C L A R K C O U N T Y
REGIONAL FLOOD CONTROL DISTRICT

# Supplemental Programmatic Environmental Impact Statement
# Clark County Regional Flood Control District
# 2002 Master Plan Update

## Final

## September 2004


**Prepared for:**
**U.S. Department of the Interior**
**Bureau of Land Management**
**Las Vegas District Office**

**In Cooperation with:**
**U.S. Army Corp of Engineers**

**Prepared by:**
**SWCA Environmental Consultants**
**2820 West Charleston Blvd., Suite 15**
**Las Vegas, Nevada 89102**

## MISSION STATEMENT

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times. Management is based upon the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wilderness, air and scenic, scientific and cultural.

**BLM/LV/PL-04/015+1793**

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

# Final Programmatic Supplemental Environmental Impact Statement

## Flood Control Master Plan

## Clark County Regional Flood Control District

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## Disclaimer Statement

National Environmental Policy Act (NEPA) Disclosure Statement
Bureau of Land Management/Clark County Regional Flood Control District
Supplemental Environmental Impact Statement
Clark County Regional Flood Control District 2002 Management Plan Update

The President's Council on Environmental Quality regulations 40 CFR 1506.5(c) require that any consultant preparing an environmental assessment include a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for the purposes of this disclosure is defined in the March 23, 1981, guidance "Forty Most asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at Questions 17a and b.

The term "financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)." 46 FR 18026-18038 at 18031.

In accordance with these requirements, SWCA Inc., a third-party contractor, has prepared this SEIS on behalf of the Clark County Regional Flood Control District and the lead agency, the Bureau of Land Management-Las Vegas Field Office (BLM), and has provided guidance, input, participation and independent evaluation. The BLM, in accordance with 40 CFR 1506.5 (a) and (b), is in agreement with the findings of the analysis and approves and takes responsibility for the scope and content of this document. SWCA declares no financial or other interest in the outcome of the proposed project.

Certified by:

September 1, 2004

Glen T. Hanson, Project Manager — Date

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# EXECUTIVE SUMMARY

## INTRODUCTION

Prior to 1985, Clark County, Las Vegas, North Las Vegas, Henderson and Boulder City addressed flooding problems individually within their jurisdictions. This approach to flood control proved ineffective following severe flood events in the early 1980s. In 1985 the Nevada Legislature passed legislation that allowed Clark County the opportunity to create the Clark County Regional Flood Control District (CCRFCD), which is charged with developing a comprehensive flood control plan and providing funding for the plan's implementation for the entire county. Nevada Revised Statues (NRS) 543.596 requires a review of the Master Plan at five-year intervals and the 1991, 1996 and 2002 Las Vegas Valley Master Plan Updates (MPUs) and the Boulder City 2003 MPU (CH2M Hill 2003) were developed to satisfy this requirement.

The Project Area is located within about 1,056 square miles of southeastern Nevada, including portions of Las Vegas, North Las Vegas, Boulder City, Henderson and unincorporated portions of Clark County. This Project Area incorporates only those areas with proposed flood control; facilities assessed by the Bureau of Land Management (BLM) as being subject to potentially adverse cumulative effects as a result of construction, operation and maintenance of the facilities.

Many of the facilities identified in the original and subsequent Master Plans are located on federal lands managed by the BLM. The National Environmental Policy Act (NEPA) of 1969 requires that actions involving federal agencies on public lands be supported by analyses of the environmental impacts of the proposed action and alternatives. In 1991, an Environmental Impact Statement (EIS) was prepared for the CCRFCD Master Plan and approved by BLM.

The CCRFCD Master Plan and subsequent MPUs of 1991, 1996, 2002 and 2003 proposed numerous drainage control facilities within the Las Vegas Valley and Boulder City. Facilities that have been constructed since the 1991 Final Environmental Impact Statement (FEIS) have undergone a project-specific analysis as outlined in Section 14 of the FEIS. This analysis is a discipline-specific review using guidelines and specific analysis procedure outlined in Section 14 to determine appropriate mitigation measures for each specific project.

Due to changes in federal regulations that have occurred since 1991, a Supplemental Environmental Impact Statement (SEIS) is being prepared for the CCRFCD Master Plan to update the 1991 FEIS. The purpose of the SEIS is to assess impacts associated with implementation of the Master Plan and subsequent updates. The SEIS is being prepared in accordance with NEPA (42 U.S.C. 4321 et seq.) and the Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508).

The BLM and U.S. Army Corps of Engineers (USACE) are the federal agencies with jurisdiction over the proposed facilities and are the agencies that requested that this SEIS be prepared. The decision to be made by the BLM and USACE will be either: 1) approval of the SEIS and its associated Proposed Actions and issue a Record of Decision (ROD); or; 2) selection of the No-Action Alternative, which would assume that facilities would be installed without a BLM ROD but would result in the implementation of flood control projects through non-federal funding sources within a Regional Flood Control Agency and a Regional Plan.

This SEIS was prepared for the BLM to describe the potential environmental effects of construction and operation of flood control facilities in the Las Vegas Valley and Boulder City by the CCRFCD forecast for the next ten-year period. These facilities are presented in the 2002 Las Vegas Valley Master Plan Update (2002 MPU) and the Boulder City Flood Control 2003 Master

Plan Update (CH2M Hill 2003). It updates and replaces the original (1991) FEIS developed for proposed flood control facilities in Las Vegas Valley and Boulder City.

Comments on the DSEIS are presented in Appendix H of this document. The comment documents have been numbered (i.e., 001) and, if the documents contain multiple comments, the comments have been marked with a bar and a number in the margin of the comment document. The text of the SEIS is marked with margin bars to illustrate where content has been changed. There are no change bars to show where text was removed in response to the comments. Appendix I contains the individual comments, the comment document number, the comment number, the responses to the comments, and the location(s) where text was added or removed within the SEIS (if warranted).

## PURPOSE AND NEED FOR THE PROPOSED PROJECT

The purpose of the proposed project is to improve the protection of life and property for existing and future residents from the impacts of flooding.

The majority of Clark County urban development is within the Las Vegas Valley, a flood prone area that has suffered loss of life and millions of dollars in property damage due to flooding since the turn of the twentieth century. The Las Vegas metropolitan area is one of the fastest growing urban areas in the United States. Historically, flood hazards in southern Nevada have been underestimated due to the arid climate and low precipitation. Southern Nevada has experienced several significant flooding events, which have resulted in various levels of damage including property damage and loss of life. Implementation of an updated comprehensive flood control Master Plan will help to alleviate these problems.

## SUMMARY OF ALTERNATIVES EVALUATED IN THIS SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Two alternatives were evaluated: the Proposed Action, and the No-Action Alternative. These are each summarized below and are described in detail in Chapter 2 of this SEIS.

## PROPOSED ACTION

The 1991 ROD for the CCRFCD Flood Control Master Plan FEIS chose the Detention/Conveyance system as its selected alternative. "The selected alternative is characterized by a series of detention basins located around the perimeter of currently urbanized areas. These basins and associated dikes are designed to collect flood flows and release the flows at metered rates that can be handled by downstream conveyance facilities" (Appendix A). Under the Proposed Action of the SEIS, the CCRFCD proposes to continue to develop a series of detention basins to reduce peak flows to levels that can be accepted by the existing downstream conveyance system with little or no major capacity improvements. These improvements will be assessed with respect to the environmental consequence at the programmatic level in this SEIS document. Project specific assessments will be determined on a case-by-case basis using tools developed in the MPU and SEIS processes. The recommended plans for each watershed are presented in the following subsections; however these are subject to revision in final development. The comparative baseline for this SEIS is formed by the 1991 FEIS, the 1991 CCRFCD MPU, 1996 CCRFCD MPU, and the Boulder City MPU. More detail for specific project and study areas referenced in this section can be found in Volume 1 of the MPU (CCRFCD 2002) and the Boulder City MPU (CH2M Hill 2003).

## NO-ACTION ALTERNATIVE

For purposes of NEPA analysis a No-Action Alternative is required to analyze the comparative consequences associated with the Proposed Action and any other alternatives. For the purposes of this SEIS, the No-Action Alternative provides the current 2003 programmatic baseline. Due to the programmatic nature of this SEIS and the existing site-specific process for evaluating individual projects for specific, significant environmental consequences, the No-Action Alternative should be considered as a basis for comparison.

Under this alternative, the CCRFCD would continue to manage floodwater control projects in the Las Vegas Valley and Boulder City. Flood control facilities would continue to be built and maintained by local developers and local municipalities without consideration of construction of a system of integrated and standardized facilities. Under this alternative, flood episodes would likely become more severe as urban growth continues, resulting in greater property damage and loss of life.

## SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION

Table ES-1 summarizes the impacts and mitigation identified for the Proposed Action. Significance criteria were established for each resource in the Environmental Consequences section in Chapter 4 of this SEIS.

## TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative

| Resource | Impacts | Mitigation |
|---|---|---|
| ***Geology and Soils*** | | |
| During Construction and Operation | 1. Difficulties in grading, site preparation, excavation and trenching. | 1. During conceptual planning of a facility, proposed location should be plotted on the environmental planning database (EPD) to determine the proximity of a site to known subsidence related features or to faults, as well as, soil types, soil hazards and shallow groundwater conditions (important in terms of liquefaction). An examination of site topography is the first step in any examination of slope stability issues. |
| | 2. Increased erosion. | 2. Routine repair procedures, or, relocation of facilities. As an alternative to facility relocation, mitigations involve several steps:<br>• General erosion problems - relocation of the proposed facilities or engineering design modifications.<br>• Wind erosion - minimize soil disturbance, use water or chemical suppressants on disturbed areas, compaction, revegetation and decorative rock coverings.<br>• Channel erosion - implement standard engineering measures.<br>• Indirect erosion - design outflow structures to direct flows in a manner that will reduce scour, or select designs that will reduce flow velocities. |
| | 3. Damage to facilities that may also impact the function of downstream facilities. | 3. Routine repair procedures or relocation of facilities. As an alternative to facility relocation, mitigations involve several steps:<br>• Review additional existing information that may not be included in the EPD but may be available in recent public documents.<br>• Perform an environmental evaluation of conditions at the proposed site to determine the impact of the proposed facility and determine if more extensive environmental investigation is required to comply with NEPA. |
| | 4. Soil hazards. | 4. Mitigation measures would consist of the following:<br>• Relocation of facilities to areas with more favorable soils conditions.<br>• Implement standard engineering measures.<br>• Create appropriate engineering measures for mitigating soil hazards.<br>• Hazards associated with salt heave can be mitigated by removal of 1 to 2 feet (0.3 to 0.6 m) of soil and placement of a thermal blanket composed of open-graded gravel.<br>• Use sulfate resistant Type V cement or equivalent for concrete in contact with corrosive soils.<br>• Use Type II cement where concrete is underlain by a moisture barrier of gravel.<br>• Use a waterproof membrane.<br>• Use high-density concrete, low water/cement ration, and smooth concrete finish.<br>• Use cathodic protection or protective coatings to mitigate corrosion of steel in contact with corrosive soil |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| | | • Perform a geotechnical investigation at each proposed facility.<br>• Subsurface soil samples obtained during soil borings at pertinent locations throughout the proposed facility site are used to determine the subsurface stratigraphy, degree of saturation and for laboratory testing of physical characteristics of soils.<br>• Develop site-specific engineering mitigations for geologic hazards and constraints. |
| | 5. Damage to equipment or injury to construction personnel could occur from falling debris initiated by ground motions. | 5. Impacts due to seismic shaking could be reduced to insignificance by proper design and construction of proposed flood control facilities. |
| | 6. Earthquake induced strong ground motion to proposed flood control facilities. | 6. Development of pertinent seismic design parameters based on an evaluation of strong ground motion at the site and consistent with criteria used for similar facilities. |
| | 7. Surface rupture hazards. | 7. Mitigation would consist of the following:<br>• Relocation of facilities to avoid areas with surface rupture hazards.<br>• Implement standard engineering measures.<br>• Establish appropriate setback requirements from potentially active faults or create appropriate design modification and construction of facilities to allow for movement of the magnitude likely to occur during the lifetime of a facility. |
| | 8. Potential slope instability in areas where flood control facilities are proposed. | 8. Relocate facilities to avoid areas of potential slope instability or use standard engineering methods such as slope modification or buttressing. |
| ***Paleontology*** | | |
| | Potentially, fossiliferous alluvial units underneath the valley floor may become exposed. | Mitigation measures are:<br>• Perform a site-specific review of geological information to determine geologic formations in the project location.<br>• Evaluate project location as part of the Chapter 8 review to determine the presence or likelihood of scientifically valuable fossils in the vicinity of the project.<br>• If the project is determined to have the potential for paleontological resources, have a qualified paleontologist perform a field survey.<br>• If scientifically valuable paleontological resources are identified and documented, develop an appropriate mitigation plan that involves recovery or avoidance, depending on the relative importance of the fossils.<br>• If recovery is the selected mitigation plan, implement recovery under the guidance of a professional paleontologist. If avoidance is selected, relocate the facility to avoid the resource. |

## TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)

| Resource | Impacts | Mitigation |
|---|---|---|
| ***Surface Water*** | | |
| During Construction | 1. Interruption in water and wastewater distribution/ collection due to unintended line break. | 1. Since the proper function of the flood control system depends on the analysis of these potential effects, it is anticipated that standard engineering practices will reduce potential adverse impacts during construction and operation, to levels that are insignificant. |
| | 2. Interruption in wastewater treatment operations due to unintended damage to wastewater facilities. | 2. See above mitigation. |
| | 3. Increase in suspended sediment loading as a result of construction exposed soils during a storm event. | 3. See above mitigation. |
| | 4. Interruption in flows during storm events from dredge or fill of jurisdictional waters. | 4. Dredge or fill of jurisdictional waters is regulated by the USACE and mitigation would be implemented during the permitting process. |
| During Operation | 1. Increases result from facilities that are designed to concentrate flows, resulting in flow depths and velocities that are more hazardous and have a higher potential for erosion. | 1. Since the proper function of the flood control system depends on the analysis of these potential effects, it is anticipated that standard engineering practices will reduce potential adverse impacts during construction and operation, to levels that are insignificant. |
| | 2. Decreases in peak flow volumes and velocities downstream from attenuation facilities would result in lower potential for erosion. | 2. See above mitigation. |
| | 3. Decreased perennial low flows in unlined channels caused by shallow groundwater seeps by lining these channels. | 3. See above mitigation. |
| | 4. Increased perennial low flows by installing de-watering facilities and flood control facilities constructed within the area of shallow groundwater. | 4. See above mitigation. |
| | 5. Increased groundwater seepage in the Lower Las Vegas Wash. | 5. See above mitigation. |
| ***Groundwater Hydrology*** | | |
| During Construction | Uncertain | Comparison of the facility location with the shallow groundwater GIS coverage (shown in Figure 3.4-1) is the first step to determining if a site-specific geotechnical evaluation should be done. If the site lies within the 30-foot (9-m) depth to water level contour, then an investigation must be performed. If the site were outside this contour, then no further mitigation measures would be required. |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| During Operation | 1. Recharge to the shallow groundwater zone. | 1. Investigation of groundwater conditions at a site within the 30-foot (9-m) depth to water level contour may indicate that groundwater is deep enough not to affect excavation or placement of materials during construction of that particular facility. |
| | 2. May impact infiltration of surface water and subsequent recharge to shallow groundwater. | 2. If the investigation shows that shallow groundwater will likely impact the facility, then additional investigation and/or special measures must be incorporated into the design of the facility. Such measures may include placement of groundwater barriers, local dewatering or facility redesign. |
| | 3. Decrease discharge of shallow groundwater. | 3. Review GIS coverage with regard to the known or possible presence of shallow groundwater (within the 30-foot [9-m] depth to water contour) in a given area (Figure 3.4-1). If the proposed channel/wash lining project is outside the area of possible shallow groundwater, no further mitigation measures would be required. If the proposed channel/wash lining project is within the area of possible shallow groundwater, proceed with investigation. |
| | 4. Reduction in discharge from the shallow aquifer. | 4. Mitigation measures would consist of the following:<br>• Gather available site-specific information regarding conditions in vicinity of proposed channel/wash lining. This information may include water level data, land use information, previous geotechnical investigations and data regarding similar channel/wash lining in the area. Information obtained should be used to evaluate whether the proposed channel/wash lining has the potential to cause water level rises in the project vicinity and whether water level rises have the potential to cause impacts in that area. If the data indicate that no water level rises will occur or that impacts will not be significant, no further mitigations are necessary. If data indicate that the potential for impacts from water level rise are significant in the area, proceed with investigation.<br>• Conduct a site-specific geotechnical investigation to evaluate whether shallow groundwater discharges to, or has the potential to discharge to, the channel/wash in question. Based on potential water level fluctuations, shallow groundwater may have the potential to discharge to the channel if it is within 2 feet (0.6 m) of the channel bottom. If the investigation indicates that the shallow groundwater does not have the potential to discharge to the channel/wash, no further investigations are necessary. If the investigation indicates that shallow groundwater may discharge to the channel/wash and that such discharge has the potential to cause impacts, proceed with investigation/mitigation.<br>• Re-site project into an area where impacts will not occur.<br>• Monitoring of groundwater levels would be conducted by periodic observation of water levels in nearby wells completed in the shallow aquifer. If such wells are not available, they may have to be constructed. If monitoring indicates that water level increases are occurring as a result of the project and that these increases could cause adverse impacts in the area, post construction modification to the lining such as installation of weep holes to allow discharge of groundwater could be conducted. |

### TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)

| Resource | Impacts | Mitigation |
|---|---|---|
| | | • If it is undesirable to conduct long-term monitoring of water levels in the area, the lining should be designed to accommodate groundwater discharge. Such design measures might consist of weep holes or drainage blankets. In extreme cases use of unlined channels or floodways could be substituted for lined channels. Measures employed should accommodate the same amount of discharge that would occur under natural conditions. |
| ***Biological Resources*** | | |
| Vegetation Communities | 1. Impacts to natural vegetation communities within the Project Area. | 1. All areas to be disturbed will have boundaries flagged prior to construction, and all disturbances will be confined to the flagged areas. |
| | 2. Direct effects to natural vegetation communities. | 2. Topsoil will be removed to a depth of 2 to 4 inches (5 to 10 cm) in all areas of potential native, non-invasive seed-bearing soil where groundbreaking will take place. The determination of which soils are potentially seed bearing will be made during pre-construction surveys conducted at each site. |
| | 3. Temporary disturbance associated with equipment access, materials, stockpile locations and workspace requirements. | 3. Disturbed areas will be stabilized with appropriate treatments immediately following project facility construction until the areas can be seeded with site-specific mix(es) during the next appropriate planting period (i.e., spring or fall). |
| | 4. Increase the potential for occurrence of indirect effects | 4. Seed disturbed natural vegetation communities with BLM-approved seed mixes during the appropriate planting period (i.e., spring or fall). |
| | 5. Increase the potential for disturbance to riparian-wetland vegetation and jurisdictional waters. | 5. Avoid disturbance to riparian-wetland vegetation to the extent possible. If disturbance is unavoidable, then some or all of the following measures shall be implemented to minimize impacts to riparian-wetland vegetation: Minimize the area of disturbance; replace affected vegetation in kind on-site if possible; construct channels with natural materials or gabions or crib walls and re-vegetate in kind on banks and channel bed; utilize floodways rather than flood channels in areas with well-developed wetlands. Activities that involve dredge, fill, or excavation of jurisdictional waters and/or wetlands must be coordinated with the USACE. |
| | 6. Increase the potential for the limited invasion and establishment of noxious weed species. | 6. Weed monitoring shall occur for species identified by the State of Nevada as well as for additional species specified by Clark County during a given year. Such species comprise the official list of weeds for which a county may cost-share funding for control and removal efforts. Should such species be found during monitoring, control and eradication efforts shall be implemented following County control procedures. |
| | 7. Soil compaction and disruption of microphytic crusts. | 7. All areas to be disturbed will have boundaries flagged prior to construction, and all disturbances will be confined to the flagged areas. |
| | 8. Increased potential for wind and water erosion of disturbed surfaces prior to reclamation. | 8. See geology and soils mitigation techniques (section 5.1) |
| | 9. Loss of cacti and yucca species. | 9. Cacti and yucca required by the BLM for salvage in the Las Vegas Valley will be salvaged and appropriately transplanted within the Project Area. Salvage operations will be coordinated with the BLM. |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| General Wildlife | 1. Increase in the potential for illegal kill and harassment of wildlife. | 1. Mitigation measures would consist of the following:<br>• All firearms and dogs shall be prohibited from the project site.<br>• Trash and food items will be disposed of promptly in predator-proof containers with resealable lids. Trash containers will be removed regularly (at least once per week). This effort will reduce the attractiveness of the area to opportunistic predators such as coyotes, kit foxes and common ravens. |
| | 2. Direct and indirect mortality and/or displacement of some wildlife species | 2. Mitigation measures would consist of the following:<br>• A maximum speed limit of 25 miles per hour will be maintained while traveling on the construction site, unpaved access roads and storage areas. This effort will reduce the potential for vehicle-wildlife collisions.<br>• Following construction, a selected number of access roads that are subject to public vehicle use shall be closed. This effort will reduce the potential for mortality and general harassment of wildlife.<br>• A Worker Environmental Awareness Program (WEAP) shall be implemented for construction crews prior to the commencement of construction activities.<br>• Any fuel or hazardous waste leaks or spills will be contained immediately and cleaned up at the time of occurrence. |
| Special Status Plants and Animals | See above impacts to vegetation communities and general wildlife. | Mitigation measures would include the following:<br>• Prior to construction, comprehensive rare plant surveys shall be conducted for all special status plants that have been identified within the study area and those plants with the potential to occur in the study area (as defined in Table 3.5-1). Surveys shall be conducted within appropriate areas susceptible to surface disturbance by construction activity. Surveys of site-specific facility areas shall be appropriately timed to cover the blooming periods of the special status plant species known to occur or with the potential to occur in the area. If an individual(s) is observed, an avoidance and impact minimization plan will be developed and implemented in coordination with Nevada Division of Forestry (NDF) and the U.S. Fish and Wildlife Service (USFWS). Maps depicting the results of these surveys will be prepared and will include other recently mapped special status plant occurrences in the area to ensure that the full scope of rare plant habitat associated with all the proposed facilities is delineated.<br>• All identified populations of special status plant species will be avoided to the extent possible. If avoidance is not possible, steps will be taken to remove and salvage populations prior to construction. Salvage would be conducted in a detailed reclamation plan approved by the BLM.<br>• Pre-construction wildlife surveys (following appropriate survey protocol, as applicable) shall be performed by qualified biologists to locate bird nests, desert tortoise/burrowing owl burrows, and/or other special status wildlife identified in Table 3.5-2 that have the potential to occur within the study area. If nests, burrows or individuals are observed, an avoidance and impact minimization plan will be developed and implemented in coordination with NDOW and the USFWS. |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| | | • By default, many of the mitigation measures previously proposed for general vegetation and wildlife, including implementation of a WEAP (Section 5.5.2), will provide de facto mitigation for special status wildlife species.<br>• During construction, operation and maintenance of the facility all appropriate and current USFWS, BLM and NDOW protocols for minimizing impacts to the Gila monster, burrowing owl, kit fox and any other sensitive species will be followed.<br>• Within 30 days prior to any surface disturbing activities, a qualified biologist, approved by the USFWS and BLM, should survey facility sites.<br>• Tortoises should be relocated onto adjacent, undisturbed lands approximately 500 to 1,000 feet (152 to 305 m) from the original capture point. Tortoises will be moved in accordance with the existing Biological Opinion. If removed from a burrow, the animal should be placed in an existing similar, unoccupied burrow. Tortoises that cannot be appropriately relocated should be removed from the area and placed with the Desert Tortoise Conservation Center. Prior to handling any tortoise, permits should be obtained from the appropriate state and federal agencies.<br>• After removing tortoises from the area, tortoise burrows found in the construction areas should be blocked or collapsed to prevent tortoise re-entry.<br>• Facilities proposed for construction within the Fiscal Year (July 1 to June 30) will be evaluated to determine whether the areas represent suitable tortoise habitat, as determined by the appropriate agency representatives. The CCRFCD will provide compensation for the loss of suitable desert tortoise habitat at the current per acre remuneration rate.<br>• Prior to the onset of construction, a desert tortoise education program should be presented to all personnel who will be on site. This program will be part of the overall WEAP as described under Section 5.5.2.<br>• A trash abatement program shall be implemented as previously described above in Section 5.5.2 for general wildlife.<br>• A qualified biologist(s) will act as a biological monitor(s) and be present during all phases of construction during the active season of desert tortoises. Alternatively, an acceptable option to construction monitoring would be the installation of temporary tortoise-proof fencing prior to any ground disturbing activities following the standards described in the Biological Opinion (USFWS 1993). |

### TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)

| Resource | Impacts | Mitigation |
|---|---|---|
| ***Cultural Resources*** | | |
| | Potential to discover intact, buried cultural resources. | Mitigation measures would consist of the following:<br>• Detailed environmental review will be conducted on a site-by-site basis. Each proposed facility would be evaluated for the need for cultural resources inventories or mitigation in compliance with Section 106 of the National Historic Preservation Act (NHPA) following the process outlined in Chapter 8 of this SEIS. The first step is the identification of cultural resources. This would be accomplished through a detailed file or literature search at the appropriate repository to identify known archaeological sites and historic resources (e.g., sites and buildings). Repositories could include the Nevada State Historic Preservation Office (NSHPO), the National Register of Historic Places (NRHP), local historic preservation groups, libraries, various map sources and individuals knowledgeable about the history of the area.<br>• Concurrently, consultation would also be initiated with the Native American Tribes or Groups with interests in this area to determine the location or presence of Traditional Cultural Properties (TCPs) and to consult on the project on a government-to-government basis.<br>• Proposed facilities located in culturally sensitive areas would require an intensive pedestrian inventory to identify the presence or absence of cultural resources. However, less intensive survey methods would be appropriate in areas that have already been developed, where the ground surface has been disturbed or covered. In areas of low sensitivity, spot checks would suffice to verify the lack of cultural resources. |
| ***Transportation*** | | |
| During Construction | 1. A direct additive impact on the current traffic congestion in the valley.<br>2. Disruption of traffic patterns through detours causing route changes. | 1. Consult with transportation planning representatives of local jurisdictions to develop alternative traffic flow patterns in the event that it becomes necessary to close traffic lanes along roadways adjacent to proposed facilities.<br>2. Coordinate facility construction planning schedules with major transportation construction planning schedules to reduce the potential for transportation delays. |
| ***Air Quality*** | | |
| During Construction | Emission of pollutants into the atmosphere. | Mitigation measures would consist of the following:<br>• Tail pipe exhaust - Regular inspection and maintenance of construction equipment, as well as, avoidance of unnecessary idling of equipment, vapor recovery control methods, use of pre-chamber engines, optimizing air-to-fuel ratios and retarding ignition timing on construction vehicles. These inspections shall also ensure that the construction equipment is properly maintained in accordance with manufacturer's specifications and is not modified to increase horsepower except in accordance with established specifications.<br>• CO - Implementation of the Wintertime Cleaner Burning Gasoline and the Oxygenated Fuels programs. |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| | | • $PM_{10}$ - Obtain a Clark County Department of Air Quality Management (CCDAQM) construction permit.<br>• Application of best management practices to further reduce exhaust emissions. |
| ***Visual Resources*** | | |
| During Construction | 1. Disturbance of the existing landscape. | 1. Where proposed facilities are located on designated open space or recreational land, consider and evaluate potential joint use of facilities for both flood control and planned development such as parks, golf courses, etc. Facilities should be developed for joint use where appropriate agreements with local jurisdictions prove feasible and where public safety issues allow. This would greatly decrease the potential for visual impacts. |
| | 2. Exposure of different colors and textures of the soil causing impacts to the existing visual continuity of the setting. | 2. Design of the proposed facilities will be reviewed with planning representatives of local jurisdictions and BLM, as appropriate, during design reviews and permitting to ensure that features, which minimize visible effects, are incorporated as feasible. |
| | 3. Creation of dust. | 3. Application of water or chemical suppressants to bare soils. |
| During Operation | Easily viewed from distant areas. | Mitigation measures would consist of the following:<br>• Incorporate coloring techniques such as surface painting or concrete varnishing and/or coloring to blend with the existing environment and ensure that architectural details incorporate materials that blend well with the existing environment.<br>• Use earthen berms and incorporate landscape elements such as planting vegetation as appropriate to reduce visual impacts on viewsheds and adjacent communities.<br>• Excavated material or other construction materials should be removed from facility sites following construction.<br>• No paint or permanent discoloring agents should be applied to rocks or vegetation to indicate survey or construction activity limits. Instead, surveyors flagging or other suitable material should be used to delineate limits.<br>• Cacti and yucca required by the BLM for salvage in the Las Vegas Valley will be salvaged and appropriately transplanted within the Project Area. This action will decrease the visual impacts of the project. Salvage operations will be coordinated with the BLM. |
| ***Noise*** | | |
| During Construction | Temporary increases in noise in the vicinity of the individual construction areas. | Mitigation measures would consist of the following:<br>• Normally scheduled construction activities will be limited to daytime hours 7 a.m. to 6 p.m. Nighttime or late evening construction will not be allowed. Construction will not begin before 11 a.m. on Saturdays, Sundays and recognized legal holidays.<br>• All construction equipment will be equipped with manufacture's standard noise control devices (i.e., mufflers, acoustical lagging, and/or engine enclosures), which will normally achieve compliance with the recommended noise limits in most areas. |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| | | • Heavy, noisier equipment will not come closer than 100 feet (31 m) from the property line of any noise-sensitive lands used for any length of time and will avoid coming closer than 200 feet if multiple sources of equipment are operating simultaneously near areas of sensitive noise receptors.<br>• In some areas, temporary noise barriers may be required to protect against excessive noise levels in construction activities that occur in an area closer than 100 feet (61 m) to noise-sensitive receptors. Noise barriers can be constructed of plywood, heavy vinyl curtain material, or natural or temporary earthen berms. The amount of noise reduction achievable by the use of barriers is dependent mainly by their height. A typical barrier can be expected to provide from 5 to 10 decibels (dB) of noise reduction.<br>• Blasting noise will be monitored for all blasts. Efforts will be made to restrict the peak overpressures to 110 dB at any property line and 120 dB at the property boundary of all unoccupied structures. Blast noise is to be measured with a sound level meter equipped with a true peak detector.<br>• All rules and regulations of the Uniform Guidelines for Blasting Permits in the City of Las Vegas, City of Henderson, City of North Las Vegas, Boulder City and Clark County are to be followed when any blasting is required in those jurisdictions. |
| During Operation | Temporary increases in noise in the vicinity of the facility during inspection. | Mitigation strategies would be the same as for construction (above). |
| ***Recreation*** | | |
| During Construction | 1. Removal of some land currently available as open space that is used for recreation. | 1. Where proposed facilities are located on designated open space or recreational land, consider and evaluate potential joint use of facilities for recreation and flood control purposes. Facilities should be developed for joint use where appropriate agreements with local jurisdictions prove feasible. |
| | 2. Temporarily restrict or impede access to recreation areas. | 2. See transportation mitigation techniques. |
| | 3. Traffic delays due to closing of traffic lanes within these areas. | 3. See transportation mitigation techniques. |
| During Operation | Addition of recreational activities. | Mitigation is not required for beneficial impacts. |
| ***Hazardous Materials*** | | |
| During Construction | 1. A direct release of a hazardous petroleum product. | 1. This SEIS should be reviewed during conceptual planning of proposed flood control facilities in order to identify areas of known hazardous materials risk. |
| | 2. Soil contaminated with hazardous materials may be disturbed during soil excavation and movement activities and expose workers to contamination or migrate off-site via wind or water erosion. | 2. Following review of the SEIS, the procedure outlined in Section 8.14 of this SEIS for a Phase I environmental site assessment (Phase I) should be implemented to collect site-specific information regarding the risks of encountering hazardous materials at the project site. |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| | 3. Excavation of detention basins and conveyances in areas of shallow groundwater contaminated with petroleum products or other hazardous materials may expose workers to this contamination. | 3. This process would involve a detailed investigation of past property usage of the project site and neighboring properties through review of historical documents, interviews with knowledgeable individuals and record searches of relevant governmental databases. An inspection of the project site, noting present usage of the site and surrounding properties, would also be performed. The results of this Phase I should be used to determine if a Phase II is required. |
| | 4. Downward migration of groundwater contamination into previously uncontaminated aquifers. | 4. In the event that the Phase I establishes a reasonable suspicion for the presence of hazardous materials on the project site, Phase II environmental testing should be implemented. The Phase II investigation involves installation and sampling of soil borings and/or monitoring wells at pertinent areas of the project site. Analytical tests are selected based on information related to specific contaminants of interest identified during Phase I. |
| During Operation | 1. Exposure of contaminated soil. | 1. Based on the results of the site-specific Phase II investigation and laboratory testing, appropriate recommendations (e.g., relocation or specific mitigation measures) can be developed and implemented. General mitigation techniques for soil and groundwater contamination are shown in Table 5.12-1. In some cases a combination of the listed methods or additional mitigation methods other than those listed in Table 5.12-1 may be appropriate for a given project site. |
| | 2. Contamination of the shallow aquifer. | 2. See above mitigation strategies. |
| | 3. Artificial expansion of any existing groundwater contamination plume. | 3. See above mitigation strategies. |
| | 4. Increased risk to plants, animals and humans due to the exposure of previously subsurface contaminated water. | 4. See above mitigation strategies. |
| Indirect Impacts | 1. Mobilization, through wind or water erosion, of soil contaminated with hazardous materials remaining after construction may have an indirect and negative effect on plant, animal and human life located at some distance from the project site. | 1. See above mitigation strategies. |

**TABLE ES-1. Summary of Environmental Impacts, Mitigation and Monitoring for the Proposed Action and No-Action Alternative (Continued)**

| Resource | Impacts | Mitigation |
|---|---|---|
| | 2. The groundwater "mounding" effect may result in induced migration of existing contaminated groundwater onto adjacent properties that would otherwise not have been affected. Similarly, nonporous flood control structures intersecting the shallow aquifer located in the eastern and southeastern portions of the Las Vegas Valley may deflect contaminated groundwater onto adjacent properties. | 2. See above mitigation strategies. |
| ***Land Use*** | | |
| | 1. Increased noise, dust, traffic detours, safety concerns, and unsightly views during the construction process. | 1. Mitigation strategies would be the same as for construction (above).<br>• Construction noise could be reduced through the use of mufflers on heavy equipment and work could be generally limited to daytime hours.<br>• Dust could be reduced by spraying water on soil surfaces and through the use of erosion control materials.<br>• Traffic detours could be unavoidable but could be structured to reduce inconvenience as much as possible.<br>• Fencing off construction sites and posting signs could address safety concerns. |
| | 2. Reduction of flood risk. | 2. Mitigation is not required for beneficial impacts. |
| ***Socioeconomics*** | | |
| | No Impacts | Not Required |
| ***Environmental Justice*** | | |
| | No Impacts | Not Required |

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# CHAPTER 1: PURPOSE AND NEED

## INTRODUCTION

This Supplemental Environmental Impact Statement (SEIS) was prepared for the U.S. Bureau of Land Management (BLM) to describe the potential environmental effects of construction, operation and maintenance of flood control facilities in the Las Vegas Valley and Boulder City. These facilities are presented in the 2002 Las Vegas Valley Master Plan Update (MPU) (CCRFCD 2002) and the Boulder City Flood Control 2003 MPU (CH2M Hill 2003). This SEIS updates and replaces the original (1991) Final Environmental Impact Statement (FEIS) developed f)or proposed flood control facilities in the Las Vegas Valley and Boulder City.

## 1.1 PURPOSE AND NEED

### 1.1.1 Background and History

Prior to 1985 Clark County, Las Vegas, North Las Vegas, Henderson and Boulder City addressed flooding problems individually within their jurisdictions. This approach to flood control proved ineffective following severe flood events in the early 1980s. In 1985 the Nevada Legislature passed legislation that allowed Clark County the opportunity to create the Clark County Regional Flood Control District (CCRFCD), which is charged with developing a comprehensive flood control plan and providing funding for the plan's implementation for the entire county. In accordance with Nevada Revised Statutes (NRS) 543, the 1986 Flood Control Master Plan (Master Plan) presented two major flood control alternatives (all conveyance and detention/conveyance) and the CCRFCD adopted the detention/conveyance alternative based on engineering and cost considerations. NRS 543.596 requires a review of the Master Plan at 5-year intervals and the 1991, 1996 and 2002 Las Vegas Valley MPUs and the Boulder City 1990, 1998 and 2003 MPUs were developed to satisfy this requirement.

Many of the facilities identified in the original and subsequent Master Plans are located on federal lands managed by the BLM. The National Environmental Policy Act (NEPA) of 1969 requires that actions involving federal agencies on public lands be supported by analyses of the environmental impacts of the Proposed Action and alternatives. In 1991 an Environmental Impact Statement (EIS) was prepared for the CCRFCD Master Plan and approved by the BLM.

### 1.1.2 Purpose

The CCRFCD Master Plan and subsequent MPUs of 1991, 1996, 2002 and 2003 proposed numerous drainage control facilities within the Las Vegas Valley and Boulder City. Facilities that have been constructed since the 1991 FEIS have undergone a project-specific analysis as outlined in Section 14 of the FEIS. These analyses were discipline-specific reviewed using guidelines and a specific analysis procedure outlined in Section 14 to determine appropriate mitigation measures for each specific project.

Due to changes in federal regulations that have occurred since 1991 a SEIS was prepared for the CCRFCD Master Plan to update the 1991 FEIS. At the time that the FEIS was prepared, it was estimated that construction of the detention/conveyance alternative would take 59 years. The Record of Decision (Appendix A) did not limit the applicability of the FEIS analysis and therefore a supplement to the original 1991 FEIS was prepared instead of a new EIS. The purpose of the SEIS is to assess impacts associated with implementation of the Master Plan and subsequent updates. This SEIS is being prepared in accordance with NEPA (42 U.S.C. 4321 et seq.) and the Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508).

Since 1991, changes have occurred in five areas of environmental regulation affecting this SEIS.

#### 1.1.2.1 Air Quality

Air quality standards for particulate matter have changed from airborne total suspended particulates (TSP) to PM10 requirements (airborne particulate matter with a diameter of at least 10 microns). Clark County has been designated non-attainment for ozone.

#### 1.1.2.2 Terrestrial and Aquatic Biology

A discussion of noxious weed management strategies is included to meet BLM requirements.

#### 1.1.2.3 Visual Resources

The visual resources discussion is amended to incorporate Visual Resource Management (VRM) plans as described in the 1998 BLM Resource Management Plan (RMP). The RMP provides BLM managers with a means for determining visual values. The inventory consists of a scenic quality evaluation, sensitivity level analysis and a delineation of distance zones. The RMP was approved after the FEIS was approved.

#### 1.1.2.4 Cultural Resources

This section has been updated to comply with regulations for Traditional Cultural Properties (TCP) or areas having religious, ceremonial or medicinal significance to native peoples. Guidance on TCP areas was amended in 1998.

#### 1.1.2.5 Environmental Justice

In accordance with regulations implemented after the FEIS was approved, an Environmental Justice section is included to consider the effects of this action on economically disadvantaged groups.

### 1.1.3 Need

#### 1.1.3.1 Regional Growth

The majority of Clark County's urban development is within the Las Vegas Valley - a flood prone area that has suffered loss of life and millions of dollars in property damage due to flooding since the turn of the twentieth century. The metropolitan area is one of the fastest growing urban areas in the country. From the 1990 census used in the 1991 FEIS to the current 2002 update, Clark County's population rose from 770,280 to more than 1.5 million (an increase of approximately 729,720).

The Southern Nevada Public Land Management Act (SNPLMA) (PL 107-282) identifies BLM lands that will be disposed of for public and private uses. These lands will be developed to accommodate regional growth. Increased urban development results in a greater need for flood control. It should be noted that the Las Vegas RMP (BLM 1998) reduces the planned disposal area by 100,000 acres in comparison to the previous Clark County Framework Plan (BLM 1983).

Since the adoption of the original flood control Master Plan (1986) approximately 1.4 billion dollars in regional flood control facilities have been constructed. Approximately 750 miles of conveyance facilities are included in the 2002 MPU. Approximately 330 miles of these facilities have been constructed to date. Approximately 106 miles of the facilities that remain to be constructed will likely not require public funds for construction, as they are located in undeveloped areas. Construction of these facilities will likely be a condition of development. Seventy-nine detention basins are included in the 2002 MPU, with 45 detention basins constructed to date. Similarly, of the remaining 34 basins, six will likely not require public funds for construction. Approximately 100 miles of conveyance facilities and 22 detention facilities have been constructed since the 1996 MPU.

### 1.1.3.2 Flooding History

Historically, flood hazards in southern Nevada have been underestimated due to the arid climate and low precipitation. Southern Nevada has experienced several significant flooding events that have resulted in various levels of damage including property damage and loss of life.

Typically, the most damaging storms occur in the late summer months (July to September), when moist unstable air from the Gulf of Mexico is forced upward by hot air currents. These tropical depressions approach the county from the south or southeast and produce summer thunderstorms that are often short in duration and high in intensity. Rain falling on steep mountain slopes and desert surfaces runs off rapidly and concentrates in the urbanized portions of the valley as it flows to the Las Vegas Wash and ultimately to Lake Mead.

The Soil Conservation Service (SCS) (1977) published a comprehensive flood history for Clark County.

CCRFCD maintains a list of major events on their website. (http://www.ccrfcd.org/flood-reports.htm.) A record-breaking flood event occurred in July 1999 when a series of thunderstorms produced 3 to 5 inches of rain per hour in Las Vegas and resulted in some of the highest flows ever recorded (Tanko and Kane 2000).

In parts of the Valley recorded rainfall intensities and/or depths exceeded rainfall criteria used for the design of drainage facilities in the County, and peak discharges in some reaches of the Las Vegas Wash indicate that this event may have exceeded a 100-year flood (Sutko 1999).

The record flows most severely impacted Duck Creek and the lower reaches of Las Vegas Wash and Flamingo Wash, where erosion of unlined sections of these washes threatened buildings. Extensive damage also occurred to many roadways where flow exceeded culvert capacities and spilled over. As a result of this event and its severe damage, the Nevada Governor's Office issued a Declaration of Emergency for the area. A federal disaster area declaration was made a few days later.

Sutko (1999) pointed out, however, that damage would have been worse if existing flood control facilities had not been completed. Furthermore, he stated, "the completed facilities appeared to have functioned as designed and provided a significant umbrella of protection to downstream properties."

## 1.2 PROJECT OBJECTIVES

The project objective is to meet the CCRFCD mission to improve the protection of life and property for existing and future residents from the impacts of flooding. The CCRFCD responsibilities include:

- Develop a comprehensive flood control Master Plan to alleviate flooding problems
- Fund and coordinate the construction of flood control facilities
- Monitor and disseminate rainfall and flow data during storms
- Provide public education regarding flood dangers
- Regulate land use in flood hazard areas

NRS 543.596 (et seq.) require that flood control Master Plans be prepared and updated at least every 5 years. The flood control Master Plan sets forth the most effective structural and regulatory means for correcting the existing problems of flooding within the area and dealing with the probable effects of development completed by the County, each city in the area, as well as the plans developed within the private sector of the community.

The Master Plan includes detailed hydrologic modeling of each populated watershed in Clark County along with land use, soil and topographic data. The recommendations of the plan include descriptions of the proposed flood control facilities, cost estimates and suggested phasing. Typical facilities include detention basins, debris basins, channels, bridges and storm drains.

The MPUs add to the Master Plan any new information that is relevant to the Master Plan; assess progress made toward fulfillment of the Master Plan; identify any major obstacles to completion of the Master Plan; and recommend amendments to the Master Plan resulting from growth and development within the planning area.

