbance of or cumulative negative effects on natural resources
  - Susceptibility to erosion after disturbance
  - Scenic quality impacts (viewshed disturbance; e.g., views on/over parked cars)
  
- c. Public Safety Optimization
  - Safe line of sight at road intersections
  - Public visibility of public areas (avoidance of illicit activities; social surveillance and control of nuisance behavior: dumping, shooting, theft, harassment, etc.)
  - Safety regarding terrain features (flood hazard, wildfire hazard, steep or unstable slopes, gullies, dump sites, hazardous mine pits, proximity to shooting areas, etc.)
  
- d. Experiential Quality Optimization
  - Richness of experiences (e.g., diversity of view shed, and micro-texture of the land, such as vegetation types and specific things to see/experience)
  - Options for different (trail) users (e.g., trail extensions; distance variations, destinations, trail connectivity)
  - Diversity of user groups for which the land use scenario is appealing

## APPENDIX C – ABSTRACT OF AN ARCHAEOLOGICAL SURVEY OF 160.8-ACRE SAN PEDRO OPEN SPACE, IN SANTA FE COUNTY, NEW MEXICO

The following abstract is from an archaeological survey prepared by Tamara J. Stewart (TAMARCH Cultural Resource Management Services). The document is filed under New Mexico State Survey Permit Number NM-15-082, TAMARCH Report No. 15-02, NMCRIS Activity No. 134629, December 2015.

In October 2015, TAMARCH CRM Services conducted a cultural resource survey of the 64.8-hectare (ha) [160.-acre (ac)] San Pedro Open Space property and 0.83-ac (0.34-ha) public access easement through private land east of the open space, located south of the Town of Golden, Santa Fe County New Mexico (refer to Figures 1-2). The parcel is north of and adjacent to NM 344, 1.4 km (.87 mi) southeast of the intersection with NM 14. Santa Fe County acquired the undeveloped property in 2011 (Tract 1 of Campbell Corp's South Mountain Ranch) and requested the survey. The access easement is on private land adjacent to Tract 1. The parcel is located on unplatted land in the eastern San Pedro Grant in projected Sections 20 and 29, Township 12 North, Range 7 East, N.M.P.M. on the San Pedro and Golden, NM Quadrangles (Figures 3-5).

A check of the New Mexico Cultural Resource Information System (NMCRIS) revealed two previously recorded archaeological sites LA 16305 and 139793 that extend within the property boundaries from adjacent BLM land and represent loci of the historic townsite of San Pedro and associated copper and gold mining features (Figure 6). LA 16305/San Pedro Townsite extends into the southeastern portion of the property and includes residential remains of the townsite (Figure 15) (Oakes and Zamora 2013). LA 139793/San Pedro Townsite Placer Field South extends within the southeastern portion of the parcel north of and adjacent to LA 16305 and includes mining features associated with the historic townsite and thousands of historic artifacts (Travis and Bogess 2003). The site boundary for previously recorded LA 139793 was adjusted to include the southern placer mining field and to group the townsite structural foundations and associated features with LA 16305/Western San Pedro Townsite (Figures 5-6). The San Pedro Townsite, more densely concentrated to the east on Bureau of Land Management (BLM) property, was previously determined eligible for inclusion on the NRHP under Criterion D and is the subject of current studies sponsored by the Abandoned Mine Land (AML) Program.

LA 183746/Placer Field North is a newly recorded site in the northeastern, upland portion of the parcel, consisting of a placer mining operation and associated historic artifact scatter that extend southwest from adjacent BLM land (Figures 6-7). The site consists of hundreds of shallow placer pits and historic artifacts associated with 1880s-1930s copper and gold mining in the San Pedro Mountains of the New Placer District, and is recommended as eligible for listing on the National Register of Historic Places (NRHP) (Figure 19).

The San Pedro Townsite is not listed on the New Mexico State Register of Cultural Properties (SRCP) or the NRHP, and no other properties listed on the registers are located within the property boundaries or vicinity, defined as a 1.6-kilometer (km) [1.0-mile (mi)] radius around the parcel.

Seven previously recorded archaeological sites are located in the vicinity of the parcel, all but one relating to the historic period San Pedro mining townsite. Several prehistoric lithic tools, utilized flakes, and lithic debris were identified in wooded areas of the parcel (refer to Table 1). Eighty-one isolated occurrences (IOs) were identified within the property, summarized in Table 3 and shown on Figures 10-13. The information potential of the IOs is considered to have been exhausted through in-field recordation. Proposed Santa Fe County trail and interpretive development of the property will avoid identified sites within the property boundaries. No further cultural resource investigation of the property is recommended.



