RESTORATION PLAN

FOR ENERGY PROJECTS

IN THE LAS VEGAS FIELD OFFICE

BUREAU OF LAND MANAGEMENT

Prepared by
Las Vegas Field Office
and
Native Resources
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1.0 Introduction.

The Las Vegas Field Office is currently processing a large number of applications for energy generation projects in order to meet the energy needs of southern Nevada and the southwestern U.S. Through the process required by the National Environmental Policy Act (NEPA), energy generation plants and ancillary facilities such as transmission and pipe lines are analyzed for their cumulative impacts on public land resources, including soils, visual resources, vegetation, wildlife, and endangered species. The issue of cumulative impacts has been identified as a concern with respect to the combined number and scope of these energy projects. However, the impacts can be reduced to a level of "not significant" provided that measures are undertaken to minimize and mitigate effects associated with facility construction. One important action is to restore surface disturbances resulting from construction to an acceptable level in order to speed up natural recovery. To reach that goal, this restoration plan has been developed and will identify actions necessary to achieve land recovery goals. This plan will:

1. **Delineate restoration actions required by BLM based on land status and habitat sensitivity;**
2. **Define and categorize levels of surface disturbance anticipated;**
3. **Provide detail on restoration methodology and protocol to be implemented; and**
4. **Lay out the methodology and schedule for monitoring the results of restoration actions.**

Although this plan has been developed specifically for energy projects, this plan, or relevant portions of it, can be applied to restoring lands disturbed through virtually any ground disturbing activity, including but not limited to communication site development, road construction, etc. This restoration protocol is meant to be used as a guide for meeting BLM's requirement of managing for healthy landscapes. This plan is iterative and dynamic. The BLM will continue to evaluate the efficacy of this plan, provide specific direction on a case-by-case basis, and adjust these requirements as needed.

2.0 Authority

Authority for restoration is provided under the following:

43CFR 2881.2

> *"The authorized officer shall impose stipulations which shall include, but not be limited to requirements for restoration, revegetation, and curtailment of erosion of the surface of the land [and] requirements designed to control or prevent damage to the enviroment (including damage to fish and wildlife habitat)..."*

FLPMA Sec. 101(a)(8)

> *Requires that "public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition..."*

Endangered Species Act of 1973, as amended Section 7(a)(2)

> *Requires that federal agencies insure that any authorized action "will not result in the adverse modification" of critical habitat.*

Las Vegas Field Office Resource Management Plan (RMP), Record of Decision, VG2.

"Restore plant productivity on disturbed areas of the public lands."

Las Vegas RMP

VS-1 Limit future impacts on the visual and aesthetic haracter of the public lands.

Clark County Multiple Species Habitat Conservation Plan

No net unmitigated loss or fragmentation of habitat for covered species.

Desert Tortoise Recovery Plan

Restoration of surface disturbance identified for all Desert Tortoise Recovery Units to pre-disturbance conditions.

3.0 Purpose and Need

The purpose of this restoration plan is to define actions needed to achieve BLM's objectives under the Las Vegas RMP for land health standards, to recover habitat for Federally listed and sensitive species, and to provide protocols for implementing and monitoring required restoration. This plan is written to be broad enough in scope to address restoration required by all energy projects, but has provisions that are specific to unique habitats. This plan is needed to address the needs of special status species and provide a consistent approach for restoring disturbed lands resulting from separate but, nevertheless, interrelated projects within the Las Vegas Field Office. This unified approach will allow BLM to track disturbance over time and monitor restoration actions for efficacy and success. Additionally, this plan will provide a means for proponents to more effectively analyze and budget restoration costs for prospective projects.

The BLM is a signatory to the Clark County Multiple Species Habitat Conservation Plan (MSHCP), which was approved in November 2000. The MSHCP is intended under Section 10(a) of the Endangered Species Act to support the issuance of a permit which would allow "take" of threatened or endangered species resulting from development on non-Federal lands within Clark County and allow "take" of threatened or endangered species which are currently unlisted but which could become listed in the future. The MSHCP identifies 79 Covered Species under the permit, and another 103 species are listed as Evaluation Species (more information being needed before these can be moved to the Covered Species list). The goal of the MSHCP is to insure the long-term conservation of Federally listed species and those species at risk of becoming listed, while allowing for the development of private lands in Clark County. The biological goal of the MSHCP is to have no net unmitigated loss or fragmentation of habitat for all species covered under the plan, which occur in all areas of Clark County including those areas identified as utility corridors in the Las Vegas RMP.