Master Plan amendments and changes allow adaptation to reflect modifications to the watershed and improvements to the Plan. Amendments generally involve an addition, deletion or substantial modification to the Plan and must be approved by the city or county proposing the amendment as well as by the governing body of each affected local government entity. A change differs from an amendment in that a change in the size, type or alignment of a facility may be authorized if the change is hydraulically similar, is the most cost effective means available, and does not adversely affect implementation of the Plan.

In 2002 the Las Vegas Valley MPU was adopted as a Master Plan amendment. The Boulder City MPU was adopted in 2003. These MPUs serve as planning tools for the implementation of the flood control system in these planning areas and the design and construction of master plan facilities.

The flood control system identified and described in the MPU may be subject to further amendments and revisions in the future as more detailed analyses are completed for individual facilities during predesign, design and other activities that may warrant modification of the flood control plan.

Modifications made to the flood control plan during development of the 2002 MPU are based on the following:

- Addition of new facilities where deemed necessary by local entities and the CCRFCD
- Incorporation of flood control facilities constructed after the 1996 MPU
- Modifications made, through Master Plan Amendments, to the flood control plan after the 1996 MPU
- Revised subbasin, watershed and ultimate development boundaries
- Revised to facility sizes and alignments due to changes in flow rates and volumes generated from the updated hydrologic models
- Updated hydrologic models using a consistent methodology throughout the nine watersheds
- Updated soils and land use data

# 1.3 PROJECT CONFORMANCE WITH LAND USE PLANS

BLM land uses in southern Nevada are managed under the Las Vegas RMP. The RMP was developed through the NEPA process and is the primary planning document that governs the development of the Proposed Action. The emphasis of the Las Vegas RMP is "protecting unique habitats for threatened, endangered, and special status species, while providing areas for community growth, recreation, mineral exploration and development, as well as many other resource uses."

In accordance with the SNPLMA, state and local governments, including the CCRFCD, can reserve available land for public purposes. The Las Vegas RMP anticipates additional storm water runoff, accelerated erosion and greater peak flow rates as a result of additional growth and development in the Valley, and the 2002 MPU addresses these issues.

The 2002 Las Vegas Valley MPU was developed to be consistent, to the fullest extent possible, with the Southern Nevada Regional Policy Plan (SNRPP) dated February 22, 2001. The Southern Nevada Regional Planning Coalition (SNRPC) developed this policy. The SNRPP promotes the use of flood control facilities as corridors for trail systems and other recreational amenities as appropriate as well as for the safe conveyance and detainment of flood flows.

During development of the 2002 MPU many proposed facilities were reviewed and analyzed to determine whether natural washes could be used to safely convey flood flows in the ultimate condition.

Maintaining these natural washes may provide significant recreational opportunities for the surrounding communities and help protect the existing natural environment.

Several flood conveyance corridors were identified in the 2002 MPU as candidates for natural conveyance (existing natural wash) of flood flows with minor structural improvements. The majority of the flood conveyance corridors do not consist of one main channel in the natural condition and are too steep and/or lack sufficient capacity to safely convey flood flows.

This condition does not necessarily preclude the use of flood control facilities for trail systems and other recreational amenities; however, a greater degree of structural improvement is necessary to adequately control flood flows. These corridors may still be used for trail systems and other recreational opportunities, provided that local parks and recreation departments work to develop master plans and funding sources for additional rights-of-way (ROW), landscaping and other recreational amenities. Many trails and other recreational components have already been incorporated into existing flood control facilities.

## 1.4 AUTHORIZING AGENCY AND DECISIONS TO BE MADE

The BLM and U.S. Army Corps of Engineers (USACE) are the federal agencies with jurisdiction over the proposed facilities and are the agencies that requested the preparation of this SEIS. The decision to be made by the BLM and USACE will be either:

- Approval of the SEIS and its associated Proposed Actions and issue a Record of Decision (ROD)
- Selection of the No-Action Alternative, which would assume that facilities would be installed without a BLM ROD but would result in the implementation of flood control projects through non-federal funding sources within a Regional Flood Control Agency and a Regional Plan

The following federal, state and local management plans contain information relevant to the proposed project:

- Clark County Carbon Monoxide Air Quality Implementation Plan
- Clark County Comprehensive Plan
- Clark County Multi-Species Habitat Conservation Plan (MSHCP)
- Las Vegas Resource Management Plan

Table 1.4-1 lists relevant federal, state and local regulatory permits and approvals that may be required for compliance. The Proposed Action may be subject to some or all of the laws and regulations in Table 1.4-2.

## TABLE 1.4-1. Regulatory Permits and Approvals that May Be Required

| Level of Government | Permit/Approval |
|---|---|
| ***Federal*** | |
| U. S. Air Force (Nellis Air Force Base) | Nellis Air Force Base, Base Civil Engineering Work Clearance Engineering Work Clearance Permit |
| U. S. Army Corps of Engineers | Section 404/Section 10 Permit |
| U. S. Bureau of Indian Affairs | National Environmental Policy Act |
| | Record of Decision for Project |
| U. S. Bureau of Land Management | National Environmental Policy Act |
| | Record of Decision for Project |
| U. S. Bureau of Reclamation | National Environmental Policy Act |
| | Record of Decision for Project |
| | Right of Entry Temporary Use Letter |
| | Land Use License |
| U.S. Environmental Protection Agency | Prevention of Significant Deterioration Authority to Construct Permit |
| | Clean Water Act Section 401 |
| | Water Quality Certification on Tribal Lands |
| | National Pollution Discharge and Elimination System General Stormwater Permit for Construction on Tribal Lands |
| U.S. Fish and Wildlife Service | Endangered Species Act - Section 7 Consultation and Biological Opinion |
| | Migratory Bird Treaty Act |
| Individual Tribes | Permission for use of Tribal Lands from individual Tribes |
| ***State of Nevada*** | |
| Nevada Department of Motor Vehicles and Public Safety | Hazardous Material Permit or Roving Permit |
| Nevada Division of Environmental Protection | 402 National Pollutant Discharge Elimination System General Stormwater Permit for Construction Activities and 401 Water Quality Certification |
| | Clean Water Act Section 401 Water Quality Certification |
| | National Pollutant Discharge and Elimination System General Stormwater Permit for Construction |
| | National Pollutant Discharge and Elimination System |
| | Temporary Discharge Permit |
| | Temporary Permit for Working in Waterways (Formerly known as a "Rolling Stock Permit") |
| Nevada Division of Forestry | Native Cacti and Yucca Commercial Salvaging Permit and Shipping or Transportation Permit |
| | Conditional Permit for Disturbance or Destruction of Critically Endangered Species |
| Nevada Division of State Lands | Approval of projects that occur on State Park property |
| Nevada Division of State Parks | Approval of projects that occur on State Park property |
| Nevada Division of Water Resources | Nevada Division of Water resources Waiver for Dewatering Wells, Monitoring Wells, and/or Testing Wells |
| Nevada Division of Wildlife | Nevada Division of Wildlife Scientific Collection Permit |
| Nevada Division of Wildlife, Southern Region | Project Review: Wildlife and Habitat Consultation for disturbance on BLM land |

**TABLE 1.4-1. Regulatory Permits and Approvals that May Be Required (Continued)**

| Level of Government | Permit/Approval |
|---|---|
| Nevada Historic Preservation Office | Section 106 review and concurrence: State Historic Preservation Office |
| Nevada Public Utility Commission | Utility Environmental Protection Act |
| Nevada State Fire Marshal | Hazardous Materials Storage Permit/Nevada Combined Agency Permit/Tier II |
| ***Clark County*** | |
| Clark County Department of Air Quality Management | Dust Control Permit |
| Clark County Department of Development Services | Drainage Study Approval |
| | Off-site Construction Permit |
| | Encroachment Permit |
| | Encroachment Permit (Discharge Water) |
| | Grading Permit |
| | Conditional Grading Permit |
| | Temporary Sign Permit |
| | Soils Report Submittal |
| | Block Wall/Fence Permit |
| | Landscape Certification for Grading and Earthwork |
| | Pad Certification for Grading and Earthwork |
| | Clark County Multiple Species Habitat Conservation Plan Compliance |
| Clark County Regional Flood Control District | Capital Improvement Program Coordination Drainage Study Review |
| | NEPA document review |
| | Federal Emergency Management Agency Flood Insurance Rate Maps Check |
| Clark County Fire Department | Above-ground Generator Permit |
| | Blasting Permit |
| Clark County Department of Public Works Traffic Operations | Traffic Barricade Plan Approval |
| ***Municipal*** | |
| City of Las Vegas Department of Public Works Flood Control Section | Drainage Study Review and Approval |
| City of Las Vegas Department of Public Works, Land Development Services | Plans Check |
| | Excavation Permit |
| | Soils Report Submittal |
| | Construction Permit |
| City of Las Vegas Department of Building and Safety | Grading Permit |
| | Temporary Stock Pile Permit |
| | Block Wall/Fence Permit |
| City of Las Vegas Construction Services | Traffic Barricade Plan Approval |
| City of Henderson Department of Public Works, Land Development | Excavation Permit |
| | Barricade Plan Approval |
| | Revocable Permit and Encroachment Plan Approval |
| | Plans Check |

### TABLE 1.4-1. Regulatory Permits and Approvals that May Be Required (Continued)

| Level of Government | Permit/Approval |
|---|---|
| City of Henderson Department of Building and Safety | Grading (Floodplain) Permit |
| City of Henderson Fire Prevention Division | Blasting Permit |
| | Above ground Storage Tank Permit for Flammable Liquid |
| City of Henderson City Hall | City Council Interlocal Contract |
| City of North Las Vegas, Development and Flood Control Division | Plans Check |
| | Drainage Study Review and Approval |
| | Grading and Drainage Permit |
| | Off-site Construction Permit |
| City of North Las Vegas, Permit Application Center | Building Permit |
| City of North Las Vegas, Transportation Services | Traffic Control Plan |
| ***Additional Approvals and Clearances that May Apply*** | |
| ATT, Fiber Optics Division | AT&T Coordination |
| Cal-Nev Pipeline | Cal-Nev Pipeline Coordination |
| Nevada Power | Nevada Power Coordination |
| Sprint | Sprint Coordination |
| Southwest Gas | Southwest Gas Coordination |
| Williams Interstate Natural Gas | Williams Interstate Natural Gas Encroachment Permit |
| Southern Nevada Water Authority, Administration Office | Southern Nevada Water Authority Occupancy Permit |
| Union Pacific Railroad (UPRR), Contract and Real Estate Department | UPRR Access and Occupancy Permit for Railroad Right-of-way |
| | UPRR Pipeline Crossing Agreement |
| | UPRR Contractor's Right-of-Entry Agreement |
| | UPRR Drainage and Waterway Encroachment |
| Private Owner | Encroachment and Occupancy Approval from Private Owners |

### TABLE 1.4-2. Applicable Environmental Laws and Regulations

| Law/Regulation | Citation |
|---|---|
| American Indian Religious Freedom Act | 42 U.S.C. 1996 et seq. |
| American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the Endangered Species Act | Secretarial Order 3206 (June 5,1997) |
| Antiquities Act of 1906 | 16 U.S.C. 431 et seq. |
| Archeological Resources Protection Act, as amended | 16 U.S.C. 470aa et seq. |
| BLM Right-of-Way Regulations | 43 CFR Part 2800 |
| Bureau of Land Management's NEPA Handbook | H-1790-1 (1988) |
| Clean Air Act | 42 U.S.C. 7401 et seq. |
| Clean Water Act | 33 U.S.C. 1251 et seq. |
| Consultation and Coordination with Indian Tribal Governments | Executive Order 13084 |
| Council of Environmental Quality general regulations implementing NEPA | 40 CFR Parts 1500-1508 |

**TABLE 1.4-2. Applicable Environmental Laws and Regulations (Continued)**

| Law/Regulation | Citation |
|---|---|
| Department of the Interior's Implementing Procedures and proposed revisions (August 28, 2002, Federal Register) | 516 DM 1-7 |
| Departmental Responsibilities for Indian Trust Resources | Secretarial Order 3175, as amended (November 8, 1993) |
| Endangered Species Act | 16 U.S.C. 1531 et seq. |
| Environmental Justice | Executive Order 12898 |
| Federal Compliance with Pollution Control Standards | Executive Order 12088 |
| Federal Land Policy and Management Act of 1976 | 43 U.S.C. 1701 et seq. |
| Floodplain Management | Executive Order 11988 |
| Government-to-Government Relations with Native American Tribal Governments | Memorandum for the Heads of Executive Department and Agencies (signed by President Clinton on April 29, 1994) |
| Indian Sacred Sites | Executive Order 13007 |
| Invasive Species | Executive Order 13112 |
| Migratory Bird Treaty Act | 16 U.S.C. 703-711; 40 Stat. 755, as amended |
| NEPA | 42 U.S.C. 4321 et seq. |
| National Historic Preservation | Executive Order 11593 |
| National Historic Preservation Act (NHPA) and regulations implementing NHPA | 16 U.S.C. 470 et seq., 36 CFR Part 800 |
| Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) | 25 U.S.C. 3001 |
| National Environmental Policy Act, Protection and Enhancement of Environmental Quality | Executive Order 11512 |
| Noise Control Act of 1972 (NCA), as amended | 42 U.S.C. 4901 et seq. |
| Occupational Safety and Health Act (OSHA) | 29 U.S.C. 651 et seq. (1970) |
| Pollution Prevention Act (PPA) of 1990 | 42 U.S.C. 13101 et seq. |
| Protection of Wetlands | Executive Order 11990 |
| Resource Conservation and Recovery Act (RCRA) | 42 U.S.C. 6901 et seq. |
| Safe Drinking Water Act (SDWA) | 42 U.S.C. s/s 300f et seq. (1974) |
| Wild Free-Roaming Horse and Burro Act of 1971 | PL 92-195 |

In addition to the Final Supplemental Environmental Impact Statement (FSEIS) and associated decision documents, the BLM would issue individual ROW grants to construct the flood control facilities on public lands. Prior to construction each facility would be analyzed under the facility-specific analysis procedures to ensure NEPA compliance.

Common stipulations include provisions for the protection of:

- Air quality
- Cultural resources
- Current land uses
- Geological and paleontological resources
- Threatened and endangered (T&E) species
- Visual resources
- Water resources
- Wetland/riparian areas
- Wildlife resources

# 1.5 ENVIRONMENTAL IMPACT STATEMENT ORGANIZATION AND PREPARATION

This SEIS is organized as follows:

**Chapter 2** Discusses the Proposed Action and the No-Action Alternative.

**Chapter 3** Characterizes the existing environmental conditions of the proposed Project Area with emphasis on changes that have occurred since the preparation of the FEIS and new information made available since its publication in 1991.

**Chapter 4** Discusses the programmatic environmental consequences that would result if the Proposed Action or No-Action Alternative were implemented. This chapter also describes cumulative impacts.

**Chapter 5** Describes the mitigation measures needed to reduce, minimize or avoid impacts.

**Chapter 6** Describes unavoidable adverse impacts, irreversible or irretrievable commitment of resources and short-term uses versus long-term productivity issues.

**Chapter 7** Provides the record of consultation and coordination with agencies and the public.

**Chapter 8** Describes the project-specific analysis procedure.

**Chapter 9** Provides the list of preparers and reviewers of the SEIS.

**Chapter 10** Lists references and literature cited.

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**Glossary**

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Comments on the DSEIS are presented in Appendix H of this document. The comment documents have been numbered (i.e., 001) and, if the documents contain multiple comments, the comments have been marked with a bar and a number in the margin of the comment document. The text of the SEIS is marked with margin bars to illustrate where content has been changed. There are no change bars to show where text was removed in response to the comments. Appendix I contains the individual comments, the comment document number, the comment number, the responses to the comments, and the location(s) where text was added or removed within the SEIS (if warranted).

This FSEIS is to be distributed to the various interested parties found in the Distribution List (Appendix C).

# CHAPTER 2: PROPOSED ACTION AND ALTERNATIVE

## INTRODUCTION

This chapter analyzes the Proposed Action and the No-Action Alternative. For purposes of analysis the Proposed Action has been broken down by watershed. In general, the Proposed Action involves the continuation of programmatic assessments and construction of detention and conveyance structures. The No-Action Alternative provides the current 2003 programmatic baseline and should be considered as a basis for comparison with the consequences associated with the Proposed Action.

## 2.1 PROJECT AREA

This document focuses on a Project Area of about 1,054 square miles (2,730 km²) in southeastern Nevada, including portions of Las Vegas, North Las Vegas, Boulder City, Henderson and unincorporated portions of Clark County (Figure 2.1-1) (BLM/CCRFCD 1991). The Project Area was expanded approximately 2 miles (3 km) further south along the southwestern boundary for the SEIS as compared to the FEIS in order to include planned flood control projects along the southern area of the Las Vegas Valley (see Figure 2.1-1).

This area was defined in consultation with the BLM and CCRFCD and does not include areas with flood control facilities outside of the Las Vegas Valley not studied as part of the 2002 Master Plan (CCRFCD 2002) or as part of the Boulder City Flood Control MPU (CH2M Hill 2003). Rather, it incorporates only those areas with proposed flood control; facilities assessed by the BLM as being subject to potentially adverse cumulative effects as a result of construction, operation and maintenance of the facilities.

Following procedures used in the 1991 and 2002 Master Plans, the area was divided into a number of study areas (Table 2.1-1; see Figure 2.1-1). The descriptions given below are abstracted from the 2002 Master Plan (CCRFCD 2002) and the Boulder City Flood Control MPU (CH2M Hill 2003).

All watersheds contain both detention and conveyance facilities. Detention basins are facilities that provide temporary storage of floodwaters during flood events. They accept high inflow rates that are usually of relatively short duration (usually 1 to 12 hours) and discharge at much lower rates than the inflow for a long period of time. The reduction in flow rate between the inflow and outflow requires that a significant volume of water be stored for a certain period of time. Stored volume is obtained by constructing a dam or excavating below-grade, or a combination of both. Conveyance facilities are channels and storm drains designed and constructed to safely pass flood flows. Concrete-lined channels convey flood flows effectively and efficiently and require little maintenance compared with riprap, grass or natural washes. The aesthetic value and environmental benefits of concrete channels are minimal; it is therefore more desirable to use natural washes to convey flood flows provided it can be done in a manner that ensures a proper level of protection to adjacent properties. Further, cost is a major consideration because natural channels are less efficient, and they require a wider channel (i.e., more ROW) leading to increased land costs and associated wider bridge costs.

For purposes of comparison later in the document, the existing facilities within the CCRFCD will be represented on maps later in this chapter. Table 2.1-2 presents the compiled footprint acre-

**TABLE 2.1-1. Watersheds in the Project Area***

| Watershed Name | Ultimate Project Development Area (Square Miles) | Undeveloped Area (Square Miles) | Total Watershed Area* (Square Miles) |
|---|---|---|---|
| Range | 61.1 | 35.7 | 96.8 |
| Northern Las Vegas Wash | 111.7 | 92.3 | 204.1 |
| Gowan | 66.1 | 17.1 | 83.1 |
| Central | 57.9 | 0.0 | 57.9 |
| Flamingo/Tropicana | 93.5 | 85.1 | 178.5 |
| Duck Creek | 89.2 | 41.4 | 130.5 |
| Pittman | 95.2 | 41.8 | 137.0 |
| C-1 | 30.3 | 17.5 | 47.8 |
| Lower Las Vegas Wash | 17.0 | 4.5 | 21.7 |
| Boulder City | 0.0 | 22.5 | 22.6 |
| **Total** | **622.2** | **357.9** | **980.0** |

*An additional, 74 square miles (192 km²) of land are present within the Project Area boundary that are not within one of the nine watersheds or Boulder City. When combined with the values in the table above, the total Project Area of 1,054 acres is determined.

**TABLE 2.1-2. Existing (Pre-2002 Master Plan) Flood Control Facilities Footprint Acreages**

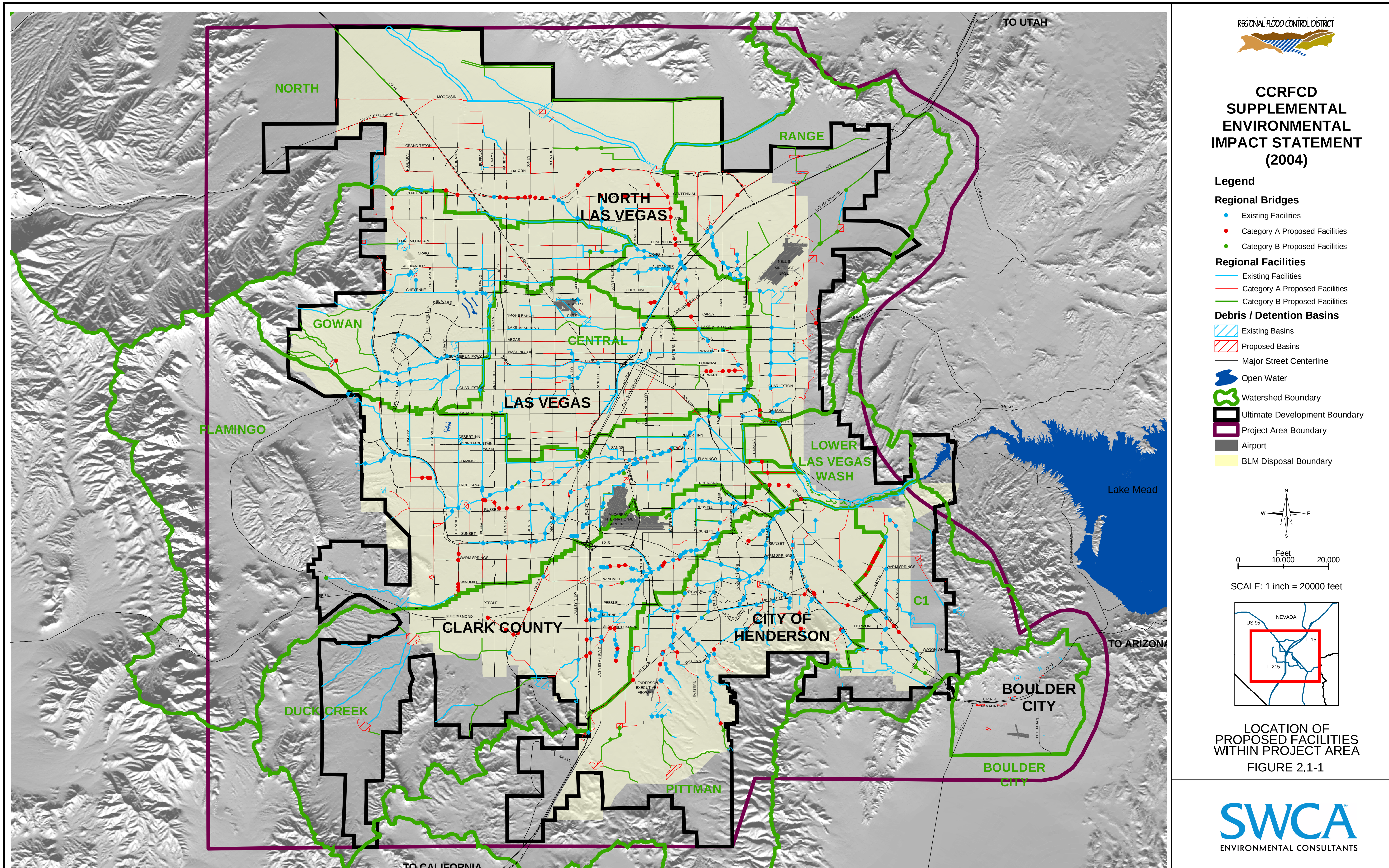
| Acres | BLM Land | Private Land | Totals |
|---|---|---|---|
| Conveyances | 2,287 | 1,320 | 3,607 |
| Basins | 2,240 | 792 | 3,032 |
| **Total** | **4,527** | **2,112** | **6,639** |

ages of existing facilities based on estimates from the GIS, rather than precise measurements of each facility. The intent of this table is to provide a comparative basis for cumulative and other impacts later in the document.

## 2.1.1 Range Watershed

The Range Watershed is located in the north-eastern portion of the Las Vegas Valley. The watershed includes portions of City of North Las Vegas, Nellis Air Force Base (AFB) and unincorporated Clark County. The Range Watershed is a major tributary to Las Vegas Wash. This watershed is bounded on the west by the Northern Watershed and Central Watershed, on the north by the Sheep and Las Vegas Range Mountains and the Range Wash Diversion Berm, on the east by the Frenchman Mountains, and to the south by Las Vegas Wash (Figure 2.1-2).

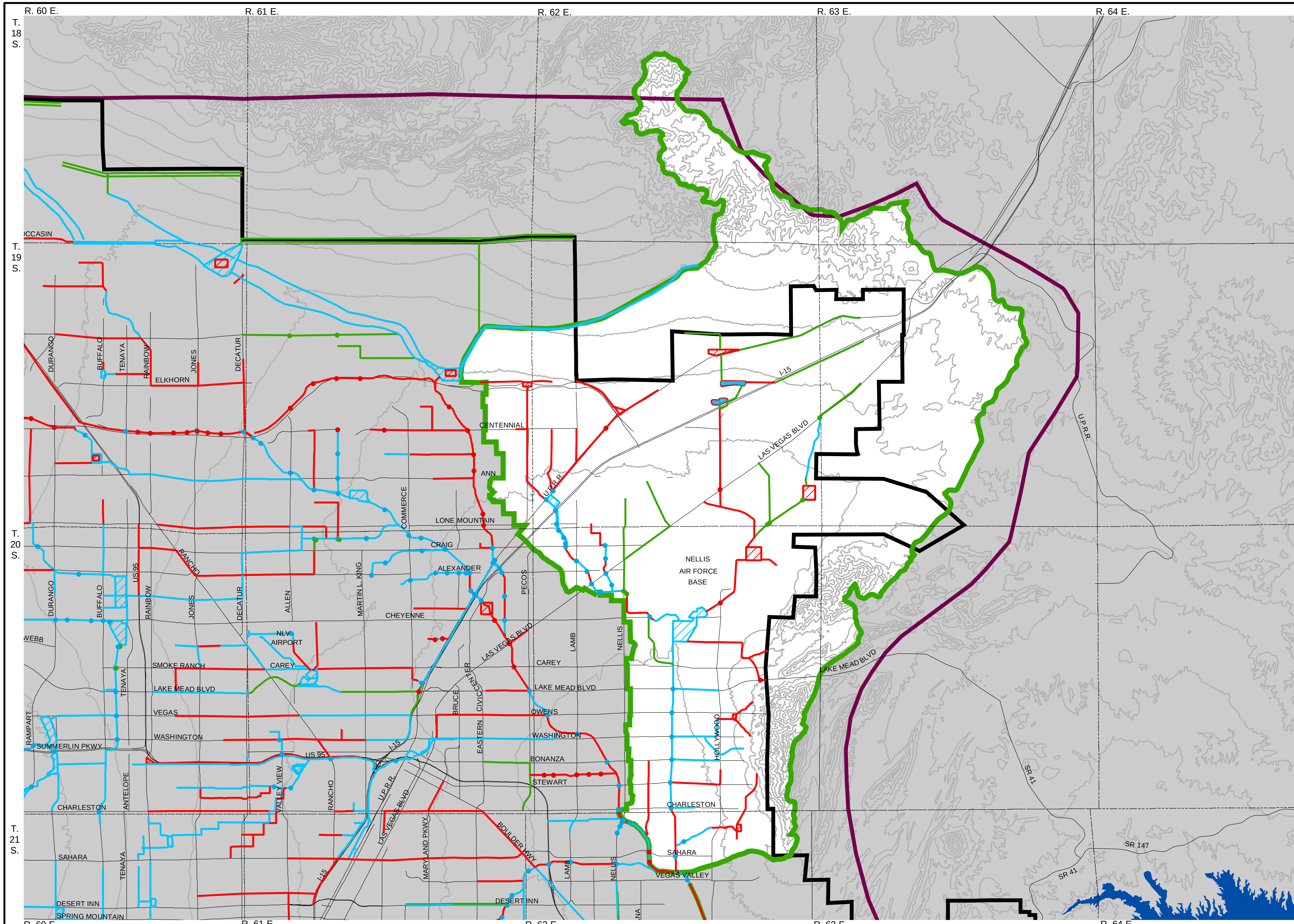
The total area of the Range Watershed is approximately 98 square miles (254 km²) of which 97 square miles (251 km²) are within the Project Area. Construction of Master Plan facilities within this watershed is approximately 23 percent complete based on construction cost estimates for both existing and proposed facilities. To date, approximately 16 miles (26 km) of conveyance facilities and four detention basins have been constructed in the Range Watershed.




LOCATION OF PROPOSED FACILITIES WITHIN PROJECT AREA

FIGURE 2.1-1

Data sources: Clark County GIS Management Office spring 2003 - Major Street Centerline, BLM Disposal Boundary, Ariports, Open Water, Watershed Boundary \ 1990 SEIS - Project Area Boundary




# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

REGIONAL FLOOD CONTROL DISTRICT

## Legend

**Regional Bridges**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Regional Facilities**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Debris / Detention Basins**
- Existing Basins
- Proposed Basins
- Major Street Centerline
- Contours 50m
- Township and Range
- Ultimate Development Boundary
- Project Area Boundary
- Watershed Boundary

Feet
0 5,000 10,000

SCALE: 1 inch = 10833 feet

RANGE WATERSHED
FIGURE 2.1-2

SWCA
ENVIRONMENTAL CONSULTANTS

## 2.1.2 Northern Las Vegas Wash Watershed

The Northern Las Vegas Wash Watershed is located in the northern portion of the Las Vegas Valley. The basin includes portions of City of North Las Vegas, City of Las Vegas and unincorporated Clark County. The basin is bound on the west by the Spring Mountains, on the north by the Sheep Mountains, on the south by Lake Mead Boulevard and on the east by Pecos Boulevard (Figure 2.1-3).

The total area of the Northern Las Vegas Watershed is approximately 744 square miles (1,927 km²) of which 204 square miles (528 km²) are within the Project Area. Construction of Master Plan facilities within this watershed is approximately 28 percent complete based on construction cost estimates for both existing and proposed facilities. To date, approximately 51 miles (82 km) of conveyance facilities and seven detention basins have been constructed in the Northern Las Vegas Watershed.

## 2.1.3 Gowan Watershed

The Gowan Watershed is located in the northwest portion of the Las Vegas Valley. The basin includes portions of City of North Las Vegas, City of Las Vegas and unincorporated Clark County. The Gowan Watershed is a major tributary to the Western Tributary of the Las Vegas Wash. The basin is bound on the west by the Spring Mountains, on the north by the northern beltway and the West Tributary and on the south and east by Charleston Blvd., U.S. 95 and Cheyenne Ave (Figure 2.1-4).

The total area of the Gowan Watershed is approximately 83 square miles (215 km²) and is completely within the Project Area. Construction of Master Plan facilities within this watershed is approximately 39 percent complete based on construction cost estimates for both existing and proposed facilities. To date, approximately 44 miles (71 km) of conveyance facilities and seven detention basins have been constructed in the Gowan Watershed.

## 2.1.4 Central Watershed

The Central Watershed is located in the middle of the Las Vegas Valley. The majority of the Central Watershed lies within the City of Las Vegas, and small portions lie within the City of North Las Vegas and unincorporated Clark County. The Central Watershed contains areas from the Vegas Creek/Washington Avenue Channel System to the Flamingo Wash and directly to the Las Vegas Wash. Subsequently, this watershed has several separate discharge points to other watersheds. Also, a portion of the main stem of Las Vegas Wash is located in this watershed. The Central Watershed is bounded by Gowan Road to the north, Buffalo Road to the west, Flamingo Road to the south and Nellis Boulevard to the east.

The Central Watershed can be divided into three sub-watersheds, which are described as follows. The area tributary to the Freeway Channel is bounded by Gowan Road to the north, Interstate 15 to the east, Washington Avenue to the south and by the Gowan South Detention Basin collector facilities to the west. The area tributary to Las Vegas Creek/Washington Avenue is bounded by Buffalo Drive to the east, Flamingo Road to the south, Las Vegas Wash to the east and Owens Avenue to the north. The area directly tributary to the Flamingo Wash is bounded by Industrial Road to the west, Boulder Highway to the east and Karen Avenue to the south. The eastern portion of the Central Watershed contains a lower portion of Las Vegas Wash, which runs from the intersection of Pecos Road and Lake Mead Boulevard to Nellis Boulevard. Figure 2.1-5 shows the location of the Central Watershed.

The total area of the Central Watershed is approximately 58 square miles (150 km²) and is completely within the Project Area. Construction of Master Plan facilities within this watershed is approximately 33 percent complete based on construction cost estimates for both existing and proposed facilities. To date, approximately 42 miles (68 km) of conveyance facilities and 3 detention basins have been constructed in the Central Watershed.

## 2.1.5 Flamingo/Tropicana Watershed

The Flamingo/Tropicana Watershed is located in the southwest and central portions of the Las Vegas Valley. The majority of the watershed is within unincorporated Clark County with a small portion in the City of Las Vegas. The Flamingo/Tropicana Watershed extends from the Spring Mountain Range on the western rim of the Las Vegas Valley to the confluence of the Flamingo Wash and the Lower Las Vegas Wash (Figure 2.1-6).

The total area of the Flamingo/Tropicana Watershed is approximately 221 square miles (572 $km^2$) of which 179 square miles (464 $km^2$) are within the Project Area. Construction of Master Plan facilities within this watershed is approximately 62 percent complete based on construction cost estimates for both existing and proposed facilities. To date, approximately 80 miles (129 km) of conveyance facilities and nine detention basins have been constructed in the Flamingo/Tropicana Watershed.

## 2.1.6 Duck Creek/Blue Diamond Watershed

The Duck Creek/Blue Diamond Watershed is located in the southwest portion of the Las Vegas Valley. The watershed is within portions of unincorporated Clark County and the City of Henderson. The watershed extends from the Bird Spring Range on the west side of the Las Vegas Valley to where the Duck Creek Channel converges with Duck Creek (Figure 2.1-7).

The total area of the Duck Creek/Blue Diamond Watershed is approximately 131 square miles (339 $km^2$) of which 130 square miles (337 $km^2$) are within the Project Area. Construction of Master Plan facilities within this watershed is approximately 35 percent complete based on construction cost estimates for both existing and proposed facilities. To date, approximately 22 miles (35 km) of conveyance facilities and three detention basins have been constructed in the Duck Creek/Blue Diamond Watershed.

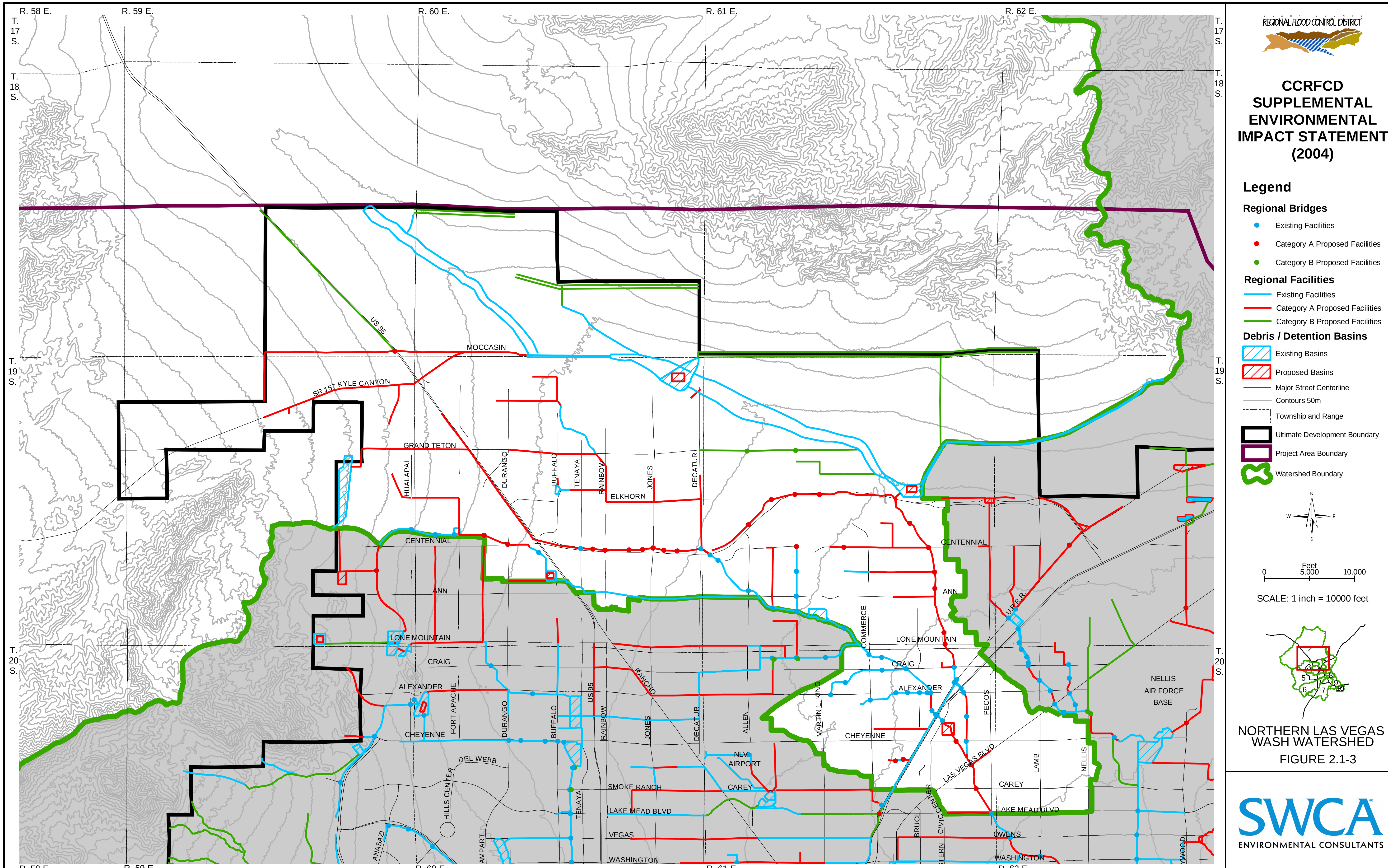
## 2.1.7 Pittman Watershed

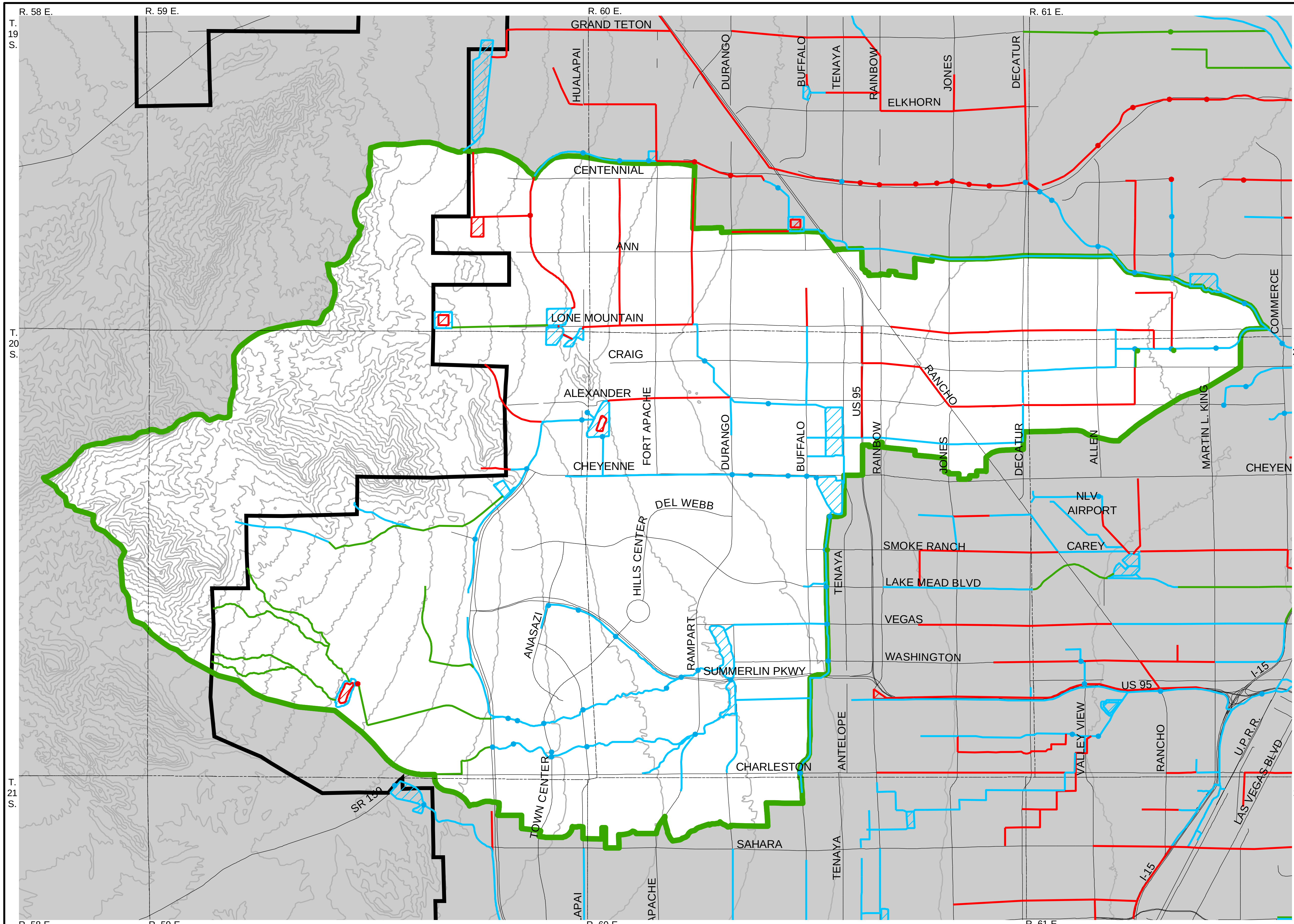
The Pittman Watershed is located in the south portion of the Las Vegas Valley. The watershed is within portions of the City of Henderson and unincorporated Clark County. The Pittman Watershed is a major tributary to the Pittman and Duck Creek Washes. The basin extends from the McCullough Range on the southwest to where the Pittman Wash crosses Boulder Highway (Figure 2.1-8).

The total area of the Pittman Watershed is approximately 156 square miles (404 $km^2$) of which 137 square miles (355 $km^2$) are within the Project Area. Construction of Master Plan facilities within the Pittman Watershed is approximately 42 percent complete based on construction cost estimates for both existing and proposed facilities. To date, approximately 41 miles (66 km) of conveyance facilities and seven detention basins have been constructed in the Pittman Watershed.

## 2.1.8 C-1 Watershed

The C-1 Watershed is located in the southeast portion of the Las Vegas Valley. The watershed includes portions of the City of Henderson and unincorporated Clark County. The C-1 Watershed is the most downstream major tributary to the Las Vegas Wash in the Las Vegas Valley. The basin is bound on the west by Greenway Road, Boulder Highway and Lake Mead Drive, on the north by the Las Vegas Wash, on the south by the McCullough Range and on the east by the River Mountains (Figure 2.1-9).