# Santa Fe County Open Space Management Planning Initiative

## A Maintenance Plan for the San Pedro Open Space Property Santa Fe County, New Mexico

**FINAL DRAFT**  
**June 30, 2016**



*San Pedro Open Space grassland maintenance is a short-term to mid-long term need and includes removal of encroached juniper and weedy and unpalatable species and erosion control*

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Conservation Planning for Landscapes in Transition

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## INTRODUCTION

This Maintenance Plan documents recommended maintenance activities for the San Pedro Open Space (SPOS) property in San Pedro, in Santa Fe County, NM, based on the analysis of findings and community feedback during a general inventory phase and a more detailed field characterization phase. The purpose of this document is to provide a detailed maintenance plan, which includes projected needs for labor and equipment, as part of the SPOS Management Plan. This Maintenance Plan also makes strategic recommendations for the frequency, timing, and human capacity options Santa Fe County may want to consider to implement the maintenance activities.

## VISION STATEMENT, GOALS AND OBJECTIVES

The following vision statement for the SPOS Management Plan is based on feedback from community meetings and other input from stakeholders.

*In 2025, the San Pedro Open Space is a safe and peaceful area for people and wildlife. The open space includes viewing areas, public access, some primitive trails, and public education about the scenic, historic, and cultural landscape. The open land remains wildlife habitat and a wildlife corridor. Local residents, especially younger generations, are actively involved in the maintenance and stewardship.*

*In the longer term, the SPOS may serve as a regional hub for hikers, mountain bikers, and horseback riders to access a system of trails through southern Santa Fe County. The area may also include additional space for children's play or community gatherings.*

*The SPOS will not include loud or disruptive activities or overly-developed facilities.*

Based on this vision description, the central management goal for SPOS is:

*Santa Fe County and the community of the area around San Pedro Open Space collaboratively maintain and enhance the open land qualities of SPOS and its wildlife habitat and corridors; its scenic, historic, and cultural resources; and its local and regional recreation opportunities. SPOS management includes the gradual development of a regional trail hub to BLM land and to trails in the wider region, including some simple trailhead and interpretive education facilities, at a scale that requires little maintenance, encourages local community stewardship, and respects the area's significant cultural resources.*

Specific management objectives in support of this vision and the central goal are:

1. Manage the property in a way that the different values and objectives are balanced as a whole (and not one despite another), and that improvements and changes are introduced in a gradual way; seek and maintain optimal working relationships with neighbors and other local stakeholders, and encourage the involvement of people from younger generations
2. Enhance public safety, for example by negotiating the closing of the shooting area on adjacent BLM land, prohibiting motorized vehicles, open fire pits, and the use of fire arms, and by protecting the public from any potential harm associated with old mine sites
3. Control access by maintaining easements, roads, trails, fences, gates, stiles, drainage crossings, and signage
4. Maintain the area's natural appearance and sweeping scenic views, and keep maintenance limited; maintain a rural, natural visual quality by using natural design principles and natural materials, and by choosing deliberately when to let nature run its course
5. Provide and maintain interpretive education, and explore and use educational and research opportunities
6. Protect the area's cultural and historic resources
7. Maintain the ecological health, resilience, and productivity of the SPOS, and maintain wildlife habitat qualities and connectivity across the landscape
8. Explore and use – when appropriate – managed, restorative grazing practices (and rest periods) as a way to improve grassland health and in response to the need to develop an agricultural use for County Open Space properties
9. Develop basic infrastructure such as space for parking, benches at viewing areas, and community spaces that serve the vision for SPOS.

Management decisions, including maintenance activities, should be made in the spirit of the vision, aimed at meeting the central management goal, and in adherence to the specific objectives for the SPOS.

## **TERRAIN MANAGEMENT UNITS**

Maintenance activities are often strongly related to specific terrain characteristics. The Land Suitability Map developed in Phase-2 for identifying appropriate uses for the different types of terrain was based on the identification of Terrain Management Units, and the Suitability Map describes the Terrain Management Units. The same map will be used in this plan to identify the Terrain Management Units as a basis for identifying maintenance activities (Figure 1). Table 1 lists the Terrain Management Units and their regular maintenance activities in relation to management goals.