4.0 Restoration Plan

4.1 Restoration Levels

This plan defines four levels of restoration effort required (R1 - R4) and is based on the following land management designations: 1) R1: Red Rock Canyon National Conservation Area (Red Rock NCA), 2) R2: High Priority Recovery Areas, 2) R3: Medium Priority Recovery Areas, 3) R4: Multiple Use Managed Areas (Figure 1). It should be clarified that special and unique habitats can occur in any of the above areas and may require a higher effort of restoration to insure their long-term viability. Additionally, these restoration categories pertain to authorized actions for approved projects and do not include trespass or unauthorized land disturbing actions. Details of each area are provided in below.

R1. Red Rock NCA. Management of this land is oriented toward actions which promote its scenic, cultural, and biodiversity values. This area will require state-of-the-art restoration techniques and methodologies available to achieve a "no residual impact" level for projects. In this area, replanting would involve 100 percent cover and diversity of shrubs and perennial grasses.

R2. High Priority Recovery Areas. Management on these lands is oriented toward actions which reduce human impacts to the landscape for the purposes of recovery of Federally listed or special status species (Desert tortoise, Las Vegas bearpoppy), preservation of scenic values, or protection of cultural property. Examples include visual resources classes 1 and 2, desert tortoise critical habitat, and Areas of Critical Environmental Concern. In the R-2 category the outplanting would be more limited and located in areas that could be accessed for plant maintenance.

R3. Medium Priority Recovery Areas. Management on these lands limits, either spacially or temporally, the range of uses on lands to protect sensitive resources. Examples include herd management areas for wild horses and burros, and crucial habitat for desert bighorn and muledeer.

R4. Multiple Use Areas. Multiple use areas are lands on which human activities are not precluded. Nonetheless they support significant areas of undisturbed natural vegetation and provide important connectivity with more intensively managed areas. Additionally, at least six of BLM's most sensitive plant species occur in these multiple use areas, and their habitat may require a higher level of restoration.

4.2 Disturbance Levels and Restoration Components

This plan defines two broad types of disturbance conditions - long term use and temporary use. Temporary use areas may be broken down further into distinct levels based on the type of construction activity.

4.2.1. Long Term Use Areas

The use of these areas is long-term and the landscape is permanently altered through removing vegetation, site leveling, modifying natural drainages, fencing, and constructing facilities, towers, and other structures. Permanent disturbance also includes constructing access roads needed for regularly scheduled maintenance of facilities and structures.

Restoration Required: For large, discrete facilities (examples: switchyard, power plant), cacti and yucca will be salvaged and transplanted to a BLM approved stockpiling area. If the permanent disturbance is linear, cacti and yucca will be located adjacent to disturbance but within the right of way. Transportation off-site will be avoided if possible.

4.2.2 Temporary Use Areas

Temporary use is defined as using an area only for the amount of time it takes to construct the project. Examples include utilizing various types of heavy equipment to install towers or pipelines, driving across public land gain access to the project site, and parking vehicles, equipment, and materials in designated staging areas. The following defines the levels of disturbance, the impacts to the land, and the components of restoration required.

D-1. Overland Drive and Crush.
Disturbance caused by accessing a site without significantly modifying the landscape. Vegetation is crushed but not cropped. Soil is compacted, but no surface soil is removed. Examples include utility line tensioning and pulling areas, tower pad sites, overland access to fiber optic meter sites, and spur roads to towers. Even though vegetation may be damaged and even destroyed, the surface soil and seed bank remains in place. Some crushed vegetation will likely resprout after disturbance ceases. These activities would result in minimal to moderate disturbance. General restoration actions include:

Pre-construction:

1 **Seed Collection**
2 **Plant propagation, if required**
3 **Cactus and yucca salvage and relocate outside of disturbance area (within the ROW)**

Post Construction:

1 **Earthworks: selectively decompact terrain, if required, or erase tracks**
2 **Shrub outplanting, if required**
3 **Stabilize soil surface**
4 **Reseed**
5. **Install restoration signs**
6. **Monitor**

