

SOIL SURVEY AND INTERPRETATIONS
GRAN QUIVIRA NATIONAL MONUMENT, NEW MEXICO

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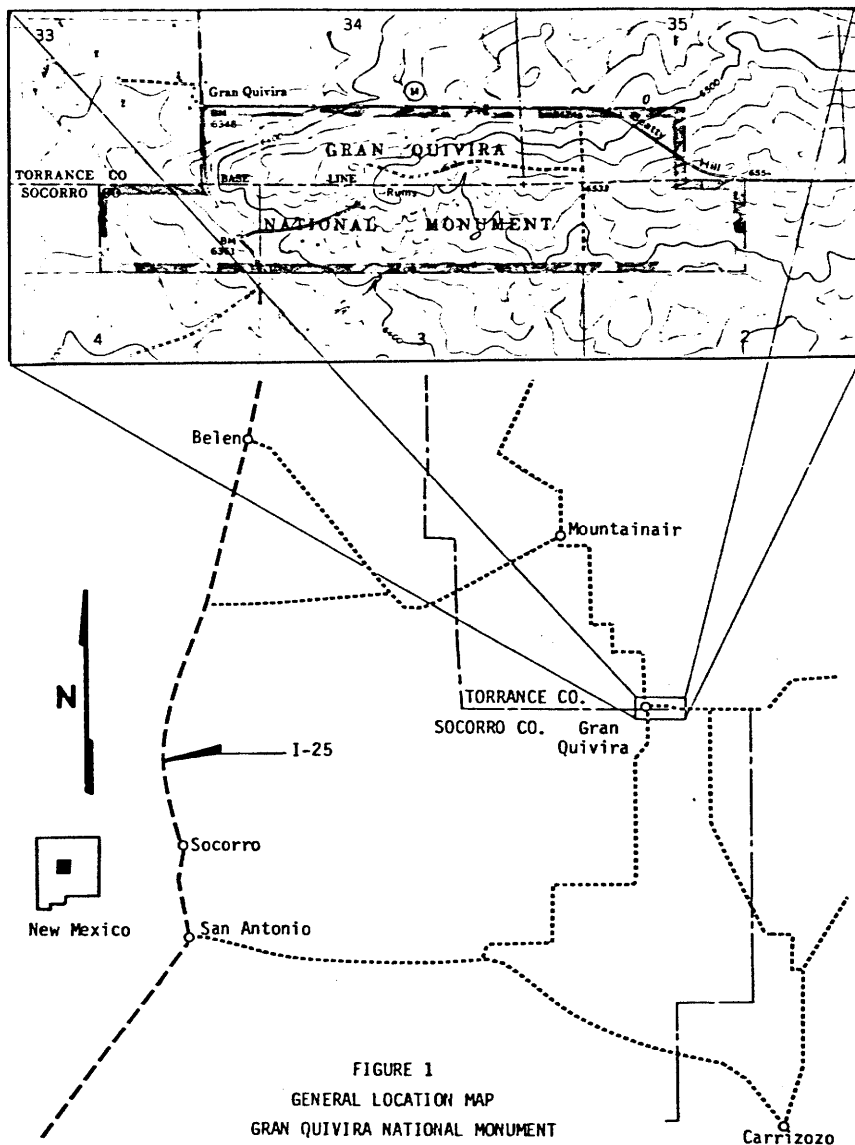
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SOIL SURVEY
GRAN QUIVIRA NATIONAL MONUMENT

INTRODUCTION

This soil survey covers a contiguous area of approximately 610 acres along the southern boundary of Torrance County and along the northeastern boundary of Socorro County in New Mexico (see FIGURE 1). Elevation ranges from 6,320 feet along the southwestern boundary and rises toward the central part of the survey area to 6,560 feet.