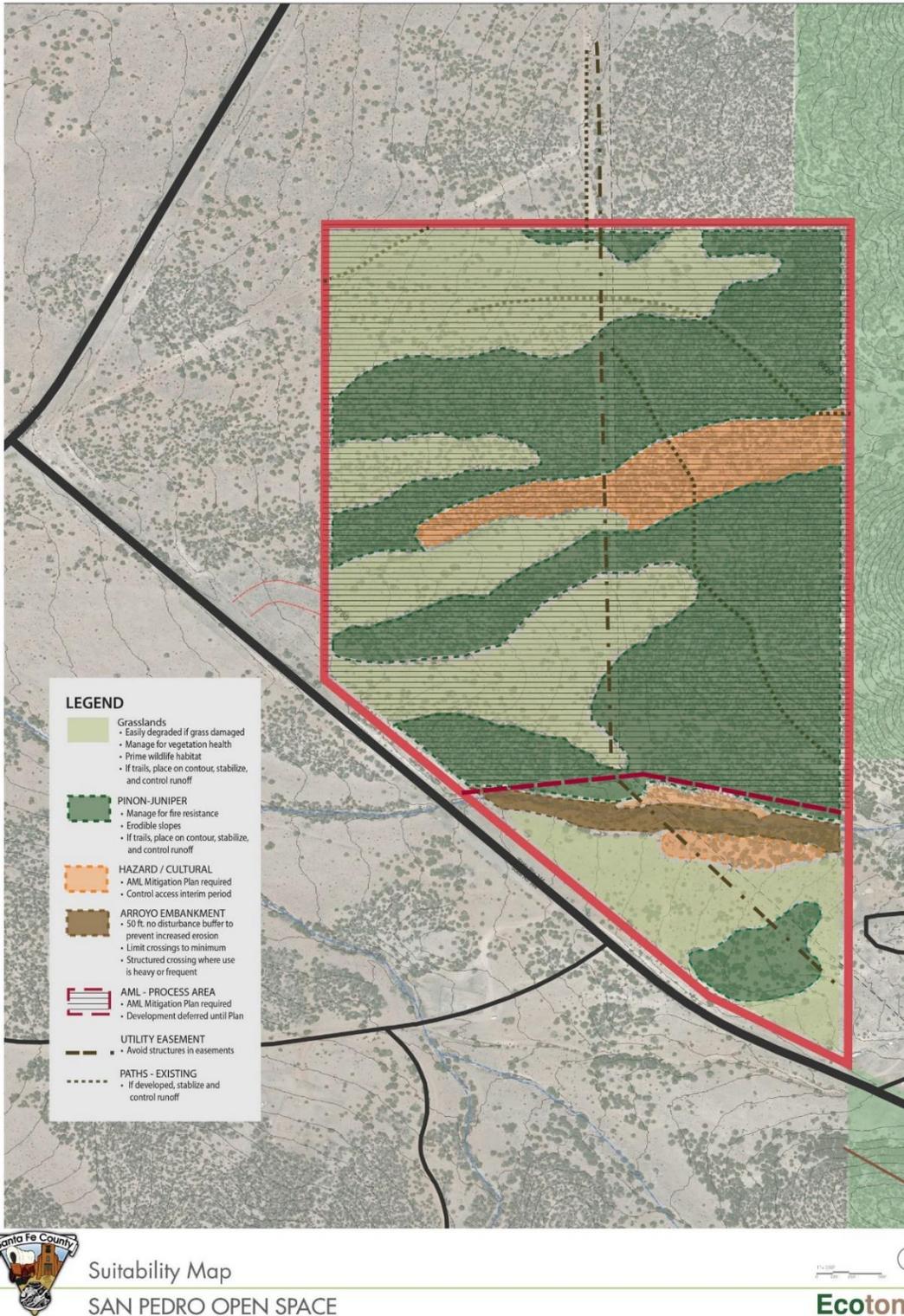


Figure 1. San Pedro Open Space – Terrain Management Units Map

Table 1. Overview of Terrain Management Units and anticipated regular maintenance activities related to subordinate management goals for the property.