D-2. Clear and Cut.
Disturbance caused by accessing the project site, but having to brush off all vegetation in order to improve or provide suitable access for other equipment. All vegetation is removed, soils are compacted, but no surface soil is removed. Examples include temporary access roads where the road is improved for access and could include some examples from D-1 above. Clear and cut activities would result in moderate disturbance. Restoration components include:
Pre-construction:

1 **Seed Collection**
2 **Plant propagation, if required**
3 **Cactus and yucca salvage and relocate outside of disturbance area (within ROW)**
4 **Windrow to the side of disturbance vertical mulch and large rocks**

Post Construction:

1 **Earthworks: Decompact terrain**

2 **Replacement of vertical mulch and large rocks**
3 **Replant succulents**
4 **Shrub outplanting, if required**
5 **Reseed**
6 **Stabilize soil surface**
7 **Permeon application**
8 **Install restoration signs**
9 **Monitor**

D-3. Clear and Cut with Soil Removal.
Disturbance is caused by removing all vegetation in the impact zone, the soils are compacted and the surface soil is displaced, and for project requiring underground installation the subsurface soils are displaced as well. These activities result in heavy disturbance. Examples include pipelines, buried fiberoptic lines, access roads that require grading and filling.

Pre-construction:

1 **Seed Collection**
2 **Plant propagation, if required**
3 **Cactus and yucca salvage and relocate outside of disturbance area (within ROW)**
4 **Windrow and separate to the side of disturbance surface vegetation (i.e. vertical mulch), surface soil, and subsurface soil. In other words, two to three passes are required - vegetation and each layer of soil depending on depth of disturbance.**

Post-construction:

1 **Earthworks: Replace soils (in proper order), decompact terrain, recontour, replace vertical mulch, and rocks**
2 **Process, remove, or color caliche**
3 **Replant succulents**
4 **Reseed**
5 **Shrub outplanting, if required**
6 **Stabilize surface soil**
7 **Permeon application**
8 **Installation of restoration signs**
9 **Monitor**

4.3 Restoration Actions in Detail

The restoration plan is divided into four sections: 1) Survey and Planning Activities, 2) Pre-construction Actions, 3) Post-construction Actions, 4) Monitoring. These are sequential actions for a project that is in the development stages.

4.3.1 Survey and Planning Activities

The following is a description of survey and planning activities required prior to the start of pre-construction restoration actions. This includes 1) inventory, 2) project area survey, 3) identification of disturbance levels, 4) determination of restoration levels, 5) special status plant inventories, 6) seed collection, 7) live vegetative propagation. A GIS coverage (ArcView shapefile or ArcInfo export file) and map of the project area will be provided to the Bureau prior to the start of pre-construction actions showing the special status plant habitat, temporary use areas, permanent use areas, and their corresponding disturbance and restoration levels. Table 1 provides a complete list of actions required within each Restoration Area, Appendix 1 provides definitions of terms, and Appendix 2 provides a list of approved contractors. Actions under 1 and 2 below can be done concomitantly. NOTE: Some energy projects are further along in development and are on a timeline for immediate implementation. For that reason, although not ideal, some elements of the Pre-construction Actions will be done at the end of the project (example: seed collection).

1. ***Inventory all existing potential access roads and disturbance sites (which could serve as stockpile areas) by GPS or aerial photos.***

2. ***Survey project. All aspects of project must be surveyed as a part of the Plan of Development, including but not limited to permanent facility locations, permanent access roads, temporary use areas, stockpiling areas, pulling and tensioning sites, tower locations, spur roads, temporary access roads, and vegetation heel-in sites, if needed.***

3. ***Identification of Disturbance Levels (D1 - D3). Once the project has been surveyed and total acres of temporary and permanent disturbance are calculated, the levels of disturbance can be applied. This along with Item #4 below will provide a description of what restoration actions are necessary to implement.***

4. ***Determination of Restoration Levels (R1-R4). The level of restoration required will be determined using the land status map (Figure 1). (See section on Restoration Levels for a description of each area). A table showing the necessary actions for each area is presented in Table 1. A summary of the Restoration Levels and Disturbance Levels for all phases of the project will be provided in the Construction, Operation, and Maintenance Plan.***

5. ***Special status plant inventories, if available (meandering transects that cover all potential habitat; surveys must be recorded as GPS point features or digitized from 7.5 minute maps and the resulting information delivered to BLM as ArcView shapefiles or ArcInfo export files so as to be included in the BLM rare plant database).***