Physiographically, the survey area is situated in the Sacramento section of the Basin and Range Province (Thornbury, 1965). The general area is composed of open valleys, pot holes, and rolling to hilly upland ridges underlain by gently dipping strata. Soils in the area are developing in alluvium, eolian materials and/or residuum derived primarily from valley fill which is unconsolidated sediment, and sedimentary rocks represented by limestone and sandstone.

The climate is semiarid continental. The average annual temperature is about 53°F.; average annual precipitation is about 14 inches; and the frost-free season is about 150 days.

The survey area is a national park and is used primarily for recreation and wildlife habitat. Vegetation consists of shrubs and grasses with one-seed junipers dominating the landscape. (A detailed vegetation description of the survey area is found in the Vegetation Report of Gran Quivera National Monument.)

METHODS AND PROCEDURES

The detailed soil survey, of second order intensity (USDA-SCS, 1957B), was made by a soil scientist who drove or walked over the land, digging holes, examining soil, describing soil profiles, and taking notes on pertinent soil characteristics. Soils with similar characteristics were grouped together and dissimilar soils were separated.

Groups of contiguous, similar soils were classified at the series level in the USDA soil classification system, Soil Taxonomy (USDA-SCS, 1975A), and are the soil taxonomic units of this soil survey. These units are groups of soils having horizons similar in differentiating characteristics and arrangement in the soil profile, except for texture of the

surface part. The taxonomic units were used in designing mapping units which were located and delineated on aerial photographs at a scale of 1:3,000. The minimum size of mapping unit delineation is 1 acre.

The mapping units are composed of phases of the taxonomic units. A phase is a subdivision of the taxonomic unit having characteristics that affect the use and management of the soil, but which do not vary sufficiently to differentiate it as a separate taxonomic unit.

Two basic kinds of mapping units, consociations and soil complexes (USDA-SCS, 1975B), were delineated in this survey. Consociations are mapping units in which only one identified phase or land type, plus allowable inclusions, occur in each delineation. A soil complex is a geographic mixture of areas of different kinds of soils that are associated in a pattern so intricate that it is impractical to separate them at the map scale being used.

DESCRIPTION OF SERIES AND MAPPING UNITS

The prominent features of each series and mapping unit are presented in this section. The series are described in general terms and are followed by mapping unit descriptions of the respective series. Mapping units are discussed in terms of their similarities and differences from the series description and from one another.

These soil series descriptions represent the soils as they occur in the survey area. The profile description is typical of the series as it occurs in the survey area, and is not the pedon of the established series.

ROYOSA SERIES 1/

The Royosa Series is a member of the mixed, mesic family of the Typic Ustipsamments. The unit consists of deep, well or somewhat excessively drained soils that formed in eolian material from mixed sources. The Royosa soils occur on undulating low hummocky uplands, and slopes range from 0 to 8 percent.

In a representative profile, the surface layer is light brown loamy fine sand, about 5 inches thick. The substratum is reddish yellow loamy sand, several feet thick.

Representative profile of Royosa loamy fine sand, located at Site 1 on Photo 3-010. (Colors are for dry soil unless otherwise noted.)

A1--0 to 5 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; weak very fine granular structure in top 3 inches that parts to single grains; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; clear smooth boundary. (2 to 5 inches thick.)

C1--5 to 60 inches; reddish yellow (7.5YR 6/6) loamy sand, strong brown (7.5YR 4/6) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; slightly effervescent.

The soil is more than 60 inches deep. Loamy fine sands, loamy sands, and sands occur throughout the profile with the finer textures found chiefly in the surface horizon. Hues are 10YR and 7.5YR, chromas range from 3 or 5 moist. Buried soils at depths below 40 inches are commonly found in this soil.

1/ Taxadjunct due to slightly dryer moisture regime.

Mapping Unit:

R0 Royosa Loamy Fine Sand, 1 to 8 Percent Slopes

This mapping unit is composed primarily of that soil described as the Royosa Series. This unit occurs on nearly level to sloping low hummocky uplands. The map unit is found in the southwestern part of the survey area. The soil has a rapid permeability and surface runoff is slow. The available water capacity is about 2.8 to 4.4 inches and effective rooting depth is about 60 inches. Water erosion hazard is slight and wind erosion hazard is severe.