<b>Mgmt Goals</b>	<b>Terrain Management Unit</b>	<b>Anticipated Regular Maintenance Activities</b>	<b>Maintenance Frequency</b>
1	All Terrain Management Units	Communication and outreach with neighbors and stakeholders and integrate feedback in planning	Quarterly
2	All Terrain Management Units	Delineation and inspection of property boundary markers	One time (year-1) and when need arises
2, 3, 5	All Terrain Management Units	Inspection and repairs of: a. Fences, gates and stiles b. Roads and trails c. Signage	a. Annually b. Annually c. Annually
7	All Terrain Management Units	a. Change fencing to be wildlife friendly	a. Year 1 and annual inspection
9	All Terrain Management Units	a. Maintain trails, stiles, signs, benches, drainage crossings, and trash cans	a. Annually (after completion of improvements)
5, 6	Cultural resource areas (SP-CUL)	a. Install and maintain signage	a. Annually
6	Grasslands – esp. in the most southern triangular area (SP-GRA)	a. Thin juniper that encroached on grassland, and spread branches to cover soil, limit erosion, and protect artifacts	a. Years 1+2; and then once in 10 years
7	Grasslands (SP-GRA)	a. Thin juniper and pinon encroaching on grassland b. Spread branches to cover soil and reduce erosion c. Check and remove any noxious weeds d. Headcut stabilization and erosion control in rills	a. Annually (14 ac/yr) b. Annually (14 ac/yr) c. Annually d. Periodically (after year 2)
8	Grasslands (SP-GRA)	a. Inspect and repair fences b. Develop and manage restorative, managed grazing (limited acreage/yr) c. Deliberately rest selected acres	a. Annually b. Annually (after year 3) c. Annually
6	Woodlands – esp. in area of cultural resources (SP-WOO)	a. Removal of dead and leaning trees b. Thin trees and spread branches (lop & scatter) to cover soil against erosion and to protect artifacts	a. Every 5 years b. Years 1-5 (20-yr rotations)

<b>Mgmt Goals</b>	<b>Terrain Management Unit</b>	<b>Anticipated Regular Maintenance Activities</b>	<b>Maintenance Frequency</b>
7	Woodlands (SP-WOO)	a. Thin woodlands based on stewardship plan b. Spread branches to cover soil and reduce erosion	a. Annually (5 ac/yr) b. Annually (5 ac/yr)
7	Arroyo & Embankments (SP-ARR)	a. Inspection and brush removal that inhibits flow and causes bank erosion b. Erosion control and bank stabilization	a. Annually b. When needed (once in 5 y)

## WOODLANDS

Woodland maintenance is a long-term need. Despite the presence of a considerable fuel load constituted by dead tree carcasses, there is no need for immediate maintenance. Erosion rates are low, except in a few locations where rills and gullies exist. The management planning team recommends that prior to beginning any woodland maintenance work, Santa Fe County develop a woodland stewardship plan aimed at grass cover improvement (as undergrowth beneath the woodland tree cover) and woodland stand management. A rotational thinning and soil conservation program with annual or biennial entries (of 4.5 acres or 9 acres respectively) in a 20-year rotation period would suffice to cover the entire 89-acre woodland area. Table 2 lists several recommended maintenance activities.

Table 2. Woodland Management and Restoration Needs, with Labor Estimates and Implementation Timelines and Prioritization.

<b>LOCATION</b>	<b>MANAGEMENT ACTIVITY</b>	<b>AREA</b>	<b>FREQUENCY</b>	<b>LABOR</b>
All woodlands	Development of a detailed woodland stewardship plan	90 acres	Once in 20 y	TBD, based on proposal
All woodlands	Cutting dead, dying, and low-vigor woodland trees (and maintaining a groupy/clumpy woodland structure)	90 acres	5 acres yearly, and returning every 18-20 y	5 days for one sawyer and one swamper
All woodlands	Spreading of dead & down and leaning woody debris (approx. 12.4 tons/acre)	90 acres	5 acres yearly, and returning every 18-20 y	5 days for two workers
Woodland-grassland edges	Thinning of juniper encroachment on the grasslands; thinning of juniper in the northern and southern edges of the woodland strips between the grasslands	10-15 acres	Once every 5 y	5 days for one sawyer and one swamper (incl. spreading)

## GRASSLANDS

Grassland maintenance is a short-term to mid-long term need. This terrain management unit is prone to sheet flows, flooding, soil erosion, wildfire, and the proliferation of invasive plant species and noxious weeds. Burnable biomass fuel consists of dense patches of dead grasses, brush, and some isolated piles of dead wood. Additionally, there is considerable encroachment of woody plants (shrubs and juniper trees) onto the grassland. Together these conditions could bring a grass fire up into the woodlands. There are also several deep gullies and large headcut areas that will need to be stabilized in the next 5-10 years to prevent damage to artifacts and to any historical or new trails.

The planning team recommends that over time Santa Fe County considers the use of managed grazing as a grassland management tool to remove decadent, old grass clumps, prevent shrub regeneration, and improve native grass density. Additionally, a rotational plan for the removal of woody plants that encroach into the grasslands would help maintain the grassland ecosystem. Table 3 lists several recommended maintenance activities.