REGIONAL FLOOD CONTROL DISTRICT
CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)
Legend
Regional Bridges
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Regional Facilities
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Debris / Detention Basins
Existing Basins
Proposed Basins
Major Street Centerline
Contours 50m
Township and Range
Ultimate Development Boundary
Project Area Boundary
Watershed Boundary
N
W
E
S
Feet
0
5,000
10,000
SCALE: 1 inch = 10000 feet
NORTHERN LAS VEGAS WASH WATERSHED
FIGURE 2.1-3
SWCA
ENVIRONMENTAL CONSULTANTS
R. 58 E.
R. 59 E.
R. 60 E.
R. 61 E.
R. 62 E.
T. 17 S.
T. 18 S.
T. 19 S.
T. 20 S.
US 95
MOCCASIN
SR 157 KYLE CANYON
GRAND TETON
HUALAPAI
DURANGO
BUFFALO
TENAYA
RAINBOW
JONES
DECATUR
ELKHORN
CENTENNIAL
ANN
LONE MOUNTAIN
CRAIG
ALEXANDER
FORT APACHE
CHEYENNE
DEL WEBB
HILLS CENTER
ANASAZI
RAMPART
RANCHO
ALLEN
NLV AIRPORT
SMOKE RANCH
CAREY
LAKE MEAD BLVD
VEGAS
WASHINGTON
COMMERCE
MARTIN L. KING
PECOS
LAS VEGAS BLVD
CIVIC CENTER
BRUCE
LAMB
NELLIS
OWENS
U.P.R.R.
NELLIS AIR FORCE BASE




REGIONAL FLOOD CONTROL DISTRICT

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

**Legend**

**Regional Bridges**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Regional Facilities**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Debris / Detention Basins**
- Existing Basins
- Proposed Basins
- Major Street Centerline
- Contours 50m
- Township and Range
- Ultimate Development Boundary
- Project Area Boundary
- Watershed Boundary

N W E S

Feet
0 3,500 7,000

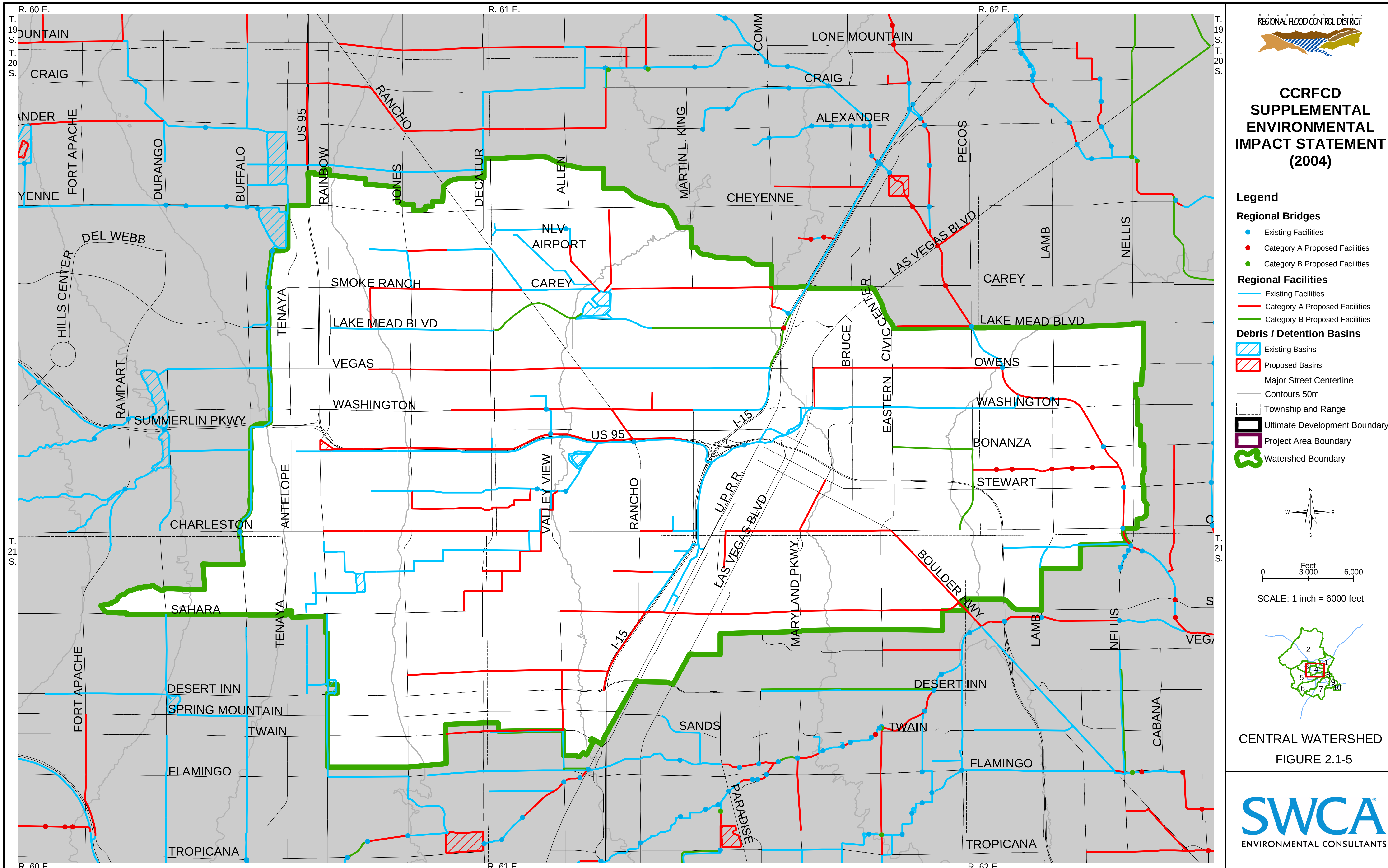
SCALE: 1 inch = 7000 feet

1 2 3 4 5 6 7 8 9 10

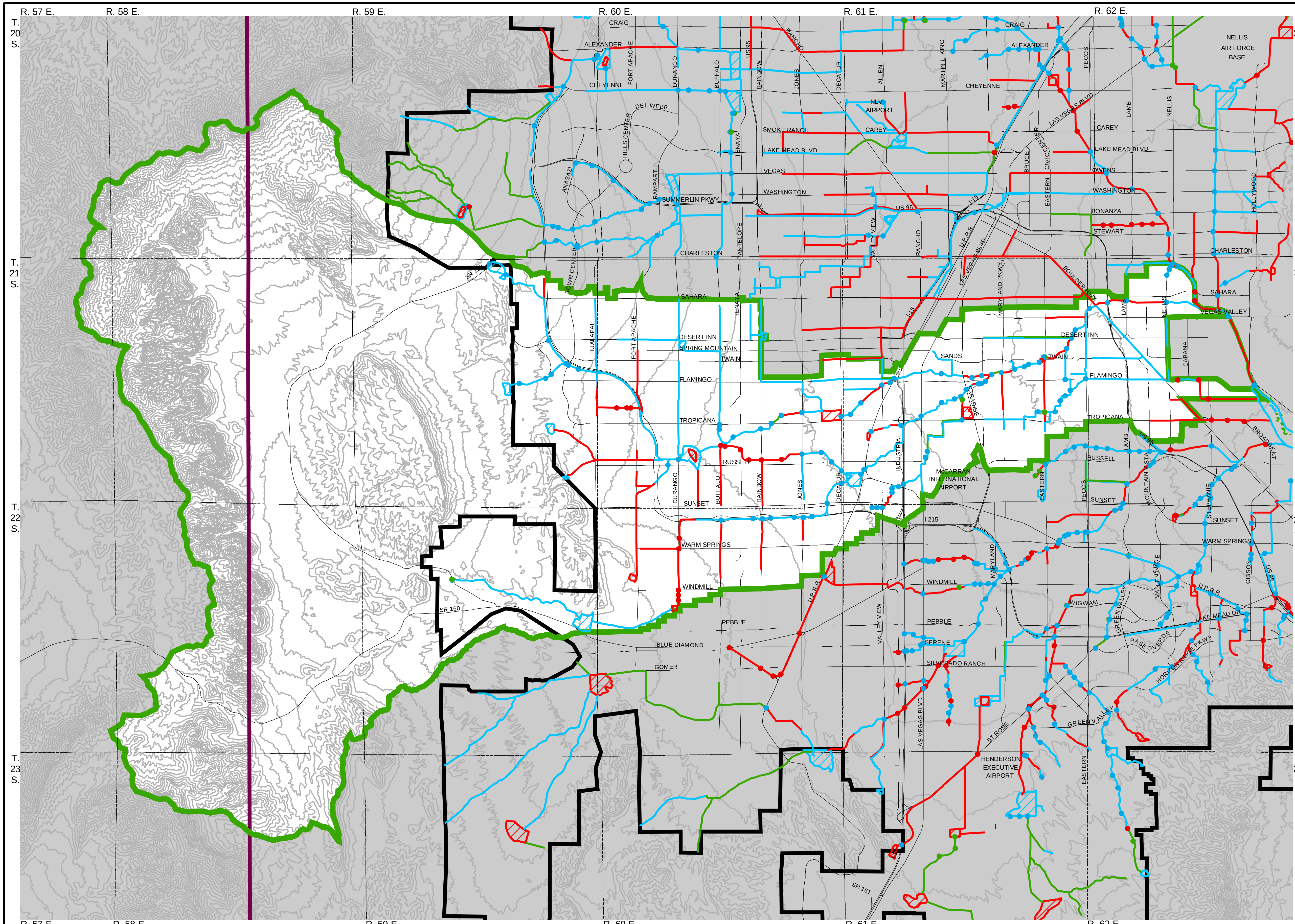
GOWAN WATERSHED

FIGURE 2.1-4

SWCA
ENVIRONMENTAL CONSULTANTS



REGIONAL FLOOD CONTROL DISTRICT
CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)
Legend
Regional Bridges
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Regional Facilities
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Debris / Detention Basins
Existing Basins
Proposed Basins
Major Street Centerline
Contours 50m
Township and Range
Ultimate Development Boundary
Project Area Boundary
Watershed Boundary
N
W
E
S
Feet
0
3,000
6,000
SCALE: 1 inch = 6000 feet
CENTRAL WATERSHED
FIGURE 2.1-5
SWCA
ENVIRONMENTAL CONSULTANTS
R. 60 E.
R. 61 E.
R. 62 E.
T. 19 S.
T. 20 S.
T. 21 S.
LONE MOUNTAIN
CRAIG
ALEXANDER
CHEYENNE
DEL WEBB
SMOKE RANCH
CAREY
LAKE MEAD BLVD
VEGAS
WASHINGTON
SUMMERLIN PKWY
US 95
OWENS
BONANZA
STEWART
CHARLESTON
SAHARA
DESERT INN
SPRING MOUNTAIN
TWAIN
SANDS
FLAMINGO
TROPICANA
NLV AIRPORT
FORT APACHE
DURANGO
BUFFALO
RAINBOW
JONES
DECATUR
ALLEN
MARTIN L. KING
COMM
RANCHO
HILLS CENTER
RAMPART
TENAYA
ANTELOPE
VALLEY VIEW
I-15
U.P.R.R.
LAS VEGAS BLVD
MARYLAND PKWY
BRUCE
CIVIC CENTER
EASTERN
PECOS
LAMB
NELLIS
BOULDER HWY
PARADISE
CABANA




REGIONAL FLOOD CONTROL DISTRICT

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

## Legend

**Regional Bridges**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

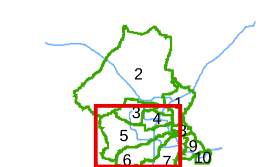
**Regional Facilities**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Debris / Detention Basins**
- Existing Basins
- Proposed Basins
- Major Street Centerline
- Contours 50m
- Township and Range
- Ultimate Development Boundary
- Project Area Boundary
- Watershed Boundary

N E S W

Feet
0 6,250 12,500

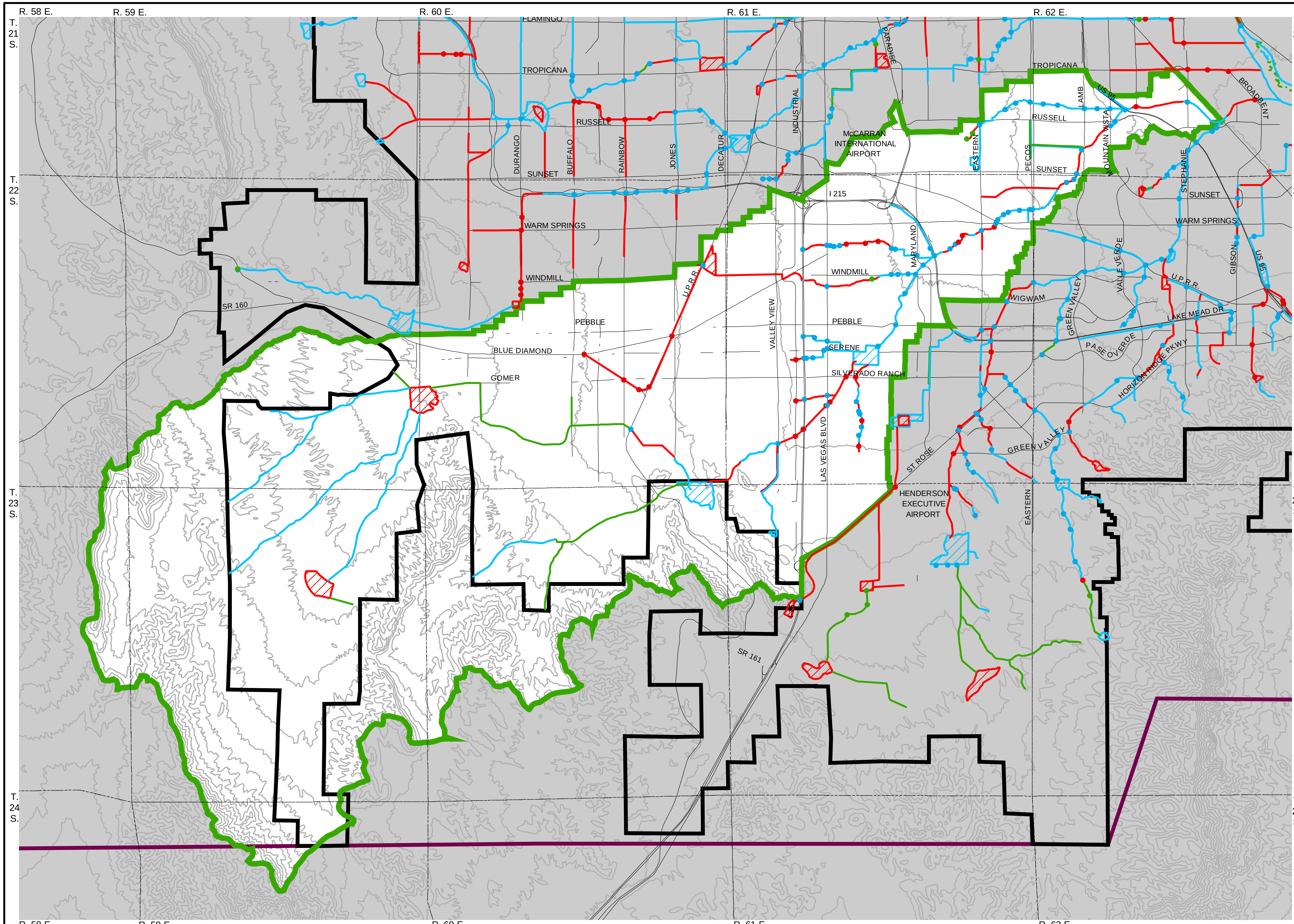
SCALE: 1 inch = 12500 feet




FLAMINGO/TROPICANA WATERSHED

FIGURE 2.1-6

SWCA®
ENVIRONMENTAL CONSULTANTS




REGIONAL FLOOD CONTROL DISTRICT

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

**Legend**

**Regional Bridges**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

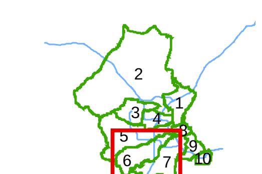
**Regional Facilities**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Debris / Detention Basins**
- Existing Basins
- Proposed Basins
- Major Street Centerline
- Contours 50m
- Township and Range
- Ultimate Development Boundary
- Project Area Boundary
- Watershed Boundary

N S W E

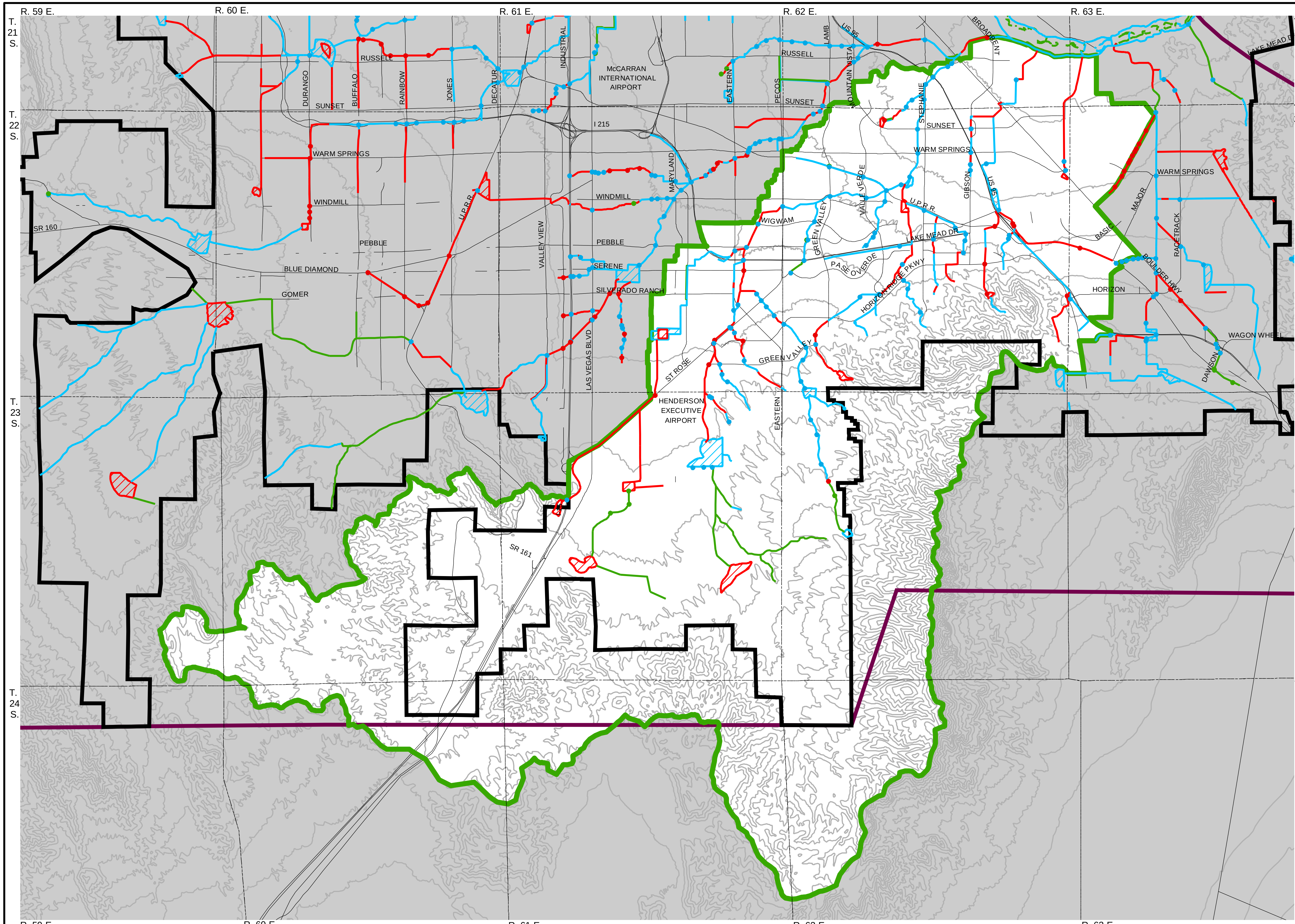
Feet
0 6,250 12,500

SCALE: 1 inch = 12500 feet




DUCK CREEK/ BLUE DIAMOND WATERSHED
FIGURE 2.1-7

SWCA
ENVIRONMENTAL CONSULTANTS




REGIONAL FLOOD CONTROL DISTRICT

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

## Legend

**Regional Bridges**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Regional Facilities**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Debris / Detention Basins**
- Existing Basins
- Proposed Basins
- Major Street Centerline
- Contours 50m
- Township and Range
- Ultimate Development Boundary
- Project Area Boundary
- Watershed Boundary

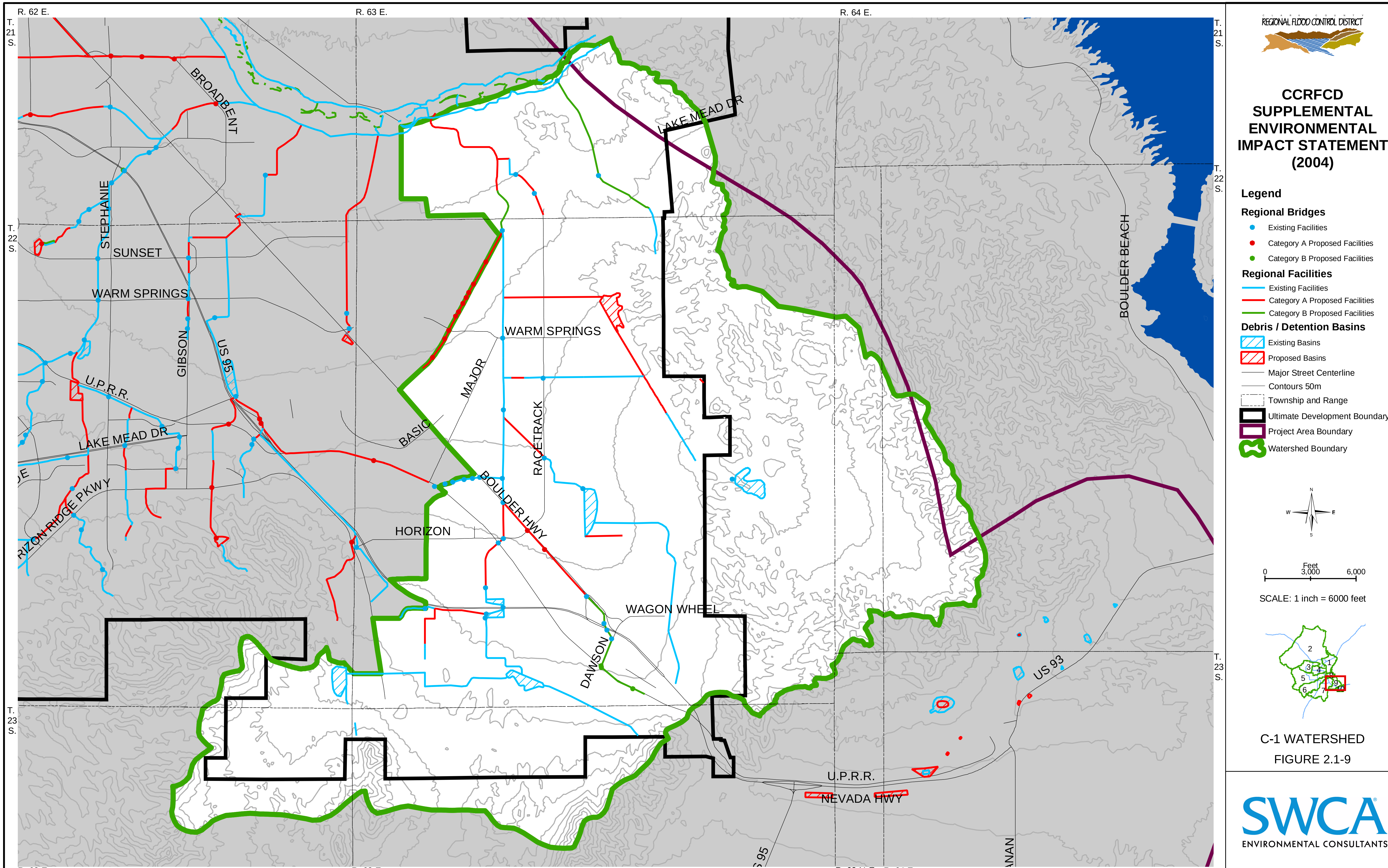
Feet
0 5,000 10,000

SCALE: 1 inch = 10833 feet

PITTMAN WATERSHED

FIGURE 2.1-8

SWCA ENVIRONMENTAL CONSULTANTS




C-1 WATERSHED

FIGURE 2.1-9

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The total area of the C-1 Watershed is approximately 49 square miles (127 km²) of which 48 square miles (124 km²) are within the Project Area. Drainage facilities within the watershed consist primarily of detention basins and tributary facilities that connect to the C-1 Channel that extends from U.S. 95 to the south to the Las Vegas Wash to the north. Construction of Master Plan facilities within this watershed is 53 percent complete based on construction cost estimates for both existing and proposed facilities. To date, 17 miles (27 km) of conveyance facilities and five detention basins have been constructed in the C-1 Watershed.

### 2.1.9 Lower Las Vegas Wash Watershed

The Lower Las Vegas Wash Watershed is located in the southeast portion of the Las Vegas Valley. The watershed is within portions of the City of Henderson and unincorporated Clark County. The Lower Las Vegas Wash Watershed consists of drainage basins tributary to the Las Vegas Wash downstream of the Sloan Channel Confluence and upstream of Lake Las Vegas. The watershed is bounded on the west by Nellis Boulevard/Boulder Highway and on the south by the Duck Creek Channel/Las Vegas Wash. The tributary drainage area extends north into the Rainbow Gardens (Figure 2.1-10).

The total area of the Lower Las Vegas Wash Watershed is approximately 25 square miles (65 km²) of which 22 square miles (57 km²) are within the Project Area. The portion of the Las Vegas Wash located within the Wetlands Park is managed in accordance with the Southern Nevada Water Authority's (SNWA) Comprehensive Adaptive Management Plan for the Las Vegas Wash. This area contains numerous existing and proposed erosion control and bank protection facilities planned and built through the SNWA. All of these facilities are impacted by flow generated within some or all of the other eight watersheds. Construction of Master Plan facilities within this watershed is approximately 19 percent complete based on construction cost estimates for both existing and proposed facilities. In total, approximately 15 miles (24 km) of conveyance facilities have been constructed to date in the Lower Las Vegas Wash Watershed (see Figure 2.1-10).

### 2.1.10 Boulder City Watershed

Boulder City is located in the southeast portion of the Las Vegas Project Area, approximately 20 miles (32 km) southeast of Las Vegas and 4 miles (6 kmkm) southwest of Lake Mead along U.S. 93 between Las Vegas and Hoover Dam (Figure 2.1-11) (Boulder City Flood Control MPU; CH2M Hill 2003). Boulder City contains four sub-watersheds (Hemenway, Georgia Buchanan, North Railroad and West Airport), which were used as the basis for the MPU study.

The total area of the Boulder City Watershed is approximately 23 square miles (60 km²) and is completely within the Project Area. Drainage facilities in Boulder City consist primarily of detention basins and tributary facilities that collect and drain storm water to Lake Mead. To date a total of 26 basin and spillway facilities and 28 miles (45 km) of conveyance facilities have been constructed in Boulder City.

## 2.2 PROPOSED ACTION

The 1991 ROD for the FEIS for the CCRFCD Flood Control Master Plan chose the Detention/ Conveyance system as its selected alternative. "The selected alternative is characterized by a series of detention basins located around the perimeter of currently urbanized areas. These basins and associated dikes are designated to collect flood flows and release the flows at metered rates that can be handled by downstream conveyance facilities" (FEIS ROD, p. 2). Under the Proposed Action of the SEIS, the CCRFCD proposes to continue to develop a series of detention basins to reduce peak flows to levels that can be accepted by the existing downstream conveyance system with little or no major capacity improvements. The CCRFCD strongly encourages and promotes the preservation of natural stream channels and will utilize them if it is determined they can provide adequate protection from flooding. These improvements to flood control in the Valley will be assessed with respect to environmental consequences at the programmatic level in this SEIS document. Project-specific assessments will be determined on a case-by-case basis using tools developed in the MPU and SEIS processes. The recommended plans for each watershed are presented in the following subsections; however, these are subject to revision in final development. The comparative baseline for this SEIS is formed by the 1991 FEIS (BLM/CCRFCD 1991), the 1990 Master Plan (CCRFCD 1990), the 1996 MPU (CCRFCD MPU 1996), and the Boulder City MPU (PBS&J 1998). More details for specific project and study areas referenced in this section can be found in Volume 1 of the MPU (CCRFCD 2002) and the Boulder City MPU (CH2M Hill 2003). It is important to note that the construction of the facilities identified in the MPUs are anticipated to occur over the next 25 to 30 years depending on funding.

For the CCRFCD MPU the planned facilities will involve an area of approximately 4,570 acres (based on calculations derived from GIS estimates and data from the MPU) (CCRFCD 2002). The facilities are almost evenly distributed between BLM lands and non-BLM lands (Table 2.2-1). Further, the overwhelming majority of the facilities 4,244 of 4,571 acres area designated for CCRFCD projects in contrast to 327 acres designated for other agencies' (e.g., SNWA) projects (see Table 2.2-1).

The construction of individual facilities may be implemented and funded by private parties. The overall plan presented here and in the MPUs will guide the location and size of these facilities.

Acreages associated with planned projects are predictably largest for basins due to the larger dimensions of these facilities in contrast to conveyances. The conveyances and basins associated with the overall acreage disturbance estimates on BLM and non-BLM lands are presented in Table 2.2-2.

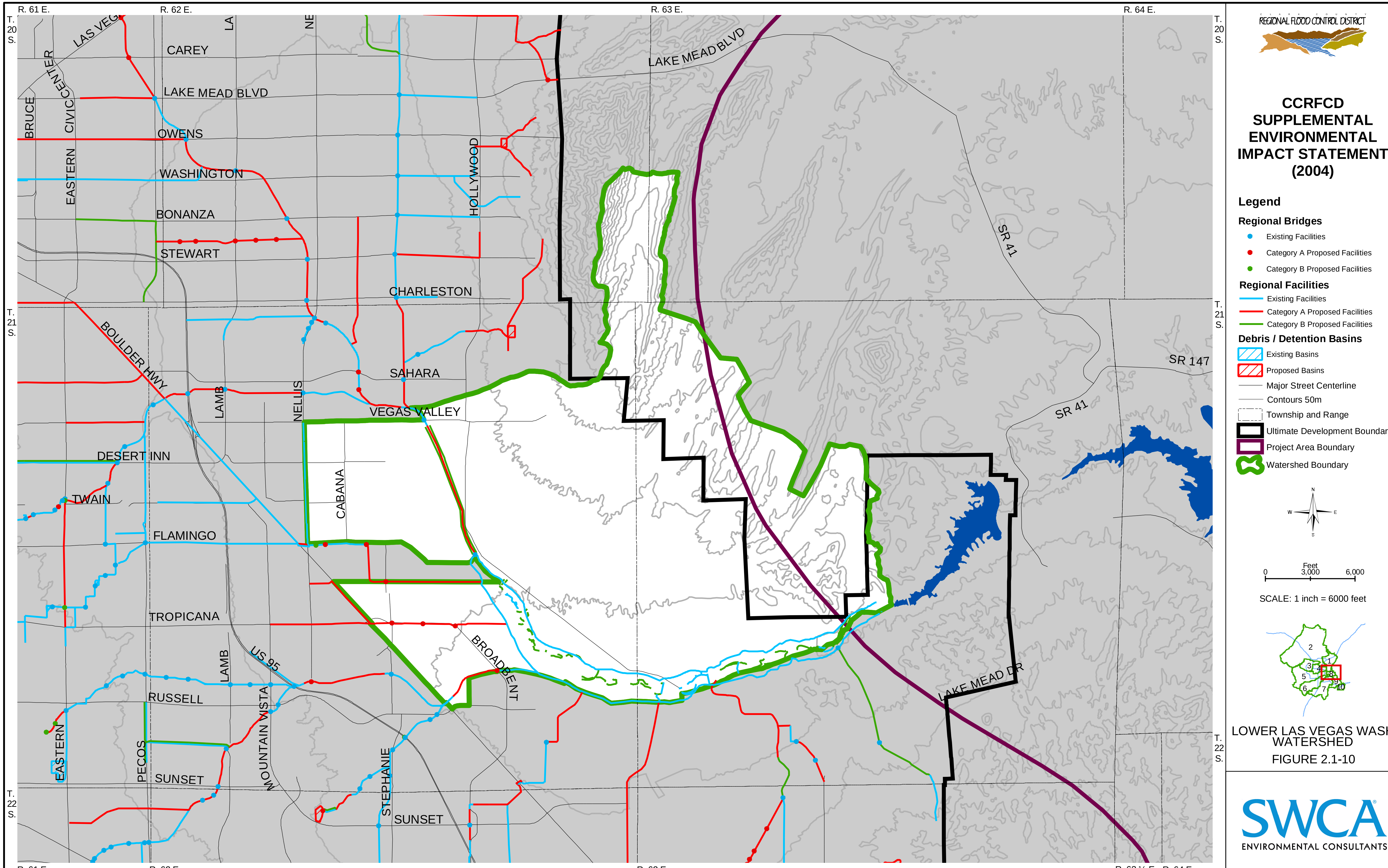
On BLM lands, the impacts associated with the temporary storage of spoil material and debris materials removed from facilities will be analyzed by BLM prior to ultimate disposal or removal. The overall purpose of presenting this information regarding the areas of disturbance has been to establish a comparative basis for the examination of impacts that will be discussed in Chapter 4 of this document.

## 2.2.1 Range Watershed Recommended Flood Control Plan

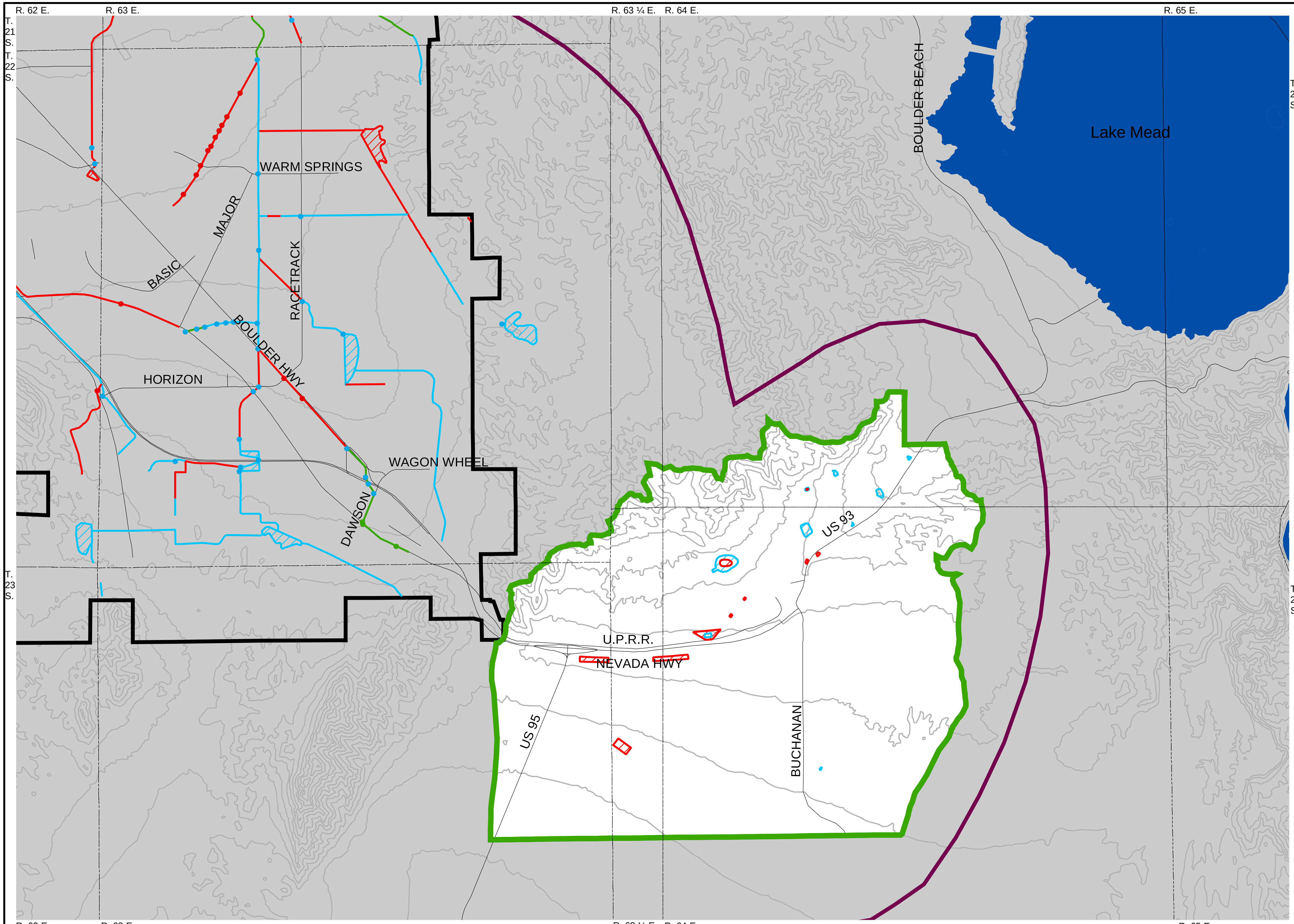
The Range Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-2). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the watershed. Areas of the recommended plan that have been significantly modified since the 1996 MPU are described in the following paragraphs.

### 2.2.1.1 Range Wash East Tributary

One new detention basin is proposed for this system. Dunes South Detention Basin is located downstream of the confluence of the main stem of the East Tributary and the Hollywood Branch. Dunes North Detention Basin is also located in this system. This proposed detention basin was named Dunes Detention Basin in the 1996 MPU. This detention basin was increased in size and the outflow was reduced. The conveyance system for the East Tributary is on the same alignment as the 1996 MPU except where Dunes South Detention Basin is located.



REGIONAL FLOOD CONTROL DISTRICT
CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)
Legend
Regional Bridges
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Regional Facilities
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Debris / Detention Basins
Existing Basins
Proposed Basins
Major Street Centerline
Contours 50m
Township and Range
Ultimate Development Boundary
Project Area Boundary
Watershed Boundary
Feet
0
3,000
6,000
SCALE: 1 inch = 6000 feet
LOWER LAS VEGAS WASH WATERSHED
FIGURE 2.1-10
SWCA
ENVIRONMENTAL CONSULTANTS
R. 61 E.
R. 62 E.
R. 63 E.
R. 64 E.
R. 63 ¼ E.
T. 20 S.
T. 21 S.
T. 22 S.
CAREY
LAKE MEAD BLVD
OWENS
WASHINGTON
BONANZA
STEWART
CHARLESTON
SAHARA
VEGAS VALLEY
DESERT INN
TWAIN
FLAMINGO
TROPICANA
RUSSELL
SUNSET
BRUCE
CIVIC CENTER
EASTERN
HOLLYWOOD
BOULDER HWY
LAMB
NELLIS
CABANA
BROADBENT
US 95
MOUNTAIN VISTA
PECOS
STEPHANIE
SR 41
SR 147
LAKE MEAD DR




## CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

**Legend**

**Regional Bridges**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Regional Facilities**
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities

**Debris / Detention Basins**
- Existing Basins
- Proposed Basins
- Major Street Centerline
- Contours 50m
- Township and Range
- Ultimate Development Boundary
- Project Area Boundary
- Watershed Boundary

Feet: 0, 3,000, 6,000

SCALE: 1 inch = 6000 feet

BOULDER CITY WATERSHED

FIGURE 2.1-11

SWCA ENVIRONMENTAL CONSULTANTS

**TABLE 2.2-1. Planned Flood Control Facility Acreages: Project Owners***

| Planned Facilities | Total Acres | BLM | Non-BLM |
|---|---|---|---|
| Total A-CCRFCD Owned Projects | 4,244 | 2,213 | 2,031 |
| Total B-Other Agency Owned Projects | 327 | 146 | 181 |
| **Total Acres** | **4,571** | **2,358** | **2,212** |

*See Appendix D for details.

**TABLE 2.2-2. Planned Flood Control Facility Acreages: Type of Facility***

| Planned Facilities | Total Acres | BLM | Non-BLM |
|---|---|---|---|
| Conveyances | 899 | 225 | 673 |
| Basins | 3,972 | 2,133 | 1,539 |
| **Total Acres** | **4,571** | **2,358** | **2,212** |

*See Appendix D for details.

#### 2.2.1.2 Northern Beltway

The area in the vicinity of the Northern Beltway includes two significant revisions to the recommended plan.

- Vandenberg North Detention Basin has been added at the intersection of the Beltway and Pecos. The outfall for this Detention Basin was also in the 1996 MPU, but as a channel rather than the 2002 MPU proposed storm drain.
- Beltway Detention Basin has been added at the intersection of the UPRR and the Beltway. The collector facilities for this Detention Basin are newly proposed for the 2002 MPU as well. The outfall channel was proposed in the 1996 MPU.

#### 2.2.1.3 Speedway Detention Basins

The area in the vicinity of Interstate 15, north of the Las Vegas Speedway, includes two significant revisions to the recommended plan.

- Speedway North Detention Basin has been added to the plan to relieve the excess flows caused by revised land use. This detention basin replaces Apex Detention Basin since the revised location of this detention basin captures and detains all areas tributary to the previously proposed location plus additional areas. The collector channel that runs parallel to the UPRR northwest of the Speedway North Detention Basin is also new to the plan.
- The collector channel for Speedway 2 Detention Basin has been extended approximately 2 miles (3 km) parallel to Interstate 15.

#### 2.2.1.4 Las Vegas Boulevard/Nellis Boulevard Intersection Area

The area near the Las Vegas Boulevard and Nellis Boulevard intersection includes two significant revisions to the recommended plan.

- A storm drain that runs in the Range Road alignment from approximately Ann Road to Las Vegas Boulevard and in Las Vegas Boulevard from Range Road to Nellis Boulevard has been added to plan.
- A storm drain that runs in Nellis Boulevard from the Washburn Road alignment to Sloan Channel has been added to the plan.

#### 2.2.1.5 North Neighborhood Study Area

The City of North Las Vegas North Neighborhood Flood Control Master Plan has a few newly proposed Master Planned Facilities within its boundaries, which have been added to the MPU. These facilities are:

- A proposed storm drain in Walnut Street from Centennial Parkway to the Vandenberg Detention Basin Collector Channel next to the UPRR.
- A proposed storm drain in Lamb Boulevard from Centennial to the Vandenberg Detention Basin Collector Channel next to the UPRR.
- A proposed storm drain in Centennial Parkway from Palmer Road to Pecos Road.

## 2.2.2 Northern Las Vegas Wash Watershed Recommended Flood Control Plan

The recommended flood control plan has changed a great deal from the 1996 MPU for areas north of Ann Road (see Figure 2.1-3). Areas south of Ann Road are generally the same as the 1996 MPU. Areas of the recommended plan that have been significantly modified since the 1996 MPU area are described in the following paragraphs.

### 2.2.2.1 Northwest Neighborhood Study Area

The City of Las Vegas Northwest Neighborhood Flood Control Master Plan Phases I and II areas, which are bounded by Decatur Boulevard on the east, Sheep Mountains on the north, Spring Mountains to the west and Ann Road to the south include several significant revisions to the recommended plan. The following facilities have been added:

- A proposed channel in the U.S. 95 ROW from the Ultimate Development Boundary to Moccasin Road.
- A proposed channel and berm system along the Ultimate Development Boundary from Durango Road to Decatur Boulevard with a collector channel that runs from the Ultimate Development Boundary south to the existing berm for Upper Las Vegas Wash Detention Basin along Moccasin Road near the Buffalo Drive alignment.
- A proposed channel in Moccasin Road from Sheep Mountain Road to the existing berm for Upper Las Vegas Detention Basin along Moccasin Road.
- A proposed channel in Sheep Mountain Road from Iron Mountain Road to Moccasin Road.
- A proposed storm drain in Kyle Canyon Road from Sheep Mountain Road to Moccasin Road.
- A proposed storm drain in Hualapai West from Horse Drive to Kyle Canyon Road.
- A proposed storm drain in Iron Mountain Road from Homestead Road to Mountain Spa.
- A proposed storm drain in Log Cabin Way from Cimarron Road to Buffalo Drive.
- A proposed storm drain in Buffalo Drive from Log Cabin Way to Iron Mountain Road.
- A proposed storm drain in U.S. 95 from Brent Lane to Elkhorn Road to connect with Centennial West Channel.
- A revised alignment for the Kyle Canyon Outfall in Grand Teton Drive to U.S. 95 and in U.S. 95 from Grand Teton Drive to Centennial Parkway connecting to the Centennial Parkway Channel West.
- A proposed storm drain in Iron Mountain Road from Moccasin Road to Las Vegas Wash.
- A proposed channel in the Severance alignment from Tenaya Way to Rainbow Boulevard.
- A proposed storm drain in Hualapai West from Farm Road to Elkhorn Road.
- A proposed storm drain in Elkhorn Road from Hualapai West to Hualapai Way.
- A proposed storm drain in Buffalo Drive from Farm Road to Elkhorn Springs Detention Basin.
- A proposed storm drain in Decatur Boulevard from Farm Road to Elkhorn Road.
- Addition of the existing Elkhorn Springs Detention Basin and associated outfall facilities from (local to regional) near the intersection of Buffalo Drive and Severance Lane.