Inclusions in this mapping unit are about 12 percent Otero fine sandy loam and about 8 percent Palma fine sandy loam. Combined inclusions make up about 20 percent of the mapping unit.

OTERO SERIES

The Otero Series is a member of the coarse-loamy, mixed (calcareous), mesic family of Ustic Torriorthents. The series consists of deep, well or somewhat excessively drained soils that formed in alluvial sediments that are wind modified in some places. Otero soils occur on sideslopes, toeslopes, and swales in the survey area. Slopes range from 0 to 15 percent.

In a representative profile, the surface layer is a dark brown fine sandy loam, about 6 inches thick. The subsoil is about 9 inches thick and is dark brown to brown sandy loam. The substratum is light brown sandy loam several feet thick.

Representative profile of Otero fine sandy loam, located at Site 2 on Photo 3-004. (Colors are for dry soil unless otherwise noted.)

A1--0 to 6 inches, brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak very fine granular structure;

soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; slightly effervescent; clear smooth boundary. (4 to 8 inches thick.)

AC--6 to 15 inches; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist; massive parts to weak fine subangular blocks; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; common very fine and fine interstitial pores; strongly effervescent; gradual smooth boundary. (6 to 10 inches thick.)

C1ca--15 to 39 inches; pink (7.5YR 7/4) sandy loam, light brown (7.5YR 6/4) moist; massive; soft, very friable, nonsticky, nonplastic; no roots; common very fine interstitial pores; common thin secondary calcium carbonate occurring as filaments throughout horizon; strongly effervescent; clear smooth boundary. (20 to 40 inches thick.)

C2ca--39 to 60 inches; pink (7.5YR 7/4) gravelly sandy loam, light brown (7.5YR 6/4) moist; massive; soft, very friable, nonsticky, nonplastic; no roots; common very fine and few fine interstitial pores; 20 percent fine gravels; common thin secondary calcium carbonate occurring in filaments throughout horizon; strongly effervescent.

Depth to bedrock is greater than 60 inches. The soil surface has 2 to 10 percent gravel cover. The A horizon has color hue of 7.5YR and 10YR, value of 4 to 7 dry and 3 to 6 moist, and chroma of 3 or 4. The C horizon has color hue of 7.5YR and 10YR, value of 5 to 7 dry and 4 to 6 moist and chroma of 3 or 4. The amount and distribution of the carbonates is erratic.

Mapping Units:

OP Otero-Palma Complex, 0 to 8 Percent Slopes

This mapping unit consists of 50 percent Otero fine sandy loam, 40 percent Palma fine sandy loam, and about 10 percent inclusions.

This complex occurs on nearly level to sloping open grassland areas. The Otero soils are as described for Otero Series and Palma soils are as described for Palma Series. The Otero and Palma Series have a rapid permeability and surface runoff is slow. Available water capacity is about 6.0 to 7.2 inches and effective rooting depth is greater than 60 inches. Water erosion hazard is slight and soil blowing hazard is moderate to severe depending on the amount of protective or vegetative cover.

Inclusions in this mapping unit are about 5 percent Chupadera loamy fine sand and 5 percent Royosa loamy fine sand.

OT Otero-Palma-Chupadera Complex, 0 to 8 Percent Slopes

This mapping unit consists of 40 percent Otero fine sandy loam, 30 percent Palma fine sandy loam, 20 percent Chupadera fine sandy loam, and about 10 percent inclusions.