Table 3. Grassland Management and Restoration Needs, with Labor Estimates and Implementation Timelines and Prioritization.

LOCATION	MANAGEMENT ACTIVITY	AREA	FREQUENCY	LABOR
Valley in the northeastern sector of the SPOS	Thinning of brush and juniper encroachment in overgrown grassland	10-15 acres	Once, followed by regular upkeep every 5 years	One time 3 days for one sawyer and one swamper (incl. spreading)
All over the grasslands	Removal of dead shrubs and cacti & down and leaning woody debris (spreading to cover exposed soil)	70 acres	Once every 5 y	Initially about 5 days; then 1-3 days/yr for one sawyer and one swamper (incl. spreading)
All over the grasslands	Managed grazing for 4-5 years to remove dead grass and weedy plants (including long rest periods between grazing)	70 acres	Every year for 4-5 years and after that based on a grazing plan	2-3 months
Select locations	Headcut stabilization	5 sites; approx. 1 acre	One time and when needed	Based on design proposal

## FENCING AND OTHER MAINTENANCE

Additional maintenance at SPOS includes periodic (mostly annual) inspections of fences, gates and stiles, and any infrastructure once it has been built. In the short term, some adjustments and repairs would be necessary on fences and on locations with serious soil erosion. Fence work includes regular repairs, adjustments for wildlife passage, and closures of fence openings and informal gates to the BLM property on the eastern boundary of the Open Space property.

A detailed overview of maintenance and repair activities is included in Tables 4 and 5. These tables will be available in spreadsheet format for convenient adjustments and tracking of maintenance and repair activities.

Table 4. Summary of Recommended Maintenance Activities for Year-1 for suggested Human Capacity Entities for Implementation.

Location Code	Management Activity	Location	Staff Prep	Volunteer Activity	SF County-M (Crew)	Contractor	Labor & Cost Items
Entire property	Fence inspection and repair	Entire property (N, E, and S sides only): approx. 7,500 lf (1.44 miles)	One time to establish standards and prescription				Annually: 3 days for 2-person crew
SP-WOO	Fence closures on East side	3 or 4 openings on east boundary: 20-25 lf	One time to establish standards and prescription and to choose form of labor source				One-time investment in posts and wire: possibly around \$500 in material and 2 days for 2-person crew
Entire property	Fence adjustments for wildlife	Entire property (N, E, and S sides only): approx. 7,500 lf (1.44 miles)	One time to formulate standards				5 days for 2-person crew; Costs TBD: Based on proposal (one-time investment); possibly around \$5,000
SP-GRA	Thinning out juniper and other shrubs that have encroached into grassland; and spreading branches for soil cover and erosion control	Grasslands	One time to establish protocols and methods				3-5 days/year for 1 sawyer and a swamper
SP-GRA, SP-WOO, SP-CUL	Cutting and removal of shrubs that have overgrown grassland in central-northeastern area alongside cultural site	Woodland/grassland	One time to establish protocols and methods				3 days/year for 1 sawyer and a swamper
SP-WOO	Cutting and removal of dead, dying, leaning, and low-vigor trees; and spreading branches for soil cover and erosion control	Woodlands	One time to establish standards and prescription				5 days/year for one sawyer and one swamper
SP-ARR	Inspection of arroyo banks for woody debris and bank erosion	Arroyo and embankments	One time to establish standards and prescription				1/2 day for one person
SP-ARR	Bank erosion stabilization	Arroyo and embankments	One time to establish standards and prescription				TBD: dependent on proposal

Table 5. Summary of Recommended Maintenance Activities for Different Time Periods.