- The existing Mountain Spa/Vista Ranch Channel between Iron Mountain Road and Grand Teton Drive.
- Many facilities are on the same alignment as the 1996 MPU but have been changed to storm drains rather than channels.

#### 2.2.2.2 Northern Beltway (Clark County 215)

The area adjacent to the Northern beltway between Centennial Parkway and 5th Street includes several significant revisions to the recommended plan.

- The facilities between Fort Apache Road and Centennial Parkway, including Fort Apache Detention Basin, have been added. Some of the area tributary to these facilities was shown in the Gowan Watershed in the 1996 MPU.
- The facilities in the beltway alignment between U.S. 95 to Rainbow Boulevard have been added. These facilities are connected with the Kyle Canyon Outfall.
- Culvert crossings between Rainbow Boulevard and Decatur Boulevard have been added.
- The proposed facility between Valley and Allen has been added.
- The alignment of the facilities between Allen and 5th Street have been changed to match the current proposed beltway alignment. In addition many culvert crossings have been added in this area.

#### 2.2.2.3 North Neighborhood Study Area

The City of North Las Vegas North Neighborhood Flood Control Master Plan which is bounded on the north by Grand Teton Drive, on the west by Decatur Boulevard, on the south by Craig Road, and to the east by the UPRR includes several significant revisions to the recommended plan. The following facilities have been added:

- A proposed channel from Clayton Road to the Las Vegas Wash in the Whispering Sands and Farm Road alignments.
- A proposed storm drain starting at the Goldfield/Deer Springs intersection and ending at the 5th Street/Centennial Parkway intersection.
- A revised alignment for Las Vegas Wash between North Las Vegas Detention Basin and Craig Road as well as culvert crossings not in the 1996 MPU.
- Portions of the Centennial Parkway Channel East and Ann Road Channel East are proposed as storm drains rather than channels.

#### 2.2.2.4 North Las Vegas Detention Basin

A channel and levee system has been proposed north of North Las Vegas Detention Basin. This east-west facility is located in the Moccasin Road alignment from Commerce to Lamb and drains to a channel in a north/south alignment along Losee Road.

A channel and levee system has been added in the Moccasin Road alignment from Commerce west to the Upper Las Vegas Wash Detention Basin, which collects and discharges flows to the Detention Basin. In the 1996 MPU this area drained directly to the North Las Vegas Detention Basin and not the Upper Las Vegas Wash Detention Basin.

### 2.2.3 Gowan Watershed Recommended Flood Control Plan

The Gowan Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-4). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the watershed. Areas of the recommended plan that have been significantly modified since the 1996 MPU are described in the following paragraphs.

#### 2.2.3.1 Summerlin West

The area west of the beltway between Charleston Boulevard and Summerlin Parkway has been revised based on the development plan for Summerlin West and the Master Plan amendment completed for that area. Three revisions have been made for the Summerlin West Plan:

- Modifications to conveyance facility alignments
- Elimination of Summerlin Detention Basin #4
- Enlargement of Summerlin Detention Basin #5

#### 2.2.3.2 Northwestern Beltway (Clark County 215)

The area adjacent to and west of the northwestern beltway between Lone Mountain Road and Centennial Parkway includes two significant revisions to the recommended plan.

Proposed detention basins have been added at the intersection of Lone Mountain Road and the beltway and at the outlet of Box Canyon. Both of these detention basins take advantage of existing gravel pits. Based on analyses completed prior to the 2002 MPU and field inspection it appears that the Box Canyon Detention Basin has enough storage capacity to retain the 100-year runoff. However, the ROW for this detention basin has not yet been acquired and the gravel operations are ongoing. Therefore, future acquisition and analysis of this detention basin will be required.

Conveyance facility alignments in this area have also been revised to convey all runoff west of the beltway to the detention basin at the intersection of Lone Mountain Road and the beltway. In addition, a small portion of the watershed north and west of the beltway in the vicinity of Centennial Parkway has been diverted to the Northern Las Vegas Wash Watershed and now drains to the Rancho Detention Basin through a newly proposed channel along the beltway. This area was previously proposed to drain to the Gowan North Channel.

#### 2.2.3.3 U.S. 95/Rancho Drive/Alexander Road

The area in the vicinity of U.S. 95, Rancho Drive and Alexander Road between Gowan Road and Lone Mountain Road includes several significant revisions to the recommended plan.

- A regional channel has been added to the recommended plan along the west side of U.S. 95 between Lone Mountain Road and Gowan Road. An unlined channel currently exists at this location and it has been included in the 2002 MPU as a regional facility.
- The proposed facility in Alexander Road that ended at Rancho Drive in the 1996 MPU has been extended north along Rancho Drive to Craig Road and then west to the channel along U.S. 95. This facility will collect flow in the U.S. 95 channel at Craig Road.
- The facilities at the intersection of Alexander Road and Decatur Boulevard have also been modified due to capacity constraints of existing facilities in that area. In the 1996 MPU the proposed Alexander facility drained to the intersection from the west and connected to the existing Gowan Outfall, which then drains north to Lone Mountain Road. At the same time, flow draining to the intersection from the south in the existing Gowan Outfall was diverted to a proposed facility in Alexander, east of the intersection. This facility plan is no longer an option due to the limited capacity of the Gowan Outfall in Lone Mountain Road downstream of this intersection. Therefore, the facility plan has been modified so that all flow draining to this intersection from the south and west will be diverted to the proposed facility in Alexander, east of the intersection.

### 2.2.4 Central Watershed Recommended Flood Control Plan

The Central Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-5). The Central Watershed flows were significantly affected by the updated hydrologic criteria and associated HEC-1 models. The inadequate capacity of many existing facilities requires mitigation in the form of either parallel facilities or removal and replacement of existing facilities with larger capacity facilities. In areas where these alternatives were not feasible, diversions or new alignments were used. Areas of the recommended plan that have been significantly modified since the 1996 MPU are described in the following paragraphs.

#### 2.2.4.1 Smoke Ranch/Carey

The existing facilities in Smoke Ranch Road and Lake Mead Boulevard west of Rancho Drive are both undersized. A facility is proposed at Torrey Pines Drive and Lake Mead Boulevard to take flows to the Smoke Ranch system. The Smoke Ranch system will be replaced with a proposed facility in Smoke Ranch Road from Torrey Pines Drive to Rancho Drive. The Carey/Lake Mead Detention Basin outfall in Smoke Ranch Road is proposed to be replaced from the Carey/Lake Mead Detention Basin to approximately 500 feet (152 m) west of the Freeway Channel.

#### 2.2.4.2 Owens Avenue East

A new facility is proposed in 4th Street between Washington and Owens, which then turns east in Owens to Las Vegas Wash. This facility will capture excess discharge from the existing Washington Avenue Channel.

#### 2.2.4.3 U.S. 95

The proposed Las Vegas Creek facility in U.S. 95 has been revised based on the 30 percent design plans. A new feature for this system is Rainbow Detention Basin at the intersection of Rainbow and U.S. 95.

#### 2.2.4.4 Meadows/Alta Parallel Facility

A new parallel facility for the Meadows/Alta system is proposed. This facility will capture excess discharge in Alta at Jones, and take this flow south to Evergreen. At Evergreen, this facility runs east towards Bedford, where the facility turns north towards the existing Meadows/Alta Facility.

#### 2.2.4.5 Meadows/Oakey Drain

This proposed facility was added by a previous MPU amendment and generally follows a north/south alignment from Sahara to the Meadows Detention Basin. It will capture flow that currently drains east toward the Freeway Channel and discharge it to the Meadows Detention Basin.

#### 2.2.4.6 Sahara Diversion

A facility has been proposed in Sahara from Interstate 15 to Boulder Highway. This facility will divert excess flows from the existing Freeway Channel to Flamingo Wash.

#### 2.2.4.7 Cedar Avenue Channel

This existing facility and its entire collection system is proposed to be upsized.

### 2.2.5 Flamingo/Tropicana Watershed Recommended Flood Control Plan

The Flamingo/Tropicana Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-6). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the watershed. Areas of the recommended plan that have been significantly modified since the 1996 MPU are described in the following paragraphs.

#### 2.2.5.1 Summerlin South

The area west of Hualapai Way between Sahara Avenue and Russell Road has been revised based on recent development and the current planning information available for this area. The revisions consist largely of modifications to conveyance facility alignments and sizing.

#### 2.2.5.2 Blue Diamond Channel

The outfall from the Blue Diamond Detention Basin is maintained as a natural conveyance facility. To mitigate the potential sedimentation problems that occur with such systems, a debris basin has been added upstream of the channel improvements in Durango Road. This will reduce the sediment load on the downstream improvements.

#### 2.2.5.3 Flamingo/Valley View System

The area bounded by Rainbow Boulevard, Desert Inn Road, Interstate 15 and Flamingo Road has been modified to alleviate downstream flooding. Twain Avenue conveys the storm flows from this area to the intersection of Twain Avenue and Valley View Boulevard. In the 1996 MPU, the storm flows were routed from this point to the Flamingo Wash. However, the original Master Plan directed the storm flows at this intersection north to the Central Watershed.

An existing 48-inch (122 cm) storm drain has capacity to convey approximately 210 cubic feet per second (cfs) south to the Flamingo Wash. However, through research and field visits it was determined that storm flows in excess of the existing 48-inch (122 cm) storm drain will continue north into the Central Watershed. A parallel conveyance facility is proposed in Twain Avenue to alleviate flooding in this area. The proposed storm drain will convey storm flows north to the Central Watershed. In addition, a parallel facility to increase conveyance capacity to the Flamingo Wash is proposed in Flamingo Road.

#### 2.2.5.4 Desert Inn Drain East

A parallel facility is proposed for this system to alleviate severe flooding of the surface streets.

#### 2.2.5.5 Tropicana Wash–North Branch

A detention basin has been added to the Tropicana Wash-North Branch as a solution to the existing flooding problems downstream in the Tropicana Wash at the existing culvert under Interstate 15.

#### 2.2.5.6 Tropicana Wash–McCarran Branch

The Tropicana Wash-McCarran Branch system includes two significant revisions to the recommended plan.

- The confluence of the Tropicana Wash-McCarran Branch with the Tropicana Wash is located near Paradise Road and Harmon Avenue. This area is located downtown in the hotel/casino corridor. At the request of Clark County Public Works (CCPW), a detention basin has been added to the Tropicana Wash-McCarran Branch to reduce the potentially massive confluence structure that would otherwise be required at this point.
- Parallel facilities are recommended along this system to increase conveyance capacity.

#### 2.2.5.7 Maryland Parkway

A storm drain facility has been added in Maryland Parkway extending from the Flamingo Wash south to University Road. This facility intercepts storm flows from the west and conveys these flows directly to the Flamingo Wash. Currently, these flows continue east where the Van Buskirk System intercepts them.

#### 2.2.5.8 Van Buskirk System

The existing Van Buskirk conveyance/detention system failed to meet the criteria established for the 2002 MPU in several areas, including insufficient storage volume in the two detention basins.

Several options were considered for this system, including the addition of detention facilities, conveyance facilities and combinations of these solutions. The difficulty lies in the fact that this area is fully developed. Little land is available for additional detention facilities and avoidance of underground utilities will provide a challenge for design of conveyance systems. The recommended solution for this system consists of an additional storm drain in Eastern Avenue extending from the Flamingo Wash south to Tropicana Avenue. This facility will convey storm flows in Eastern Avenue directly to the Flamingo Wash, bypassing the Van Buskirk system. With this additional conveyance system, the existing Van Buskirk facilities meet the 2002 MPU criteria.

#### 2.2.5.9 Colorado Avenue

With the Colorado Avenue Storm Drain project, a regional facility was added in Boulder Highway which routes storm flows from the Central Watershed to the Flamingo Wash. This area has been added to the HEC-1 models for the Flamingo Wash. This impacts the peak flows in the Flamingo Wash downstream of Boulder Highway. This change was coordinated with the Central Watershed.

#### 2.2.5.10 Nellis Boulevard

This facility was originally designed as a 10-year system, although it was included in the previous MPU. A parallel facility is proposed for this system to alleviate severe flooding of the surface streets.

### 2.2.6 Duck Creek/Blue Diamond Watershed Recommended Flood Control Plan

The Duck Creek/Blue Diamond Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-7). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the described in the following paragraphs.

#### 2.2.6.1 Southern Highlands Master Plan Area

The area south of Cactus Avenue, west of Interstate 15 and east of the UPRR has been revised based on the Southern Highlands Master Plan. The revisions include:

- The Central Duck Creek Detention Basin Phase I has been moved to match the location of the constructed detention basin. The location of the constructed detention basin is 0.5 miles (0.8 km) south of the 1996 MPU location.
- The inflow and outflow conveyance facilities have been modified to accommodate the relocation of the detention basin. The proposed downstream conveyance facilities for the Central Duck Creek Detention Basin daylight to the existing Paseo Drainage Channel.
- The constructed alignment for the Paseo Drainage Channel is also different from the 1996 MPU.
- The Bruner Detention Basin is an adopted regional facility located at the south boundary of the Southern Highlands development. The outfall from the Bruner Detention Basin drains into the Valley View Boulevard Storm Drain System. A parallel storm drain is proposed for the Valley View Boulevard Storm Drain System to increase the conveyance capacity to meet 2002 MPU criteria. The parallel storm drain extends from Southern Highlands Parkway to the Paseo Drainage Channel.

#### 2.2.6.2 Buffalo Drive/Cactus Avenue

The proposed regional facilities near the future intersection of Buffalo Drive and Cactus Avenue have been relocated onto BLM property. Relocating these facilities provides a more economic alternative.

#### 2.2.6.3 Lower Blue Diamond Detention Basin Area

The proposed Lower Blue Diamond Detention Basin has been relocated 1 mile (1.6 km) west of the original location, adjacent to the UPRR between Robindale Road and Windmill Lane. The new location is on BLM property, providing a better economic alternative to the original location.

The downstream conveyance facilities have been modified to accommodate the new detention basin location. The revised alignment runs east in Robindale Road, south in Valley View Boulevard, and east in Windmill Lane. The upstream conveyance facility has been relocated to the west side of the UPRR. The relocation of this facility requires a new crossing at Blue Diamond Road.

### 2.2.7 Pittman Watershed Recommended Flood Control Plan

The Pittman Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-8). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the watershed. Areas of the recommended plan that have been significantly modified since the 1996 MPU are described in the following paragraphs.

#### 2.2.7.1 Anthem Master Plan Community

The area south of St. Rose Parkway has been updated to reflect the development plan for the Anthem Master Plan Community. The revisions include the following:

- The Pittman Anthem Detention Basin is proposed to protect development within and downstream of the Anthem development.
- The Pittman Anthem Channel is proposed to convey flows from the proposed Pittman Anthem Detention Basin to the McCullough Hills Detention Basin, approximately 3 miles (5 km) downstream.
- In the south portion of Anthem, collection facilities for the Pittman East Detention Basin have been added to the 2002 MPU. These facilities will help protect downstream future development within the City of Henderson Annexation Area.

#### 2.2.7.2 Seven Hills

Within the Seven Hills development, three channel systems have been added to the 2002 MPU at the request of the City of Henderson:

- Pittman Seven Hills Channel
- Pittman Green Valley Channel
- Pittman Anthem Parkway Channel

These systems protect existing and future development from storm flows.

#### 2.2.7.3 City of Henderson Annexation Area

The area south of St. Rose Parkway between Interstate 15 and Maryland Parkway has been revised to incorporate the current development plan by the City of Henderson. The revisions to the 2002 MPU to accommodate the development plan are extensive and include the following:

- The Pittman Southeast Detention Basin is proposed at the southwest corner of the Anthem Master Plan Community to protect future development in the Annex area.
- The Pittman East Channel has been added to convey the outflow from the Pittman Southeast Detention Basin to the Pittman East Detention Basin.
- The Pittman Southeast Channel has been added as a collection facility to the Pittman East Detention Basin.

- The proposed Pittman North Detention Basin (labeled the Southwest Pittman Detention Basin in the 1996 MPU) has been relocated south to better fit into the City of Henderson Development Plan.
- The Pittman South Detention Basin is proposed approximately 2 miles (3 km) southwest of the Pittman North Detention Basin to protect future development within the annex area.
- The Pittman South Channel facilities have been added to convey the outflow from the Pittman South Detention Basin to the Pittman North Detention Basin.
- The Pittman South Channel extends south of the Pittman South Detention Basin to act as a collection facility within the Annex area.

#### 2.2.7.4 Pittman Stephanie Debris Basin

The Pittman Stephanie Detention Basin has been eliminated from the 1996 MPU recommended plan and replaced with a debris basin proposed at the same location. The detention basin was removed from the Master Plan because the downstream facilities have already been constructed with the capacity to convey the peak storm flows without the detention basin in place.

#### 2.2.7.5 Pittman MacDonald Ranch Channel

The existing Pittman MacDonald Ranch Channel has been realigned to follow the actual alignment through the existing Desert Willows Golf Course from Horizon Ridge Parkway to Valle Verde Drive.

#### 2.2.7.6 Pittman Desert Willows Facility

The existing Pittman Desert Willows Golf Course Channel, Detention Basin and Storm Drain have been added to the 2002 MPU at the request of the City of Henderson. The golf course channel collects runoff from the McCullough Range and conveys the runoff to the Pittman Desert Willows Detention Basin. The Desert Willows Storm Drain conveys the outflow from the detention basin down Horizon Ridge Parkway to the Pittman MacDonald Ranch Channel system.

#### 2.2.7.7 Collection Facilities for the Pioneer Detention Basin

The existing Pittman Gas Line Road system, the existing Pittman Pioneer Detention Basin conveyance system, the partially constructed Pittman Horizon Ridge Parkway system and the future Pittman West Horizon Ridge Parkway system have been added to the 2002 MPU at the request of the City of Henderson.

#### 2.2.7.8 Pittman Foothills Drive System

The existing Pittman Foothills Drive system has been added to the 2002 MPU coverage at the request of the City of Henderson. This system extends south to the Foothills at MacDonald Ranch subdivision and is tributary to the Railroad East Detention Basin.

#### 2.2.7.9 Pittman Pabco Detention Basin

At the intersection of Pabco Road and Boulder Highway, the existing culvert under Boulder Highway does not have the capacity to convey the runoff generated in the area between Van Wagenen Street and Boulder Highway. A detention basin has been proposed at this location to reduce the peak flow to this culvert and the downstream Pabco Channel.

#### 2.2.7.10 Whitney Wash Duck Creek Detention Basin

A proposed detention basin has been added north of the Sunset Road and Arroyo Grande intersection at the request of the City of Henderson. The purpose of this detention basin is to protect the future City of Henderson Golf Course currently under design for this area.

#### 2.2.7.11 Eastern Avenue Storm Drain System

The existing storm drain facilities in Eastern Avenue between Interstate 215 and St. Rose Parkway have been added to the recommended plan. These facilities begin at an existing splitter structure north of St. Rose Parkway adjacent to Eastern Avenue. The flow from this splitter structure is divided to the Pittman Eastern conveyance system, which is already included as an MPU facility, and the Pittman Beltway Channel. The storm flows from these two facilities recombine at the intersection of Eastern Avenue and Interstate 215. Therefore, the system was added because it conveys significant storm flows from one MPU facility to another.

### 2.2.8 C-1 Watershed Recommended Flood Control Plan

The C-1 Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-9). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the watershed. Areas of the recommended plan that have been significantly modified since the 1996 MPU are in the following paragraphs.

#### 2.2.8.1 C-1 Channel

The C-1 Channel alignment north of Lake Mead Drive has been revised based on the development plan for the Tuscany Hills subdivision.

#### 2.2.8.2 C-1 Channel–Equestrian Detention Basin Outfall

The C-1 Channel-Equestrian Detention Basin Outfall alignment adjacent to the C-1 Channel has been revised to minimize impacts to Racetrack Road and Burkholder Boulevard. The alignment extends from the intersection of Newport Drive and Racetrack Road through an existing BLM parcel to the C-1 Channel at Burkholder Boulevard.

#### 2.2.8.3 C-1 Channel–Ithaca

The C-1 Channel-Ithaca storm drain alignment has been revised between the C-1 Channel and Racetrack Road. The realignment of this facility reduces the length and therefore the cost.

#### 2.2.8.4 C-1 Channel-Equestrian Tributary 1

A regional storm drain system has been added to the recommended plan along Equestrian Drive between Magic Way and Appaloosa Road. This facility will intercept flows from the area north of Boulder Highway and west of the C-1 Channel-Equestrian Detention Basin Outfall dike.

#### 2.2.8.5 C-1 Channel–Four Kids

A regional channel has been added to the recommended plan between the C-1 Channel at Dusan Way to the intersection of Racetrack Road and Athens Avenue. This facility will intercept flows north of Ithaca Avenue and will convey flows through the proposed Athens Commons subdivision south of Lake Mead Drive. An existing earth bottom channel with vertical rock walls comprises a portion of the northern part of this facility and the channel is recommended to remain.

#### 2.2.8.6 C-1 Channel–Lake Mead Drive

A new regional channel has been added to the recommended plan along the east side of Lake Mead Drive between Burkholder Boulevard to the south and the intersection of the C-1 Channel and Cadiz Avenue. This facility will intercept flows from the area north of Boulder Highway and west of the C-1 Channel. Reinforced box culverts have also been added along this facility to maintain access to Lake Mead Drive from the east.

#### 2.2.8.7 C-1 Channel–U.S. 95 and C-1 Channel–U.S. 95 Tributary 1

A new Regional channel has been added to the recommended plan along the south side of U.S. 95 between College Drive to the east and Laguna Landing to the west. This channel extends from the northern portion of Paradise Hills subdivision to the U.S. 95/College Drive Interchange. A tributary storm drain facility has also been added that will extend from the U.S. 95 channel to the existing storm drain facility north of the intersection of Patti Ann Woods Drive and Greenway Road. This tributary facility will collect flows from the southern portion of the Paradise Hills subdivision and the area south of Foothills Parkway between Greenway Road to the east and Horizon Ridge Parkway to the west.

#### 2.2.8.8 Lake Las Vegas-Magic Way

A new Regional facility has been added to the recommended plan from the Las Vegas Wash south to an existing channel constructed by the SNWA. This facility collects flows from the River Mountains and areas north and south of Lake Mead Drive.

### 2.2.9 Lower Las Vegas Wash Watershed Recommended Flood Control Plan

The Lower Las Vegas Watershed actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures (see Figure 2.1-10). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the watershed. Areas of the recommended plan that have been significantly modified since the 1996 MPU are as follows:

#### 2.2.9.1 Duck Creek Wash

The Duck Creek Wash downstream of Boulder Highway has been revised to reflect the Duck Creek Phase II improvements and the Duck Creek Phase III 30 percent design plans. Downstream of Broadbent Boulevard the channel has been changed from a proposed gabion-lined facility to an existing natural wash to reflect current Wetlands Park planning.

#### 2.2.9.2 Las Vegas Wash

Subsequent to the completion of the 1996 MPU the Las Vegas Wash Facilities Study has been completed for the Las Vegas Wash from Lake Mead Boulevard to the Service Road at Rochelle. Facility types and sizes for the 2002 MPU have been adopted from the Facilities Study. However, since 2002 MPU design flows are higher than those used in the Facilities Study, riprap levees have been added along both banks of the unlined channel between Vegas Valley Drive and the Service Road in order to meet 2002 MPU criteria. All other facilities meet MPU criteria.

The SNWA has taken charge of design of facilities along the Las Vegas Wash between the Service Road and Lake Las Vegas. Therefore, these facilities were not analyzed with the 2002 MPU.

### 2.2.10 Boulder City Watershed Recommended Flood Control Plan

The Boulder City actions would involve the continuation of programmatic assessments and construction of detention and conveyance structures consistent with the original 1998 MPU and subsequent 2003 MPU (CH2M Hill 2003) (see Figure 2.1-11). The recommended flood control plan is generally the same as the 1996 MPU for the majority of the watershed. Areas of the recommended plan that have been significantly modified since the 1996 MPU are described in the following paragraphs.

#### 2.2.10.1 Trailhead Detention Basin Diversion Berm

This proposed facility was originally in the Boulder City MPU and is retained in the 2003 MPU. There is an existing unlined berm into the southwest of the Trailhead Detention Basin. The berm varies in height and has a small ditch on its upstream side. The purpose of the berm is to collect and convey flow from the mountains northwest of the detention basin, and highly erosive velocities make it an ideal candidate for riprap lining. The riprap lining of the Trailhead Detention Basin Diversion Berm is listed as the proposed facility.

#### 2.2.10.2 Upper Lake Mountain Channel Grate Inlet

This proposed facility was originally planned in the 1998 MPU and is retained for the 2003 MPU. It is a concrete channel that lies on the north side of the Lake Mountain Estates Subdivision and terminates at the north end of Lake Mountain Drive. The proposed modification includes lengthening the grate inlet and catch basin by 40 feet (12 m).

#### 2.2.10.3 Hemenway Channel

The remaining portions of the Hemenway Channel that have not been completed are those west of Lake Mountain Road and east of Pacifica Way.

#### 2.2.10.4 Lake Mead View Estates

A proposed improvement to the existing natural wash in the Lake Mead View Estates drainage basin will be the construction of a grouted riprap channel. This facility will collect basin flows and flows from existing conveyances and direct them to Hemenway Wash.

#### 2.2.10.5 Buchanan Channel

While most of the modifications of the channel are complete there are two culvert crossing replacements that are required.

#### 2.2.10.6 Vaquero Drive Bridge

The Vaquero Drive Bridge across the Georgia Channel connecting Vaquero Drive and Georgia Drive was proposed in the 1998 MPU and remains in the 2003 MPU.

#### 2.2.10.7 Buchanan Boulevard Crossing of the Georgia Wash

The existing Buchanan Avenue crossing of the Georgia Wash consists of three corrugated metal pipes, which do not have the capacity to convey 100-year event flood flows. The recommendation to replace the existing crossing at Buchannan Avenue and Georgia Wash is carried into the 2003 MPU.

#### 2.2.10.8 Veteran's Memorial Drive

The extension of Veteran's Memorial Drive from Adam's Drive to the intersection of Georgia Avenue and Buchanan Boulevard is a recent modification impacting flows in Boulder City. An extension to a soil cement channel is proposed to convey flows past the boundary of the existing wastewater treatment plant, and a diversion berm and associated facilities are planned in the 2003 MPU.

#### 2.2.10.9 Bootleg Detention Basin

This existing 95 acre-foot capacity detention basin is recommended for improvements, including the removal of stockpiled material in the bottom of the basin, relocation of the outlet pipe to the bottom of the basin and construction of associated berms and channels.

#### 2.2.10.10 Industrial Road Diversion Berm

The existing system along Industrial Road has limited capacity; the 2003 MPU facilities propose a system to relieve the problem with the following components:

- Lining the existing berm with riprap
- Extension of the berm

- Construction of a reinforced concrete box to convey flow under Yucca Street
- Construction of a berm on the west side of Yucca Street
- Continuing southwest to Industrial Road

Enhancements will include:

- Grouted riprap-lined berm on the south side of Industrial Road
- Construction of a sedimentation basin north of Industrial Road and east of Yucca Street crossing

#### 2.2.10.11 Railroad Detention Basin

The basin is located north of the railroad tracks near the end of Industrial Road and has a current storage volume of approximately 27 acre-feet. It is proposed that this basin be increased in size to provide 125 acre-feet of storage. In addition, a concrete spillway and an outfall pipe are proposed.

#### 2.2.10.12 Railroad Channel

The Railroad Channel would involve the construction of a concrete-lined channel from Canyon Road on the upstream end, west to the Bootleg Detention Basin on the downstream end. The proposed channel will collect flow between the railroad tracks and the Industrial Road diversion berm.

#### 2.2.10.13 Adams Boulevard Facilities

The Adams Boulevard Facilities involve improvements to conveyances at the south end of Yucca Street and along Veteran's Memorial Drive.

#### 2.2.10.14 Red Mountain Drive Facilities

This facility will be a conveyance improvement to collect discharge from a conveyance and discharge it to an existing riprap channel.

#### 2.2.10.15 Airport Facilities

Proposed improvements at the airport include the following:

- Construction of concrete channels west of the airport runway
- Construction of a reinforcement concrete box under a proposed roadway construction of a channel to convey flow from the west into the proposed channel.

#### 2.2.10.16 BB, CC and DD Facilities

These large-scale facilities are associated with the management of large areas of undeveloped land in the area of the Boulder City Airport. These are:

- DD facilities, which center on the WADD 0165 Detention Basin and associated conveyances
- CC facilities, which center on the WAC 1066 Detention Basin and associated conveyances
- BB facilities, which center on the WACC 0000 Detention Basin that combines the flows from CC and DD and conveys outflow to the southwest

## 2.3 NO-ACTION ALTERNATIVE

For purposes of NEPA analysis, a No-Action Alternative is required to analyze the comparative consequences associated with the Proposed Action and any other alternatives. For the purposes of the CCRFCD SEIS, the No-Action Alternative provides the current 2003 programmatic baseline. Due to the programmatic nature of the SEIS and the existing site-specific process for evaluating individual projects for specific, significant environmental consequences, the No-Action Alternative should be considered as a basis for comparison.

Under this alternative, the CCRFCD would continue to manage floodwater control projects in the Las Vegas Valley and Boulder City. Flood control facilities would continue to be built and maintained by local developers and local municipalities without consideration of construction of a system of integrated and standardized facilities. Under this alternative, flood episodes would likely become more severe as urban growth continues, resulting in greater property damage and loss of life.

The No-Action Alternative is the unmodified implementation of the 1996 MPU for Las Vegas Valley (PBS&J 1997) and the 1998 MPU for Boulder City (PBS&J 1998). This alternative would have the potential for negative impacts to surface water runoff and flooding in both areas. Facilities that were previously planned were designed to manage flood flows that were estimated based on outdated land use criteria and ultimate land development plans, as well as less flood flow monitoring data.

# CHAPTER 3: AFFECTED ENVIRONMENT

## INTRODUCTION

This chapter presents the current environmental conditions within the Project Area with respect to the changes that have occurred since the publication of the FEIS (BLM/CCRFCD 1991) and to the Proposed Action and No-Action Alternative in the Project Area. Since this document is a programmatic document for which subsequent project-specific reports will be prepared, the level of detail presented in this chapter is on the valley-wide level, appropriate to the nature of the programmatic impact assessments, which will be made in Chapter 4. The detailed process for assessing the specific environmental properties and impacts at individual project locations is outlined in Chapter 8 of this document.

## 3.1 GEOLOGY AND SOILS

### 3.1.1 Physiography

The majority of the proposed flood control facilities are located in the Las Vegas Valley, Clark County, Nevada. The valley is within the Great Basin region of the Basin and Range physiographic province of southern Nevada. Several proposed flood control facilities are located southeast of Las Vegas Valley in the northern portion of Eldorado Valley and in a small unnamed valley north of Boulder City.

#### 3.1.1.1 Las Vegas Valley Physiography

The Las Vegas Valley is surrounded by steep, rugged mountain ranges. Surface elevations of the Valley floor range from approximately 1,540 feet (469 m) in Las Vegas Wash to 2,400 feet (732 m) above mean sea level (Donovan and Katzer 2001). The basin is bordered on the north by the Las Vegas Range, with a peak elevation of approximately 7,000 feet (2,134 m), and on the east by the Frenchman, Sunrise, and River Mountains, with peak elevations ranging 3,000 to 4,000 feet (914 to 1,219 m). The western boundary of the valley is formed by the Spring Mountains, which attain a maximum elevation of 11,918 feet (3,633 m) at Charleston Peak. The southeastern boundary is the McCullough Range with a peak elevation of 5,000 feet (1,524 m). Low hills and the Bird Spring Range bound the basin on the southwest. The cities of Las Vegas, Henderson and North Las Vegas and Nellis AFB are located in the alluvial valley in the central and southern parts of the basin.

Extensive coalescing alluvial fans extend from the surrounding mountain ranges to the floor of the Las Vegas Valley. These fan surfaces have gentle slopes of about 1.5 to 3 percent. The valley floor is relatively flat with a slope of less than 1 percent to the southeast. Three major and numerous minor escarpments trending north to south and northwest to southeast cut through or border the valley. These escarpments vary in relief from approximately 5 to 150 feet (2 to 46 m), with the lower side generally on the east or northeast.

Several major drainage channels (washes) dissect the Las Vegas Valley and have locally eroded channels up to 30 feet (9 m) deep into the bajada and valley floor alluvium. These washes include Duck Creek, Tropicana Wash, Flamingo Wash and Las Vegas Wash. They are tributaries of Las Vegas Wash, which drains from north to south near the eastern edge of the valley floor and extends to the southeast out of the basin to Lake Mead. Surface water flow in the basin occurs only locally, due to wastewater discharges and runoff from urban areas and shallow groundwater seepage, except during and immediately following periods of runoff due to rainfall in the basin or surrounding mountains.

#### 3.1.1.2 Boulder City Area Physiography

Proposed flood control facilities in the Boulder City area are located in the northernmost portion of Eldorado Valley and the small unnamed valley north of Boulder City. The Eldorado Valley is bounded by the River Mountains to the north, the Eldorado Mountains to the east and the McCullough Range to the west. Surface elevations in the vicinity of proposed flood control facilities located near Boulder City range 2,000 to 3,200 feet (607 to 975 m) above mean sea level.

Coalescing alluvial fans extend from the River Mountains, McCullough Range and Eldorado Mountains into Eldorado Valley. The fans on the north and west sides of the valley have relatively steep surfaces in comparison to those on the east. The valley floor consists of an alluvial fault and playa that are located in the northwest portion of the valley. The small valley north of Boulder City is floored by coalescing alluvial fans emanating from the northern portions of the Eldorado and River Mountains.

Several major ephemeral washes are present in the Boulder City area. The two largest washes are located in the mountains north of Boulder City; however, several minor drainages flow from Boulder City toward the south. Bootleg Wash flows out of the River Mountains area to the south towards Boulder City and into Hemenway Wash. Hemenway Wash drains the northern half of Boulder City and empties into Lake Mead. Some of the washes have meandering or braided morphologies, suggesting lateral migration during wash development, while others have incised channels.

### 3.1.2 Stratigraphy

Two major geologic units, bedrock and valley-fill sediments, characterize the geology of the project region. The mountain ranges on the east, west and north sides of the Las Vegas Valley consist primarily of Paleozoic and Mesozoic sedimentary rocks including limestones, siltstones, sandstones and fanglomerates. The mountain ranges on the south and southeast sides of the valley consist primarily of Tertiary volcanic rocks including basalts, andesites, rhyolites and intrusive rocks that overlie Precambrian metamorphic and granitic rocks. The valley-fill sediments predominantly consist of Miocene to Holocene age fine to coarse clastic sediments (Mantti and Bachhuber 1985; Bingler 1977). More detailed discussions of stratigraphy can be found in the FEIS (BLM/CCRFCD 1991).

### 3.1.3 Geologic Structure

Much of today's relief was established by major orogenic activity in southern Nevada that began in Cretaceous time and continued into Tertiary time. Geologic units were folded and offset by thrust faulting during the late Mesozoic and by normal and strike-slip faults during the Miocene and Pliocene (Plume 1984). In addition, a series of low-angle extensional detachment faults began forming in Miocene time. These fault systems are essentially comprised of upper plate rocks, whose extension was accommodated by high angle block faulting, in low angle contact with a lower plate being detached, or pulled apart. These detachment faults systems are locally present in the mountain ranges surrounding the project site (Longwell et al. 1965; Wernicke et al. 1984; Guth 1988).

The valleys in the site region were created by this extension and were subsequently infilled with Miocene and younger age clastic and volcanic deposits. Displacement on several of the mountain-bounding faults has continued into the late Pleistocene. More detailed discussions of geologic structure can be found in the FEIS (BLM/CCRFCD 1991).

### 3.1.4 Seismicity and Historic Earthquakes

The southern Great Basin has a relatively low level of historic seismicity in comparison to the central and northern portions of the Great Basin. Historic seismicity in the project region is characterized by earthquakes with magnitudes of less than 4.0. Areas of relatively high seismicity include an east-west trending zone between latitude 36ºN and 38ºN and the Lake Mead area. The east-west trending zone is in part due to nuclear testing at the Nevada Test Site but also is related to a number of naturally seismic subzones (Rogers et al. 1987). Seismicity in the Lake Mead area is in part induced as a result of filling Lake Mead (Rogers and Lee 1976; Bohannon 1979). Another area of potentially significant seismicity is south of Lake Mead in the Eldorado Valley (Harmsen 1987).

The largest historical earthquake in the region was the 1872 Owens Valley earthquake with a magnitude of 7.8 that was located approximately 180 miles (290 km) northwest of the site and caused extensive surface fault rupture. In addition, an earthquake with an estimated magnitude of approximately 6.0 occurred in Death Valley in 1908 (Meremonte and Rogers 1987). More recently, a similar distance away (80 miles [129 km]) were two events: 1) the 1966 Caliente/Clover Mountain event, northeast of Las Vegas and 2) the 1992 5.6 magnitude Little Skull Mountain earthquake in the southwestern Nevada Test Site, northwest of the city (Smith et al. 1996). For more detailed information on the historical seismicity of the region, refer to the FEIS (BLM/CCRFCD 1991).

The following active and potentially active faults in the region and in the Project Area have a potential to generate seismicity that could generate significant strong ground motion in the Project Area.

### 3.1.4.1 Southern Death Valley Fault Zone

Located approximately 80 miles (129 km) west of the Project Area, the Death Valley fault system is the largest and potentially most active seismic source in the Basin and Range Province in terms of length, slip rate, earthquake frequency and maximum earthquake magnitude (Sawyer et al. 1996). The fault system is a northwest trending, 2-mile-wide (3-km-wide) fault zone composed of two major faults and numerous folds and minor faults (Stamm 1986). Matching of an offset alluvial fan gravel with its source area indicates 12 to 22 miles (19 to 35 km) of right lateral strike-slip movement on the southern Death Valley fault zone during the last 10 to 12 million years (Butler 1986; Wright 1988). Most of this slip took place prior to 0.9 million years ago along the western most traces of the fault zone. During the last 0.9 million years, eastern fault traces have been active and are characterized by dominantly normal slip with a lateral component of only a few hundred meters. This recent movement has resulted in normal faults and tight isoclinal folds that have uplifted fan gravel and lacustrine sediments as much as 328 feet (100 m) above the modern alluvial fan surface. The average lateral-slip rate along the Southern Death Valley fault zone was 1.2 to 1.9 miles (2 to 3 km) per million years prior to 0.9 million years ago, but has been an order of magnitude less during the last 0.9 million years. The observed differences in slip rates for the eastern and western subzones is probably related to interaction with the eastern termination of the left-lateral Garlock fault zone, located about 1 mile (1.6 km) south of the Death Valley fault zone (Butler 1986).

Prominent geomorphic evidence of Holocene faulting is apparent on the Death Valley Fault System and slip rates of about 0.08 to 0.12 inches (0.20 to 0.30 cm) per year occur on the Southern Death Valley fault zone. Sawyer et al. (1996) concluded:

> Considering basin response in the Las Vegas Valley region to the Little Skull Mountain earthquake, and the late Holocene record of large-magnitude earthquakes, the Death Valley fault system should be considered to represent multiple ground-motion sources significant for southern Nevada.

### 3.1.4.2 Death Valley/Furnace Creek Fault Zone

The Death Valley/Furnace Creek fault zone is a northwest trending right-lateral fault zone that occupies the depression formed by northern Death Valley and Furnace Creek Wash and probably terminates in Fish Lake Valley to the northwest (Stewart 1967; Albers 1967). This fault zone is located approximately 100 miles (161 km) northwest of the Project Area. This Quaternary fault zone is approximately 100 miles (161 km) long (Wright and Troxel 1967; Jennings 1975). Estimates of the amount of right lateral displacement along the zone differ widely. A limit of several miles of total right lateral displacement has been suggested by Wright and Troxel (1967, 1970), while Stewart (1967) and McKee (1968) propose displacements of as much as 50 and 30 miles (81 and 48 km), respectively.

McKee (1968) proposes that the Death Valley/Furnace Creek fault zone has been active since Middle Jurassic time and that, based on reconstruction of a Pliocene drainage system, there may have been 3,000 feet (914 m) of right-lateral offset since that time. Wright and Troxel (1970) suggest that it is possible that right-lateral displacement along the fault zone may become greater northwestward, and that although little offset exists at the southeast end of the fault zone, an offset of 10 to 20 miles (16 to 32 km) is possible and could be attributed to differential extension on opposite sides of the fault zone.

### 3.1.4.3 Pahranagat Shear Zone

The Pahranagat Shear Zone is a northeast trending fault zone that exhibits left-lateral strike-slip displacement of Miocene age volcanic rocks (Ekren et al. 1977). This fault zone is located approximately 55 miles (89 km) north of the northern boundary of the Project Area. Alluvial deposits of Quaternary age are displaced by the faults within this zone (Rogers et al. 1987). Historic seismicity with a magnitude of 5 or greater has occurred along this fault and the fault zone is currently seismically active (Rogers et al. 1987).

### 3.1.4.4 Las Vegas Valley and Boulder City Faults

#### *3.1.4.4.1 Strong Ground Motion*

Strong ground motions during an earthquake have the potential to damage existing structures in the Project Area. Slemmons et al. (2001) utilized tectonic modeling, assessed fault surface rupture length, and analyzed geophysical and seismic data to evaluate the tectonic activity of several faults and regional fault zones in the Project Area. Work performed by Slemmons (2000, 2001); Dohrenwend (1991); Bell (1981, 1991); Castor (1999); Werle and Knight (1996); Haynes (1967); and others indicates the presence of Quaternary tectonic faults in the Project Area that are active or potentially active. Publications by Slemmons indicate that Quaternary faults in the Project Area are capable of producing earthquakes with magnitudes ranging from 6.5 to 7.0 (Table 3.1-1).

Earthquake recurrence data are generally not available for the main tectonic faults and regional fault zones in the Project Area. Several other major tectonic fault zones outside of the Project Area are located in Owens Valley, Panamint-Saline Valley, Death Valley-Furnace Creek, Fish Lake Valley and Pahrump Valley. Slemmons (2000) reports that paleoseismic events in these areas indicate previous earthquake magnitudes ranging from 7.0 to 7.6. Figure 3.1-1 indicates the locations of bedrock, Quaternary (alluvial) and subsidence faults in the vicinity of the Project Area.

Publications prepared by Nevada Bureau of Mines and Geology defines three categories for active faults:

- Holocene active fault (a fault that has moved within the last 10,000 years)
- Late Quaternary active fault (a fault that has moved within the last 130,000 years)
- Quaternary active fault (a fault that has moved within the last 1,600,000 years)

**TABLE 3.1-1. Potential Earthquakes on Quaternary (Alluvial) Faults, Las Vegas Valley**

| Name of Fault/Fault Zone | Approximate Fault/Fault Zone Surface Rupture Length (km) | Estimated Earthquake Magnitude |
|---|---|---|
| Arrow Canyon Range fault zone | 80 | 6.8 |
| California Wash Fault | 50 | 7.0 |
| Cashman-Whitney Mesa fault zone | 30 | 6.8 |
| Decatur-Eglington Fault | 31-36 | 6.9 |
| Dry Lake Range fault zone | 25 | 6.7 |
| Lake Mead fault system | 48 | 7.0 |
| Las Vegas Shear zone | 70-100 | 6.8 |
| Sunrise-Frenchman-River Mountains fault zone | 20 | 6.8 |
| Sunrise-Frenchman-River Mountains fault zone | 38 | 6.9 |
| Valley View fault zone | 27-31 | 6.8 |

Source: Slemmons (2000).