The unit occurs on nearly level to sloping ridges, sideslopes, and swales. Otero and Palma soils occur on toeslopes and swales, and Chupadera soils occur on sideslopes and ridges. The Otero soils are as described for Otero Series and Palma soils are as described for Palma Series. The Otero and Palma Series have a rapid permeability and surface runoff is slow. Available water capacity is about 6.0 to 7.2 inches and the effective rooting depth is greater than 60 inches. Water erosion hazard is slight and soil blowing hazard is moderate. The Chupadera soils are as described for the Chupadera Series. This soil has a moderately rapid permeability and surface runoff is moderately

slow. Available water capacity is about 2.8 to 3.6 inches and effective rooting depth is less than 40 inches. Water erosion hazard is moderate and soil blowing hazard is moderate.

Inclusions in this mapping unit are about 7 percent Royosa loamy fine sand and 3 percent limestone rock outcrop.

OC Otero-Palma-Chupadera Complex, 8 to 15 Percent Slopes

This mapping unit consists of 35 percent Otero fine sandy loam, 30 percent Palma fine sandy loam, 25 percent Chupadera and about 10 percent inclusions.

The unit occurs on sloping to moderately steep ridges, sideslopes, and swales. Otero and Palma soils occur on swales and toeslopes, and Chupadera soils occur on sideslopes and ridges. The Otero soils are as described for Otero Series and Palma soils are as described for Palma Series. These soils have a rapid permeability and surface runoff is moderately slow. Available water capacity is about 6.0 to 7.2 inches and effective rooting depth is greater than 60 inches. Water erosion hazard is moderate and soil blowing hazard is moderate. The Chupadera soils are as described for Chupadera Series. This soil has a moderately rapid permeability and surface runoff is moderately slow. Available water capacity is about 2.8 to 3.6 inches and effective rooting depth is less than 40 inches. Water erosion hazard and soil blowing hazard are both moderate to severe.

Inclusions in this mapping unit are about 5 percent Royosa loamy fine sand and about 5 percent limestone rock outcrop.

PALMA SERIES

The Palma Series is a member of the coarse-loamy, mixed mesic family of Ustollic Haplargids. The series consists of deep, well-drained soils that formed in alluvial sediments that are modified by wind in some places.

B3ca--23 to 28 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; few thin secondary calcium carbonate filaments; slightly effervescent; gradual wavy boundary. (2 to 6 inches thick.)

C1ca--28 to 42 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; soft very friable, nonsticky, nonplastic; no roots; common very fine and fine interstitial pores; common thin secondary calcium carbonate filaments; strongly effervescent; gradual wavy boundary. (9 to 16 inches thick.)

C2--42 to 60 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; soft very friable, nonsticky, nonplastic; no roots; common very fine and fine interstitial pores; very few thin secondary calcium carbonate filaments; slightly effervescent.

The A horizon has 7.5YR hue, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 to 4. It is fine sandy loam or loamy sand. The Bt horizon has 7.5YR hue, value of 5 to 7 dry and 4 to 6 moist, and chroma of 3 to 5. It is sandy loam or fine sandy loam. The C horizon is the same as the Bt and it's texture is sandy loam, fine sandy loam or loam.

Mapping Units:

The Palma soils are mapped only in complexes with the Otero and Chupadera Series.

CHUPADERA SERIES 1/

The Chupadera Series is a member of the coarse-loamy, mixed, mesic family of the Ustollic Calciorthids. The unit consists of moderately deep, well-drained soils that formed partly in eolian sands and partly in residuum from limestone bedrock. Chupadera soils occur on side-slopes and ridges of bedrock controlled uplands. Slopes range from 0 to 15 percent.

In a representative profile, the surface layer is brown loamy fine sand about 4 inches thick. The subsoil, about 11 inches thick, is brown fine sandy loam. The substratum is pink sandy loam, about 14 inches deep. This is underlain by partially calcium carbonate-coated limestone bedrock.

Representative profile of Chupadera loamy fine sand, located at Site 4 on Photo 2-004. (Colors are for dry soil unless otherwise noted.)

A1--0 to 4 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; slightly effervescent; clear smooth boundary. (3 to 6 inches thick.)