6. ***Seed Collection: The BLM will develop an appropriate seed mix for the project (see Table 2 for an example). Seed collection activities will be conducted prior to commencement of construction activities by a qualified seed company or other BLM-approved method (e.g., trained volunteers). Standard seed collection protocol will be followed. Sites for seed collection can be anywhere on public lands within the Las Vegas Field Office with prior approval. Only mature seed will be collected. Pounds of seeds required will be based on the approved seed mix and estimate of acres of temporary disturbance for the project. No more than 50 percent will be collected from any one population. Seeds will be collected, cleaned, tested for pounds live seed (PLS), certified weed free, and stored by the contractor until they are ready for use, unless other arrangements approved by BLM are made. Seeds will be stored dry in containers which will be labeled with exact location, date of collection, and collector. Containers must be located in a rodent and insect proof location. Some of the material may be pellatized prior to application (required in Restoration Areas R1 and R2). Necessary permits will be provided by BLM and the Nevada Division of Forestry, if needed.***

Table 2. EXAMPLE OF SEED MIX FOR RESTORATION OF MOJAVE DESERT SHRUBLAND

Species and Common Name	# per acre	% by Weight
Hilaria rigida (galleta grass)	3.0	17.5
Oryzopsis hymenoides (Indian ricegrass)	3.0	17.5
Sphaeralcea ambigua (desert globemallow)	1.5	9
Ambrosia dumosa (white bursage)	3.0	18
Larrea tridentata (Creosote)	1.0	6
Ephedra nevadensis (Nevada ephedra)	2.0	12
Atriplex canescens (Four-wing saltbush)	2.0	12
Total	16.5	100

Note: All of the amounts in the table are based on the weight of pure live seed.

7. ***Live Vegetation Propagation:***
For Restoration Areas R1 and R2, some plant propagation will be required. A portion of the native seed collected for the project will be propagated by a qualified nursery (Appendix 2). The live material will be maintained at the nursery for at least one year in tall pots before being outplanted in the field. Material will be free of noxious weeds before being outplanted. The total number of plants needed and locations where they will be outplanted will be directed by BLM.

4.3.2 Pre-construction Actions.

The following is a description of restoration actions that are performed prior to the construction of the project. This includes 1) perennial plant salvage, 2) succulent plant salvage, 3) vegetation propagation, 4) salvaging vertical mulch and rock and 5) Salvage of surface and subsurface soils.

1 Salvage of Perennial Shrubs:

In Red Rock NCA, perennial shrubs impacted by projects will be salvaged. Plants will be salvaged by a qualified contractor (Appendix 2). Plants approximately 12-16 gallon-size will be salvaged. Root dip gel should be applied to the plant to prevent bacterial growth and a minimum of 4 months growth in containers will be required prior to transplanting. Plants desirable to herbivores will need a protective sleeve secured around until they are fully established. The plants will be adequately maintained for one full year. Every effort will be made to transplant the material at the time of year (early spring or fall) when the plants are the least likely to experience environmental stress.

2 Succulent Plant Salvage:

The BLM, and the ROW applicant shall identify on site with flagging tape all cacti and yucca that is subject for removal and will mark the north orientation for all cacti. During survey all yucca clusters shall be counted as separate plants. A list describing quantity and species will forwarded to the BLM upon completion of task For Restoration Areas R2 - R4, the Las Vegas Field Office requires that all cacti, yucca, and agave be salvaged, **except** for cylindropuntia cacti (aka cholla), including *Opuntia echinocarpa*, *O. acanthocarpa*, and *O. ramosissima* over three (3) feet tall. These taller cholla are not required to be salvaged and will instead become a part of the "vertical mulch". All cholla under three feet tall shall be salvaged. For Restoration Area R1 (Red Rocks NCA), all succulents, irrespective of size, will be salvaged.