Werle and Knight (1996) also conducted a limited study of a Quaternary fault in the El Dorado Valley, which is located southeast of the Las Vegas Valley and southwest of the Boulder City area. The El Dorado Fault scarp is approximately a 2-mile-long (3.2-km-long) feature extending roughly in a northeast to southwest direction. The most recent movement of this fault scarp is reportedly less than 11,000 years ago. Diffusion-equation modeling of the scarp suggests that the age of the fault ranged from 5,500 to 8,200 years ago. Accordingly, this fault is considered active. A portion of this fault was also previously mapped by Anderson (1977).

Based on a Probabilistic Seismic Hazard Assessment for the Western United States, issued by the United States Geological Survey (USGS) (1999), the horizontal peak ground accelerations having a 5 percent probability of exceedence in 50 years ranged from 0.12 g (percent gravity) to 0.19 g in the Project Area.

Depending on the location of the project site, the maximum considered earthquake spectral response accelerations at short (0.2 second) and long (1-second) periods are determined from Figures 1615(1) and 1615(2) in the 2000 or 2003 International Building Code (IBC). For design of structures, maximum considered earthquake spectral response accelerations at short periods generally range from approximately 0.55 g to 0.85 g in the Project Area. Maximum considered earthquake spectral response accelerations at long periods generally range from approximately 0.16 g to 0.22 g in the Project Area.

### *3.1.4.4.2 Surface Rupture*

Surface rupture is a fracture or break in the ground surface resulting from faulting, fissuring, or ground subsidence that could cause significant damage to structures situated on or directly adjacent to these areas. The primary source of surface rupture is active and potentially active tectonic faults and/or compaction faults. Known surface fault ruptures resulting from faulting in and near the Project Area are summarized in the Table 3.1-2.

Fault slip rate data generally are not available. However, surface fault ruptures in Nevada generally have occurred from multiple episodes of faulting that are typically several hundred or more years apart. Age dating of some of the fault escarpments in and near the Project Area indicate that previous surface fault rupture has occurred about 5,500 to 35,000 years ago on these escarpments.

The Southern Nevada Building Code Amendments (1997) defines a fault as "a fracture or zone of fracturing in geologic materials (soil or rock) along which there has been displacement

**TABLE 3.1-2. Surface Fault Ruptures in and near the Project Area**

| Name of Fault/Fault Zone | Approximate Fault/Fault Zone Surface Rupture Length (km) | Maximum Vertical Fault Surface Displacement (m) |
|---|---|---|
| Black Hills-El Dorado Valley Fault | 3.2 | 7.6 |
| Cashman-Whitney Mesa fault zone | 30.0 | 61.0 |
| Decatur-Eglington Fault | 31.0-36.0 | 23.0 |
| Lake Mead fault system | 48.0 | >3.0 |
| Sunrise-Frenchman-River Mountains fault zone | 38.0 | >11.0 |
| Valley View fault zone | 27.0-31.0 | 25.0 |

of the sides relative to one another parallel to the fracture. Inactive faults without recognized activity within Quaternary time (within the past 1.8 million years) are exempt."

Horizontal ground surface displacement may also occur during an earthquake. Tectonically driven ground surface rupturing occurs relatively quickly during an earthquake. In contrast, compaction faulting, or differential consolidation or compaction over time of the thick alluvial and lakebed sediments, generally results in a relatively broader and slower downward movement of the ground surface. A combination of differential consolidation, tectonic factors, fissuring, and/or ground subsidence, may also contribute to surface fault rupturing.

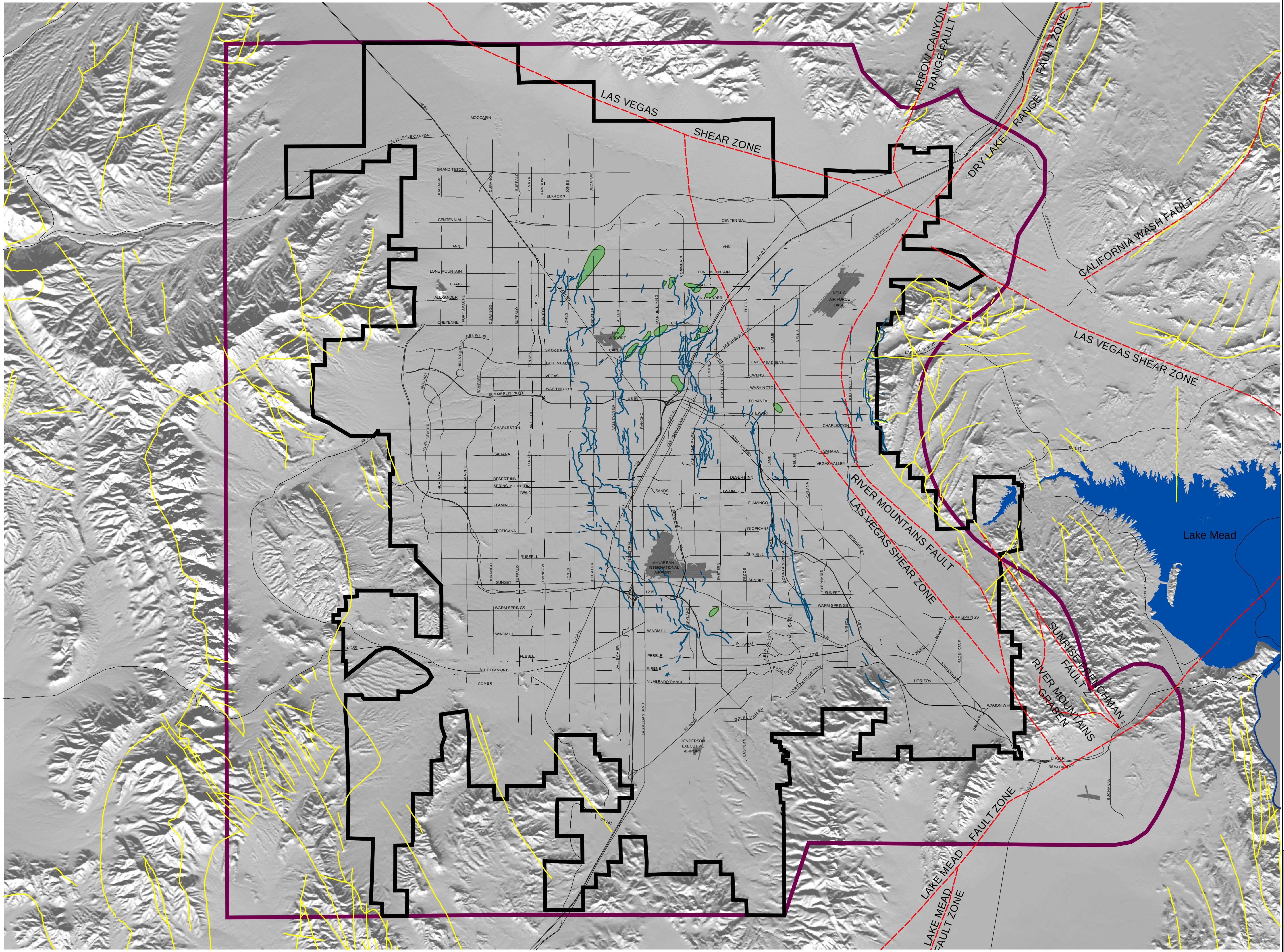
## 3.1.5 Subsidence

Ground subsidence is the gradual downward settling or sinking of the ground surface. Localized subsidence could cause significant damage to structures (Bell 1981). Subsidence generally occurs as a result of a decrease in hydrostatic pressure due to the withdrawal of groundwater. Subsidence can also occur as a result of differential compaction of soils. These processes may result in the formation of small-scale topographic changes, fault scarps and zones of fissuring. Faulting and localized areas of ground fissuring have been previously documented in subsidence areas (Bell 2002).

Ground subsidence has been documented in the Las Vegas Valley since 1935; no subsidence studies have been performed in the Boulder City Area. Maxey and Jameson (1948) first noted that the Las Vegas Valley had subsided particularly in well water withdrawal areas. By 1963, the center portion of the Las Vegas Valley had subsided as much as 3.3 feet (1.0 m) and as much as 5 feet (2 m) by 1980 (Bell 1981). Subsidence continues at varying rates in varying parts of the Las Vegas Valley. Recent work has revealed changes in subsidence rates. Bell et al. (2001) reported that subsidence rates for the period 1991 to 1997 indicate a significant decrease in subsidence rates, based on conventional leveling line measurements, GPS, and InSAR results from 1990 to 1998 collectively. Bell et al. (2001) reported subsidence rates from 0.2 to 0.8 inches (0.5 to 2.0 cm) per year for the period 1991 to 1997 based on conventional monitoring and rates 0.16 to 1.3 inches (0.4 to 3.3 cm) during the years 1992 to 1997 based on InSAR data. Amelung et al. (1999) attribute this decrease in subsidence rates to a net reduction in groundwater extraction from the valley's aquifers. Thus, the inference is that subsidence is related to the location and amount of groundwater pumping and groundwater recharge in relation to soil types and existing faults. Therefore, predictions of future subsidence are highly dependant upon groundwater extraction in subsidence prone areas that have produced three bowl-like depressions: the northwestern bowl (up to approximately 5.6 feet [1.7 m] of subsidence since

REGIONAL FLOOD CONTROL DISTRICT

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)



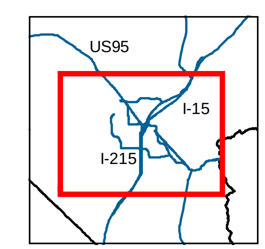

## Legend

- Fault Zones
- Alluvial Faults
- Bedrock Faults
- Zone of Fissuring
- Major Street Centerline
- Ultimate Development Boundary
- Project Area Boundary

N S W E

Feet
0 10,000 20,000

SCALE: 1 inch = 20000 feet




ALLUVIAL AND BEDROCK FAULTS AND KNOWN ZONES OF FISSURING

FIGURE 3.1-1

SWCA ENVIRONMENTAL CONSULTANTS

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1963), the central bowl (up to approximately 3 feet [1 m]), and the southern bowl (up to approximately 3.3 feet [1 m]).

### 3.1.6 Ground Fissures

Fissuring associated with differential subsidence on or near fault scarps in the valley fill has caused damage to structures situated on or directly adjacent to these areas (Bell 2001; Bell 1981; Converse Consultants 1985). Ground fissures have been observed in the Las Vegas Valley since 1925.

Near-surface ground cracks or voids are generally believed to have formed in response to tensional or horizontal stresses from regional land subsidence and/or to ground shaking from earthquakes resulting in ground deformation or both (Patt and Maxey 1978; Mifflin 1991). Fissures may measure up to 6 feet (2 m) deep and 9 feet (3 m) wide and they may link to form semi-continuous cracks up to a 0.5-mile (0.8 km) long (Ninyo & Moore 2003; Bell 2000: Plate 1). Fissures typically originate as fractures at some depth beneath the ground surface, and continued infiltration of water and erosion of the cracked walls causes an increase in fissure dimensions (dePolo 2000). This process may lead to well developed fissures beneath an apparently coherent ground surface. Eventually, void space collapse may cause surface expression. Slumping and side-stream gullying causes widening of the fissure. Fissures may become filled with slump, detritus, and other runoff debris. Reactivation of tensile stress may widen and/or deepen existing fissures.

Bell (2001) reports that 90 percent of mapped ground fissures are located within 2,000 feet (610 m) of a mapped fault and that 95 percent of mapped ground fissures are located within 2,400 feet (732 m) of a mapped fault. In general, a ground fissure is longer the closer it is to a fault. The known areas of fissuring are shown on Figure 3.1-1.

### 3.1.7 Soils

Soils in the Las Vegas Valley are generally composed of loamy gravels, aeolian sands, and fine grained silts and clays (Speck 1985). Characteristics of soils in the Las Vegas Valley and Boulder City areas that are pertinent to this project are summarized on Table 3.1-3. The information in this table and the following sections were summarized from the soil survey of the Las Vegas Valley area (Speck 1985). The primary source of soil material is bedrock exposed in nearby mountain ranges. Soil development ranges from thin soils with minor development of pedogenic horizons to stratified soils with well-developed subsoils and accumulations of calcium carbonate (caliche deposits). Desert pavement, consisting of a residual concentration of closely packed pebbles and rock fragments on the ground surface mantles much of the area. Soils in the Project Area are typically susceptible to slight water erosion except on steep slopes along the banks of channels or areas where the soils have been disturbed by grading. Susceptibility of soils to wind erosion is high; especially when protective desert pavement is removed, exposing soils which are easily mobilized and dispersed by wind. Wind erosion is a primary concern in the Las Vegas Valley where strong, turbulent winds are common.

Soils surrounding Boulder City are primarily deposited on recent and relict alluvial fans in the north and on extensive, several feet thick sand sheets in the south (Bell and Smith 1980). Sand sheets are formed from aeolian sands deposited on pluvial lake beaches. Rock outcrops with very shallow soils or no soils are abundant, especially to the northwest and northeast of Boulder City. Soils deposited on alluvial fans are generally deep and consist of gravelly fine sandy loams. Fine sandy loams with no associated gravels are typically found on the sand sheets. The Boulder City area is subject to weaker winds than those that occur in the Las Vegas Valley.

## TABLE 3.1-3. Characteristics of Soil Units in the Las Vegas and Boulder City Areas

| Soil Unit Number | Name | Texture | Slope (%) | Depth | Permeability | Erosion Potential | | Subsidence (Gypsum) | Corrosivity (Salt) | Map Group Number |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Water | Wind | | | |
| 105 | McCulloug-Jean-Bluepoint Complex | Fine sand loam to loamy fine sand | 0 - 4 | Very Deep | Moderate | Low | High | | | 7 |
| 107 | Arizo | Extremely stony loam | 0 - 4 | Very Deep | Rapid | Low | Low | | | 3 |
| 112 | Arizo | Very gravelly loamy sand | 0 - 4 | Very Deep | Rapid | Low | High | | | 3 |
| 113 | Arizo | Very gravelly fine sandy loam | 2 - 8 | Very Deep | Rapid | Low | Mod | High | High | 3 |
| 117 | Arizo | Very gravelly fine sandy loam | 2 - 8 | Very Deep | Rapid | Low | Mod | | | 3 |
| 120 | Bluepoint | Fine sandy loam, wet | 0 - 2 | Very Deep | Rapid | Low | High | | | 4 |
| 127 | Bluepoint | Loamy fine sand | 0 - 2 | Very Deep | Rapid | Low | High | | | 4 |
| 128 | Bluepoint | Gravelly loamy fine sand | 2 - 4 | Very Deep | Rapid | Low | High | | | 4 |
| 129 | Bluepoint | Loamy fine sand | 4 - 15 | Very Deep | Rapid | Low | High | | | 4 |
| 130 | Bracken-Destazo Complex | Cobbly fine sandy loam | 2 - 15 | Deep | Moderate - Rapid | Low | Moderate - Low | High | High | 6 |
| 132 | Bracken | Very gravelly fine sandy loam | 2 - 8 | Deep | Moderate - Rapid | Low | Moderate - Low | High | High | 6 |
| 133 | Bracken-rock outcrop complex | Very gravelly sandy loam and rock outcrop | 8 - 30 | Deep | Moderate - Rapid | Low | Moderate - Low | High | | 1 |
| 134 | Bracken | Very gravelly fine sandy loam | 4 - 30 | Deep | Moderate - Rapid | Low | Moderate - Low | High | | 6 |
| 140 | Casaga | Very gravelly sandy clay loam | 0 - 8 | Very Deep | Slow | Low | Moderate - Low | | | 5 |
| 150 | Cave | Very stony sandy loam | 0 - 4 | Very shallow | Moderate | Low | Moderate | | | 2 |
| 151 | Cave | Loamy fine sand | 2 - 8 | Shallow | Moderate | Low | High | | | 2 |

**TABLE 3.1-3. Characteristics of Soil Units in the Las Vegas and Boulder City Areas (Continued)**

| Soil Unit Number | Name | Texture | Slope (%) | Depth | Permeability | Erosion Potential | | Subsidence (Gypsum) | Corrosivity (Salt) | Map Group Number |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Water | Wind | | | |
| 152 | Cave | Gravelly fine sandy loam | 0 - 4 | Shallow | Moderate | Low | High | | | 2 |
| 155 | Cave | Gravelly fine sandy loam | 4 - 5 | Shallow | Moderate | Low | High | | | 2 |
| 160 | Destazo | Cobbly fine sandy loam | 0 - 2 | Very Deep | Moderate - Slow | Low | Low | | | 5 |
| 181 | Caliza-Pittman | Extremely stony fine sandy loam | 2 - 8 | Very Deep | Moderate - Rapid | Low | Moderate - Low | | | 6 |
| 182 | Caliza-Pittman-Arizo Complex | Cobbly fine sandy loam to very gravelly loamy sand | 0 - 8 | Very Deep | Rapid | Low | Moderate - Low | | | 6 |
| 183 | Caliza | Very cobbly loamy sand | 4-- 8 | Very Deep | Moderate - Rapid | Low | Moderate | | | 6 |
| 184 | Caliza | Very gravelly sandy loam | 2 - 8 | Very Deep | Moderate - Rapid | Low | Moderate | | | 6 |
| 187 | Caliza | Extremely fine sandy loam | 2 - 8 | Very Deep | Moderate - Rapid | Low | Moderate - Low | | | 6 |
| 190 | Dalian | Very gravelly fine sandy loam | 2 - 4 | Very Deep | Moderate - Rapid | Low | Moderate | | | 5 |
| 191 | Dalian | Very cobbly fine sandy loam | 2 - 8 | Very Deep | Moderate - Rapid | Low | Low | | | 5 |
| 192 | Dalian-McCullough complex | Very gravelly fine sandy loam | 0 - 4 | Very Deep | Moderate - Rapid | Low | Moderate | | | 5 |
| 200 | Glencarb | Silt loam | 0 - 2 | Very Deep | Moderate - Slow | Low | High | | | 8 |
| 206 | Glencarb | Silt loam, flooded | 0 - 2 | Very Deep | Moderate - Slow | Low | Moderate - Low | | | 8 |
| 222 | Glencarb | Silty clay loam wet | 0 - 2 | Very Deep | Moderate - Slow | Low | Moderate - Low | | | 8 |
| 236 | Glencarb | Very fine sandy loam, saline | 0 - 2 | Very Deep | Moderate - Slow | Low | High | | | 8 |
| 237 | Glencarb | Very fine sandy loam, caliche in substratum | 0 - 2 | Deep | Moderate - Slow | Low | High | | | |

**TABLE 3.1-3. Characteristics of Soil Units in the Las Vegas and Boulder City Areas (Continued)**

| Soil Unit Number | Name | Texture | Slope (%) | Depth | Permeability | Erosion Potential | | Subsidence (Gypsum) | Corrosivity (Salt) | Map Group Number |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Water | Wind | | | |
| 240 | Goodsprings | Gravelly fine sandy loam | 2 - 4 | Shallow | Moderate | Low | High | | | 2 |
| 252 | Grapevine | Very fine sandy loam | 0 - 2 | Very Deep | Moderate | Low | Moderate | | High | 5 |
| 255 | Grapevine | Loamy fine sand | 2 - 4 | Very Deep | Moderate | Low | High | | High | 5 |
| 260 | Jean | Gravelly loamy fine sand | 2 - 4 | Very Deep | Rapid | Low | High | | | 3 |
| 262 | Jean-Goodsprings Complex | Gravelly loamy fine sand to very gravelly loamy fine sand | 2 - 4 | Very Deep | Rapid - Moderate | Low | Moderate - Low | | | 2 |
| 263 | Jean Complex | Gravelly loamy fine sand to very gravelly loamy fine sand | 2 - 4 | Very Deep | Rapid | Low | Moderate - Low | | | |
| 264 | Jean | Very gravelly loamy fine sand | 2 - 4 | Very Deep | Rapid | Low | Low | | | 3 |
| 270 | Land | Silty clay loam | 0 - 2 | Very Deep | Moderate - Slow | Low | Moderate - Low | | High | 9 |
| 278 | Land | Silty clay loam | 0 - 2 | Very Deep | Moderate - Slow | Low | High | | High | 9 |
| 282 | Land | Silty clay loam | 0 - 2 | Very Deep | Moderate - Slow | Low | Moderate - Low | | High | 9 |
| 300 | Las Vegas | Gravelly fine sandy loam | 0 - 2 | Shallow | Moderate - Slow | Low | High | | | 2 |
| 301 | Las Vegas | Gravelly fine sandy loam | 2 - 4 | Shallow | Moderate - Slow | Low | High | | | 7 |
| 302 | Las Vegas-McCarran | Gravelly fine sandy loam | 0 - 4 | Shallow | Moderate - Slow | Low | High | | | 7 |
| 305 | Las Vegas-Destazo Complex | Gravelly fine sandy loam to fine sandy loam | 0 - 2 | Shallow | Moderate - Slow | Low | High | | | 2 |

**TABLE 3.1-3. Characteristics of Soil Units in the Las Vegas and Boulder City Areas (Continued)**

| Soil Unit Number | Name | Texture | Slope (%) | Depth | Permeability | Erosion Potential | | Subsidence (Gypsum) | Corrosivity (Salt) | Map Group Number |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Water | Wind | | | |
| 307 | Las Vegas-skyhaven complex | Gravelly fine sandy loam to very fine sandy loam | 0 - 4 | Shallow | Moderate - Slow | Low | High | | High | 8 |
| 325 | McCarran | Fine sandy loam | 0 - 4 | Very Deep | Moderate - Slow | Low | High | High | High | 7 |
| 326 | McCarran | Very cobbly fine sandy loam | 2 - 8 | Very Deep | Moderate - Slow | Low | Moderate | High | High | 7 |
| 341 | Paradise | Silt loam | 0 - 2 | Very Deep | Moderate | Low | Moderate - Low | | | 3 |
| 360 | Rock outcrop St. Thomas complex | Rock outcrop and extremely cobbly fine sandy loam | 15 - 30 | Shallow | Moderate - Rapid | Moderate | Low | | | 1 |
| 380 | Skyhaven | Very fine sandy loam | 0 - 4 | Mod-Deep | Moderate - Slow | Low | High | | High | 8 |
| 390 | Spring | Clay loam | | Very Deep | Slow | Low | Moderate - Low | | High | 9 |
| 400 | Tencee | Very gravelly fine sandy loam | 2 - 8 | Shallow | Moderate | Low | Low | | | 2 |
| 415 | Aztec | Very gravelly sandy loam | 2 - 8 | Very Deep | Moderate - Slow | Low | Moderate - Low | | High | 6 |
| 417 | Aztec-Rock outcrop complex | Gravelly fine sandy loam to loamy sand | 8 - 30 | Very Deep | Moderate - Slow | Low | Moderate - Low | | High | 1 |
| 418 | Aztec-Nickel-Knob Hill complex | Gravelly fine sandy loam to loamy sand | 2 - 15 | Very Deep | Moderate - Slow | Low | High | | High | 6 |
| 419 | Aztec-Bracken complex | Gravelly fine sandy loam to very gravelly fine sandy loam | 4 - 30 | Very Deep | Moderate - Slow Moderate - Rapid | Low | High | | | 6 |
| 430 | Knob Hill | Loamy sand | 0 - 4 | Very Deep | Moderate - Rapid | Low | High | | | 4 |
| 440 | Nickel | Very gravelly fine sandy loam, bedrock substratum | 2 - 8 | Deep | Moderate - Slow | Low | Moderate | | | 6 |

**TABLE 3.1-3. Characteristics of Soil Units in the Las Vegas and Boulder City Areas (Continued)**

| Soil Unit Number | Name | Texture | Slope (%) | Depth | Permeability | Erosion Potential | | Subsidence (Gypsum) | Corrosivity (Salt) | Map Group Number |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Water | Wind | | | |
| 450 | Cave Variant | Very cobbly very fine sandy loam | 4 - 30 | Shallow | Moderate - Rapid | Moderate | Moderate | | | 2 |
| 481 | Hobog | Loamy fine sand | 15 - 50 | Shallow | Moderate | High | High | | | 1 |
| 484 | Hobog | Very cobbly fine sandy loam | 15 - 50 | Shallow | Moderate | Moderate | Low | | | 1 |
| 500 | Canutio-Akela Complex | | 2 - 15 | Deep | Moderate - Rapid | Moderate | Low | | | 5 |
| 501 | Canutio | Gravelly fine sandy loam | 0 - 2 | Very Deep | Moderate - Rapid | Moderate | High | | | 5 |
| 502 | Canutio-Cave | Gravelly fine sandy loam | 2 - 8 | Very Deep | Moderate - Rapid | Moderate | High | | | 5 |
| 505 | Canutio-Akela complex | Very cobbly sandy loam | 15 - 50 | Deep | Moderate - Rapid | Moderate | Low | | | 5 |
| 510 | Akela-Rock outcrop complex | Very cobbly fine sandy loam and rock outcrop | 15 - 50 | Shallow | Moderate | Moderate | Moderate | | | 1 |
| 540 | Weiser | Extremely gravelly fine sandy loam | 2 - 8 | Very Deep | Moderate - Rapid | Low | Moderate | | | 5 |
| 542 | Weiser-Aztec complex | Extremely gravelly fine sandy loam | 2 - 8 | Very Deep | Moderate - Slow | Low | Moderate | | | 5 |
| 545 | Weiser-Good-springs complex | Fine material | 2 - 4 | Very Deep | Moderate - Rapid | Low | Moderate | | | 5 |
| 600 | Slickens | Waste rock and refuse | | | | | | | | 13 |
| 605 | Dumps | Extremely gravelly fine sandy loam | | | | | | | | 12 |
| 610 | Pits | Gravel | | | | | | | | 10 |
| 615 | Urban Land | Asphalt, concrete and buildings | | | | | | | | 11 |
| 630 | Badland | Mod-steep to steep barren, dissected land | | | | | | | | 7 |
| 635 | Rock Outcrop | Limestone | | | | | | | | 1 |

**TABLE 3.1-3. Characteristics of Soil Units in the Las Vegas and Boulder City Areas (Continued)**

| Soil Unit Number | Name | Texture | Slope (%) | Depth | Permeability | Erosion Potential | | Subsidence (Gypsum) | Corrosivity (Salt) | Map Group Number |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Water | Wind | | | |
| 640 | Rock Outcrop | Sandstone | | | | | | | | 1 |
| 645 | Pits | Quarry | | | | | | | | 10 |
| 999 | Waterbody | | | | | | | | | 12 |

Limiting factors for successful soil reclamation include soil depth, percentage of rock fragments, salinity, alkalinity, low available water capacity, and slope. Soils filled with cobbles prove difficult to grade and those with a desert pavement may be subject to erosion when the pavement is disturbed. The salinity and alkalinity of the soils may inhibit plant re-establishment. Many of the soils have a low available water capacity (droughty) requiring frequent irrigation if vegetation is going to be established on disturbed soils. Steep slopes create problems for soil stability, especially if the soils are disturbed (see Table 3.1-3). Detailed discussions of soils are provided in the FEIS (BLM/CCRFCD 1991), and Figure 3.1-2 displays the distribution of soil types in the Project Area.

### 3.1.7.1 Expansive Soils

Expansive soils are earth materials with relatively high percentages of expandable clay materials (such as montmorillonite or illite) that are prone to volumetric changes based on variation in water content. These volumetric changes of expansive soils can cause differential soil movement in the active zone (upper zone of soil that experiences moisture content changes due to seasonal factors and/or surface water infiltration). This differential movement presents a potential hazard to engineered structures founded on such material.

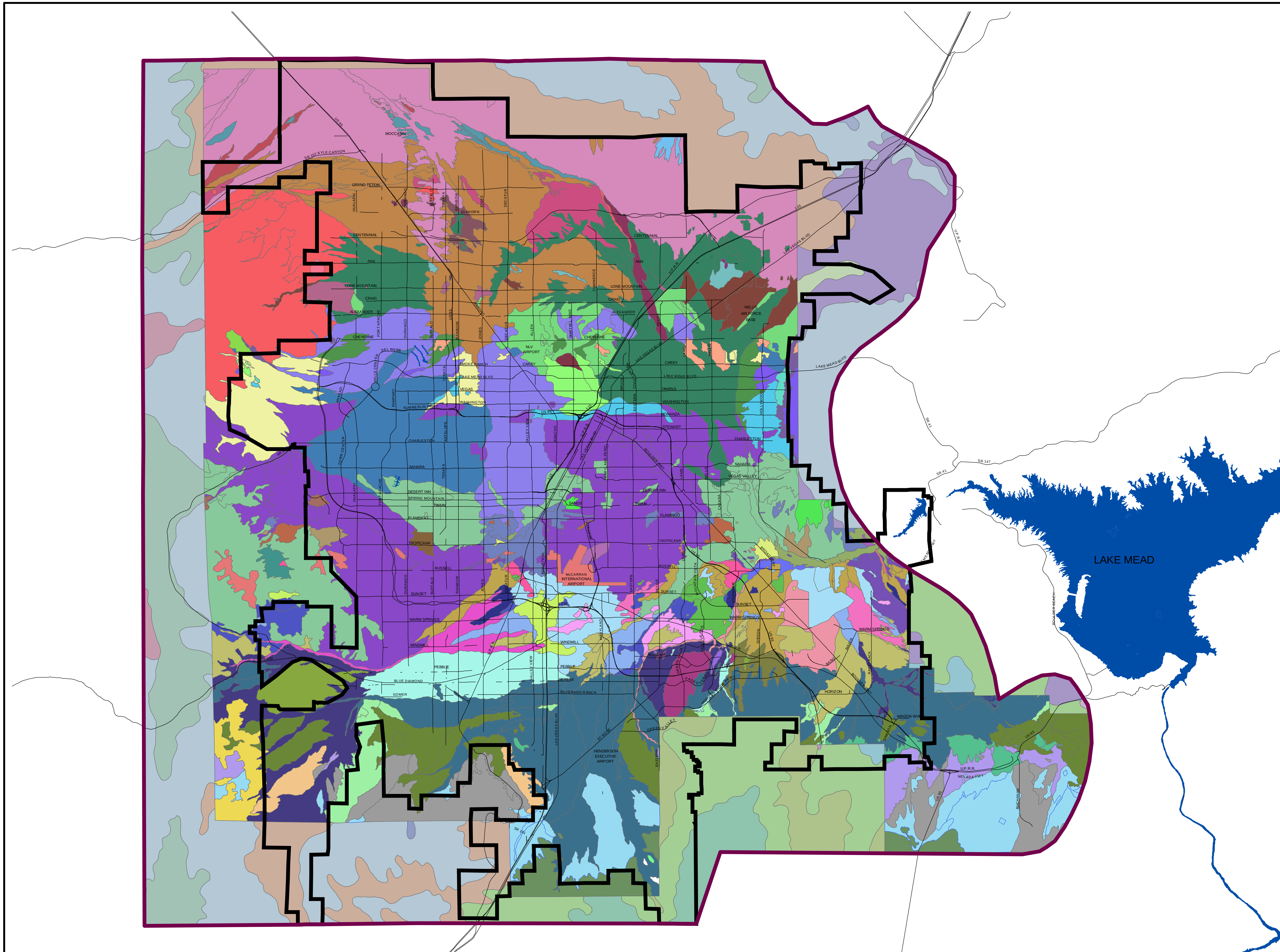
Some of the areas potentially containing expansive soils are indicated on the Clark County Soils Guidelines Map (1998). Expansive soils are common in portions of the Project Area, particularly in the western and central areas of the City of North Las Vegas. Several mapped soil units, including the Casaga, Glencarb, Land, Spring, Las Vegas and Skyhaven soils located in the central and eastern part of the valley contain significant quantities of clay and have a potential for expansion resulting in damage to structures. Mapped surficial soil units in the Boulder City area are not clay rich (Speck 1985). However, some of the deeper deposits (below a depth of approximately 10 feet [3 m]) in the southwest portion of the developed areas of the city have proven to be highly expansive.

Soils that are susceptible to salt heave (chemical heave) are also present in the Project Area. Salt heave generally occurs in fine-grained soils with at least 15 percent clay and contain 0.2 percent or more soluble sodium sulfate salts (Converse Consultants 1985). The salt hydrates at temperatures less than 55ºF (13ºC). Alternating cycles of warm and cool temperatures cause alternating cycles of salt dissolution and recrystallization that result in increasing salt concentrations as moisture is drawn into the hydration cycle. Damage may occur when soils supporting light loads are exposed to significant temperature changes. Because these salts are highly soluble, they are most likely to occur where drainage is poor. Sodium sulfate-rich soils are known to be present in an area parallel to and along the northeast side of Boulder Highway from north of Lake Mead Drive to south of Las Vegas Boulevard and in a smaller area southwest of Boulder Highway (Cibor 1983).

### 3.1.7.2 Collapsing Soils

Soils prone to collapsing are typically those with low in-place densities and low moisture contents. The low in-place densities generally indicate a relatively porous (high void ratio) and/or the presence of relatively low-density soluble minerals within the soil structure. At relatively low moisture contents, porous soils may have medium dense to very dense consistencies based on standard penetration test or similar blow counts based on cemented bonds at particle contacts. Soils with soluble minerals within the soil structures may also have medium dense to very dense consistencies at relatively low moisture contents.

As water infiltrates the relatively low in-place density soils, the soils collapse as the cemented bonds break down at particle contacts and/or as soluble minerals within the soil structure become dissolved in solution. This collapse typically occurs relatively rapidly and may result in signif-




REGIONAL FLOOD CONTROL DISTRICT

**CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)**

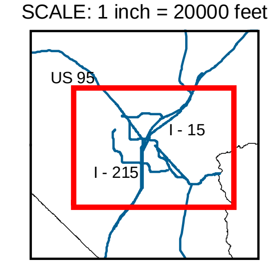
## Legend

- Project Area Boundary
- Ultimate Development Boundary
- Major Street Centerline

See Figure 3.1-2a For Soils Legend

Feet
0 10,000 20,000

SCALE: 1 inch = 20000 feet




SOIL MAP OF THE LAS VEGAS VALLEY AND BOULDER CITY AREA

FIGURE 3.1-2

SWCA ENVIRONMENTAL CONSULTANTS

CCRFCD SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
(2004)

FIGURE 3.1-2a SOILS LEGEND OF THE LAS VEGAS VALLEY AND BOULDER CITY AREA

## Las Vegas Valley Soil Survey

- AKELA-ROCK OUTCROP COMPLEX, 15 TO 50 PERCENT SLOPES
- ARIZO EXTREMELY STONY LOAM, 0 TO 4 PERCENT SLOPES
- ARIZO VERY GRAVELLY FINE SANDY LOAM, 2 TO 8 PERCENT SLO PES
- ARIZO VERY GRAVELLY FINE SANDY LOAM, GYPSIFEROUS SUBSTR ATUM, 2 TO 8 P
- ARIZO VERY GRAVELLY LOAMY SAND, FLOODED, 0 TO 4 PERCENT SLOPES
- AZTEC VERY GRAVELLY SANDY LOAM, 2 TO 8 PERCENT SLOPES
- AZTEC-BRACKEN COMPLEX, 4 TO 30 PERCENT SLOPES
- AZTEC-NICKEL-KNOB HILL COMPLEX, 2 TO 15 PERCENT SLOPES
- AZTEC-ROCK OUTCROP COMPLEX, 8 TO 30 PERCENT SLOPES
- BADLAND
- BLUEPOINT FINE SANDY LOAM, WET, 0 TO 2 PERCENT SLOPES
- BLUEPOINT GRAVELLY LOAMY FINE SAND, 2 TO 4 PERCENT SLOP ES
- BLUEPOINT LOAMY FINE SAND, 0 TO 2 PERCENT SLOPES
- BLUEPOINT LOAMY FINE SAND, 4 TO 15 PERCENT SLOPES
- BRACKEN VERY GRAVELLY FINE SANDY LOAM, 2 TO 8 PERCENT S LOPES
- BRACKEN VERY GRAVELLY FINE SANDY LOAM, 4 TO 30 PERCENT SLOPES
- BRACKEN-DESTAZO COMPLEX, 2 TO 15 PERCENT SLOPES
- BRACKEN-ROCK OUTCROP COMPLEX, 8 TO 30 PERCENT SLOPES
- CALIZA EXTREMELY COBBLY FINE SANDY LOAM, 2 TO 8 PERCENT SLOPES
- CALIZA VERY COBBLY LOAMY SAND, 4 TO 8 PERCENT SLOPES
- CALIZA VERY GRAVELLY SANDY LOAM, 2 TO 8 PERCENT SLOPES
- CALIZA-PITTMAN EXTREMELY STONY FINE SANDY LOAMS, 2 TO 8 PERCENT SLOPES
- CALIZA-PITTMAN-ARIZO COMPLEX, 0 TO 8 PERCENT SLOPES
- CANUTIO GRAVELLY FINE SANDY LOAM, 0 TO 2 PERCENT SLOPES
- CANUTIO-AKELA COMPLEX, 15 TO 50 PERCENT SLOPES
- CANUTIO-AKELA COMPLEX, 2 TO 15 PERCENT SLOPES
- CANUTIO-CAVE GRAVELLY FINE SANDY LOAMS, 2 TO 8 PERCENT SLOPES
- CASAGA VERY GRAVELLY SANDY CLAY LOAM, 0 TO 8 PERCENT SL OPES
- CAVE GRAVELLY FINE SANDY LOAM, 0 TO 4 PERCENT SLOPES
- CAVE GRAVELLY FINE SANDY LOAM, 4 TO 15 PERCENT SLOPES
- CAVE LOAMY FINE SAND, 2 TO 8 PERCENT SLOPES
- CAVE VARIANT VERY COBBLY VERY FINE SANDY LOAM, 4 TO 30 PERCENT SLOPES
- CAVE VERY STONY SANDY LOAM, 0 TO 4 PERCENT SLOPES
- DALIAN VERY COBBLY FINE SANDY LOAM, 2 TO 8 PERCENT SLOP ES
- DALIAN VERY GRAVELLY FINE SANDY LOAM, 2 TO 4 PERCENT SL OPES
- DALIAN-MCCULLOUGH COMPLEX, 0 TO 4 PERCENT SLOPES
- DESTAZO COBBLY FINE SANDY LOAM, 0 TO 2 PERCENT SLOPES
- DUMPS
- GLENCARB SILT LOAM
- GLENCARB SILT LOAM, FLOODED
- GLENCARB SILTY CLAY LOAM, WET
- GLENCARB VERY FINE SANDY LOAM, HARDPAN SUBSTRATUM
- GLENCARB VERY FINE SANDY LOAM, SALINE
- GOODSPRINGS GRAVELLY FINE SANDY LOAM, 2 TO 4 PERCENT SL OPES
- GRAPEVINE LOAMY FINE SAND, 2 TO 4 PERCENT SLOPES
- GRAPEVINE VERY FINE SANDY LOAM, 0 TO 2 PERCENT SLOPES
- HOBOG LOAMY FINE SAND, 15 TO 50 PERCENT SLOPES
- HOBOG VERY COBBLY FINE SANDY LOAM, 15 TO 50 PERCENT SLO PES
- JEAN COMPLEX, 2 TO 4 PERCENT SLOPES
- JEAN GRAVELLY LOAMY FINE SAND, 2 TO 4 PERCENT SLOPES
- JEAN VERY GRAVELLY LOAMY FINE SAND, 2 TO 4 PERCENT SLOP ES
- JEAN-GOODSPRINGS COMPLEX, 2 TO 4 PERCENT SLOPES
- KNOB HILL LOAMY SAND, 0 TO 4 PERCENT SLOPES
- LAND SILT LOAM, DRAINED
- LAND SILTY CLAY LOAM
- LAND VERY FINE SANDY LOAM, WET
- LAS VEGAS GRAVELLY FINE SANDY LOAM, 0 TO 2 PERCENT SLOP ES
- LAS VEGAS GRAVELLY FINE SANDY LOAM, 2 TO 4 PERCENT SLOP ES
- LAS VEGAS-DESTAZO COMPLEX, 0 TO 2 PERCENT SLOPES
- LAS VEGAS-MCCARRAN-GRAPEVINE COMPLEX, 0 TO 4 PERCENT SL OPES
- LAS VEGAS-SKYHAVEN COMPLEX, 0 TO 4 PERCENT SLOPES
- MCCARRAN FINE SANDY LOAM, 0 TO 4 PERCENT SLOPES
- MCCARRAN VERY COBBLY FINE SANDY LOAM, 2 TO 8 PERCENT SL OPES
- MCCULLOUGH-JEAN-BLUEPOINT COMPLEX, 0 TO 4 PERCENT SLOPE S
- NICKEL VERY GRAVELLY FINE SANDY LOAM, BEDROCK SUBSTRATU M, 2 TO 8 PERC
- PARADISE SILT LOAM
- PITS, GRAVEL
- PITS, QUARRY
- ROCK OUTCROP, LIMESTONE
- ROCK OUTCROP, SANDSTONE
- ROCK OUTCROP-ST. THOMAS COMPLEX, 15 TO 30 PERCENT SLOPE S
- SKYHAVEN VERY FINE SANDY LOAM, 0 TO 4 PERCENT SLOPES
- SLICKENS
- SPRING CLAY LOAM
- TENCEE VERY GRAVELLY FINE SANDY LOAM, 2 TO 8 PERCENT SL OPES
- URBAN LAND
- WATER
- WEISER EXTREMELY GRAVELLY FINE SANDY LOAM, 2 TO 8 PERCE NT SLOPES
- WEISER-GOODSPRINGS COMPLEX, 2 TO 4 PERCENT SLOPES

## Nevada State Soil Geographic Database

- ZUKAN-WELRING-POOKALOO
- TENCEE-WEISER-COLOROCK
- ST. THOMAS-ROCK OUTCROP-KYLER
- CAVE-AJO-CAVE FAMILY
- AZTEC-CALIZA-SPRING
- WEISER-DALIAN-JEAN
- GLENCARB-CASAGA-LAS VEGAS
- MCCARRAN-BLUEPOINT-BRACKEN
- MCCULLOUGH-RILLITO-BLUEPOINT
- NICKEL-CANUTIO-TENCEE
- AKELA-GARR-HOBOG
- DEDAS-KANACKEY-ROCK OUTCROP
- QUILOTOSA-GACHADO-HYDER
- WEISER-ARIZO-TENCEE
- CANUTIO-CAVE-WEISER

icant settlement and associated distress to structures supported by these soils, because of the infiltration of water.

Gypsum and sodium sulfate salts are soluble minerals that are common in the Project Area. Hydro consolidation can occur when soluble material, such as gypsum and sodium sulfate soils, dissolves. Dissolution of mineral material can result in void space, a corresponding loss of shear strength, and an increase in compressibility potential. Some of the areas potentially containing gypsiferous soils, and/or soils prone to hydro-collapse, are indicated on the Clark County Soils Guidelines Map (1998).

### 3.1.7.3 Liquefaction

Soil liquefaction is a process in which the shear strength of granular, saturated soils is reduced by an increase in pore water pressure during seismic shaking. Requisite conditions for liquefaction to occur include saturated, primarily granular soils that have a loosely packed grain structure capable of progressive rearrangement of soil grains during repeated cycles of seismic loading.

Soils in the Las Vegas Valley are generally not known to be loose (Converse Consultants 1985), and are generally not considered to have a high liquefaction potential. However, liquefaction may be a potential hazard in localized areas of the Las Vegas Valley that are underlain by a shallow groundwater table and where loose, granular soils are locally present. Liquefaction is not considered a potential hazard in the Boulder City area because groundwater occurs at depths generally greater than 300 feet (91 m) below the ground surface (Anderson 1977).

### 3.1.7.4 Erosion and Sedimentation

Potential erosion and detritus deposition may occur in the Project Area from sheet flow, channel erosion, and sedimentation during and after periods of heavy rains and wind erosion. Soils in the Project Area are generally susceptible to water erosion (Speck 1985). The low annual precipitation in the Project Area reduces the potential for sheet flow erosion. However, ephemeral (dry) washes are susceptible to erosion and bank degradation during high intensity flooding. Incised channels are common in the Project Area. Significant bank erosion in the Las Vegas Wash can also occur, particularly during heavy rains.