B2--4 to 15 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine, and few medium roots; many very fine and fine interstitial pores; slightly effervescent; clear smooth boundary. (8 to 15 inches thick.)

1/ Tentative Series

C1ca--15 to 30 inches; pink(7.5YR 7/4) sandy loam, light brown (7.5YR 6/4) moist; massive; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; common very fine and fine interstitial pores; disseminated secondary calcium carbonate; 10 percent calcium carbonate-coated gravels; violently effervescent; abrupt wavy boundary. (8 to 14 inches thick.)

R--30 inches; calcium carbonate-coated limestone bedrock.

Depth to bedrock 20 to 40 inches. Color of the A and B horizon ranges in hue from 7.5YR to 10YR, chroma from 2 to 4, and in value from 4 to 6 dry and 2 to 4 moist. The color of Cca horizon ranges in hue and chroma the same as the overlying horizon but is 1 to 2 units lighter in value. Texture of the control section ranges from sandy loam to fine sandy loam. The Cca horizon typically has lime nodules and disseminated calcium carbonate immediately above the fractured bedrock and in the rock fractures. Coarse fragments consisting of limestone and hard caliche gravels range from 2 to 15 percent by volume throughout profile. These increase considerably at the interface of the Cca horizon and the limestone bedrock.

Mapping Units:

CH Chupadera Loamy Fine Sand, 0 to 15 Percent Slopes

This mapping unit is composed primarily of that soil described as the Chupadera Series. This unit occurs on nearly level ridge tops to moderately steep sideslopes. This soil has a moderately rapid permeability and surface runoff is moderate to slow. Available water capacity is about 2.8 to 3.6 inches and effective rooting depth is less than 40 inches. Water erosion hazard is moderate and soil blowing hazard is moderate.

Inclusions in this mapping unit are about 5 percent Otero fine sandy loam, 4 percent Palma fine sandy loam, and 6 percent rock outcrop and shallow soils.

DISTURBED AREA

The Disturbed Area includes the ruins and that area around the ruins. The soil in the area is classified tentatively into the Entisols soil order, which is the highest level of categorization in the soil classification system. The soils are characterized by an Anthropic Epipedon, which indicates the soils developed under human habitation. The unit consists of shallow to deep, generally skeletal soils. They formed under the influence of the long-continued use of the soil by man as a place of residence. The disturbed area occurs on a knoll of a ridge and on its sideslopes. Slopes range from 0 to 10 percent.

Although the soil is quite variable in depth and texture, in an average profile, the surface layer is a dark brown gravelly loamy sand about 5 inches thick. Below this, the texture is variable but is generally moderately coarse or coarse textured and commonly has 15 to 50 percent by volume limestone gravels and cobbles, with admixtures of artifacts, ceramic pieces, charcoal, and sherds. This soil material is generally a very dark grayish brown to dark brown cobbly sandy loam or cobbly loamy fine sand, ranging in depth from a few inches to several feet. This is underlain by limestone bedrock.

Mapping Units:

DI Disturbed Area, 0 to 10 Percent Slopes

This mapping unit is that soil described in general for the disturbed area. The unit occurs on a nearly level ridgetop with moderately steep sideslopes. The soil has a moderately rapid permeability and surface runoff is slight along the ridge to moderate on sideslopes. Available water capacity is about 2.5 to 4.0 inches and the effective rooting depth ranges from a few inches to several feet. Water erosion hazard and soil blowing hazard are slight to moderate.

SOIL CLASSIFICATION

For the purposes of this survey, soils are classified in accordance with the system developed and used by the Soil Conservation Service (USDA-SCS, 1975A). The classifications presented in this report are considered tentative.

There are ten Orders at the highest level of categorization. Two of the ten categories are represented in the survey area. These are: 1) Aridisols, which have light-colored or thin surface horizons (ochric epipedons), a soil moisture content below permanent wilting point for at least sixty cumulative days during the period the soil is warm enough to support plant growth, and 2) Entisols, which are youthful soils exhibiting limited or no development of pedogenic horizons.