Prior to any ground disturbance, an organized, accessible and secure nursery site of appropriate size will be identified and established. This nursery shall provide ease of care and maintenance for the plant material. Site-specific nursery requirements may be applicable but should be designed to minimize any additional disturbance to the project site. All salvaged plant material shall be replanted in vertical trenches that have a depth of 18 inches or larger. Yuccas should be planted with 1 foot spacing. All succulents will be dug bareroot and replanted within 24 hours at the nursery site. Yucca clusters will be broken into individual stems prior to replanting at nursery. All cacti will be planted with the same north orientation as they originally grew (+/- 15 degrees). All small cacti shall be watered thoroughly one time upon being replanted to the nursery. All yucca stems will be watered in initially with DriWater being applied at a rate of one quart for every foot in height. Driwater cartons are to be buried completely. A one time watering approximately fifteen (15) days after planting shall occur to remove or minimize any air pockets and assure proper soil compaction. Care

should be taken to properly compact all soil around roots of plants that are directly transplanted in the nursery.

3. Salvage of Biological Crust:
For Restoration Areas R1 and R2, significant stands of biological crust must be salvaged either by hand or with very small equipment. The crust will be placed dry in plastic buckets and kept dry until ready to place back on the soil surface.

4 Salvage Vertical Mulch and Rocks:
For areas that require clearing and cutting, the vegetation shall be mechanically windrowed to an area outside disturbance boundary (vertical mulch). This will include any cholla over 3 feet in height not salvaged for areas R2-R4. Large rocks and boulders shall also be removed to the side. Care should be taken to prevent the disturbance of the natural patina or desert varnish of these rocks.

5 Salvage of Surface and Subsurface Soils:
After required plants have been salvaged from the site, conduct topsoil salvage by removing the top 4" (+/- 2") of soil, including all rocks and vegetation. Rocks over 6 inches can be removed and stockpiled outside the disturbance areas (within the ROW). This topsoil should be labeled as such and protected from erosion and inadvertent use as fill. Topsoil shall never be mixed with subsoil. When stockpiled, topsoil shall be treated with a vegetal-based tackifier to a 2" wetting depth to minimize erosion. If bedrock close to surface will not allow for full salvage, salvage what is available. Different soil types will be stockpiled separately (gypsum and sand for example). Overall handling should be kept to a minimum.

4.3.3 Post-construction Actions

The following is a description of actions that are implemented after the completion of construction activities, and include 1) earthwork, 2) replacing windrowed plant material and rocks, 3) stabilizing surface and replanting succulents, 4) reseeding, 5) shrub outplanting, and 6) permeon application.

1 Earthwork:
Includes burying subsurface soils (including caliche), applying surface soils, and decompacting terrain.

For underground utility projects which disturb surface and subsurface soil, the segregated material windrowed on either side of the trench should be replaced back into the trench in order with the subsurface below the surface soils. If significant caliche is encountered during the excavation, it shall be crushed into fine material before replacing back into the trench. Small amounts of caliche may be replaced into the trench, however there must be sufficient finer material to achieve natural terrain contours. After re-contouring to natural grade and loosening the subsurface soil, surface soils will be replaced over the top of the subsurface materials.

Where any compaction exists, the surface will be scarified, tilled or harrowed to a depth of 6 inches, as appropriate (e.g. not applicable to rock faces, severe slopes, or cliff areas). Depth of compaction relief will depend on site-specific conditions. Decompacting and ripping will be conducted to avoid "corn rows". Cross-ripping is preferable and care should be taken to prevent inverting the soil layers. The surface soil will be re-distributed following site re-contouring and preparation (decompacting and ripping). Small pieces of surface caliche may be buried to a minimum of 24" depth. Large pieces of caliche will be completely removed and disposed of in an appropriate landfill. Soil will be wet to a depth of 2" to prevent further erosion. The site will be left adequately rough after surface soil placement to provide micro sites for seed germination and to reduce soil movement. Deep sandy soils do not need to be decompacted and will not be ripped. Those soils will be identified in the Plan of Development prior to the start of the project.

Replaced surface soil will be left in an unscreened condition in an effort to minimize erosion. In case of shortage, it is better to replace a shallower depth in all areas than none in a few places. Additional erosion control and soil stabilization may be required to minimize soil movement, especially for heavily sloped areas or for fine-textured soils. Vegetal-based soil binder will be used on any steep stockpile slopes to reduce movement and erosion. Surface soil will not be handled excessively during windy conditions.

2 *Rocks and vertical mulch*:
For areas that have been cleared, vegetation that was windrowed to the outside of the disturbance boundary shall be replaced back onto the site. Large rocks and boulders removed to the side of the disturbance shall be placed back with the darkened side facing up in a natural appearing pattern. Permeon may be applied to rocks to enhance the desert varnish when necessary.