Deposition of sediment typically occurs as debris is transported or as a result of a decrease in water velocity flow in channels. Debris flows occur within alluvial fans near the base of mountain ranges and typically occur during a high intensity rainstorm event (Weide 1982). Sedimentation typically occurs near the base of mountain ranges, on active alluvial fans, in drainage channels and on the valley floor.

Other erosional processes may include formation or enlargement of ground fissures. Soils in the Project Area are also susceptible to wind erosion (Speck 1985).

### 3.1.7.5 Caliche

In situ soil cementation processes form caliche. Windblown calcium carbonate dust is carried into the soil through infiltrating water (rain water or runoff), the water evaporates or moves back up in the soil column, leaving the calcium carbonate material to deposit around soil grains and form a cement. The texture of caliche varies with the original soil texture and can range from primarily fine-grained material to primarily coarse-grained material. The Southern Nevada Building Code Amendments (1997) defines caliche as a "hard, rock-like crust of highly carbonated soil material formed at or near the ground surface. This material can exist in thin laminations or can be several feet in thickness, materials classified by the Geotechnical Engineer as medium hard, hard, or very hard caliche shall be treated as ‘rock.’"

Caliche generally occurs in layers a few inches to several feet thick. The layers typically vary significantly in thickness, hardness and degree of cementation over short distances. Caliche is a geologic constraint because relatively thick, hard, and strongly cemented layers can be very difficult to excavate.

Rock excavation techniques are often needed to remove caliche. Techniques include: heavy-duty ripping equipment, heavy-duty backhoe, headache ball, hoe-ram, rock saw and/or rock core barrels. Blasting methods are also sometimes used. The use of rock excavation techniques can delay construction during grading and excavation operations significantly increasing the cost of a project. The potential for vibrational damage to adjacent or nearby structures should also be considered when using heavy caliche removal equipment.

#### 3.1.7.6 Concrete Deterioration by Sulfate Soils

Concrete deterioration caused by exposure to sulfates, or "sulfate attack," is a phenomenon in which chemical and/or physical reactions occur between sulfates and concrete (ACI 1997). In the Project Area sulfates are common in soil, groundwater, or surface water that comes in contact with concrete.

The chemical process occurs as the sulfates react with calcium aluminate hydrates in the concrete. The chemical reaction results in an increase in concrete volume and tensile forces within the concrete. The physical process occurs as sulfate salts entrained in air voids within the concrete hydrate and crystallize. As the crystals grow, they also exert additional tensile forces within the concrete, which can cause the concrete to crack, spall and deteriorate.

#### 3.1.7.7 Corrosion of Metal by Low Resistivity Soils

Corrosion of buried metal pipes and steel reinforcing bars is an electrochemical process in which a loss of metal occurs because of a reaction with the surrounding environment (ACI 1997). Soil resistivity (i.e., the resistance of soil to transmit an electrical current) is generally considered to be indirectly proportional to the amount of metal lost due to corrosion.

Attributes that can affect soil resistivity and corrosion of metal are pH, redox potential, and chemical (chloride, sodium-sulfate, sodium, sulfate, sulfide and total salts) content. Aeration and anaerobic conditions may also influence corrosion of metal. Soils with low resistivity are common in the study area and soils with significantly low resistivity are typically comprised of fine-grained soils with relatively high moisture contents. Some of the areas potentially containing corrosive soils are indicated on the Clark County Soils Guidelines Map (1998).

### 3.1.8 Slope Instability

Areas of significant slope instability potential, such as known major landslide terrain, have not been identified in the Project Area. The proposed facilities are generally located in gently sloping areas with no mapped landslides. The potential for minor slope instability exists along the valley fill-fault scarps illustrated in Figure 3.1-1 and on side slopes of incised drainage channels. In addition, a potential for relatively shallow surficial slope failures exist in areas of steeper terrain along the upper portions of alluvial fans and in the foothills around the perimeter of the Las Vegas Valley and the Boulder City area. Steep slope areas are also indicated on the Clark County Soil Guidelines Map (1998).

### 3.1.9 Mineral Resources

The primary mineral resource in the Project Area is sand and gravel. The mining and processing of these nonmetallic minerals exceeds that of the mineral resources located in surrounding mountain ranges in both tonnage and value (Longwell et al. 1965). Deposits of sand and gravel are used as construction and building material in the Las Vegas Valley. Over 20 million tons of aggregate were consumed in the Las Vegas market in 1996 (Lombardo 1997) and are also exported, primarily to Southern California. This material is principally derived from alluvium and alluvial fans within the Valley.

Gypsum deposits are abundant in the Project Area and several of these deposits have been mined since the early 1900s. Locations that have produced small quantities of gypsum, but are no longer mined include the North and East Rainbow Gardens, White Eagle, Arden and Bard Mines (Papke 1987). The Apex and Blue Diamond Mines, located within the Project Area, currently produce large quantities of calcined gypsum, most of which is used to manufacture wallboard. The Apex Mine, located in the northeast corner of the Project Area, is owned by Pacific Coast Building Materials and provides gypsum from the Muddy Creek formation. The 2001 production was just over 943,000 tons of gypsum (Driesner and Coyner 2002). James Hardie Gypsum recently sold the Blue Diamond Mine, near the southwest corner of the Project Area, to British Plaster Board (BPB). This mine produced gypsum from the Permian Kiabab Formation and the 2001 production was over 576,000 tons of gypsum.

Sporadic patches and veins of potash and iron alum in lightly altered flows are reported in several areas 1 mile (2 km) west and 3 miles (5 km) east of Boulder City (Longwell et al. 1965). These reserves, scarcely 100 acres in total extent, were considered by Longwell to be too small to warrant development.

Numerous oil and gas wells have been drilled in the Project Area, but none have become producers (Longwell et al. 1965) and most wells are currently abandoned (Garside et al. 1988). First exploration began in the late 1920s and some sporadic drilling occurred in the 1940s. More serious exploration efforts began in 1950 when exploration throughout Nevada increased significantly. Although a number of these exploration wells have reported oil shows, the lack of a discovery resulted in few wells being drilled in Clark County until the early 1980s. Some of these recent wells were drilled to investigate the possibility of 'overthrust belt' oil fields, although none of these were successful (Garside et al. 1988).

# 3.2 PALEONTOLOGICAL RESOURCES

Paleontological resources, commonly referred to as fossils, are protected on public lands. Where not expressly mentioned, fossils have been interpreted by federal agencies to be covered for their scientific or historic value. An area is considered to be paleontologically sensitive if it contains abundant vertebrate fossils or few other (large or small, vertebrate or invertebrate) fossils that may provide new and important scientific information. Areas that may contain datable organic remains older than recent and areas that may contain unique, new vertebrate deposits, traces and/or trackways are considered paleontologically sensitive. The probability of finding sediments or outcrops containing fossils is based on the age of the sediments and their environmental conditions when deposited. The sedimentary outcrops are characterized as having low, high or unknown potential to contain fossils and legally protected paleontological resources.

Most of the proposed facilities occur in areas with little to no paleontological potential. Geologic units with little to no potential are the Quaternary alluvial deposits that cover most of the valley floors (Las Vegas Valley and Boulder City), volcanic and intrusive rocks that make up the bedrock bordering Boulder City and southeast Las Vegas, and Precambrian intrusive and metamorphic rocks that form the base of Frenchman Mountain on the east edge of the Project Area.

Construction of some of the facilities has the potential to encounter paleontological resources within the proposed Project Area. These resources are associated with distinct geological units that are considered to have a high potential to contain fossils and are discussed below.

### 3.2.1 Sultan Limestone: High Potential

The Devonian aged Sultan Limestone crops out in the Project Area on Lone Mountain (Longwell et al. 1965). Fossils are not uniformly distributed, but these are widespread and can be found at many locations. Fossils include marine fauna consisting of coral, brachiopod and infrequent gastropod (Hewett 1931). The Sultan Limestone has a high potential for containing these fossils.

### 3.2.2 Monte Cristo Formation: High Potential

Five members of the Mississippian aged, carbonate rocks of the Monte Cristo Formation have been delineated (Longwell et al. 1965) and all have the potential to contain fossils. Within the Project Area, outcrops can be found at Lone Mountain and in mountainous areas in the south-central area, adjacent to Interstate 15. Fossils that are marine fauna include corals, brachiopod, pelecypods, gastropods, cephalopods, arthropods, echinoderms, bryzoans and crustacea (Hewitt 1931). The Monte Cristo Formation has a high potential for containing fossils.

### 3.2.3 Bird Spring Formation: High Potential

The Mississippian aged carbonate rocks of the Bird Spring Formation crop out in the Project Area in mountainous areas, the southwest, and the south-central area, near Interstate 15. The Bird Spring Formation typically contains abundant fossils and can be considered to have high fossil-containing potential. Fauna in the area are marine and consist of algae, echinoderm and fusilinid (Longwell et al. 1965).

### 3.2.4 Kiabab and Toroweap Formation: High Potential

Permian rocks of the Kiabab and Toroweap Formations crop out in the southwestern area of the Project Area, west of the intersection of Blue Diamond Road and Rainbow Boulevard. Small outcrops of these formations may be present on the eastern edge of Frenchman Mountain. These fossiliferous gypsiferous carbonate rocks contain abundant fossils. Fossils, mostly of the Paleozoic marine taxa, can be found in these formations including brachiopod, echinoderm, and bryzoa.

### 3.2.5 Chinle and Moenkopi Formation: High Potential

Triassic aged sedimentary rocks of the Chinle and Moenkopi Formation crop out within the Project Area in the southwest, near the intersection of Blue Diamond Road and Nevada State Route 160. The Moenkopi Formation is the older of the two and is largely marine in origin, with gypsiferous units in the limestone member (Longwell et al. 1965). Marine fossils within include gastropods, ammonites, and shell fragments (Gregory 1948). The Chinle Formation lies above the Moenkopi and is terrestrial in origin. Rocks of the Chinle Formation were deposited in channels, flood plains, and local and temporary lakes giving rise to large variability in lithology (from conglomerate, to sandstone, to shale with or without gypsum beds) and thickness. Petrified wood is common in sandy layers; volcanic ash is found in the upper part of the formation in some areas (Longwell et al. 1965).

### 3.2.6 Muddy Creek Formation: Unknown; But Could Be, High Potential

Tertiary-aged, gypciferous sedimentary rocks of the Muddy Creek Formation crop out near the southeast and northeast corners of the Project Area and near Boulder City. These deposits are coarse-grained near mountain borders and grade basin-ward into fine-grained sandstone, siltstone, and clay. Beds are generally flat lying, except in a few disturbed zones near faults. Dames & Moore (1991) suggested that these rocks have the potential to produce significant fossils. Blair and Armstrong (1979) document the occurrence of gastropods, ostracods, trace fossils, diatoms, plant, and leaf stem fossils in the upper member of this formation in the Lake Mead area. A correlative unit, the Panaca Formation, in Lincoln County yielded mammalian fossils of Pliohippus (Tschanz and Pampeyan 1970). The occurrence of fossils in this formation within Las Vegas Valley is unknown, but based on observations of similar rocks in nearby areas, the potential for fossils is likely to be high.

### 3.2.7 Las Vegas Formation: High Potential

Light-colored, fine-grained deposits of clay and silt are prominent in the floor of Las Vegas Valley. The thin, horizontal layers have an abundance of shells of snails and other mollusks. Some places also contain bones of Pleistocene mammals, including horse, camel, elephant, bison, sheep, and deer (Longwell et al. 1965). This formation does not occur in the Boulder City area. Pleistocene mammalian fossils generally occur near or within spring mounds, or small-diameter, roughly circular build-ups of fine-grained sediments with various degrees of calcareous cementation formed by springs that existed in the wetter climate of the Pleistocene.

## 3.3 SURFACE WATER HYDROLOGY

### 3.3.1 General Conditions

The Las Vegas Valley and Boulder City areas consist of a portion of rocky mountainous terrain, but the majority consists of sandy alluvial material in both valley bottom and alluvial fan configurations. Drainage patterns are complex because of the alluvial nature of the soil, but most surface water flows eventually outfall to Lake Mead or directly to the Colorado River. Lake Mead and the Colorado River are both defined as “Waters of the United States” (jurisdictional waters). As defined in 33 CFR 328.3(a), jurisdictional waters include navigable rivers as well as their tributaries, intermittent and ephemeral streams that exhibit defined bed and bank characteristics, or an ordinary high water mark (OHWM) resulting from period flows. Therefore, all channels (including man-made structures) or washes in the Project Area that eventually connect to Lake Mead or directly to the Colorado River, whether ephemeral or perennial, are also considered jurisdictional waters. The discharge of dredge or fill material into jurisdictional waters is regulated by the USACE under Section 404 of the Clean Water Act. Several types of USACE permits are available to authorize this activity, depending upon the type of project and amount of actual disturbance. Permit types, ranging from simplest to most complex, are Nationwide, Regional General, Letter of Permission, and Individual. The CCRFCD currently has a Regional General permit that covers all flood control facilities that impact less than 5 acres of jurisdictional waters and 2 acres of wetlands. Any facility exceeding those limits must apply for an Individual permit. The remaining surface waters flows that discharge to natural playas or to man-made detention basis not connected to downstream channels are not considered jurisdictional. Figure 3.3-1 shows surface water features including large drainages/washes and open water in the Las Vegas Valley.

Jurisdictional waters in the Las Vegas Valley are essential in conducting flood flows to Lake Mead. The predevelopment jurisdictional waters are generally ephemeral in nature (Devitt et al. 2002), conveying surface flows only in response to storm events. Currently, perennial flow occurs in the Lower Las Vegas Wash due to:

- Emerging shallow groundwater
- Treated wastewater

The channels show evidence of lateral migration with braided areas and reaches of either down cutting or deposition. Although the overall general drainage system can be considered somewhat stable, significant erosion has occurred in the last 25 years as a result of increasing flows from wastewater treatment plant discharge. As a result, 2,000 acres of wetlands along the Lower Las Vegas Wash have been reduced to 200 acres (Hester and Crear 2002).

The Project Area is generally arid in nature. Precipitation over the Project Area is infrequent and totals to a yearly average of only 4.4 inches (11.2 cm) (Western Regional Climate Center 2003). However, much of the rainfall occurs as short duration, high intensity late summer storms with up to 2.6 inches (6.6 cm) of rainfall recorded in a 24-hour period (Western Regional Climate Center 2003). The storm selected for the design of flood control facilities varies somewhat between different parts of the Project Area, but has a 100-year recurrence interval and 6-hour rainfall depths of approximately 2.3 to 4.3 inches (5.8 to 10.9 cm) (CCRFCD 2002). The location of proposed facilities are shown on Figure 2.1-1. The design flows were developed during the Master Plan preparation (CCRFCD 2002).

The Las Vegas Valley hydrologic analysis provided facility planning for flood events with a 100-year recurrence interval and an ultimate development condition complied with CCRFCD Hydrologic Criteria and Drainage Design Manual (CCRFCD 2001). The Boulder City hydrologic analysis provided facility planning for design storm event of 6-hour duration with a 100-year recurrence interval. Hydrologic models from the 1998 MPU were used but updated with land use and facility development that has occurred. Specific methodology, hydrologic analysis and facilities are contained within the MPU for Las Vegas Valley (CCRFCD 2002), and the MPU for Boulder City (CH2M Hill 2003) and incorporated herein by reference.

Rainfall events with intensities similar to the selected design storm will produce rapid runoff and flash flooding of down slope areas, especially if the storm cell is moving in the down slope direction. Alluvial channels cannot normally contain runoff from such severe storms and over bank flows result, often covering the entire floodplain. However, since both the channel and the floodplain are often poorly defined in alluvial areas, the storm runoff patterns can be significantly altered between flows by construction, occupation, and more importantly, during flows. As a result, shallow flooding can be expected just about anywhere except on the higher ground or where upslope flood control facilities are in place and operating correctly.

Sediment movement can be extensive during major flows and can be quite significant even during one or more minor flows. Lateral channel migration can occur with flows approaching man-made facilities from different angles or increasing peak flow rates in adjacent channels. Sediment deposition can occur, reducing channel conveyance capacity and widening the floodplain. Alternatively, channel down cutting can occur as general channel degradation or as head cutting from downstream steeper reaches.

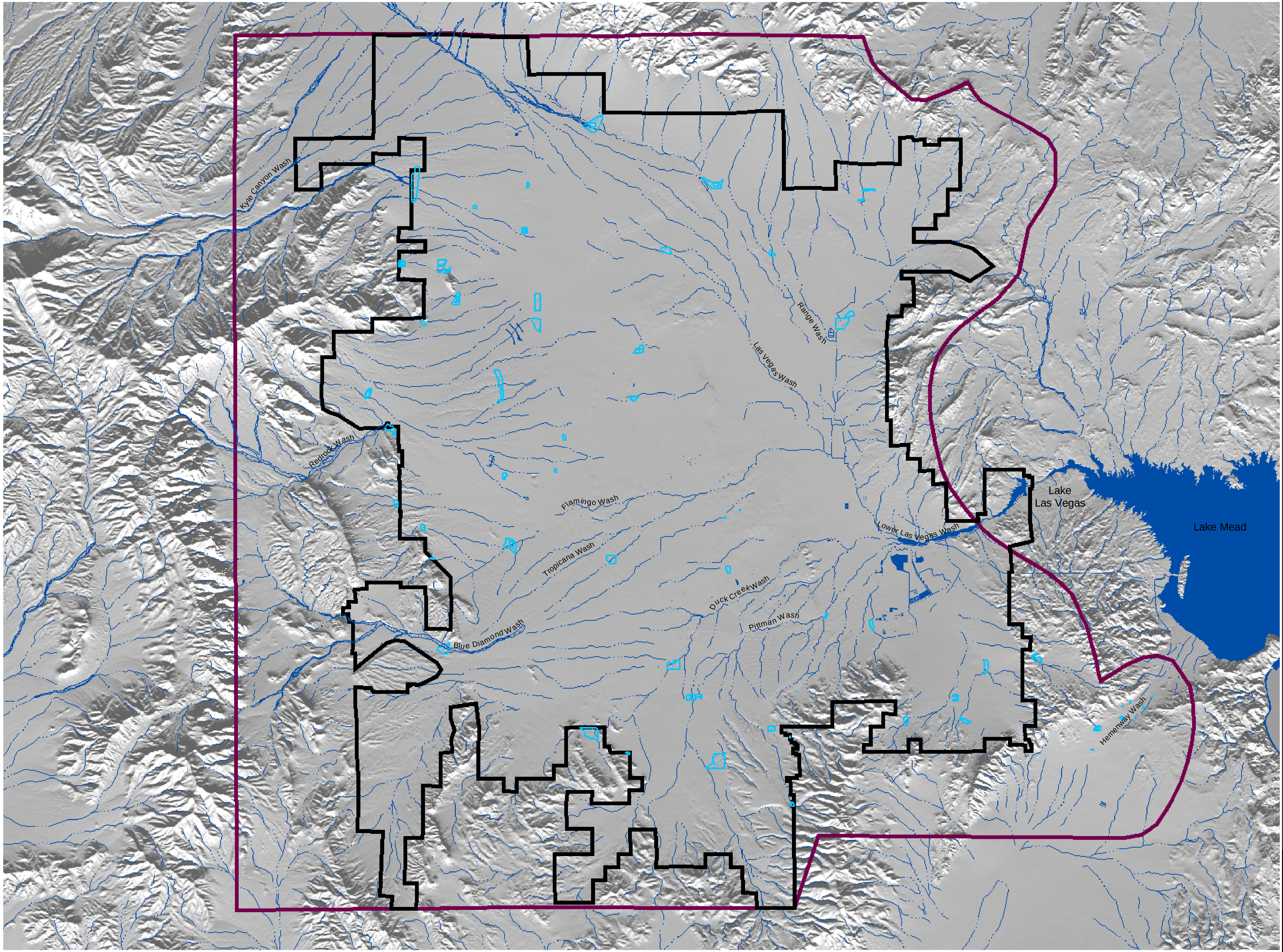
The water quality for the storm water runoff is probably mostly a function of human activity in the tributary areas. As the watershed is developed, the occurrence and concentrations of contaminants associated with rural and urban areas can be expected to increase in the storm water runoff. The interaction between the storm water runoff and sewage effluent can be considered both harmful and beneficial. Mixing with the effluent may degrade the quality of storm runoff water. However, the storm runoff may also dilute and help treat the effluent.

### 3.3.2 Summary of Significant Resources and Conditions

There are a variety of significant resources and issues related to the categories of surface water and water resources facilities. In general, the pattern of flow, flow rate, velocity and water quality of flowing surface water are of principal

REGIONAL FLOOD CONTROL DISTRICT

**CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)**



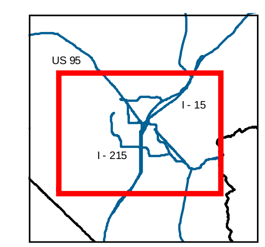

**Legend**

- Drainage/Wash
- Open Water
- Existing Debris/Detention Basin
- Ultimate Development Boundary
- Project Area Boundary

N
W E
S

Feet
0 10,000 20,000

SCALE: 1 inch = 20000 feet




SURFACE WATER FEATURES

FIGURE 3.3-1

SWCA ENVIRONMENTAL CONSULTANTS

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concern in this section of the SEIS. Clearly all water flowing or ponded on the surface should be classified as surface water resources. This includes storm water runoff and wastewater treatment plant (WWTP) effluent.

In addition to the surface waters, natural and man-made facilities, which help to manage the surface waters, are included in this consideration of surface water resources. These include ponds, lagoons, detention/retention basins, channels, stormdrains and washes. These categories of water resources facilities have been included in this assessment because these facilities are significant and may not otherwise be included in the assessment. Other water resources facilities that are not related to flood control include wastewater collection and conveyance facilities, wastewater treatment plants and effluent conveyances. These facilities are also addressed in this section to evaluate potential impacts to these facilities. Any plans to manage flood flows in the Project Area will encounter these facilities at numerous locations.

The existing drainage facilities themselves are also surface water resources and meet the definition of a jurisdictional water. The channels provide for both channel and over bank storage that attenuates peak runoff and flow rates and reduces the potential for downstream flooding; although the over bank storage experienced in some areas may represent an existing flooding problem. In addition, the unlined channels and over bank areas induce natural groundwater recharge during runoff periods and some may act as groundwater discharge areas at other times. Potential effects of flood control facilities on shallow groundwater are addressed in Section 4.4 of this document. However, owing to the infrequent occurrence and short-lived nature of large flood events, the amount of groundwater recharge is negligible.

Under existing conditions, much of the surface water occurring during storm events in the Las Vegas Valley flows to Las Vegas Wash and to Lake Mead. In Boulder City, most of the flow is to Hemenway Wash and to Lake Mead. The channels/washes that carry those flows and exhibit an OHWM are considered jurisdictional. Some portions of the storm flows may percolate into shallow groundwater zones. As described in greater detail in Section 4.4 of this document, some of the tributary washes in the Las Vegas Valley act as discharge areas for shallow groundwater during much of the year. As a result of these groundwater discharges and WWTP discharges of effluent to these washes, perennial low flows and shallow subsurface flows are noted along the lower reaches of some of the washes. These washes exhibiting perennial low flows or an OHWM are also considered jurisdictional. For this document, perennial low flows are defined as both continuous surface flows and the discontinuous pools of water that are connected by shallow subsurface flows down the washes. With this definition, perennial low flows have been identified along the Lower Las Vegas Wash below the WWTP facility.

In 2001 the Las Vegas Valley imported 444,640 acre-feet of water from Lake Mead (21,269 acre-feet of which were recharged to the principal aquifer) and pumped 79,376 acre-feet from the groundwater system for potable water use in the valley (Coache 2001). Diversions from Lake Mead and the Colorado River system are greater than Nevada's allocation of 300,000 acre-feet because Nevada receives return flow credit. Colorado River water that is not consumptively used in the Las Vegas Valley and is returned to Lake Mead is credited to Nevada's allotment. Return flow credits are based on a return of a portion of water discharged by wastewater treatment plants to the Lake Mead reservoir. Only a portion of the discharged water is credited as return flow, because some of the wastewater originated as groundwater from water purveyor's groundwater wells.

Like the Las Vegas Valley, Boulder City imports its water supply from Lake Mead and the Colorado River System. Potable water comes from the SNWA and in 2001 Boulder City imported 10,225 acre-feet. The community also imports raw water from the Colorado River at a diversion located at SNWA's River Mountain Treatment

Plant. The amount of raw water imported in 2001 was 466 acre-feet. This water is used for irrigation in the artificial wetlands park, golf courses, the cemetery and some public parks. The wetlands park, located just north of the airport has four wetland ponds, a fish lake and a boat pond. The two golf courses also have constructed ponds.

The majority of the water resources environmental evaluations for the Project Area relate to the existing system to manage storm water runoff. This system is mainly comprised of natural and man made open channel conveyances and the pedestrian, vehicle and utility crossings of these conveyances. Additional system facilities include detention basins, some closed storm water conveyances and the wastewater treatment plants located adjacent to the washes. A description of each of the watersheds and its water resources environmental conditions is presented in the following sections.

## 3.3.3 Watershed Drainage Patterns and Facilities

The selection of drainage area boundaries for this Project Area is somewhat subjective because of the alluvial nature of the ground surface and how flows are affected by man-made facilities in the developed areas. The watershed boundaries assumed in this analysis are those presented in the MPU (CCRFCD 2002). The boundaries of these watersheds are shown on Figure 2.1-1 and specific drainage patterns within each watershed are described below.

### 3.3.3.1 Range Wash

The Range Wash Watershed is in the northeastern part of the Las Vegas Valley. Floodwaters are generated in the mountains to the north and east and flow onto a large upland alluvial fan and then southward from the apex of the fan. These flows are routed overland and through small braided washes, finally being collected along the UPRR tracks and then southward through existing culverts under the tracks. North of Interstate 15, flows may be detained in one of three detention basins: Speedway 1, Speedway 2 and Vandenburg. South of Interstate 15, flows are overland or directed into eastern and western tributary channels to the Sloan Channel (west side of watershed) and into the existing east tributary channel.

At the northern end of the Sloan Channel overland runoff and channelized flow from the headwaters of the Range Wash Watershed is centrally collected by the Range Wash Confluence Detention Basin. The Sloan Channel continues southward for about 4.5 miles (7.3 km) collecting tributary runoff from Frenchman Mountain and its alluvial fan to its confluence with the Las Vegas Wash. Flows exiting the Range Wash Watershed enter the Lower Las Vegas Watershed and travel approximately 8.5 miles (13.7 km) to Lake Mead.

### 3.3.3.2 North Las Vegas Wash

The general drainage patterns include collection of runoff from tributary areas to Upper Las Vegas Wash and conveyance of these flows to the southeast and eventually outfall to the Las Vegas Bay of Lake Mead (see Figure 3.3-1). In the developed area in the southern part of the watershed, the flow passes near the center of North Las Vegas and through a variety of residential and commercial areas. From the point where Las Vegas Wash outfalls from this Project Area, it is approximately 14 miles (23 km) flow distance to Lake Mead.

The Upper Las Vegas Wash drainage collects storm water runoff from the Sheep Mountains, Las Vegas Range, Spring Mountains and alluvial fans north of the City of North Las Vegas. The Spring Mountain runoff flows overland to the east from Kyle Canyon and is routed through the Kyle Canyon Detention Basin. The runoff flows on the north side of the Kyle Canyon Road route across U.S. 95 and enters the head of the Upper Las Vegas Wash where they are joined with flows from the east side of Sheep Mountain and flows from the Las Vegas Range. These flows are then routed through the Upper Las Vegas Wash

Detention Basin and continue southeasterly in the existing wash, eventually reaching the diversion for the North Las Vegas Detention Basin. This flow continues southeasterly along the wash to exit the Northern Las Vegas Wash watershed and enter the Central watershed. From the end of this watershed to Lake Mead flows travel approximately 14 miles (23 km) to Lake Mead.

#### 3.3.3.3 Gowan Watershed

The Gowan watershed consists of steep mountainous terrain on the west to a broad alluvial apron reaching from Kyle Canyon on the north to Red Rock Wash on the south. Many small washes drain the area from west to east, and the steep portions of the fan slopes display channel erosion and a bayena topography. Flatter portions of the fan experience runoff in the form of sheet flow. This area has experienced rapid development that extends west of the beltway.

Flows in the north of this watershed are overland where they are intercepted on the west by an unnamed detention basin and further east (down gradient) by the Lone Mountain Detention Basin. East of these detention basins, flow is channelized and directed to the Gowan North and South Detention Basins. Flow from the Gowan South Basin is directed to the North Basin and then channelized through the Gowan Outfall facilities and discharged to the Middle Las Vegas Wash facilities in the Northern Las Vegas Wash Watershed.

Central flows are overland and into channels of the Gowan/Lone Mountain System-Branch 3 and to the Summerlin Village Number 26 Detention Basin. From here, flows are directed to the Lone Mountain Detention Basin and finally to the Gowan Detention Basins.

Flows in the southern part of this watershed are overland to be intercepted by the Summerlin Number 5 Detention Basin. Downstream from this basin, flow is overland to the beltway, where it is directed underneath through culverts and into north and south branches of the Angel Park channels. Flows are then intercepted by the Angel Park Detention Basin and outfall to the Gowan North and South Basins.

#### 3.3.3.4 Central Las Vegas Watershed

The general drainage pattern is from west to east across this watershed. The Gowan Watershed flows are directed into the Northern Las Vegas Wash Watershed and the Flamingo/Tropicana Watershed flows are directed into the Lower Las Vegas Wash Watershed. The Central Watershed conveys flows that originate within it. The major drainage features of this watershed are the Las Vegas Creek Channel and the Washington Avenue Channel.

Flows in the northern portion of this watershed are transmitted in three channel systems: the North Las Vegas air terminal channels, the Peak Drive/Rancho/Smoke Ranch channel system and the Lake Mead channel. The channels direct water to the Carey/Lake Mead Detention Basin. From this detention basin flow is overland to the Freeway Channel and into the North Las Vegas Wash Watershed.

The Las Vegas Creek Channel carries flows through the central portion of the watershed. Tributary to this channel from the south is the Meadows/Charleston collection system. Flows from the Meadows/Charleston collection system are intercepted on the west by the Oakey Detention Basin and on the east, near the confluence with the Las Vegas Creek Channel by the Meadows Detention Basin. In between the Las Vegas Creek Channel and the Meadows/Charleston collection system flows are drained by the Meadows Alta Channel. This channel is tributary to the Meadows/Charleston collection system that is up gradient from the Meadows Detention Basin.

From the confluence of the Meadows/Charleston collection system, flows in the Las Vegas Creek Channel are carried easterly to the Washington Avenue Channel that serves as the major feature on the eastern portion of this watershed. Tributary to the Washington Avenue Channel and collecting flows from the southwestern portion of this watershed is the Freeway Channel.

Flows from the Washington Avenue Channel are directed into the Middle Las Vegas Wash. South of the Washington Channel, flows are collected in streets and conveyed to the Middle Las Vegas Wash. From the Central Watershed, flows are carried about 11 miles (18 km) in the Las Vegas Wash to Lake Mead.

### 3.3.3.5 Flamingo/Tropicana Watershed

The general drainage pattern is from mountainous areas rimmed by alluvial fans on the west to lower portions of alluvial aprons and valley lowlands in the east. The major drainage features in the watershed are the Red Rock, Flamingo, Tropicana and Blue Diamond Washes, which originate in the mountainous areas. The Red Rock Wash flows towards Flamingo Wash. Flows from the Flamingo and Tropicana Wash Watersheds merge in the east and drain into Middle Las Vegas Wash.

Mountainous areas in the western part of the watershed are part of the Red Rock Wilderness Project Area and are expected to remain undeveloped. Bordering the wilderness area are the Blue Diamond Hills that are currently disturbed for gypsum mining and are privately owned. The future of these private lands in terms of development has not been decided. East of the Blue Diamond Hills, on the upper apron, rapid residential development continues. While lower portions of the alluvial apron and valley lowlands are already developed.

The Red Rock Wash Watershed comprises the northern part of the Flamingo/Tropicana Watershed. Flows from the northwestern part of the watershed (the northern Red Rock Wilderness Study Area and the northern Blue Diamond Hills) are intercepted west of the Interstate/Clark County 215 beltway by the Red Rock Detention Basin. Outfall from the basin is via the Red Rock Channel southeast to the beltway. Along the beltway, the Red Rock Channel collects tributary flows from smaller channels and overland flow that empties into the Flamingo Detention Basin. Outfall from this basin is along the Flamingo Wash Channel that collects flow from the north and south of the channel. The wash carries it east - northeast to the confluence with the Tropicana Wash Channel.

Flows collected by the Flamingo Wash Channel also include those that originate in the middle part of the watershed. These flows are overland in the west where the larger washes are intercepted by three debris basins. Channels convey flows from these basins to the Upper Flamingo Detention Basin. Outfall from this basin is directed easterly along the Flamingo Channel. About 0.5 miles (0.8 km) below the basin, a portion of the flow is directed southeasterly to the Tropicana Wash Channel via the Flamingo/Tropicana Diversion Channel, which joins the southerly drainage system at the Tropicana Detention Basin. The Flamingo Channel continues easterly to the Lower Flamingo Detention Basin, where flows from the northwestern developed area of this watershed are also impounded. East of the Lower Flamingo Detention Basin, flows from the Tropicana and Flamingo Channels join. The flows are then routed approximately 6 miles (10 km) to the Middle Las Vegas Wash.

Flows that originate in the southern portion of this watershed are routed through either the Blue Diamond Detention and conveyance facilities or the Tropicana and Wagon Trail Channels. Wagon Trail Channel flows are directly northeasterly to the confluence with the Tropicana Wash. About 70 percent of the drainage area for the Blue Diamond Watershed flows into the Blue Diamond Detention Basin and these flows are diverted into the Flamingo/Tropicana Channel System. The other 30 percent is tributary to the South Duck Creek Detention Basin that is diverted into the Pittman Wash System.

### 3.3.3.6 Duck Creek Watershed

The total natural drainage area of the Duck Creek Watershed is over 350 square miles (907 $km^2$) (CCRFCD 1996), but for the purposes of this planning document the total watershed area is 131 square miles (339 $km^2$). A portion of the Blue Diamond Watershed (70 square miles [181 $km^2$]) is diverted from the natural Duck Creek drainage system into the Flamingo/Tropicana Watershed to the north. The Pittman Wash system, of approximately 156 square miles (404 $km^2$), is considered as a separate watershed.

The general drainage pattern is from mountainous areas rimmed by alluvial fans on the southwest to lower portions of alluvial aprons and valley lowlands in the east. Flow is generally east northeast, with all portions of the drainage system converging into Duck Creek Wash and exiting the watershed about 1.5 miles (2.4 km) before draining into the Lower Las Vegas Wash.

Flow from Blue Diamond Wash is naturally tributary to Duck Creek. However, at the apex of the alluvial fan incised by the wash channel, the flows split with the majority of the flows going into the Flamingo/Tropicana Watershed.

Flow directed into the Duck Creek Watershed originates from the southwest in the undeveloped mountainous areas and upper alluvial fans. The flow travels overland and in small braided washes over a broad alluvial apron to the Upper Duck Creek Detention Basin (north) and the Birdspring Detention Basin (south). From these basins, flow is uncontrolled to the northeast. Flows that originate from the mountains rimming the southern portion of the Project Area flow uncontrolled in small washes and overland to converge with those from the southwest. From here, flows are northeasterly to the Duck Creek Wash Channel and then to the Lower Duck Creek Detention Basin. The Lower Blue Diamond Detention Basin intercepts flows occurring north and not tributary to the Lower Duck Creek Channel. Downstream from this Basin, flows are channelized, collecting tributary overland and small wash flows. Flow eventually spills into the Duck Creek Channel, approximately 7 miles (11 km) downstream from the Lower Duck Creek Detention Basin.

The Rawhide Channel portion of the Duck Creek Channel System occurs in the northeastern corner of the watershed. At the west end of this Channel, the McCarran East Detention Basin intercepts overland flows and discharges the flow into the Channel system, which joins with the Duck Creek Channel before exiting the Project Area and flowing eastward to join the Lower Las Vegas Wash.

### 3.3.3.7 Pittman Wash Watershed

The general drainage pattern is from the mountainous areas of the McCullough Mountain Range in the south and west, north and east to the Lower Las Vegas Wash. The upper watershed consists of western slopes of the mountains. The middle reach is an alluvial fan system stretching from the edge of the mountain slopes across Lake Mead Drive and the UPRR to Sunset Road. The lower reach is the flattest and extends from Sunset Road to the Las Vegas Wash.

Little development has occurred in the southwestern and mountainous portion of this watershed, but rapid development has occurred in the middle reach. The northeast portion of the watershed is partially developed. The development in this watershed consists of master planned residential communities, large areas of industrial development, and single-family residential custom lots. Streets and storm drain facilities that ultimately discharged collect storm flows in these areas to the Pittman Wash.

No facilities exist in the sparsely populated area of this watershed west of Interstate 15. Flows here occur overland and in braided washes. East of Interstate 15, Pittman North, Pittman East and McCullough Hills Detention basins intercept runoff. From these basins, flow is northward toward Pittman Wash, north of the beltway. Pittman Wash Channel carries flows first easterly and then northerly to Lower Las Vegas Wash. Tributary to Pittman Wash are some of the flows from the central and eastern McCullough Mountain, which are routed through the Pittman-Railroad-East Channel. Further east, the Pittman Wash-Interstate Channels gather runoff and convey it northward to the Lower Las Vegas Wash, less than 1 mile (2 km) downstream from the confluence of Pittman Wash.

### 3.3.3.8 C-1 Watershed

The C-1 Watershed is the small area drained by the C-1 Channel on the north and eastern side of the McCullough Mountains. Less than about half of this area is developed and the development is limited to the eastern part, where it occurs on the alluvial areas surrounding the Boulder Highway and near Lake Mead Boulevard. Flows from the mountainous areas are overland and in small washes to the C-1 Channel. Tributaries to this channel on the east side of the watershed are the Equestrian Detention Basin Outfall, Ithaca and Drake Channels. Five detention basins occur in this watershed on the up-gradient end of the C-1 Channel and its tributaries. All flows are tributary to the Las Vegas Wash.

### 3.3.3.9 Lower Las Vegas Wash Watershed

All of the previously described watersheds comprise the tributaries to the Lower Las Vegas Wash. Water flowing into Las Vegas Wash comes from treated wastewater, landscape and surface street runoff, seeping shallow groundwater and storm water. This watershed planning area has been developed on its eastern edge. The Las Vegas Wash Channel occurs on the eastern side and forms the southern margin of the area. Just beyond the western limit of the planning area is the man-made Lake Las Vegas with residential and resort communities along its shores.

The Las Vegas Wash Channel in the Lower Las Vegas Wash Watershed varies from concrete-lined reaches to unlined earthen reaches to grass swales through golf courses (CCRFCD 1996). The channel transmits approximately 240 cfs (about 150 to 160 million gallons) of water per day of base flow in the form of urban runoff and wastewater discharge that has caused significant erosion of the banks of the wash, de-stabilizing the channel and increasing sedimentation into Lake Mead at the Las Vegas Bay (Zikmund et al. 2002). In the last 25 years, 1,800 acres of wetlands have been eroded away leaving only 200 acres (Hestor and Grear 2002). Efforts are underway to stabilize the channel.

Runoff from storm events can result in flows from 500 to greater than 10,000 cfs (323 to 6,463 million gallons per day). One of the most recent, record-breaking floods occurred in July 1999 and generated a peak flow of 16,000 cfs (10,340 million gallons per day) (Sutko 1999). These peak flows lead to intense erosion and increasing sedimentation into Las Vegas Bay and Lake Mead (LVWCAMP 1999).

Currently, the Las Vegas Wash Coordination Committee is working on plans to manage the Lower Las Vegas Wash. The Las Vegas Wash Comprehensive Adaptive Management Plan calls for specific action to reduce the devastating effects of erosion on wetlands and other habitats for wildlife species, to ensure that waters conveyed through the wash do not adversely affect Lake Mead's water quality.

### 3.3.3.10 Boulder City Drainage Patterns

Drainage from the Boulder City area generally flows northeasterly into Hemenway Wash to Lake Mead and south towards Dry Lake. The Boulder City planning area is divided into four major sub-watersheds: Hemenway, Georgia Buchanan, North Railroad and West Airport by the 2003 MPU (CH2M Hill 2003). Figure 2.1-11 shows the location of the Boulder City Watershed. The MPU details the drainage patterns of each of the watersheds and what follows below is a summary of that data.

The Hemenway Sub-watershed is half-developed and half mountainous terrain that is completely channelized through the center of the sub-watershed. Mountainous areas trend northeast and form both the south and north borders of the sub-watershed. Large runoff volumes and rates come from the mountainous terrain because of its steepness, lack of vegetation, large aerial extent and low permeability. The alluvial apron, adjacent to the south of the mountains; supports present urban development where the natural drainage has been altered. The existing drainage channels now collect and channel mountain runoff into channels typically along the rear lot lines of developments along the mountain front and into channels or streets. Along U.S. 93 the runoff is collected, channelized and directed down-gradient into Hemenway Wash.

The Georgia Buchanan Sub-watershed is largely developed. Flow is generally to the south, towards Eldorado Valley along a relatively gentle slope. Hilly areas form the western border and rugged mountainous areas occur along the northern border. Flow from the north is overland and is collected and conveyed southward via the storm drains. Storm drains outfall into channels north and south of Adams Street. Further south, flow is channelized along the eastern boundary (east airport channel), along Buchanan (central) and along Georgia (east-central). All three channels terminate just north of the wastewater treatment plant, where flow enters natural washes.

The North Railroad Sub-watershed is composed mostly of mountainous areas to the north that transition to alluvial fan deposits. Runoff is from north to south. The southern boundary is formed by an existing dike/berm/levee system on the western half of the sub-watershed, positioned just north of U.S. 93. The diagonal dike/berm/levee system funnels flow into culverts that have been constructed under the railroad first and then under U.S. 93. South of U.S. 93 flow spreads out as sheet flow across the alluvial surface or into braided channels. A detention basin occurs at the end of Bootleg Wash, a major drainage in the River Mountains in the northeast part of the sub-watershed. Outfall from the detention basin is collected in an unlined channel along Industrial Road and conveyed to the Railroad Detention Basin which outfalls to the West Airport Sub-watershed.

The West Airport Sub-watershed is mostly undeveloped. Development occurs only along the eastern edge. The U.S. 93 forms the northern border. The sub-watershed is characterized by a gently sloping alluvial pediment that conveys flow via sheet flow and in braided channels. Concentrated flow from the North Railroad Sub-watershed southward in culverts underneath the railroad and U.S. 93 spreads out into overland flow across this sub-watershed. Flows from the northeast portion of this sub-watershed are channelized through the developed area and carried south through the sub-watershed in the west airport channel, that runs just west of the airport and ends just south of the runways.

### 3.3.4 Areas of Perennial Surface Flow

Perennial low flows are defined in this document as both continuous surface flows and the discontinuous pools of water that are connected by shallow subsurface flows down the washes. These low flows may be supported by discharge from shallow groundwater or excess irrigation of lawn in urban areas along various wash-drainage systems. No areas of low flow have been noted in the Boulder City area.

### 3.3.5 Water Quality

Urban runoff may contain higher-than-normal concentrations of nutrients and/or pollutants. Increased nutrients may also occur in wastewater. Shallow groundwater may contain higher concentrations of nutrients and pollution caused by excess fertilizer application and by sewage from septic systems or leaky sewer pipes. Storm water may also contain pollutants and nutrients derived from surface streets and urban landscapes. Other water quality issues of concern in Las Vegas Valley runoff include sediment load, selenium, perchlorate, and urban chemicals (e.g., pesticides and herbicides, solvents, gas products, oil and grease) (LVWCAMP 1999).

#### 3.3.5.1 Las Vegas Wash Water Quality

The USGS monitored nutrient concentrations in Las Vegas Wash downstream from the sewage discharge and reported that between 1974 and 1988, the nitrogen load in Las Vegas Wash downstream from sewage discharge increased more than threefold and consisted almost entirely of ammonia (Bevans et al. 1998). From 1993 to 1995 ammonia levels were still a large part of the total nitrogen load downstream from the sewage treatment plants, but these levels decreased fivefold in 1996 and 1997 because of implementation of tertiary treatment of wastewater.