TABLE 1 presents the tentative classification of all soils mapped during the survey. The soil order can be determined from the ending of the subgroup classifications. For example, Torriorthents are Entisols and those ending in ids are Aridisols.

TABLE 1
CLASSIFICATION OF SOILS 1/

SERIES NAME	FAMILY	SUBGROUP
Royosa <u>2/</u>	Mixed, mesic	Typic Ustipsamments
Otero	Coarse-loamy, mixed (calcareous), mesic	Ustic Torriorthents
Palma	Coarse-loamy, mixed, mesic	Ustollic Haplargids
Chupadera	Coarse-loamy, mixed, mesic	Ustollic Calciorthids

1/ Tentative soil classification.

2/ Taxadjunct due to slightly dryer moisture regime.

INTERPRETATIONS

Interpretations were made for various uses of the soils. These interpretations were made in accordance with standard criteria as provided in "Guide for Interpreting Engineering Uses of Soils," USDA-Soil Conservation Service, 1971. These interpretations are shown on the following interpretative forms, (TABLES 2, 3, 4 and 5), by soil series. Most of the interpretations are estimates that are based on the physical and chemical characteristics.

The Identification Legend is presented as TABLE 6 at the end of this Report. The proportional extent of the Map Units are also shown in TABLE 6.

TABLE 2

INTERPRETATIONS FOR ROYOSA LOAMY FINE SAND

ESTIMATED PHYSICAL AND CHEMICAL PROPERTIES

MAJOR SOIL HORIZONS (INCHES)	CLASSIFICATION			COARSE FRACT. > 3 IN. %	PERCENTAGE LESS THAN 3 INCHES PASSING SIEVE NO. ---				LL	PI	PERMEA- BILITY (in./hr)	AVAILABLE WATER CAPACITY (in/in)	SOIL REACTION (pH)	SALINITY ($\text{EC}_e \times 10^3$ @25°C)	SHRINK- SWELL POTENTIAL	POTENTIAL FROST ACTION
	USDA TEXTURE	UNIFIED	AASHTO		4	10	40	200								
0-60	lfs, ls, fs	SM SW-SM	A-2	---	100	100	60-80	15-50	--	--	6.0-20	2.8-4.4	---	---	low	low
DEPTH TO BEDROCK OR HARDPAN: >5' DEPTH TO SEASONAL HIGH WATERTABLE >5'																
FLOOD HAZARD: Slight HYDROLOGIC GROUP B																

SUITABILITY AND MAJOR FEATURES AFFECTING SOIL AS RESOURCE MATERIAL 1/

TOPSOIL: Poor - Coarse Texture	GRAVEL: Unsited
SAND: Fair	ROADFILL: Good

DEGREE OF LIMITATION AND MAJOR SOIL FEATURES AFFECTING SELECTED USE 2/

LOCAL ROADS AND STREETS: Slight	SEPTIC TANK FILTER FIELDS: Slight
SHALLOW EXCAVATIONS: Severe - Coarse Texture, Side Wall Stability	SEWAGE LAGOONS: Severe - High Permeability
DWELLINGS: <u>3/</u> Slight	LIGHT BUILDINGS: <u>3/</u> Slight

- 1/ Suitability ratings are good, fair, and poor.
2/ Limitation ratings are slight, moderate, and severe.

- 3/ Interpretation refers to inherent soil characteristics.
 Disturbance of soil or improper compaction may alter
 foundation supporting characteristics of soil.