Location Code	Management Activity	Location & Area Size	YR1	YR2	YR3	YR4	YR5	YR6-10	YR11-20	>YR20	Team	Logistical Needs	Labor & Cost Estimate
Entire property	Fence inspection and repair	Entire property (N, E, and S sides only): approx. 7,500 lf (1.44 miles)									SFC-M (Crew)	Notepad/GPS (Avenza), camera	Annually: 3 days for 2-person crew
SP-WOO	Fence closures on East side	3 or 4 openings on east boundary: 20-25 lf									SFC-M (Crew) or volunteers	Fencing supplies	One-time investment in posts and wire: possibly around \$500 in material and 2 days for 2-person crew
Entire property	Fence adjustments for wildlife	Entire property (N, E, and S sides only): approx. 7,500 lf (1.44 miles)									Contractor or SFC-M (Crew)	Fencing supplies	5 days for 2-person crew; Costs TBD: Based on proposal (one-time investment); possibly around \$5,000 depending on material and labor costs and special features
Entire property	Inspection of roads, trails, stiles, signage, benches, etc.	Entire property									Contractor or SFC-M (Crew)	Notepad/GPS (Avenza), camera	TBD; once trails and signs are installed; no short-term need
SP-GR	Thinning out juniper and other shrubs that have encroached into grassland; and spreading branches for soil cover and erosion control	Grasslands									SF County Fire Crew	Woodland management tools	3-5 days/year for 1 sawyer and a swamper
SP-GRA, SP-WOO, SP-CUL	Cutting and removal of shrubs that have overgrown grassland in central-northeastern area alongside cultural site	Woodland/grassland									SF County Fire Crew	Woodland management tools	3 days/year for 1 sawyer and a swamper
SP-WOO	Cutting and removal of dead, dying, leaning, and low-vigor trees; and spreading branches for soil cover and erosion control	Woodlands									SF County Fire Crew	Woodland management tools	5 days/year for one sawyer and one swamper
SP-GRA	Managed grazing (oversight)	Grasslands									Contractor	Community notification	Annually in the first 3-5 years; after that every 5 years
SP-GRA	Headcut stabilization and erosion control	Grasslands									Contractor		After year-2, based on cost proposal
SP-GRA	Weed management	Grasslands									Contractor		When necessary, based on cost proposal
SP-ARR	Inspection of arroyo banks for woody debris and bank erosion	Arroyo and embankments									SFC-M (Crew)	Notepad/GPS (Avenza), camera	0.5 days/year, annually
SP-ARR	Bank erosion stabilization	Arroyo and embankments									SFC-M (Crew) or contractor	TBD	When necessary, based on cost proposal

SP-GRA = Grassland, Pasture Unit

SP-WOO = Woodland Unit

SP-CUL = Cultural Resource Unit

LP-ARR = Arroyos Unit

## INSPECTIONS, MONITORING, AND ADAPTIVE MANAGEMENT

Effective maintenance must be grounded in scheduled, periodic field inspections and a rigorous monitoring schedule. Findings from inspections and monitoring must lead to a confirmation of scheduled maintenance, and to specifications and adaptations in the scope and scale and timing of maintenance work. It may also lead to changes in the identification of who should do the maintenance work. Eventually, inspections and monitoring lead to adaptive management of the Open Space property and to lessons learned for all involved. This collaborative learning process will likely have both a practical aspect and an aspect of community building as the interaction of learning together may contribute to people's appreciation for the area and for the different people involved. The latter is important to grow people's interest, care, and respect for the place, and their support for recurring maintenance work.

### Inspection Protocols

County staff must establish a regular inspection schedule based on the recommended maintenance tasks and their recommended inspection frequency as described above. Inspections follow a protocol by filling out an inspection form. Information is gathered by using all the senses and if possible by speaking with neighbors, users, or passersby. Santa Fe County already has an adequate inspection form. A template inspection protocol that outlines the communication and verification process and adaptive management for inspections is included in Appendix A.

### Monitoring

Monitoring is the rigorous practice of documenting or measuring specific landscape features to verify whether a change of certain indicator factors is achieved or whether threshold levels of indicators are exceeded. Analysis of monitoring data will help ascertain whether the measured or observed changes are meeting management goals or not.

Monitoring can be done by taking photographs at very specific locations and comparing a time series of photographs at each photo point to detect change. Monitoring can also be done by taking specific measurements or documenting qualitative field observations on data logs.

Monitoring work must be based on a study design of the monitoring process, based on selected indicators which, in turn, reflect progress toward a stated goal. Therefore, monitoring protocols are goal and site specific, and it is not useful to present templates of monitoring protocols. However, there are monitoring Best Management Practices, such as those developed for the US Forest Service Collaborative Forest Restoration Program (CFRP), or for EPA and NRCS funded stream measurements. A selection of monitoring BMP references is included in the Santa Fe County Open Space Management Planning Guide.

### Adaptive Management: Identifying Choices and Making Decisions

Feedback from inspections and monitoring will offer information that needs to be compared with goals and objectives for the property in order to decide whether the information points

toward progress in meeting goals and objectives or not. No action is needed in most cases if the information supports management goals. However, if the information indicates that the situation in the field is deviating from management goals, choices will have to be made about appropriate action.

Depending on the seriousness of the deviation of terrain conditions from management goals, a choice can be made to deliberately defer maintenance activities and letting nature take its course. This choice may be relevant if a triage or allocation of County resources is necessary to determine where maintenance efforts should be focused, or if County staff would like to experience what the consequences are of deferring maintenance.