During 1993 to 1995, pesticides were also detected by the USGS in samples from Lower Las Vegas Wash upstream from the sewage discharge. One sample exceeded a Maximum Contaminant Level (MCL). Other samples exceeded the aquatic life criterion for diazinon (47 percent of samples) and malathiaon (25 percent of samples). During 1994, downstream from the sewage discharge points, pesticides were also found in samples from the Las Vegas Wash. And in 1995, volatile organic compounds (VOCs) were also found-the combined concentration of VOCs did not exceed the drinking water advisory.

The Las Vegas Storm Water Quality Management Committee issues reports on the results of water quality monitoring in Las Vegas Valley. Since 1992, both wet and dry weather monitoring of runoff is performed at various places in the valley. This program has been initiated to gather information on urban runoff (dry weather), storm water runoff (wet weather), and treated wastewater that flows ultimately to Lake Mead. The following information is from the most recent report (MWH 2002).

Only a limited number of storms are sampled in each year and there exists a large variability of water quality between the storms and between the sites. The report indicates that overall averages may be similar, but overall averages are of little consequence in such a variable system. The most recent sampling (2001-2002) shows that Total Suspended Sediment (TSS) and Total Dissolved Solid (TDS) levels were much higher than previous years. The highest levels of oil and grease were also observed, due to "the very high value reported for Las Vegas Wash" during one sampling event. Nitrate and nitrite followed historic concentrations. Copper "appeared to have a slight increase over the last four years" (MWH 2002).

#### 3.3.5.2 Storm Water Quality between Las Vegas Valley Watersheds

MWH (2002) summarizes the potential impact of storm water discharges and dry weather flows on the quality of water for the primary outfalls to Las Vegas Wash. Comparing storm water (wet weather) quality monitoring data between watersheds revealed the following:

- Suspended solids have been the highest on the most undeveloped watersheds-Range Wash, Duck Creek and C-1 Channel-although other watersheds also show high suspended solids. This suggests that factors other than level of development (storm characteristics, construction activity or re-suspension of sediment trapped in the drainage system) play a significant role.
- Watersheds with the highest level of urbanization have the highest concentrations of urban chemicals.
- Metal concentrations are independent of the level of urban development in the watershed.
- Nutrients show a mixed response to watershed characteristics.
- Strong correlation between bacteria levels and extent of urbanization.

#### 3.3.5.3 Comparing Wet Weather and Dry Weather Runoff Water Quality in Las Vegas

Comparing wet weather and dry weather concentrations, MWH (2002) concluded that wet weather flows are a more important contributor of short-term high pollutant concentrations in Las Vegas Wash flows than dry weather flows. MWH (2002) made the following observations:

- Bacteria counts are twice as high in wet weather flows.
- Suspended solids and turbidity are about twice as high in wet weather flows due to high sediment loads in storm water. TDS is lower in wet weather flows because during dry weather, seeping shallow groundwater that is high in TDS makes up a large component of the flow. During storms, the runoff is diluted and TDS concentrations fall.
- Hydrocarbons are higher in wet weather flows, but still only slightly above detectable quantities. Surfactants are an order of magnitude higher in wet weather flows.
- Nutrients are between an order of magnitude and 1.4 times higher in wet weather flows.
- Heavy metals are significantly higher in wet weather flows.
- Biochemical and chemical oxygen demand are about an order of magnitude higher in wet weather flows.

#### 3.3.5.4 Storm Water Pollutant Loading in Las Vegas

MWH (2002) calculated pollutant loading based on 2001-2002 sampling data and 2001 rainfall runoff. Annual rainfall runoff was estimated to be slightly over 25,000 acre-feet per year and loads in tons, as outlined in Table 3.3-1.

**TABLE 3.3-1. Storm Water Pollutant Loading in Las Vegas**

| Pollutant | Projected Annual Wet Weather Load (Tons) |
|---|---|
| Boron | 8.50 |
| Copper | 1.40 |
| Copper, dissolved | 0.34 |
| Lead | 3.40 |
| Lead, dissolved | <3.40 |
| $NO_2$ | <171.00 |
| $NO_3$ | 59.00 |
| Oil and Grease | <103.00 |
| TDS | 19,134.00 |
| Total Potassium Nitrate (TKN) | 167.00 |
| Total Nitrogen | 246.00 |
| Total Phosphorus | 33.00 |
| TSS | 32,459.00 |
| Zinc | 3.90 |
| Zinc, dissolved | 0.68 |

#### 3.3.5.5 Water Quality in Boulder City

Boulder City does not monitor, nor is it required to monitor, storm water flows or dry weather runoff. Dry weather flows into streets and/or storm drains are not monitored because it is unlikely for any of this water to reach a body of receiving water (e.g., Lake Mead or Boulder City groundwater). Dry weather runoff will likely evaporate well before either reaching the deep groundwater table or reaching Lake Mead. Wastewater treatment plant effluent that is not reused in the gravel operation to the west is discharged to Eldorado Valley to the south where it evaporates well before it reaches the deep groundwater (i.e., greater than 300 feet [91 m] deep).

### 3.3.6 Wastewater Treatment Plants and Effluent

Wastewater treatment plants in the Las Vegas Valley are operated by three entities: the City of Las Vegas, the City of Henderson and the Clark County Water Reclamation District. The City of Las Vegas operates three facilities. The Water Pollution Control Facility is within the Lower Las Vegas Wash Watershed at 6005 East Vegas Valley Drive; one is within the Central Watershed at Bonanza and Mojave, and the Northwest Reclamation Facility is in the Gowan Watershed at 3271 North Durango Drive. The facilities in the Central and Gowan Watersheds are re-use facilities or facilities that treat the water for irrigation. The Water Pollution Control Facility discharges the effluent to the Lower Las Vegas Wash (City of Las Vegas 2003).

The City of Henderson and the Clark County Water Reclamation District operate facilities in the Lower Las Vegas Wash and in the Pittman

Watershed, respectively. Both of these facilities treat water for discharge into Lower Las Vegas Wash.

In Boulder City, water that is not consumptively used in irrigation is returned to the wastewater treatment plant, located in the southeast area of town, just south of the airport. After evaporation losses, the treatment plant processes about 1.1 million gallons per day. About half of this water is delivered to a gravel operation west of the city near U.S. 95 and the other half is discharged down gradient in braided channels flowing south to Eldorado Valley where it evaporates.

# 3.4 HYDROGEOLOGY/GROUND WATER HYDROLOGY

## 3.4.1 Hydrogeologic Setting

The hydrogeologic setting of this project has not changed substantively since the publication of the FEIS. The primary changes that have occurred are the release of new information regarding the hydrogeologic setting. This will be the primary focus of discussion in this section of the SEIS. Readers wishing more in-depth background information are referred to the 2002 MPU (CCRFCD 2002) and the FEIS (BLM/CCRFCD 1991).

The majority of the proposed flood control facilities are located in the Las Vegas Valley alluvial basin, which is an intermontane structural depression in the Basin and Range physiographic province. The basin is bounded to the west by the Spring Mountains, to the north by the Sheep and Las Vegas Ranges, to the east by Frenchman and Sunrise Mountains and to the south by the River Mountains and the McCullough Range (Plume 1984). Boulder City is located just east of the Las Vegas Basin in the northern end of the Eldorado Valley.

The valley floor is hot and arid with a mean annual high temperature of 80ºF (27ºC) and a low temperature of 53ºF (12ºC), and the average annual precipitation is 4.4 inches (11.2 cm) at the Las Vegas Weather Service Office Airport station (Western Regional Climate Center 2003). Most of the natural groundwater recharge occurs on the surrounding mountain blocks and most of the discharge occurs as evapotranspiration on the valley floor from the groundwater system. There are no perennial flows into the valley, and prior to urbanization, there were no perennial flows out of the valley. Surface and groundwater flow are tributary to Lake Mead, and since at least 1957, significant perennial flow has occurred in Las Vegas Wash where urban wastewater is discharged and shallow groundwater seeps.

Las Vegas Valley Basin is filled with a complex sequence of interfingered and intermixed deposits of boulders, gravels, sands, silts and clays, which reach thicknesses of up to 5,000 feet (1,524 m) in parts of the valley (Harrill 1976). The valley fill is derived from carbonate and clastic sedimentary rocks from the north, west and east; volcanic and intrusive igneous rocks from the south; and metamorphic rocks from the east (Noack 1988). Groundwater in the Las Vegas Valley occurs in four general aquifer systems (Van Denburgh et al. 1982; Brothers and Katzer 1988):

- Shallow zones are defined as being 0 to 30 feet (0 to 9 m) below ground surface where groundwater is within 20 feet (6 m) of ground surface.
- Near-surface reservoir is defined as being 0 to 200 feet (0 to 61 m) below the water table where the water table is greater than 20 feet (6 m) below ground surface.
- Principal aquifers (generally greater than 200 feet [61 m] below the water table).
- Regional carbonate aquifers (occurring at depths of several thousand feet).

Groundwater used for drinking water is generally produced at a depth of about 250 to 1,600 feet (76 to 488 m) below ground surface from course alluvium within the principal aquifer system on the west side of the valley (Kaufmann 1978; Donovan 1996). These alluvial deposits are more permeable, therefore more productive than the fine-grained sediments in the central and eastern portions of the valley (Dettinger 1987; Donovan 1996). Generally, groundwater moves down gradient from the west and northwest to the east and southeast across the valley (Van Denburgh et al. 1982; Hines, et al. 1993). Hydraulic head and water quality vary with depth and location because water flows both horizontally and vertically in the Las Vegas Valley. Horizontal water flow occurs more easily than vertical water flow because the flat lying strata are interlayed with impermeable or low permeability sediments.

## 3.4.2 Hydrogeologic Units

### 3.4.2.1 Shallow Unit

The shallow units occur in the central portion of the valley. The area includes Alta Drive to the north, Sunset Road to the south, Decatur Boulevard to the west and Frenchman and Sunrise Mountains to the east (Brothers and Katzer 1988; Cibor 1983; Converse Consultants 1985; Harrill and Katzer 1980; Katzer et al. 1985; Van Denburgh et al. 1982; Zikmund 1996). The occurrence of phreatophytes in the valley, including mesquite, indicates a shallow water table of less than 50 feet (15 m) below ground surface under predevelopment conditions. Mesquite taps groundwater in the valley up to a depth of 50 feet (15 m). Most other phreatophytes in the valley are restricted to areas where the water table is within a few feet of the land surface or along surface drainages with relatively continuous surface flows (Converse Consultants 1985).

The shallow zones consist primarily of silts and clays interbedded with sand, gravel and caliche layers (Kaufmann 1978). These saturated zones are generally unconfined; however, confined to semi-confined conditions exist locally (Dettinger 1987). The shallow zone is 0 to 30 feet (0 to 9 m) thick, where the water table occurs within 20 feet (6 m) of the land surface (Brothers and Katzer 1988; Zikmund 1996). Figure 3.4-1 displays the location of shallow groundwater in Las Vegas Valley (SNWA 2003). No shallow groundwater occurs in the Boulder City area.

Under predevelopment conditions, the shallow zones would have been fed by upwelling of artesian water in the principal aquifers and to a lesser extent, the near surface reservoir (Devitt et al. 2002). Some amount of infiltration of surface flow from the natural spring flow in the valley may have also contributed to water in the shallow zones. Although, much of the surface flow was lost to evapotranspiration.

### 3.4.2.2 Near-Surface Reservoir

The near-surface reservoir generally extends from north of Tule Springs in the northwest corner of the valley to north of Nellis AFB, southward to Henderson and westward to west of Interstate 15. Originally, researchers included shallow units in the near-surface reservoir, but water quality differences and transmissivity differences led later workers to distinguish between the two zones (Brothers and Katzer 1988; Dettinger 1987).

As in the shallow zone, the near-surface reservoir is composed primarily of silts and clays with interstratified deposits of sands, gravels and caliche layers (Kaufmann 1978). Unlike the shallow zones, some of the deposits may be transmissive enough to provide suitable well yields for domestic purposes. Groundwater in the near-surface reservoir may be confined or unconfined (Dettinger 1987). The thickness of the near-surface reservoir is reported to be in the range of 0 to 200 feet (0 to 61 m) (Brothers and Katzer 1988; Van Denburgh et al. 1982; Maxey and Jameson 1948). Harrill (1976) noted that the near-surface reservoir is sometimes difficult to delineate, because where it is unconfined there are no distinct lithologic boundaries between it and the shallow zone of the principal aquifers.

### 3.4.2.3 Principal Aquifers

The principal aquifer system underlies the entire Las Vegas Valley and consists of three indistinct confined aquifer zones; a shallow, middle and deep zone (Maxey and Jameson 1948). These aquifers generally consist of sand and gravel interbedded with lesser amounts of silt and clay (Kaufmann 1978). Because of decreasing quantities of sand and gravel from west to east across the valley, aquifers in the eastern two-thirds of the valley yield progressively less water (Kaufmann 1978).

The shallow zone of the principal aquifer system generally lies below a depth of about 200 feet (61 m) below ground surface. This zone is present to depths of approximately 450 feet (137 m) below ground surface and is underlain by a 10 to 60 foot (3 to 18 m) thick, blue clay horizon (Kaufmann 1978; Broadbent 1980). The middle zone that underlies the blue clay layer occurs at depths of about 500 to 700 feet (152 to 213 m) below ground surface. The deep zone of the principal aquifers is defined as those aquifers present at depths greater than approximately 700 feet (213 m) below ground surface.

The approximate potentiometric surface of the principal aquifer system ranges from within 50 feet (15 m) of land surface to greater than 700 feet (213 m). This surface is no longer a natural, nor a constant one. Groundwater pumping in the Las Vegas Valley has exceeded natural replenishment since about 1946. Decades of over pumping the principal aquifer system have led to declines in the potentiometric surface of up to 300 feet (92 m) (Hines et al. 1993) and the creation of cones of depression in the vicinity of Las Vegas Valley Water District and City of North Las Vegas wells; including the area of concentrated domestic use north of Craig Road in the northwestern part of the valley.

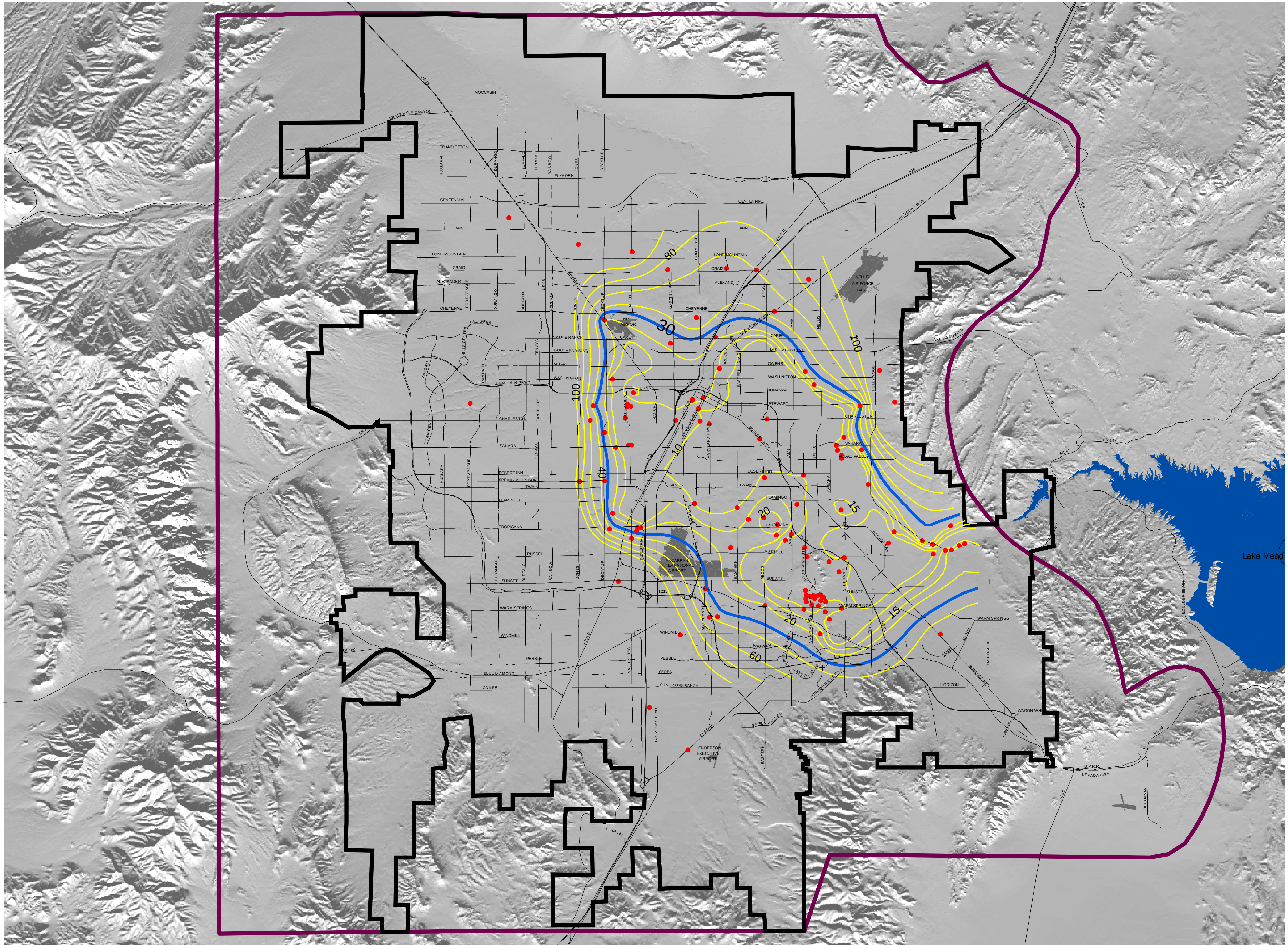
Beginning in 1988, municipal water purveyors began injecting treated water from Lake Mead into the principal aquifer, primarily during the lower water use season (October to April). This artificial recharge has resulted in significant rises in the potentiometric surface and has been credited with slowing land subsidence rates in the valley (Amelung et al. 1999). The potentiometric surface increases are occurring in the areas of either generally greater transmissivity or areas of municipal wells. This water has been injected into the aquifer in order to store an emergency or drought bank of water that purveyors can pump out of the aquifer in times of need.

### 3.4.2.4 Regional Carbonate Aquifers

Hess and Mifflin (1978) proposed that the Las Vegas Valley is underlain at several thousand feet belowground surface by a regional carbonate aquifer system. Groundwater in the aquifer is believed to move into the valley from the northeast. Oil and gas exploration well logs indicate that the regional carbonate aquifer is separated from the principal aquifers by approximately 2,700 feet (823 m) of aquitard (Noack 1988). This regional carbonate aquifer is the source of groundwater recharge to the principal aquifer. The conduits for recharge are unknown, but the most likely pathways are normal or thrust faults because:

- The lower section of alluvium beneath the principal aquifers have low permeability.
- Wells drilled near Quaternary fault scarps tend to higher transmissivity than wells more distant.
- Isotope and geochemical investigations by Noack (1988) documented a "regional" water upwelling from depth near the Quaternary fault scarps (Donovan 1996).

Because little is known regarding this aquifer in the Las Vegas Valley (no wells produce water from this aquifer in the valley), no additional discussion is presented in the following sections.



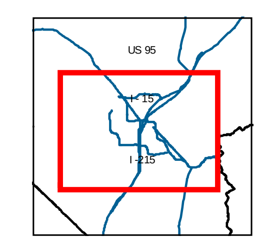

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

## Legend

- Ground Water Monitoring Wells
- Depth to Ground Water
- Shallow Ground Water
- Ultimate Development Boundary
- Project Area Boundary
- Major Street Centerline

Feet
0 10,000 20,000

SCALE: 1 inch = 20000 feet




AREA AND DEPTH OF SHALLOW GROUND WATER

FIGURE 3.4-1

SWCA ENVIRONMENTAL CONSULTANTS

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## 3.4.3 Groundwater Occurrence and Flow

### 3.4.3.1 Shallow Units

Generally, all shallow groundwater in the valley discharges to Las Vegas Wash and its tributaries. As a result, the groundwater in the shallow units generally flows to the southeast. However, shallow groundwater flows northeast towards Las Vegas Wash in the southeast part of the valley (Converse Consultants 1985). Local gradients can be in any direction and result from channels, washes or mounding effects that can occur in areas with high amounts of irrigation (Zikmund 1996).

Seasonal water level variation in shallow groundwater is related to land use patterns. Wild (1989) observed two patterns of water level fluctuation: wells with lowest water levels in the summer, because of high evapotranspiration rates, and wells with highest water levels in the winter, due to decreased evapotranspiration, year-round irrigation and/or decreased pumpage of principal aquifers (resulting in less drawdown of the overlying saturated sediments). Wells strongly influenced by landscape irrigation display water level rises during the heavy summer turf irrigation season, despite the high evapotranspiration rates.

### 3.4.3.2 Near-Surface Reservoir

The water table in the near-surface reservoir generally slopes eastward toward the base of Frenchman Mountain, the lowest point in Las Vegas Valley (Malmberg 1961; and Dinger 1977). Thus, the movement of groundwater in the near-surface reservoir is primarily towards the east. However, the amount of water moving through the unit is believed to be small due to the low transmissivity of the sediments (Malmberg 1961).

### 3.4.3.3 Principal Aquifers

Based on potentiometric maps of the alluvial aquifers compiled by Broadbent (1980) (see Figure 3.4-1), groundwater in the northwestern portion of the valley flows southeast at a gradient ranging from approximately 0.005 to 0.024. Groundwater in the eastern half of the valley generally flows eastward and southward at a gradient of 0.006 to 0.016. Groundwater in the southwestern portion of the valley flows to the northwest at a gradient of 0.004 to 0.016. Under pre-pumping conditions, the potentiometric surface in the principal aquifers was above the water table in the overlying aquifers throughout most of the central part of the valley. By 1975, the potentiometric surface had declined as much as 180 feet (55 m) due to over pumping, significantly reducing the artesian recharge of the overlying aquifers (Broadbent 1980); by 1990, declines up to 300 feet (91 m) were observed (Hines et al. 1993).

The primary producing horizons in the shallow zone of the principal aquifer system occur in several sand and gravel lenses at approximate depths of 200 feet, 300 feet, 350 feet, 400 feet and 450 feet (61 m, 91 m, 107 m and 137 m) belowground surface (Broadbent 1980). Prior to 1940, the shallow zone was the principal source of groundwater in the Las Vegas Valley. However, the middle zone is currently the principal source (Broadbent 1980). Only small quantities of groundwater are withdrawn from the deep zone aquifers because they are thin and generally contain considerable silt and clay (Maxey and Jameson 1948; Broadbent 1980).

Zones of highest transmissivity in the principal aquifer system occur in the west-central portion of the Las Vegas Valley from approximately T19S, R60E to T21S, R60E (Harrill 1976).

## 3.4.4 Groundwater Quality

### 3.4.4.1 Shallow Units

In comparison to groundwater in the principal aquifer, the quality of the shallow units is poor. Water quality in the shallow units has the potential to be further degraded by infiltration of irrigation waters and surface runoff containing fertilizers, organics and other contaminants (NDEP 1987; Brothers and Katzer 1988).

The salinity of shallow groundwater generally increases across the extent of the shallow zone from west to east. Salinity in the northwest part of the shallow zone is less than 1,000 mg/L TDS and it increases to over 8,000 mg/L in the eastern portion of the valley in the vicinity of Las Vegas Wash. This general variation exists because of lithological differences. In general, there are more evaporative clasts in the alluvium in the southeast part of the valley and evaporite deposits are likely to occur at lower elevations in the valley floor (Wild 1990).

Salinity can also vary because of seasonal fluctuations in the water levels of the shallow zones. Groundwater levels may be higher in the winter and lower in the summer (Converse Consultants 1985), due to high summer evapotranspiration rates. Water levels may also show the opposite pattern, if the shallow zone is under the influence of heavy summer irrigation. In either case, high summer evaporation of shallow groundwater or infiltrating irrigation water causes salts to be precipitated in the unsaturated zone and increase TDS concentrations in the groundwater (Converse Consultants 1985; Brothers and Katzer 1988). Nutrient concentrations in shallow groundwater appear to be controlled by the presence of septic tanks, application of sewage effluent to golf courses, fertilization practices and over irrigation of turfgrass (Wild 1990).

Downward migration of poor quality water from the shallow units into the near surface reservoir and principal aquifer systems can potentially degrade water quality from the near surface reservoir and principal aquifer systems (Brothers and Katzer 1988), depending upon site-specific vertical hydraulic gradients. Hines et al. (1993) reported no evidence of decreasing water quality in deeper aquifers from shallow zone groundwater.

### 3.4.4.2 Near-Surface Reservoir

Like shallow groundwater, salinity in the near-surface reservoir varies across the valley. In the northwest part of the valley, the quality may be sufficient for domestic use. Domestic uses have tapped this water source in the past, prior to water purveyor expansion into the north-central and northwest parts of the valley.

In the central and southeast parts of the valley, the poor quality groundwater in the near-surface reservoir is not used for drinking water (Brothers and Katzer 1988). In parts of North Las Vegas, the near-surface reservoir contains high levels of nitrates, which are concentrated at depths of about 80 to 100 feet (24 to 31 m) below ground surface (Hess and Patt 1977). These high nitrate concentrations are believed to be from natural mineral sources (Hess and Patt 1977). High nitrate concentrations also occur in the eastern parts of the valley and are thought to be closely related to waste disposal activities in the Henderson area (Kaufmann 1978). Poor water quality in the near-surface reservoir is also a result of urbanization and associated irrigation, which have resulted in downward leaching of salts from the soil profile (Kaufmann 1978).

### 3.4.4.3 Principal Aquifers

Like shallow and near surface groundwater in the Las Vegas Valley, groundwater quality in the principal aquifer underlying the Project Area becomes progressively poorer to the south under the influence of lithologic changes. TDS ranges 200 to 400 mg/L are reported in the north and northwest part of the valley, whereas in the south the concentrations range 700 to 1,500 mg/L (Dettinger 1987). Groundwater that occurs in the principal aquifer in the northern and western parts of Las Vegas Valley, an area composed primarily of carbonate bedrock rock and alluvial aquifer derived from carbonate detritus, consists of calcium-magnesium-bicarbonate water (Weaver 1982). Principal aquifer groundwater in the southern and southeastern portions of the valley, an area composed of primarily Mesozoic clastic rocks or Tertiary clastic and volcanic rocks, is sodium-potassium-bicarbonate type. The east, southeast and southwest portions of the valley contain mixed cation sulfate type water, typical of the Horse Spring and Muddy Creek Formations from which it was derived. Groundwater in this area is generally of poor quality (Lyies et al. 1987).

Artificial recharge of the principal aquifers in the northwestern parts of the valley and in the vicinity of the City of North Las Vegas municipal supply wells, have resulted in changes of water quality in the vicinity of the injection well in the principal aquifer in these areas. The water is within potable standards (i.e., it represents a mixture of groundwater and Lake Mead water that is treated to potable standards and delivered to customers).

### 3.4.5 Groundwater Recharge and Discharge

Prior to the development of Las Vegas and the surrounding communities, groundwater flowed to the valley from the recharge areas west and northwest of the valley. Groundwater discharged through Las Vegas Springs on the west-central side of the valley and into Las Vegas Creek, Kyle Springs and Whitney Mesa Springs (Noack 1988). Artesian conditions in the principal aquifers caused groundwater to flow upwards and recharge the overlying aquifers, which discharged into Las Vegas Wash through seeps, springs and by evapotranspiration.

The near-surface reservoir, formerly exclusively recharged by upward flow from the principal aquifers, may now recharge the principal aquifer where head declines in the principal aquifer are large enough to reverse the natural flow gradient. As the population of Las Vegas grew and groundwater pumpage increased, the potentiometric surface in the principal aquifers and the water levels in near-surface reservoirs declined. Concurrently, the shallow system (water table within 30 feet [9 m] of the land surface) was rising as a result of increased irrigation. For several decades the groundwater from the principal aquifer system in Las Vegas Valley was pumped at a rate two to three times the natural recharge rate, causing the decline in potentiometric surface. As a result, the natural hydraulic gradient has been reversed in some areas.

Declining groundwater levels in the principal and near-surface aquifers have caused subsidence problems in several parts of the Las Vegas Valley. Since 1955, the groundwater levels have dropped 180 feet (55 m) in the principal aquifers. Associated land subsidence, approximately 3.8 feet (1.2 m), has been documented in proximity to the main groundwater pumping areas (Cibor 1983). In the vicinity of the Las Vegas Valley Water Districts main well field (Alta and Charleston Blvd.), water levels declined approximately 300 feet (91 m) from the early 1900s to the late 1980s, creating a large depression in the potentiometric surface. This depression has caused water from the southwest and northwest to be deflected toward the main well field and a groundwater barrier to develop in the central part of the valley, east of the main well field (Weaver 1982). Water level declines in the North Las Vegas and Nellis AFB well field have not been as pronounced.

Since about 1990, groundwater levels in the principal aquifer have largely increased throughout the valley due to the practice of artificial recharge. By winter of 2003, water purveyors had stored just over one quarter of a million acre-feet of potable water in the Valley's principal aquifer. As a result, the potentiometric surface has increased to close to land surface in the Las Vegas Valley Water Districts' main well field, and significant rises have been observed throughout the valley (Donovan, personal communication 2003).

### 3.4.5.1 Shallow Groundwater Zones

The shallow groundwater zones are recharged primarily by irrigation and urban runoff and in some areas of the valley, also by water upwelling from the near-surface reservoir or principal aquifers. The volume of water from the surface sources has increased significantly as a result of the extensive development in the Las Vegas Valley. Water levels in the shallow units are subsequently rising (Brothers and Katzer 1988; Converse Consultants 1985). Converse Consultants (1985) reported recharge to the shallow aquifers from domestic irrigation increased from 1,662 acre-feet per year in 1974 to 3,264 acre-feet per year in 1982. Brothers and Katzer (1988) projected that the shallow groundwater will extend further westward as development continues in the western portions of the valley. Wild (1990) reported that, on average, water level in the shallow groundwater zone rose about 1.5 feet (0.5 m) during 1981 to 1989. Zikmund (1996) does not report an increase in shallow zone.

Shallow groundwater is discharged by direct evaporation, transpiration from phreatophytes, and seepage into Las Vegas Wash and its tributaries. Shallow groundwater may also infiltrate downward to the near-surface reservoir where the hydraulic gradient allows (Brothers and Katzer 1988). The estimated configuration of the shallow groundwater table is shown in Figure 3.4-1. Significant direct infiltration of precipitation to shallow groundwater zones in the valley does not occur, because the arid climate of the Las Vegas Valley generally yields less than 5 inches (13 cm) of annual precipitation and has approximately 80 inches (200 cm) of potential evaporation (Dinger 1977). Figure 3.4-1 is a recently updated depth to groundwater map displaying the location of shallow (i.e., less than 30 feet [9 m] below land surface) groundwater.

### 3.4.5.2 Near-Surface Reservoir

Currently, the principal sources of recharge to the near-surface reservoir includes upwelling principal aquifer water, irrigation return flows, septic tank and sewage treatment plant effluents, industrial effluent ditches and disposal ponds, and downward migration of water from the shallow groundwater zones (Kaufmann 1978; Blegen 1988; Brothers and Katzer 1988). Natural discharge in the near-surface reservoir is from evapotranspiration and discharge to surface watercourses, primarily the Las Vegas Wash (Kaufmann 1978).

Prior to groundwater development, which effectively began in 1907 and constituted an overdraft by the 1940s, recharge to the near-surface reservoir was principally by upward movement from underlying aquifers. As a result of pumping from deeper aquifers, the gradient in the near-surface reservoir has reversed in many areas causing the potential for groundwater from the near-surface reservoir to discharge into underlying aquifers (Kaufmann 1978).

### 3.4.5.3 Principal Aquifers

Recharge to the principal aquifers is primarily a result of infiltration of precipitation in surrounding mountainous recharge areas. Rainfall and snowmelt in the Spring Mountains, and to a lesser extent, in the Las Vegas and Sheep Ranges, infiltrates directly into the bedrock through fractures and joints recharging principal aquifers at the alluvium/bedrock interface in the subsurface. Recharge to the principal aquifer from infiltration directly into alluvial fans is considered to be insignificant (Katzer 1989). Minor recharge occurs in the McCullough Range and from the Frenchman-Sunrise block east of the valley (Kaufmann 1978). Between 25,000 to 35,000 acre-feet per year is recharged to the principal aquifers under natural conditions (Brothers and Katzer 1988); more recent estimates place this figure at 57,000 acre-feet per year (Donovan and Katzer 2000). Discharge from the principal aquifers once occurred through native springs in the valley, but now occurs by pumping. Total groundwater pumpage was 58,000 acre-feet in 2001 (NDWR 2002) and it is reasonable to assume that more than 97 percent pumpage was from the principal aquifer. A portion of domestic wells is completed within the near surface reservoir and domestic pumpage accounts for about 5,000 acre-feet of the annual pumpage from 1999 to 2001 (NDWR 2002).

The principal aquifers may also discharge a minor amount to the near-surface reservoir near Las Vegas Wash as a result of upward artesian flow (Malmberg 1961; Kaufmann 1978). Additional discharge may have occurred as outflow from the Las Vegas Valley either through gravels underlying Las Vegas Wash (Donovan and Katzer 2000), phreatophyte evapotranspiration in Las Vegas Wash or under Frenchman and Sunrise Mountains (Harrill 1976; Morgan and Dettinger 1994). Estimates of outflow ranged from 1,200 to 6,000 acre-feet per year.

In an attempt to minimize depletion of groundwater in the principal aquifers and to fully utilize the allotted Colorado River water of 300,000 acre-feet per year, the Las Vegas Valley Water District began artificially recharging the principal aquifer system with Colorado River water in 1987. Since then, approximately 240,000 acre-feet have been artificially recharged to the principal aquifer system in the Las Vegas Valley (Brothers 2003).

## 3.4.6 Groundwater Usage

### 3.4.6.1 Shallow Groundwater

Due to the high TDS concentrations in the shallow unit of the groundwater, it has never been developed for drinking water (Brothers and Katzer 1988). Brothers and Katzer (1988) suggested that the shallow groundwater could be used for irrigation in the central and eastern portions of the valley to assist in conserving potable water supplies currently used for irrigation and to reduce the then rising shallow water table. Pilot studies have been conducted, but the shallow groundwater zone is not exactly an aquifer and thus yields can be poor. Costs for treatment of this water to potable standards are prohibitive (SNWA 2002).

### 3.4.6.2 Near-Surface Reservoir

In 1976, Harrill reported that approximately five percent of the developed groundwater in the Las Vegas Valley came from the near-surface reservoir. However, Las Vegas Valley Water District (LVVWD) indicated that the groundwater in the near-surface reservoir is not used at present because of poor quality (Katzer 1989), although it is possible that a small percentage of private wells are drawing water from this reservoir.

### 3.4.6.3 Principal Aquifers

Municipal purveyors (LVVWD), Nellis AFB, the City of North Las Vegas and permitted water right owners pumped just over 74,000 acre-feet during 2001 and domestic pumpage contributed over 5,000 acre-feet per year for a total of just over 79,000 acre-feet (NDWR 2002).

A breakdown of the 79,000 acre-feet per year of groundwater produced in the Las Vegas Valley during 2001 is described below. The City of North Las Vegas well field produced 5,449 acre-feet, the LVVWD well field produced 40,619 acre-feet, and the Nellis AFB well field produced 2,367 acre-feet. An additional 30,941 acre-feet was produced from all permitted and domestic wells in the valley.

## 3.4.7 Boulder City Area

Water sources for Boulder City are imported from the Colorado River and Lake Mead; therefore, due to a general lack of development, very little information exists on groundwater resources in the vicinity of Boulder City.

### 3.4.7.1 Hydrogeologic Units

Part of the Boulder City area overlies the bedrock divide between the River Mountains to the north and the Eldorado Mountains to the south. The southern part of the city is located on alluvial deposits in the northeast corner of Eldorado Valley. The bedrock consists of Tertiary volcanic and intrusive rocks that are fairly impermeable, but may have secondary permeability developed in fractures and joints (Rush and Huxel 1966).

#### 3.4.7.2 Groundwater Occurrence and Flow

The groundwater in the northern part of Eldorado Valley generally flows south and southeastward through the volcanic rocks towards the Colorado River at depths greater than 300 feet (91 m) (Rush and Huxel 1966).

#### 3.4.7.3 Groundwater Quality

The groundwater quality in the area is reported to be poor, with high salinity and TDS concentrations (Rush and Huxel 1966). There are no groundwater wells in Boulder City and the closest producing well is located at Railroad Pass, between Eldorado and Las Vegas Valleys (Coache 1988). Producing wells in this area and to the south are used for industrial and commercial purposes.

#### 3.4.7.4 Groundwater Recharge and Discharge

Groundwater in this area is recharged by infiltration of precipitation from the surrounding mountains. Downward percolation of surface waters discharged by Boulder City may result in minor amounts of groundwater recharge, but evaporation rates are high and the depth to groundwater is deep. The city discharges wastewater to the sewage treatment plant southwest of Boulder City where it evaporates or percolates into the alluvium (Rush and Huxel 1966). The water supply for Boulder City is imported from the Colorado River via Lake Mead. Imports for 2001 consisted of 10,225 acre-feet of potable water from the Southern Nevada Water System and 466 acre-feet of raw water from the City's diversion at Hoover Dam (USBOR 2003).

#### 3.4.7.5 Groundwater Usage

Groundwater is not used in Boulder City. Wells in the other parts of Eldorado Valley are used to serve domestic, stock watering and industrial needs (NDWR 2003). A few monitoring wells and dewatering wells also occur in the basin (NDWR 2003).

## 3.5 BIOLOGICAL RESOURCES

This section provides an update on biological resources from information presented in the FEIS Flood Control Master Plan for the CCRFCD (BLM/CCRFCD 1991). The biological setting of the Project Area has not changed significantly since the publication of the 1991 FEIS; however, the extent of many natural vegetation communities have been reduced as a result of increased urbanization and development in the Las Vegas Valley.

The list of special status species occurring in the Project Area has also changed based on changes in the legal status of some plant and animal species in the region since the 1991 FEIS and updated information on these species from Nevada Natural Heritage Program (NNHP) database records. Some species that either had no status or were federal candidates for listing have since become elevated to threatened or endangered status. Similarly, some species previously listed as species of concern in Nevada have lost this status, while others that previously had no legal status in 1991, have since been listed as endangered, threatened or species of concern by the State of Nevada.

### 3.5.1 Environmental Baseline

The majority of the 1,054-square-mile (2,730-km²) Project Area is located within the Las Vegas Valley, while the remaining portion is located within the Eldorado Valley (Clark County, Nevada). The Las Vegas Valley is a bowl-shaped basin surrounded by a number of rugged mountain ranges which include the Spring Mountains to the west; the Sheep, Las Vegas and Arrow Canyon ranges to the north; the Muddy Mountains (including Sunrise Mountain, Frenchman Mountain, Lava Butte and Rainbow Gardens) and River Mountains to the east; and the McCullough Range, Eldorado Valley, Sheep Mountain and the Bird Spring Range to the south. The majority of the Project Area is drained to the southeast by the Las Vegas Wash and its tributaries that include the Las Vegas Creek, Red Rock Wash, Flamingo Wash, Tropicana Wash, Duck Creek, Pittman Wash, C-1 Channel, Sloan Channel, Range Wash, Monson Channel and Tropicana Avenue Floodway. The remaining portion of the Project Area, which comprises a subarea of Boulder City, drains southward into the Eldorado Valley or eastward to Lake Mead via Hemenway Wash.

The Project Area has a variety of physical features that offer a diversity of habitat types, represented by a characteristic assemblage of plant species. The large size of the area, together with its geology, soils, climate and anthropogenic influences have combined to produce a mosaic of floristic components and associated wildlife species. Dry air masses, high summer temperatures, infrequent precipitation and an extremely high rate of evaporation characterize the climate of the Valley and surrounding region. Precipitation averages approximately 4.4 inches (11.2 cm) annually and occurs primarily during the winter months. For most of the region, the availability of water or soil moisture is the critical factor that determines the broad distribution of vegetation types and associated wildlife species.

## 3.5.2 Vegetation

The Project Area is located within the northern Mojave Desert region of the desert floristic province. Low, widely spaced shrubs dominate the Mojave Desert vegetation. The species composition of the Mojave Desert has common elements with the Great Basin to the north and many succulent species common to the Sonoran Desert to the south and east. The most widely distributed plant is the creosote bush (*Larrea tridentata*), which covers extensive areas in nearly pure stands, often in close association with bursage (*Ambrosia dumosa*).

The vegetation communities that occur in a given region are largely determined by prevailing environmental variation and disturbance history. Individual plant communities can generally be separated along environmental gradients (Whittaker 1967). Gradients in soil moisture, soil fertility, temperature, slope and other physical parameters affect the distribution of individual species, and this in turn affects the type of plant community that develops at a given location. Since plant species generally respond individually to environmental gradients (Sawyer and Keeler-Wolf 1995), it is often difficult to differentiate recurrent and ecologically meaningful combinations of species as plant communities. Plant community classification, despite these limitations, nonetheless serves an important function in organizing vegetation data into relatively distinct units, which occur with some consistency in the landscape and are amenable to study and management.

### 3.5.2.1 Vegetation Communities

A comprehensive vegetation map has yet to be prepared for the Las Vegas Valley and surrounding region, although an updated and more detailed classification of vegetation for the National Gap Analysis Program's (GAP) mapping and assessment of biodiversity is under way for the five-state region encompassing Arizona, Colorado, Nevada, New Mexico and Utah (SW Regional GAP Analysis Project 2003). Therefore, the description of land cover types and communities in this section is based primarily on the most current assessment of vegetation communities for the State of Nevada, which was completed in 1996 (Utah Cooperative Fish and Wildlife Research Unit 1996). In this effort, a total of 65 vegetation and other land cover classes were developed for the state from satellite imagery and other records using the National Vegetation Classification System (Federal Geographic Data Committee 1996). Additional sources of information include detailed wetlands data from the Las Vegas Wash Coordinating Committee used to replace GAP data in the area of Lower Las Vegas Wash. Based on these information sources, 13 general vegetation cover types were identified within the Project Area:

1. Blackbrush scrub
2. Creosote-bursage scrub
3. Developed/Urban areas
4. Grassland
5. Juniper
6. Mojave desert mixed scrub
7. Mountain shrub
8. Pinyon
9. Pinyon-juniper
10. Riparian-wetland
11. Sagebrush
12. Sagebrush/perennial grass
13. Salt desert scrub - mesquite/acacia

Creosote-bursage scrub represents the largest area, at 42 percent (448.4 square miles [1,161.0 km²]), followed by developed/urban areas, at about 32 percent (333.1 square miles [862.7 km²]), and blackbrush scrub at approximately 9 percent (97.6 square miles [252.8 km²]). Mojave desert mixed scrub (94.5 square miles [244.8 km²]), salt desert scrub-mesquite/acacia (25.8 square miles [66.8 km²]), riparian-wetland (6.4 square miles [16.6 km²]), sagebrush (5.1 square miles [13.2 km²]), and grassland (4.0 square miles [10.4 km²]) communities collectively contribute another 13 percent to the total. Juniper (1 square mile [3 km²]), pinyon (1.3 square miles [3.4 km²]), pinyon-juniper (1.6 square miles [4.1 km²]), mountain shrub (0.6 square miles [1.6 km²]), and sagebrush/perennial grass communities account for the remaining 4 percent. The 13 vegetation cover types identified in the Project Area are described below and are depicted in Figure 3.5-1.