TABLE 3

INTERPRETATIONS FOR OTERO FINE SANDY LOAM

ESTIMATED PHYSICAL AND CHEMICAL PROPERTIES

MAJOR SOIL HORIZONS (INCHES)	CLASSIFICATION			COARSE FRACT. > 3 IN. %	PERCENTAGE LESS THAN 3 INCHES PASSING SIEVE NO. ----				LL	PI	PERMEABILITY (in./hr)	AVAILABLE WATER CAPACITY (in./in)	SOIL REACTION (pH)	SALINITY (EC x 10 ³ @25°C)	SHRINK-SWELL POTENTIAL	POTENTIAL FROST ACTION
	USDA TEXTURE	UNIFIED	AASHO		4	10	40	200								
0-60	fs1,s1	SM	A-2 A-4	---	100	100	60-85	30-55	--	--	2.0-6.0	6.0-7.2	---	---	low	low
DEPTH TO BEDROCK OR HARDPAN: >5' DEPTH TO SEASONAL HIGH WATERTABLE >5'																
FLOOD HAZARD: Slight HYDROLOGIC GROUP B																

SUITABILITY AND MAJOR FEATURES AFFECTING SOIL AS RESOURCE MATERIAL 1/

TOPSOIL: Good	GRAVEL: Unsited
SAND: Poor	ROADFILL: Good

DEGREE OF LIMITATION AND MAJOR SOIL FEATURES AFFECTING SELECTED USE 2/

LOCAL ROADS AND STREETS: Slight	SEPTIC TANK FILTER FIELDS: Slight
SHALLOW EXCAVATIONS: Slight	SEWAGE LAGOONS: Severe - High Permeability
DWELLINGS: 3/ Slight	LIGHT BUILDINGS: 3/ Slight

- 1/ Suitability ratings are good, fair, and poor.
 2/ Limitation ratings are slight, moderate, and severe.

- 3/ Interpretation refers to inherent soil characteristics. Disturbance of soil or improper compaction may alter foundation supporting characteristics of soil.

TABLE 4

INTERPRETATIONS FOR PALMA FINE SANDY LOAM

ESTIMATED PHYSICAL AND CHEMICAL PROPERTIES

MAJOR SOIL HORIZONS (INCHES)	CLASSIFICATION			COARSE FRACT. > 3 IN. %	PERCENTAGE LESS THAN 3 INCHES PASSING SIEVE NO. ---				LL	PI	PERMEA- BILITY (in./hr)	AVAILABLE WATER CAPACITY (in/in)	SOIL REACTION (pH)	SALINITY ($E_C \times 10^4$ @25°C)	SHRINK- SWELL POTENTIAL	POTENTIAL FROST ACTION
	USDA TEXTURE	UNIFIED	AASHO		4	10	40	200								
0-60	fsl, sl, sl(h)	SM-SC	A-2 A-4	---	100	100	60-75	30-45	---	---	2.0-6.0	6.0-7.0	---	---	low	low
DEPTH TO BEDROCK OR HARDPAN: >5' DEPTH TO SEASONAL HIGH WATERTABLE >5'																
FLOOD HAZARD: Slight HYDROLOGIC GROUP B																

SUITABILITY AND MAJOR FEATURES AFFECTING SOIL AS RESOURCE MATERIAL 1/

TOPSOIL: Good	GRAVEL: Unsited
SAND: Poor	ROADFILL: Good

DEGREE OF LIMITATION AND MAJOR SOIL FEATURES AFFECTING SELECTED USE 2/

LOCAL ROADS AND STREETS: Slight	SEPTIC TANK FILTER FIELDS: Slight
SHALLOW EXCAVATIONS: Slight	SEWAGE LAGOONS: Severe - High Permeability
DWELLINGS: 3/ Slight	LIGHT BUILDINGS: 3/ Slight

- 1/ Suitability ratings are good, fair, and poor.
2/ Limitation ratings are slight, moderate, and severe.

- 3/ Interpretation refers to inherent soil characteristics.
 Disturbance of soil or improper compaction may alter
 foundation supporting characteristics of soil.