3 *Desert crust:* ***The timing of re-application of crusts is critical for the success of crust recovery. Soil crust salvaged from a site must be re-applied in the late fall to early spring. After the surface soil has been replaced, the salvaged crust will be spread evenly over the surface and watered once per day over the next three days.***

4 *Transplanting Succulents*:
All salvaged plant material shall be replanted in a natural pattern to depth of 18 inches or greater. Mojave yuccas will be re-planted in groups of three. All cacti will be planted with the same north orientation as they originally grew (+/- 15 degrees). All small cacti shall be watered thoroughly one time upon being transplanted into the field. All yucca stems will be thoroughly watered initially and DriWater will be applied at a rate of one quart for every foot in height. Driwater cartons are to be buried completely. A one time watering approximately fifteen (15) days after planting shall occur to remove or minimize any air pockets and assure proper soil compaction. Care should be taken to properly compact all

soil around roots of plants that are directly transplanted in the nursery. Extra planting effort will be applied to closing temporary access roads as directed by BLM. Transplanting and maintenance of plant material will be done such that 80 percent survivorship after one year is achieved.

5 *Seeding method*:
Harvested seed shall be pelletized prior to application for Restoration Areas R-1 and R-2, unless approved otherwise by BLM. Seed pelletizing process will include macrobiotic components specially laboratory grown for Mojave habitats. Per acre application of pelletized seed shall be a minimum of 250 pounds of pellets to a minimum of 12 pounds of site-specific harvested seeds. Dry pelletized material can be applied by hand or mechanical dispersal. Hydromulch or hydroseeding may be required if seasonal conditions are appropriate and don't contribute to the spread of exotic annual grasses. Broadcast seeding is an appropriate method for R-3 and R-4 Restoration Areas.

6. Shrub Outplanting:
Methods for transplanting shrubs should be such that a success rate of at least 80 percent survival after 1 year is achieved.

7. Permeon application:
Depending upon the soil type, permeon may be required in disturbance levels D2 and D3 if the soil surface contrast is high.and may be required in D1 in some areas. Permeon application rates and color tint will be site specific and may require both a blanket operation and spotting treatments dependant on the adjacent natural landscape. Product is applied with backpacks or a truck mounted sprayer if access to the area adjacent to the restoration site remains open.

8. Signing:
All Restoration Areas will have signs installed at regular intervals to deter vehicular damage to the site. BLM will provide the restoration signs and t-posts. Sign locations will be provided to the Bureau following completion of post-construction restoration procedures.

4.3.4 Monitoring

Monitoring of a project will need to be site specific and therefore requirements will be provided with the project specific restoration protocol. The monitoring process is currently being developed by the Science Advisor to the Clark County MSHCP, US Geologic Survey, and BLM. Methods for restoration monitoring are intended to be reasonable and practical with enough statistical rigor to insure effective results within five to seven years. Methods will be designed to quantify the level of recovery for the treated sites by comparing the recovery progress with adjacent undisturbed habitat of similar soil and vegetative characteristics.

Upon completion of the monitoring design, the Bureau will provide the proponent with a monitoring handbook that will include detailed methods for establishing monitoring sites,

monitoring protocol, criteria for success, steps to take if success criteria is not being met, report formats and requirements and datasheets.

Appendix 1

Definitions. The following terms are used in the Restoration Plan and are defined below.

range site - Interpretive units into which landscapes of native vegetation are separated for study, evaluation and management

vertical mulch - Use of bare-root live and dead plant material to visually screen and provide microhabitat for collecting seed, moisture and reducing transpiration rates on newly reclaimed disturbances.

windrowing - Pushing soil off to one side within the ROW in area free from disturbance that will protect surface and subsurface soil from disturbance until replaced into disturbed sites.

permeon - Non-hazardous stain used on rocks and soil to simulate a native coating and color.

Area of Critical Environmental Concern (ACEC) - Areas that contain significant physical, cultural, or biological values that are more than locally significant and warrant special management attention to prevent their degradation or loss.

discing - Aerating soil to decompact and allow for nutrient cycling and seed capture.

biological crust - Surface material made up of live organisms, including bacteria, algae, lichens, and mosses. Crusts are important for soil surface stabilization, nutrient cycling, and soil-water relations.