Alternatively, County staff will want to make adjustments to either the management goals or to the terrain conditions by organizing maintenance or repair activities. It is useful to evaluate findings in a group of stakeholders and experts in order to learn from each other's viewpoints and arrive at a well-thought-out and broadly supported solution for corrective action. Such an approach also offers optimal collaborative learning opportunities and ensures strong, broadly carried stewardship over time.

## LABOR REQUIRMENTS AND CAPACITY BUILDING

### FTEs

The recommended maintenance and repair work for SPOS would require 0.09-0.15 FTE each year for regular maintenance, and up to 0.39 FTE annually of planning staff time for planning, coordination, and community outreach. Additionally, it would require 0.18 FTE each year of the County Fire Crew time.

### Santa Fe County Capacity

The maintenance work identified in this Maintenance Plan for SPOS will require capacity building among Santa Fe County staff and among volunteers who assist staff with plan implementation. The planning team recommends that capacity building includes:

1. Expansion of County maintenance staff to meet the required FTEs for SPOS maintenance.
2. Workshops and training for higher management on (a) strategies and methods of capacity building, continued education, and leadership development (for planning and oversight staff, supervisors, and crew); (b) content matter aspects of Open Space management, such as agricultural program development, interpretive planning, cultural resource preservation, trail and road management, vegetation management, soil & water conservation, etc.; and (3) the use of electronic (IT) tools, including GIS, for terrain management, labor allocation, budget control, and public outreach services.
3. Staff and crew training workshops, seminars, conferences, and literature on Best Management Practices (BMPs). Essential BMPs for maintenance of SPOS would include:

- a. Vegetation management, including botany and native plants, thinning, pruning, planting, mowing, etc.
  - b. Grazing management and grassland restoration
  - c. Integrated Pest Management, including approaches to weed control, invasive animal management, pathogen/vector management (e.g., mosquitoes)
  - d. Wildlife management
  - e. Soil and water conservation (erosion control, water quality improvement)
  - f. Trail and road management and drainage
  - g. Access management: Fencing, gates, stiles, and signage
  - h. Cultural resource conservation protocols
  - i. Inspections and monitoring
4. Collaborative collection and review of periodic inspection reports and monitoring reports, and joint analysis and discussion of corrective action needed or changes in management.
  5. Staff training and guidance for managing community volunteers and site stewards, contractors, contracts and leases aimed at supporting field assessments, maintenance and repair at the Open Space properties.

### Community Outreach and Engaging Volunteers

Santa Fe County has more Open Space, Parks and Trails assets and associated maintenance needs than it will likely have staff capacity and funds to address them. Therefore, and also in order to grow community buy-in and stewardship of the Open Space properties, Santa Fe County needs to strengthen its community outreach and volunteer engagement services.

### Potential Volunteers

SPOS has a diverse spectrum of community stakeholders that are interested in the property and that Santa County can mobilize for volunteer stewardship work. These stakeholder groups include:

- a. Immediate neighbors and members of the San Pedro Neighborhood Association
- b. Local youth (e.g., East Mountain High School or San Antonio Elementary School in Sandoval County)
- c. The East Mountain Regional Trails Council
- d. The Turquoise Trail Preservation Trust
- e. The Turquoise Trail Regional Alliance
- f. Equestrian groups in the area
- g. Local livestock owners
- h. Local mining and prospecting groups and individuals
- i. Pueblos, such as Santa Ana Pueblo and San Felipe Pueblo
- j. Area schools and their students
- k. Any regional conservation groups, hiking and outdoor organizations, and other entities that could become interested in the SPOS – however, the involvement of such outside

groups must be discussed first with local stakeholders in order to ensure good working relationships

#### Volunteer Maintenance Activities

Maintenance activities that are particularly suitable to be conducted with support from (small) groups of volunteer stewards include:

- Maintenance of stiles, fence repair and fence adjustments for wildlife
- Removal of dead wood and woody debris in grasslands
- Trail maintenance, drainage management, and erosion control around old and new trails (if/when established)

The planning team recommends that volunteer activities are conducted according to a regular schedule to establish precedent, leading to an accountable system that after several years may even become a “tradition”. In this way, people will look forward to the maintenance events, and the events become part of the community calendar or the annual schedule of the volunteer groups. These activities also ensure periodic face to face contact between County staff and volunteer stewards. The more the activities include a sense of celebration, fun, sharing, and play, besides getting good work done that builds pride, the more participants will enjoy the events and return any next time.