TABLE 5

INTERPRETATIONS FOR CHUPADERA LOAMY FINE SAND

ESTIMATED PHYSICAL AND CHEMICAL PROPERTIES

MAJOR SOIL HORIZONS (INCHES)	CLASSIFICATION			COARSE FRACT. > 3 IN. %	PERCENTAGE LESS THAN 3 INCHES PASSING SIEVE NO. ---				LL	PI	PERMEA- BILITY (in./hr)	AVAILABLE WATER CAPACITY (in/in)	SOIL REACTION (pH)	SALINITY (EC x 10 ³ @25°C)	SHRINK- SWELL POTENTIAL	POTENTIAL FROST ACTION
	USDA TEXTURE	UNIFIED	AASHO		4	10	40	200								
0-4 4-30	lfs,ls,sl	SM SM	A-2 A-2 A-4	---	100 100	100 100	50-85 60-70	15-40 30-40	---	---	6.0- 20.0 2.0-6.0	0.24- 0.32 2.8-3.5	---	---	low	low
DEPTH TO BEDROCK OR HARDPAN: < 4' DEPTH TO SEASONAL HIGH WATERTABLE > 5' FLOOD HAZARD: Slight HYDROLOGIC GROUP C																

SUITABILITY AND MAJOR FEATURES AFFECTING SOIL AS RESOURCE MATERIAL 1/

TOPSOIL: Poor - Thin Layer	GRAVEL: Unsuitd
SAND: Poor	ROADFILL: Good

DEGREE OF LIMITATION AND MAJOR SOIL FEATURES AFFECTING SELECTED USE 2/

LOCAL ROADS AND STREETS: Moderate - Slopes >8%	SEPTIC TANK FILTER FIELDS: Severe - Depth to Bedrock < 40 inches
SHALLOW EXCAVATIONS: Severe - Depth to Bedrock < 40 inches	SEWAGE LAGOONS: Severe - Depth to Bedrock < 40 inches
DWELLINGS: <u>3/</u> Moderate - Slopes >8%, Depth to Bedrock	LIGHT BUILDINGS: <u>3/</u> Moderate - Slopes >8%, Depth to Bedrock

- 1/ Suitability ratings are good, fair, and poor.
2/ Limitation ratings are slight, moderate, and severe.

- 3/ Interpretation refers to inherent soil characteristics.
 Disturbance of soil or improper compaction may alter
 foundation supporting characteristics of soil.

DISCUSSION AND RECOMMENDATIONS

The Royosa soils in Map Unit R0 and the Chupadera soils in Map Unit CH and OC have rather delicate surfaces and when disturbed are subject to wind erosion. Past erosion, in these mapping units, has healed rather nicely; however, there are a few small areas remaining that could be reseeded. There is some active gullying along drainage-ways. These occur throughout the monument but occur more frequently in the southeastern part.

The CH Map Unit is extensive throughout the central part of the monument whereas the R0 Map Unit is extensive in the southwestern part.

It is recommended that all surface traffic on these units (R0 and CH) be limited to established trails and roads. Trails and roads in these areas should be treated or surfaced with durable material to avoid erosion. Small areas actively eroding by wind should be reseeded or mulched to reduce erosion.

The active gullying should be treated with wire and brush structures for stabilization.

The agronomic and engineering standards and specifications for these treatments can be obtained from the USDA Soil Conservation Service through the local Soil and Water Resource Conservation District.

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TABLE 6

IDENTIFICATION LEGEND AND APPROXIMATE ACREAGE

MAP SYMBOL	NAME	ACREAGE	PAGE
RO	ROYOSA Loamy Fine Sand, 0 to 8 Percent Slopes	79.3	5
OP	OTERO-PALMA COMPLEX, 0 to 8 Percent Slopes	97.6	7
OT	OTERO-PALMA-CHUPADERA COMPLEX, 0 to 8 Percent Slopes	97.6	7
OC	OTERO-PALMA-CHUPADERA COMPLEX, 0 to 8 Percent Slopes	54.9	8
CH	CHUPADERA Loamy Fine Sand, 0 to 15 Percent Slopes	050.1	12
DI	DISTURBED AREAS	30.5	13

Total Acres 610.0