Appendix 2. List of Prospective Contractors for Implementation of Restoration Activities

The Bureau must approve the selected contractor/collector to be used by the applicant to implement the actions contained in the Restoration Plan. Any contractor not previously approved may be used but will need to submit documentation of experience (ie. curriculum vitae, etc.) with these techniques and be approved by the Bureau before being authorized to implement the techniques in this plan.

Approved Contractors for Restoration Techniques

Native Resources
5375 Cameron St # L
Las Vegas, NV 89118
(702) 367-3888

Science Application Intn'l Corp. (SAIC)
4216 N. Pecos Rd. #106
Las Vegas NV 89115
(702) 739-7376

Bitterroot Restoration
445 Quast Lane
Corvallis, Montana 59828-9406
(406) 961-4991

Approved Contractors for Seed Collection

Comstock Seed
8520 West 4th St.
Reno, NV 89523
(775) 746-3681

Homan Brothers Seed, Inc.
101 North 55th St., Suite 1
Phoenix, AZ 85034
(602) 244-1650

Desert Enterprises
P.O. Box 23
Morristown, Arizona 85342
Attn: Judith Clement
telephone: (623) 388-2448
mobile (602) 908-3015
Note: this company only collects seed; seeds would have to be sent out for processing and testing.

Granite Seed
1697 West 2100 North
Lehi, UT 84043
telephone: (801) 768-4422
fax: (801) 768-3967

Wind River Seed
3075 Lane 51½
Manderson, Wyoming 82432
(307) 568-3361
Comstock Seed Company

Native Seed Company
44 Villa Minano
Lake Elsinore, AC 92532
Attn: Kyle Wagstaff
Telephone: (909)645-0319

Pawnee Buttes Seed Inc.
P.O. Box 100
Greeley, CO 80631
(970) 356-7002
(970) 356-7263

Plummer Seed Co., Inc.
P.O. Box 70
Ephraim, Utah 84627
Telephone: (435) 283-4844
fax: (435)283-4030

III. Plant Salvage Contractors

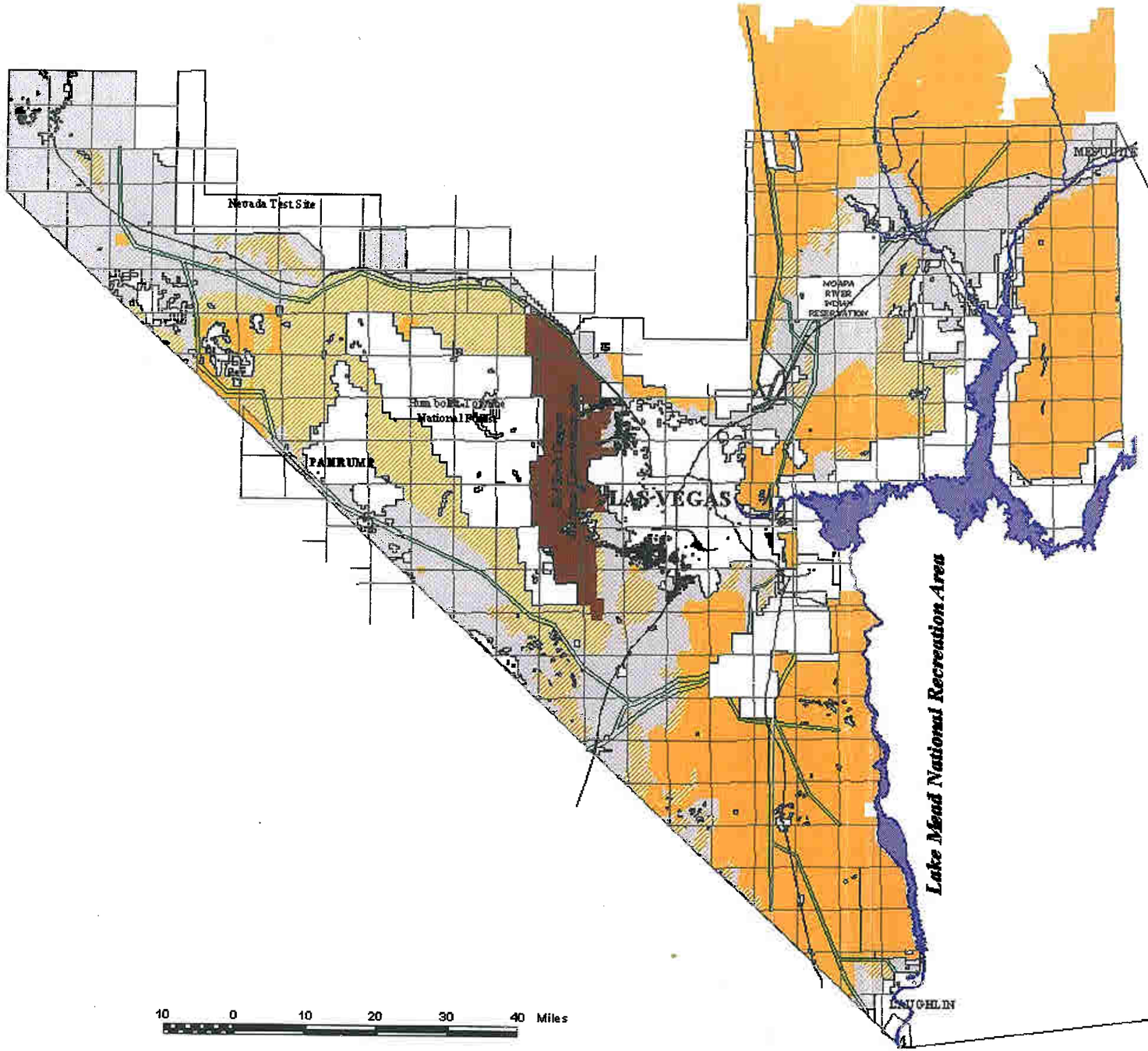
Southern Nevada Environmental
6295 McLeod Drive
Las Vegas, Nevada 89120
(702) 248-5370
(702) 248-8036