#### Community Liaisons

Besides developing volunteer stewardship engagement, it may prove essential to cultivate a couple of community liaisons that can serve on a rotational basis to communicate with Santa Fe County staff and help mobilize and direct volunteer stewards. Santa Fe County already recognized the EMRTA and the San Pedro Neighborhood Association as informal liaisons. However, it would be important to clarify and formalize these relationships and perhaps identify any alternates that could support these groups.

#### County Point Person

Volunteer activities need to be diligently prepared and coordinated to ensure participant safety, work effectiveness, and general enjoyment by all. It will be essential that Santa Fe County identify a staff member for SPOS who serves as the designated point person in the communication with the community liaisons and stewardship volunteers. This staff person would be in charge of fielding questions and alerts from the community, communicating messages from Santa Fe County, and organizing any volunteer stewardship events. This staff person also would need to identify and mobilize, when necessary, any technical experts, either in the community, within Santa Fe County staff, or among contractors, to assist with technical guidance and quality control before, during and after the volunteer stewardship events. Additionally, this person would be in charge of planning and coordination between staff and maintenance crew to assist and to provide equipment and supplies, such as fencing materials and baling wire or twine, or plant stock, soil amendments, mulch, and stone material. This staff

person would also be responsible for any safety instructions and for ensuring that people work in a safe manner and have adequate protective gear.

Finally, Santa Fe County will need to develop a repository of tools, protective gear and supplies to provide during work days. Systems would need to be developed to account for tools and gear that is handed out, and a crew member or the County point person for the community would need to be in charge to account for the supplies and tools at the end of the work day.

## APPENDIX A: Santa Fe County Open Space Inspection Checklist – San Pedro OS

Inspected by: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

<b>Item to be Checked</b> Use a separate page to describe the necessary repairs	<b>OK or FIX = needs work</b>	<b>Comments (corrective action or work needed, who needs to be contacted)</b>
<b>Monthly</b>		
Exterior Fence condition		
Santa Fe County Open Space Signage		
Signs of garbage or illegal dumping		
Signs of illegal off-road vehicle use		
Gates or open stile entrances		
<b>Annually</b>		
Headcuts in arroyos are not advancing		
Woody invasive plants are not increasing		
Banks in main arroyo are stable		

## APPENDIX E: Maintenance, Stewardship, and Restoration Projects for Year-1

List of Terrain Management project activities for year-1 aimed at land health restoration.

Location Code	Management Activity	Location	Staff Prep	Volunteer Activity	SF County-M (Crew)	Contractor	Labor & Cost Items
SP-GRA	Thinning out juniper and other shrubs that have encroached into grassland; and spreading branches for soil cover and erosion control	Grasslands	One time to establish protocols and methods				3-5 days/year for 1 sawyer and a swamper
SP-GRA + SP-WOO	Cutting and removal of shrubs that have overgrown grassland in central-northeastern area alongside cultural site	Woodland/grassland	One time to establish protocols and methods				3 days/year for 1 sawyer and a swamper
SP-WOO	Cutting and removal of dead, dying, leaning, and low-vigor trees; and spreading branches for soil cover and erosion control	Woodlands	One time to establish standards and prescription				5 days/year for one sawyer and one swamper
SP-ARR	Bank erosion stabilization	Arroyo and embankments	One time to establish standards and prescription				TBD: dependent on proposal

List of Terrain Management maintenance and stewardship activities for year-1 aimed at land health maintenance

Location Code	Management Activity	Location	Staff Prep	Volunteer Activity	SF County-M (Crew)	Contractor	Labor & Cost Items
SP-all TMUs	Fence inspection and repair	Entire property (N, E, and S sides only): approx. 7,500 lf (1.44 miles)	One time to establish standards and prescription				Annually: 3 days for 2-person crew
SP-all TMUs	Fence closures on East side	3 or 4 openings on east boundary: 20-25 lf	One time to establish standards and prescription and to choose form of labor source				One-time investment in posts and wire: possibly around \$500 in material and 2 days for 2-person crew
SP-all TMUs	Fence adjustments for wildlife	Entire property (N, E, and S sides only): approx. 7,500 lf (1.44 miles)	One time to formulate standards				5 days for 2-person crew; Costs TBD: Based on proposal (one-time investment); possibly around \$5,000
SP-ARR	Inspection of arroyo banks for woody debris and bank erosion	Arroyo and embankments	One time to establish standards and prescription				1/2 day for one person