Native Resources
5375 Cameron St # L
Las Vegas, NV 89118
(702) 367-3888
(702) 367-0359

TABLE 1. RESTORATION ACTIONS REQUIRED BY AREA

RESTORATION CLASSIFICATION	R-1				R-2				R-3				R-4			
ACTION	Permanent	Temporary				Temporary				Temporary				Temporary		
		D1	D2	D3	Permanent	D1	D2	D3	Permanent	D1	D2	D3	Permanent	D1	D2	D3
Pre-construction	No permanent disturbance permitted				No permanent disturbance permitted											
Seed Collection		X	X	X		X	X	X		X	X	X		X	X	X
Plant propagation		X	X	X		X	X	X				X				
Perennial shrub transplants		X	X	X												
Cactus salvage and relocate outside of disturbance area (within the ROW)		X	X	X		X	X	X	X	X	X	X	X	X	X	X
Windrow to the side of disturbance surface vegetation			X	X			X	X			X	X			X	X
Windrow and segregate surface from subsurface soil and surface vegetation. In other words, two passes are required - vegetation and then soil.																
Post-Construction																
Process, remove, or color caliche			X	X			X	X				X				X
Decompact terrain, recontour, and replace surface soils and vegetation			X	X			X	X			X	X			X	X
Earthworks: decompact terrain, 3-4 inches		X	X	X		X	X	X		X	X	X		X	X	X
Shrub outplanting		X	X	X		X	X	X								
Stabilize soil surface		X	X	X		X	X	X		X	X	X		X	X	X
Replacement of desert pavement and surface vegetation			X	X			X	X			X	X			X	X
Backfill subsurface soil, then surface soil, and vertical mulch		X	X	X		X	X	X		X	X	X		X	X	X
Replant succulents		X	X	X		X	X	X		X	X	X		X	X	X
Reseed		X	X	X		X	X	X				X				X
Permeon application				X				X				X				X
Signage		X	X	X		X	X	X		X	X	X		X	X	X
Monitoring		X	X	X		X	X	X		X	X	X		X	X	X

Map 18.
Overview of Restoration Requirements for the Las Vegas Field Office

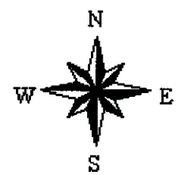


Legend

- Roads
- Rivers
- Lake Mead
- Township and range

Restoration Standards

- Restoration Level 1 (R1)
- Restoration Level 2 (R2)
- Restoration Level 3 (R3)
- Restoration Level 4 (R4)



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Date of Composition: October 31, 200