#### 3.5.2.1.1 Blackbrush Scrub

Blackbrush scrub is the second most extensive natural vegetation community in the Project Area covering nearly 98 square miles (253.8 km²) [9 percent]). This community is limited exclusively to the northwestern and southwestern portions of the Project Area (see Figure 3.5-1). Blackbrush scrub is a typical high desert community found 4,000 to 5,000 feet (1,219 to 1,524 m) above sea level (Dames & Moore 1990). This type is less common in southern Nevada than the creosote bush scrub. It occurs mostly on shallow, rocky or calcareous gravelly soils of flats, plateaus and upper bajadas and is primarily located on the lower slopes of the Spring Mountains.

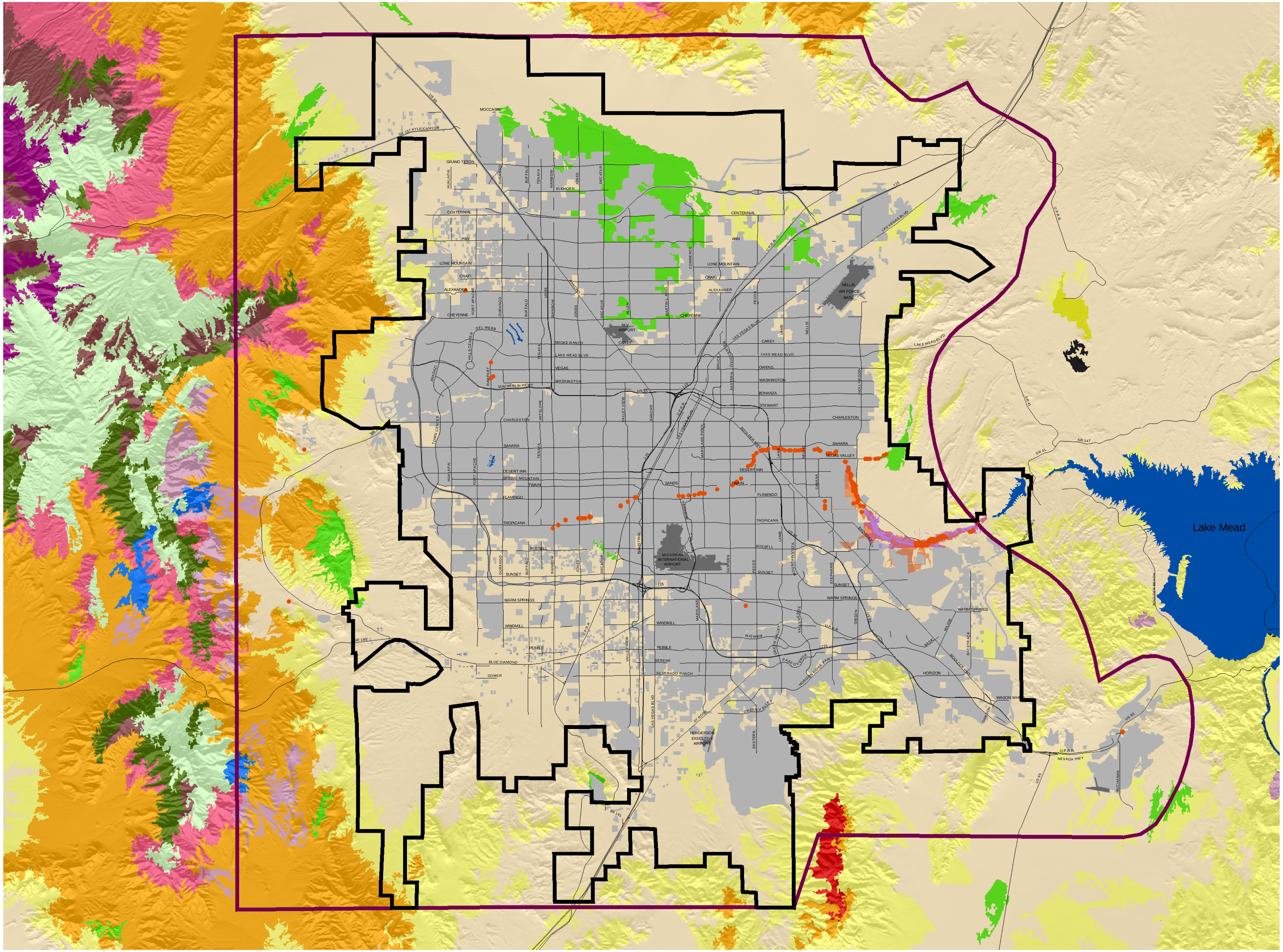
Blackbrush scrub intergrades with other upland vegetation communities at higher elevations (with pinyon-juniper woodland) and lower elevations (creosote-bursage scrub). Common plant species characteristic of this community include blackbrush (*Coleogyne ramosissima*), Utah juniper (*Juniperus osteosperma*), winterfat (*Ceratoides lanata*), Nevada tea (*Ephedra nevadensis*), hopsage (*Grayia spinosa*), cheesebush (*Hymenoclea salsola*), creosote bush, spiny menodora (*Menodora spinescens*), bladder-sage (*Salazaria mexicana*), desert sage (*Salvia dorii*), turpentine-broom (*Thamnosma montana*), and banana yucca (*Yucca baccata*).

#### 3.5.2.1.2 Creosote-Bursage Scrub

The most extensive natural vegetation community in the Project Area and surrounding region consists of creosote-bursage scrub, which occupies over 448 square miles (1,160 km² [42 percent]). This community is principally dominated by creosote bush, with which white bursage is commonly co-dominant. It occurs in a broad band that extends nearly continuously around the entire perimeter of the Project Area on alluvial slopes, valley floors and mountain slopes below 4,000 feet (1,219 m) in elevation (see Figure 3.5-1). This community is usually found on well-drained soils, often on bajadas and low hills, and is conspicuously absent around playas because of high salinity (Wallace and

REGIONAL FLOOD CONTROL DISTRICT

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)




DISTRIBUTION OF VEGETATION COMMUNITY TYPES

FIGURE 3.5-1

SWCA ENVIRONMENTAL CONSULTANTS

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Romney 1972) and/or dense fine-textured basin soils low in oxygen (Lunt et al. 1973). Areas without significant concentrations of this community are the steepest and rockiest slopes, washes, saltbush flats and dry lakebeds.

Primary associated shrub species include blackbrush, Nevada tea, dalea (*Dalea* spp.), shadscale (*Atriplex confertifolia*), hopsage, spiny menodora, desert thorn (*Lycium* spp.), ratany (*Krameriaceae parvifolia*), honey mesquite (*Prosopis glandulosa*), and brittlebush (*Encelia farinosa*). Other associated species include Joshua tree (*Yucca brevifolia*), Mojave yucca (*Y. schidigera*), prickly pear (*Opuntia engelmannii*), Schockley's goldenhead (*Acamptopappus schockleyi*), Indigo bush (*Dalea fremontii*) and turpentine-broom.

### 3.5.2.1.3 Developed/Urban Areas

Developed/Urban areas are generally paved with asphalt or overbuilt with structures that generally do not support vegetation. These areas can be broadly defined as anthropogenic communities, which have replaced many of the native natural plant communities and collectively comprise 333 square miles (863 km² [32 percent]) of the Project Area. Plants that grow in these areas include many species of ornamental trees and shrubs planted as landscaping around buildings and other developed areas, turf grass associated with golf courses and private residences, and non-native annual and ruderal grassland species associated with disturbed or cleared areas.

### 3.5.2.1.4 Grassland

The grassland vegetation community is comprised of perennial and annual grasslands that cover approximately 4 square miles (10 km²) or 0.4 percent of the Project Area. The extent of this community is limited primarily to the extreme southwest portion of the Project Area (see Figure 3.5-1). The majority of this community exists as a result of seeded perennial grasslands or fire induced annual grasslands. However, it also includes valley, foothill and mountain native grasslands. Principle perennial grass species include wheatgrasses (*Agropyron* spp.), bluegrass (*Poa* spp.), basin wildrye (*Elymus cinereus*), galleta (*Hilaria* spp.), needlegrass (*Stipa* spp.), sand dropseed (*Sporobolus cryptandrus*), blue gramma (*Bouteloua gracilis*), squirreltail (*Sitanion hystrix*) and Indian ricegrass (*Oryzopsis hymenoides*). Principle annual grass species include cheatgrass (*Bromus tectorum*). Primary associated shrub species include sagebrush (*Artemisia* spp.), shadscale, greasewood (*Sarcobatus vermiculatus*), and creosote bush.

### 3.5.2.1.5 Juniper

Although juniper is widely distributed throughout Nevada, it is one of the least abundant natural vegetation communities in the Project Area, covering approximately 1 square mile (3 km²). It occurs in the southernmost portion of the Project Area on the upper slopes of Black Mountain (see Figure 3.5-1). This community typically occurs in open canopy stands at lower elevations below the pinyon-juniper zone and is principally dominated by Utah juniper. Primary associated tree species include Rocky Mountain juniper (*J. scopulorum*), western juniper (*J. occidentalis*) and single leaf pinyon (*Pinus monophylla*). Primary associated shrub species include sagebrush, rabbitbrush (*Chrysothamnus* spp.) and blackbrush. In southern Nevada, juniper occurs commonly with blackbrush.

### 3.5.2.1.6 Mojave Desert Mixed Scrub

Mojave desert mixed scrub is the third most extensive natural vegetation community in the Project Area covering nearly 95 square miles (246 km² [9 percent]). This community occurs discontinuously in areas in the western, eastern and southern portions of the Project Area on the midslopes of the bajadas, generally below the blackbush scrub community and above the creosote-bursage scrub community (see Figure 3.5-1). The typical elevation range is 2,000 to 5,000 feet (61 to 1,524 m). The sites where this community occurs typically have very shallow, overly drained, often rolling to steep soils, usually derived from granitic parent materials. These sites have extremely low water holding capacity, mild alkalinity and are not very saline.

The Mojave desert mixed scrub community is a heterogeneous assemblage of shrubs that also occur in other nearby communities. The lack of a dominant shrub species makes it difficult to clearly categorize this scrub type into the more common communities. It is typically considered a scrub community comprised of a highly variable mixture of shrubs with several species sharing dominance. Although the dominant species in this community varies from place to place, it is usually characterized by the occurrence of creosote bush in association with several possible species, including bursage, dalea, desert thorn, shadscale, hopsage, ratany and Nevada tea. Primary associated shrub species include blackbrush, brittlebrush (*Encelia* spp.), bebbia (*Bebbia juncea*), allscale (*Atriplex polycarpa*) and desert holly (*A. hymenelytra*). Other associated species include Joshua tree, Mojave yucca, cacti (*Echinocereus* spp.), and teddybear cholla (*Opuntia biglovii*).

### 3.5.2.1.7 Mountain Shrub

The mountain shrub vegetation community covers approximately 0.6 square miles (1.6 km²) of the Project Area occurring near the La Madre Mountain area at elevations above the pinyon zone (see Figure 3.5-1). It occurs extensively on the upper slopes of the Spring Mountains at elevations of 4,500–6,000 feet (1,400–1,800 m).

The mountain shrub community usually exhibits a mosaic pattern of several co-dominant shrub species distributed across a heterogeneous landscape and is often associated with a variety of shrubs, including Gambel oak (*Quercus gambelii*), maple (*Acer* spp.), alder leaf mountain mahogany (*Cercocarpus montanus*), cliffrose (*Cowania mexicana*), bitterbrush (*Purshia tridentate*), serviceberry (*Amelanchier* spp.), buckbrush (*Ceanothus* spp.), snowberry (*Symphoricarpos* spp.), manzanita (*Arctostaphylos* spp.), ninebark (*Physocarpus alternans*), currant (*Ribes* spp.), squawbush (*Rhus* spp.), and littleleaf mountain mahogany (*C. intricatus*). At elevations above 5,000 feet (1,500 m), where annual precipitation exceeds 8 inches, the mountain shrub community is characterized by a mosaic of black sagebrush (*Artemisia nova*) and big sagebrush (*Artemisia tridentata*), depending on a number of factors, including soil types and aspect.

### 3.5.2.1.8 Pinyon

The pinyon vegetation community covers approximately 1.3 square miles (3.4 km²) of the Project Area. This community is limited to the western portion of the Project Area on the upper slopes of La Madre Mountain at elevations above the pinyon-juniper zone (see Figure 3.5-1). The pinyon vegetation community is principally dominated by single leaf pinyon at canopies from 30 to 60 percent. Primary associated tree species include Utah juniper, ponderosa pine (*Pinus ponderosa*), white fir (*Abies concolor*), mountain mahogany (*Cercocarpus ledifolius*) and Jeffrey pine (*Pinus jeffreyi*). Primary associated shrub species include sagebrush, Gambel oak, alder leaf mountain mahogany, littleleaf mountain mahogany, cliffrose, manzanita, shrub live oak (*Quercus turbinella*) and bitterbrush.

### 3.5.2.1.9 Pinyon-Juniper

The pinyon-juniper vegetation community covers approximately 1.6 square miles (4.1 km²) of the Project Area. Similar to the pinyon vegetation community, this community is limited to the Spring Mountains in the western portion of the Project Area, occurring primarily in the foothills and mesas tops at elevations above the juniper zone and below the pinyon zone (see Figure 3.5-1). In Nevada, the pinyon-juniper community generally occurs 5,500 to 8,000 feet (1,500 to 2,400 m) in elevation, but may reach as high as 9,000 feet (2,700 m) on south-facing slopes. At the hotter and drier lower elevations pinyon-juniper woodlands often occur in relatively sparse, savanna-like conditions. As elevation increases, pinyon-juniper woodlands become thicker and eventually intersperse with ponderosa pine and oak woodlands.

This community is principally co-dominated by pinyon and juniper at 30 to 60 percent canopies. Primary associated tree species include mountain mahogany. Primary associated shrub species include sagebrush, rabbitbrush, oak (*Quercus* spp.), alder leaf mountain mahogany, bitterbrush, littleleaf mountain mahogany, and cliffrose.

#### 3.5.2.1.10 Riparian-Wetland

The riparian-wetland community is extremely limited in the Project Area. Isolated examples of this community occur along several major washes including Flamingo, Tropicana and Las Vegas Wash. The most significant riparian-wetland community is located along a 3.5-mile (5.6 km) portion of the Lower Las Vegas Wash that extends from Russell Road east to Lake Las Vegas.

Approximately 78 acres of emergent wetland occur along portions of the Lower Las Vegas Wash. These areas are characterized by erect, rooted herbaceous hydrophytes that primarily include cattail (*Typha* spp.), river bulrush (*Scirpus fluviatilis*), common reed (*Phragmites australis*) and American threesquare (*Scirpus americanus*). Non-persistent emergent wetland is also present along the portions of the Las Vegas Wash and other channels in the Valley. It consists of short-lived, hydrophytic herbaceous vegetation in freshwater areas that are permanently or seasonally flooded or have saturated soils (Dames & Moore 1990). Common species include white pigweed (*Amaranthus albus*), common sunflower (*Helianthus annuus*), five-horn smotherweed (*Bassia hyssopifolia*), white goosefoot (*Chenopodium album*), common horseweed (*Conyza canadensis*), white sweetclover (*Melilotus alba*), muhly (*Muhlenbergia asperifolia*), dock-leaf smartweed (*Polygonum lapathifolium*), rabbit-foot grass (*Polypogon monspeliensis*) and cockleburr (*Xanthium strumarium*).

These wetlands typically transition into riparian communities, which comprise the majority of vegetation within the Lower Las Vegas Wash. Common riparian vegetation found in this area includes: cat's claw (*Acacia greggii*), quail bush (*Atriplex lentiformis*), Emory baccharis (*Baccharis emoryi*), Fremont cottonwood (*Populus fremontii*), Goodding's willow (*Salix gooddingii*), mesquite (*Prosopis* spp.) and silvery buffalo-berry (*Shepherdia argentea*). Exotic species are also widely distributed within the area, including giant reed (*Arundo donax*), salt cedar or tamarisk (*Tamarix ramosissima*) and cockleburr. Tamarisk, introduced to the Las Vegas Valley in the 1950s, has been particularly devastating, outcompeting many of the native riparian species such as cottonwood and willow. This species is currently the dominant riparian species within the wash, comprising approximately 80 percent of the vegetation.

#### 3.5.2.1.11 Sagebrush

Sagebrush is the most widespread and abundant vegetation community type in Nevada, but has a somewhat limited distribution within the Project Area, occurring on approximately 5 square miles (13 km²) near the La Madre Mountain area (see Figure 3.5-1). Typically this community occurs in the foothills, plateaus and mountains of Nevada at elevations ranging 5,000 to 7,200 feet (1,524 to 2,195 m) with associated grass species making up less than 25 percent of the sagebrush canopy. This type is less common in southern Nevada than the blackbrush shrub type. It occurs mostly on shallow, gravelly or stony soils above the blackbrush scrub zone along the lower slopes of the Spring Mountains.

This community is principally dominated by one or more species of sagebrush including big sagebrush, black sagebrush, or low sagebrush (*Artemisia arbuscula*). Primary associated shrub species include rabbitbrush, snakeweed (*Gutierrezia sarothrae*), blackbrush, shadscale, greasewood, spiny hopsage, and bitterbrush. Common grass species characteristic of this community include: wheatgrasses, cheatgrass, bluegrasses, needlegrasses, fescues (*Festuca* spp.) and galleta.

#### *3.5.2.1.12 Sagebrush/Perennial Grass*

The sagebrush/perennial grass community is limited to an area of less than 1 square mile (3 km²) in the extreme southwestern portion of the Project Area (see Figure 3.5-1). This community typically occurs in mid-elevation between sagebrush and mountain sagebrush classes in central and southern Nevada and is wide-spread as part of the sagebrush steppe of northern Nevada. This community is typically co-dominant with either shrub or grass composing at least 25 percent of the total canopy. Principle grass species include wheatgrasses, bluegrasses, needlegrasses, fescues, Indian ricegrass, and galleta. Principal associated shrub species include rabbitbrush, bitterbrush, and cliffrose.

#### *3.5.2.1.13 Salt Desert Scrub-Mesquite/ Acacia*

The salt desert scrub vegetation community covers approximately 26 square miles (67 km² [2 percent]). The extent of this community is limited primarily to the northern portion of the Project Area (see Figure 3.5-1). Small mesquite/ acacia stands are located within the northern watershed between U.S. 95 and I-15, south of the Sheep Mountains on both sides of Clark County-215. These mesquite/acacia stands are associated with spring mounds found only in this area and provide potential habitat for many wildlife species, including phainopepla (*phainopepla nitens*).

Salt desert scrub is associated with low land habitats that often have moderately shallow water tables and alkaline soils toxic enough to inhibit most desert shrubs that occur in the creosote-bursage scrub. It commonly occurs on lower bajada slopes and plains throughout most of the Mojave Desert (Holland 1986). Typically, one strongly dominant species of saltbush (*Atriplex* spp.) is found in association with several additional species in a particular area (possibly including other species of saltbush). Physiognomically, this community is often composed of a nearly uniform stand of shrubs about 3 feet (1 m) tall forming a more complete cover than in creosote-bursage scrub.

The salt desert scrub community, also commonly referred to as saltbush or shadescale scrub, is characterized by the dominance of one or more of the following species: shadscale, Torrey saltbush (*Atriplex torreyi*), fourwing saltbush (*A. canescens*), desert holly, Bailey's greasewood (*Sarcobatus baileyi*), desert thorn, winterfat, budsage (*Artemisia spinescens*), Nevada tea, horsebrush (*Tetradymia canescens*) and snakeweed. Primary associated shrub species include greasewood, sagebrush, blackbrush, iodine bush (*Allenrolfea occidentalis*) and creosote bush.

### 3.5.2.2 Noxious Weeds

Noxious weeds, as defined by the NRS, are "any species of plant which is, or is likely to be, detrimental or destructive and difficult to control or eradicate" (NRS 1999). Noxious weeds mostly occur in riparian and wetland areas. They outcompete native vegetation and can spread quickly in a short time span. Many noxious weeds can be found dominating the areas along Nevada's borders (BLM 1999). They tend to thrive in areas with 8 to 12 inches (20 to 30 cm) of precipitation and may expand their range into Nevada if they are not controlled or eradicated.

The following noxious weeds are found in Clark County, southern Nevada: camelthorn (*Alhagi maurorum*), Russian knapweed (*Acroptilon repens*), yellow starthistle (*Centaurea solstitialis*), perennial pepperweed (i.e., tall whitetop) (*Lepidium latifolium*), saltcedar (*Tamarix* spp.), and puncture vine (*Tribulus terrestris*) (BLM 2000).

Camelthorn is a common weed along streams and ditches. Puncturevine is found all over, but is most common on farm and rangeland. Yellow starthistle is common along roads and in waste areas, but it can be found on various soil types. Saltcedar infests riparian areas and can cause streams, springs and seeps to dry up. Perennial pepperweed can be found in wet areas, ditches, along roads, on croplands and in waste areas (UDOT 2001). Russian knapweed is not limited to specific habitat types, but it is typically found in disturbed areas and tends to avoid healthy, natural habitats (Carpenter and Murray 1998).

## 3.5.3 Wildlife

### 3.5.3.1 Wildlife Habitats

Individuals of many wildlife species often use multiple habitat types throughout their life cycle. Movement along habitat types or between patches of similar vegetation occurs within corridors of vegetative cover acceptable to these species. These corridors can be critical for certain wildlife species to find adequate food, water, nesting or denning sites and breeding opportunities, or to allow seasonal movements. Where native plant cover has been eliminated, as is the case for much of the Las Vegas Valley, a corresponding decrease usually occurs in a habitat that provides the necessary life requisites for many species. Historically, the Las Vegas Valley contained a variety of natural communities and habitats that supported numerous wildlife species. Since the turn of the century, however, much of the original natural habitat within the valley has been converted to urban land uses. This loss of habitat has resulted in the elimination of many historical wildlife populations and the reduction of population sizes of many species. In this context, the remaining natural communities along the perimeter of the Las Vegas metropolitan area extending into the foothills have become the only suitable habitat for many wildlife species in the Valley.

Most wildlife species within the Las Vegas Valley and surrounding region are adapted to drought conditions, including sparse vegetative cover and limited sources of permanent water. However, a number of drainages in the Project Area provide intermittent or perennial sources of water that support a relatively high concentration of vegetation and cover that contribute to increased wildlife diversity in these areas. These drainages are typically defined as jurisdictional waters. Wildlife species utilize these drainages as travel corridors within the Valley. Large mammals, such as the coyote (*Canis latrans*) and desert kit fox (*Vulpes macrotis arsipus*) also use the water sources in these drainages and return to them regularly. Bats may also forage over these areas because of increased abundance of invertebrate prey. More common bird species may nest and forage in these areas year-round, while migratory bird species may forage and rest in these areas during their migration.

While many species may commonly feed in upland habitats, they also depend on riparian-wetland habitat for breeding and cover. The riparian-wetland habitat generally has more structured and complex vegetative assemblages, along with higher wildlife diversity than the surrounding upland areas. These areas effectively function as movement corridors for mammals and serve as congregation and feeding areas for a variety of bird species. While riparian habitat covers less than 1 percent of the Project Area, it provides habitat for the majority of the species recorded in the region.

### 3.5.3.2 General Wildlife

Some 300 wildlife species have been recorded on or proximal to the Project Area either as residents or as migrants/transients. These include over 240 species of birds, 27 species of mammals and approximately 25 species of reptiles and amphibians.

#### *3.5.3.2.1 Mammals*

Most mammals in the Project Area and surrounding region are nocturnal, but occasionally a few may be seen during the day. Small mammals that occur in the Project Area include the black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audobonii*), desert woodrat (*Neotoma lepida*), long-tailed pocket mouse (*Chaetodipus formosus*), desert pocket mouse (*C. penicillatus*), little pocket mouse (*Perognathus longimembris*), cactus mouse (*Peromyscus eremicus*), Merriam's kangaroo rat

(*Dipodomys merriami*), house mouse (*Mus musculus*) and white-tailed antelope squirrel (*Ammospermophilus leucurus*). Larger mammal species include the grey fox (*Urocyon cinereoargenteus*), desert kit fox, coyote, bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), and spotted skunk (*Spilogale gracilis*).

Although no information is available specifically for bats, a number of bat species have the potential to occur on or near the Project Area. Mines and natural caves, as well as crevices associated with buildings, bridges and trees located on and near the Project Area, provide potential roosting habitat for bats. Bats may also roost among foliage or on tree trunks in riparian woodlands along the Lower Las Vegas Wash. The Yuma myotis (*Myotis yumanensis*), California myotis (*M. californicus*), western pipistrelle (*Pipistrellus hesperus*), palid bat (*Artrozous pallidus*) and little brown bat (*Myotis lucifugus*) are the species most likely to inhabit the Project Area and the surrounding region.

### *3.5.3.2.2 Birds*

A checklist of birds for Clark County and the Las Vegas Wash area confirms that approximately 240 species have been observed in the Project Area and in the surrounding region either as residents or as migrants/transients. Most bird species that occur in the Project Area and surrounding region are associated with either riparian-wetland or creosote-bursage scrub habitat. Within the riparian habitat type, common bird species that are typically found in the winter include the yellow-rumped warbler (*Dendroica coronata*), verdin (*Auriparus flaviceps*), Abert's towhee (*Pipilo aberti*), black phoebe (*Sayornis nigricans*), black-tailed gnatcatcher (*Poliptila melanura*), marsh wren (*Cistothorus palustris*) and phainopepla. In the spring, common riparian bird species include the red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), cliff swallow (*Hirundo pyrrhonota*), mourning dove (*Zenaida macroura*), verdin, common yellowthroat (*Geothlypis trichas*) and Abert's towhee.

Common bird species that are associated with creosote-bursage scrub habitat include the greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), scrub jay (*Aphelocoma coerulescens*), common raven (*Corvus corax*), black-throated sparrow (*Amphispiza bilineata*) and sage sparrow (*A. belli*). Game birds that utilize this habitat type include mourning dove and Gambel's quail (*Callipepla gambelii*).

Birds associated with permanent sources of open water include the yellow-headed blackbird (*Xanthocephalus xanthocephalus*), black-crowned night heron (*Nycticorax nycitorax*) and green heron (*Butorides striatus*). Seasonal migratory birds use both permanent and temporary bodies of water for foraging and resting. These birds include a number of waterfowl species such as the ruddy duck (*Oxyura jamaicensis*), northern mallard (*Anas platyrhynchos*), northern pintail (*A. acuta*), cinnamon teal (*A. cyanoptera*), American coot (*Fulica americana*) and Canada goose (*Branta canadensis*).

Numerous birds occur as winter or summer residents or migrants within the Project Area for brief periods in the spring and fall. Some common species include the yellow-rumped warbler, Hutton's vireo (*Vireo huttoni*), cliff swallow, ruby-crowned kinglet (*Regulus calendula*) and white-crowned sparrow (*Zonotrichia leucophrys*).

Red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), golden eagles (*Aguila chrysaetos*) and prairie falcons (*Falco mexicanus*) are some raptors that occur within the Project Area. Many raptor species use large trees, cliff faces, and rocky ledges as sites to roost or nest. Owl species that occur in the Project Area include the western burrowing owl (*Athene cunicularia*), great-horned owl (*Bubo virginianus*), and barn owl (*Tyto alba*).

#### 3.5.3.2.3 Reptiles and Amphibians

Reptiles are especially adapted to drought conditions and extreme temperatures and are therefore well represented in the Project Area and surrounding region. Many diurnal lizards are widespread, while others are habitat specialists. Widespread species include the side-blotched lizard (*Uta stansburiana*), desert iguana (*Dipsosaurus dorsalis*), Great Basin fence lizard (*Sceloporus occidentalis biseriatus*), desert horned lizard (*Phrynosoma platrhinos*), western whiptail lizard (*Cnemidophorus tigris*) and western-banded gecko (*Coleonyx variegates*). Other lizard species that are widespread but less abundant include the zebra-tailed lizard (*Callisaurus draconoides*), desert spiny lizard (*Sceloporus magister*) and long-nosed leopard lizard (*Gambelia wislezenii*). Habitat specialists include the collared lizard (*Crotophytis insularis*), banded gila monster (*Heloderma suspectrum cinctum*), chuckwalla (*Sauromalus obesus*), long-tailed brush lizard (*Urosaurus graciosus*) and common (desert) night lizard (*Xantusia vigilis*).

The desert tortoise's (*Gopherus agassizii*) abundance varies, and it is most prevalent in undeveloped areas throughout the Project Area. This species is listed as threatened by the USFWS and requires special management considerations. Detailed information on this species is presented in Section 3.5.4.2.

Representative snake species include the coachwhip (*Masticophis flagellum*), Great Basin gopher snake (*Pituophis melanoleucus deserticola*), western patch-nosed snake (*Salvadora hexalepis*), glossy snake (*Arizona elegans*), red racer (*Masticophis flagellum piceus*) and the Mojave green rattlesnake (*Crotalus scutulatus*). Unlike lizards, most of which are primarily diurnal, most snake species in the Project Area are nocturnal.

Amphibians that are relatively common within the Project Area include Woodhouse's toad (*Bufo woodhousei*), southwestern toad (*Bufo microscaphus*), Great Plains toad (*Bufo cognates*), Pacific treefrog (*Hyla regilla*) and American bullfrog (*Rana catesbeiana*). The American bullfrog, introduced into the Southwest, is a problematic species that feeds on native wildlife, including other amphibians, small reptiles, and fish.

## 3.5.4 Special Status Species

Special status species include those listed as threatened or endangered under the Federal Endangered Species Act (ESA) of 1973, as amended, species proposed for listing, species of special concern and other species identified either by the USFWS, BLM, NDOW, NNHP, or Nevada Native Plant Society (NNPS) as unique or rare, and which have the potential to occur within the Project Area. Tables 3.5-1 and 3.5-2 provide lists of special status plant and wildlife species that have either a federal or a state listing status (some of these species may also be BLM designated sensitive species). BLM sensitive species are taxa that are not already included as BLM Special Status Species under (1) Federally listed, proposed or candidate species; or (2) State of Nevada listed species. BLM policy is to provide these species with the same level of protection as is provided for candidate species in BLM Manual 6840.06 C, that is to "ensure that actions authorized, funded, or carried out do not contribute to the need for the species to become listed." The BLM Sensitive Species designation is normally used for species that occur on BLM-administered lands for which BLM has the capability to significantly affect the conservation status of the species through management. A comprehensive list of BLM sensitive plant and animal species for Clark County, Nevada is provided in Appendix E.

### 3.5.4.1 Special Status Plants

There are currently no federal-listed plant species in Clark County (USFWS 2002). The closest listed plants are found in Ash Meadows National Wildlife Refuge, Nye County, Nevada. However, there is one federal candidate species in Clark County, the Blue Diamond cholla (*Opuntia whipplei* var. *multigeniculata*), which occurs within the Project Area.

## TABLE 3.5-1. Special Status Plant Species with the Potential to Occur within the Project Area

| Common Name (*Scientific Name*) | Regulatory Status | | | | Population Census | Habitat and Distribution | Potential for Occurrence |
|---|---|---|---|---|---|---|---|
| | USFWS | BLM | State | NNHP | | | |
| Blue Diamond cholla (*Opuntia whipplei* var. *multigeniculata)* | C | S | CE | S | 10 occurrences mapped in Nevada. | Found in dry open carbonate ledges, crevices, and rocky colluvium on gentle to steep slopes of all aspects in Clark County. | Low |
| Las Vegas bearpoppy *(Arctomecon californica)* | SC | S | CE | S | 92 extant and 22 extirpated occurrences mapped in Nevada. | Located in open, dry, spongy or powdery, often dissected badland or hummocked soils with high gypsum content in areas of low relief on all aspects and slopes in Clark County. | High |
| Las Vegas buckwheat (*Eriogonium corymbosum* var. *glutinosum)* | None | S | None | WL | 29 occurrences mapped in Nevada. | No summary of habitat available. Confined largely to the Las Vegas Valley area. | Moderate |
| Rosy twotone beardtongue (*Penstemon bicolor* spp. *roseus*) | SC | None | None | S | 52 occurrences mapped in Nevada. | Found in rocky calcareous, granitic, or volcanic soils in washes, roadsides, rock crevices, or similar places receiving enhanced runoff, in the creosote-bursage, blackbrush, and mixed-shrub zones in Clark and Nye Counties. | High |
| Threecorner milkvetch (*Astragalus geyeri var. triquetrus)* | SC | S | CE | S | 44 extant occurrences mapped in Nevada. | Occurs in open, deep sandy soil or dunes, generally stabilized by vegetation and/or a gravel veneer in Clark and Lincoln Counties. | Moderate |
| Unusual catseye (*Cryptantha insolita)* | SC | S | CE | S | One extent and one extirpated occurrence mapped in Nevada. | Found in light-colored, alkaline clay flats and low hills in the creosote bush zone in the Las Vegas Valley. | Low |
| White bearpoppy (*Arctomecon merriamii)* | SC | S | None | S | 129 occurrences mapped in Nevada. | Found on a wide variety of dry to sometimes-moist basic soils, including alkaline clay and sand, gypsum, calcareous gravels and carbonate rock outcrops in Clark, Lincoln and Nye Counties. | High |
| Yellow twotone beardtongue (*Penstemon bicolor* spp. *bicolor)* | SC | S | None | S | 34 occurrences mapped in Nevada. | Occurs on calcareous or carbonate soils in washes, roadsides, rock crevices, outcrops, or similar places receiving enhanced runoff, in the creosote-bursage, blackbrush and mixed-shrub zones in Clark County. | High |

**USFWS**
C=Candidate for federal listing under the Federal ESA
SC=Federal Species of Concern
None=No listing

**BLM**
S=Special Status Species in Nevada
None = No listing

**STATE**
CE = Critically Endangered in the State of Nevada
None =No listing

**NNHP**
S = Sensitive
WL=Watch List

**TABLE 3.5-2. Special Status Wildlife Species Observed or with the Potential to Occur in the Project Area**

| Common Name (*Scientific Name*) | Regulatory Status | | | Habitat | Potential for Occurrence |
|---|---|---|---|---|---|
| | USFWS | BLM | STATE | | |
| Allen's big-eared bat (*Idionycteris phyllotis*) | SC | S | None | Typically associated with pine forests, pinyon-juniper and riparian areas. Also found in Mojave desert scrub. Roosts in caves and abandoned mineshafts. | Moderate |
| Banded gila monster (*Heloderma suspectum cinctum*) | SC | S | FP | Occurs in desert scrub habitats in southernmost Nevada. | Low |
| Big free-tailed bat (*Nyctinomops macrotis*) | SC | S | None | Occurs in rugged mountainous country; may roost in buildings. | Low |
| Bighorn sheep *(Ovis canadensis nelsoni)* | None | SS | P | Found in dry, desert mountain ranges, usually near foothills near rock cliffs and permanent water. | Moderate |
| California leaf-nosed bat (*Macrotus califor-nicus*) | SC | S | None | Occurs in desert scrub; Roosts in caves, mines and rock shelters. Feeds on large, flying insects. Roost sites are usually located near foraging areas. | Moderate |
| Chuckwalla (*Sauromalus obesus*) | SC | S | None | Found in rocky hillsides and rock outcrops within the desert scrub community. | Low |
| Common yellowthroat (*Geothlypis trichas*) | None | P | FP | Uncommon to fairly rare migrant in brushy habitats and tall weedy vegeta-tion, especially near water. | Low |
| Desert tortoise (*Gopherus agassizii*) | FT | S | FP | Present in low to moderate densities throughout creosote-bursage scrub and salt desert scrub habitat. | Moderate |
| Ferruginous hawk (*Buteo regalis*) | SC | P | FP | Uncommon winter resident of grasslands and open areas in Nevada. Frequents open grasslands, sagebrush flats, desert scrub, low foothills surrounding valleys and fringes of pinyon-juniper habitat. | Moderate |
| Fringed myotis (*Myotis thysanodes*) | SC | S | None | Found in desert scrub, shrub-steppe, oak-pinyon and coniferous forest habitats. Roosts in cave, rock crevices and buildings. | Moderate |

Sources: http://heritage.nv.gov; http://www.nv.blm.gov/wildlife/wildlife.htm; http://nevada.fws.gov/species/species.htm#birds.

**USFWS**
FE=Listed as endangered under the Federal ESA
FT=Listed as threatened under the Federal ESA
C=Candidate for federal listing under the Federal ESA
SC=Federal Species of Concern
DL=Delisted
None=No listing

**BLM**
P=Protected
S=Special Status Species in Nevada
SS=Sensitive Species in Nevada
None=No listing

**STATE**
FP=Listed as Fully Protected in the State of Nevada
None=No listing
P=Protected

## TABLE 3.5-2. Special Status Wildlife Species Observed or with the Potential to Occur in the Project Area (Continued)

| Common Name (*Scientific Name*) | Regulatory Status | | | Habitat | Potential for Occurrence |
|---|---|---|---|---|---|
| | USFWS | BLM | STATE | | |
| Golden eagle (*Aquila chrysaetos*) | None | P | FP | Uncommon permanent resident and migrant throughout Nevada up to 10,000 feet. Uses rolling foothills and mountain terrain, wide arid plateaus, open mountain slopes and cliff and rock outcrops. | Low |
| Greater western mastiff bat (*Umops perotis californicus*) | SC | S | None | Found in arid and semiarid areas in desert scrub; roosts in cliffs and rock crevices. | Moderate |
| Loggerhead shrike *(Lanius ludovicianus)* | SC | P | FP | Common summer resident throughout open parts of the state. Frequents open habitats with sparse shrubs and trees, other suitable perches, bare ground and low or sparse herbaceous cover. | High |
| Long-billed curlew *(Numenius americanus)* | None | P | FP | Uncommon winter resident in portions of the East Mojave. Nonbreeding individuals occasionally summer in the winter range. Occurs on inland grassland and agricultural habitats. | Low |
| Long-eared myotis *(Myotis evotis)* | SC | S | None | Occurs primarily in forests but also less frequently in sage and chaparral habitats. Roosts in cracks in cliffs, hollow trees, caves, mines and buildings. | Moderate |
| Long-legged myotis *(Myotis volans)* | SC | S | None | Typically associated with montane forests but also found in riparian and desert habitats. Roosts in rock crevices in cliffs, cracks in ground, behind loose bark on trees and in buildings. | Moderate |
| Pallid bat (*Antrozus pallidus*) | None | S | None | Found in a variety of habitats including forests, brushy terrain, rocky canyons, and deserts. Roosts in cliffs, crevices, mine tunnels, caves, house attics and other man-made structures; feeds on ground by stalking flightless prey. | Moderate |
| Peregrine falcon (*Falco peregrinus*) | DL | S | FP | Uncommon migrant found in open habitats from tundra, savannah, and coastal areas to high mountains. It is most commonly associated with tall cliffs with open views that are used for perching and nesting and usually near a water source. Typically, this species breeds in woodland, forest and coastal habitats. | Moderate |

Sources: http://heritage.nv.gov; http://www.nv.blm.gov/wildlife/wildlife.htm; http://nevada.fws.gov/species/species.htm#birds.

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FT=Listed as threatened under the Federal ESA
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**TABLE 3.5-2. Special Status Wildlife Species Observed or with the Potential to Occur in the Project Area (Continued)**

| Common Name (*Scientific Name*) | Regulatory Status | | | Habitat | Potential for Occurrence |
|---|---|---|---|---|---|
| | USFWS | BLM | STATE | | |
| Phainopepla (*Phainopepla nitens*) | None | S | FP | Primarily found in washes, riparian areas, and other habitats that support arid scrubs; unique relationship with its main food source, mistletoe berries. | Moderate |
| Southwestern willow flycatcher (*Empidonax traillii extimus*) | FE | S | FP | Uncommon to rare in southern Nevada along the Colorado and Virgin rivers. Riparian obligate that breeds along rivers, streams and other wetlands where a dense growth of willow or other similarly structured riparian vegetation is present. | Low |
| Spotted bat (*Euderma maculatum*) | SC | S | FP | Found mostly in foothills and mountains and desert regions of southern Nevada, California, and Arizona. Habitats occupied range from arid deserts and grasslands through mixed conifer forests. Roost in rock crevices, but occasionally found in caves and buildings. Cliffs provide optimal roosting habitat. Feeds on insects, especially moths. | Moderate |
| Townsend's western big-eared bat (*Plecotis townsendii townsendii*) | SC | S | None | Found in desert scrub and woodlands. Roosts in cave, mines, buildings and other man-made structures; flies late at night feeding on insects, especially moths. | Moderate |
| Western burrowing owl *(Athene cunicularia)* | SC | P | FP | A yearlong resident of open, dry grassland and desert habitats. Found as residents in grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats. Occurs throughout the state of Nevada in appropriate habitats. | Moderate |
| Western least bittern *(Ixbrychus excilis hesperis)* | SC | None | FP | Rare migrant associated with dense riparian and marsh vegetation comprised of cattail and bulrush stands of moderate to high density adjacent to shorelines. | Low |
| Western small-footed myotis *(Myotis ciliolabrum)* | SC | S | None | Occurs in a variety of habitats but most common in arid environments. Roosts primarily in caves, buildings, mines or crevices. | Moderate |
| Western Yellow-billed cuckoo *(Coccyzus americanus occidentalis)* | C | S | FP | Riparian obligate that breeds along rivers and streams where a mature stand of cottonwood or willows is present. | Low |

Sources: http://heritage.nv.gov; http://www.nv.blm.gov/wildlife/wildlife.htm; http://nevada.fws.gov/species/species.htm#birds.

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## TABLE 3.5-2. Special Status Wildlife Species Observed or with the Potential to Occur in the Project Area (Continued)

| Common Name (*Scientific Name*) | Regulatory Status | | | Habitat | Potential for Occurrence |
|---|---|---|---|---|---|
| | USFWS | BLM | STATE | | |
| White-faced ibis (*Plegadis chihi*) | SC | P | FP | Uncommon permanent resident and migrant in southern Nevada. Found mostly in freshwater areas, on marshes, swamps, ponds and rivers. Nests in small colonies, often with other colonial waterbirds. | Low |
| Yellow warbler (*Dendroica petechia brewsteri*) | None | P | FP | Found in riparian deciduous habitats in summer: cottonwoods, willows, alders and other small trees and shrubs typical of low, open-canopy riparian woodland. | Low |
| Yuma clapper rail (*Rallus longiosteris yumanensis*) | FE | None | FP | Rare resident restricted to the region of the lower Colorado River, the Colorado River delta and appropriate habitats. Associated with dense riparian and marsh vegetation comprised of cattail and bulrush stands of moderate to high density adjacent to shorelines. | Low |
| Yuma myotis (*Myotis yumanensis*) | SC | S | None | Found in areas with trees adjacent to open water. Roosts in caves, tunnels and buildings. | Moderate |

Sources: http://heritage.nv.gov; http://www.nv.blm.gov/wildlife/wildlife.htm; http://nevada.fws.gov/species/species.htm#birds.

**USFWS**
FE=Listed as endangered under the Federal ESA
FT=Listed as threatened under the Federal ESA
C=Candidate for federal listing under the Federal ESA
SC=Federal Species of Concern
DL=Delisted
None=No listing

**BLM**
P=Protected
S=Special Status Species in Nevada
SS=Sensitive Species in Nevada
None=No listing

**STATE**
FP=Listed as Fully Protected in the State of Nevada
None=No listing
P=Protected

State-listed species are protected by the 2001 NRS. State listed plants found in Clark County fall into one of two categories: critically endangered (CE) and cactus/yucca (CY). Critically endangered plants are species threatened with extinction because of habitat loss, overexploitation, disease or other factors affecting their populations. Cactus, yucca and Christmas tree species are legally protected throughout the state of Nevada and includes any members of the family Cactaceae and the genus Yucca, and all parts of any evergreen tree that has been cut and removed from its original growth place without the foliage being removed. Permits are required to remove these species from the wild and to ship or sell them.

Eight special status plants species with the potential to occur in the Project Area have been identified from a number of sources including: a NNHP species list for Clark County and GIS database of known locations, GIS data of potential habitat from the BLM and information on the location of sensitive plant species from the 1991 FEIS. These eight special status plants species are listed in Table 3.5-1 and include Las Vegas bearpoppy (*Arctomecon californica*), Las Vegas buckwheat (*Eriogonium corymbosum* var. *glutinosum*), rosy twotone beardtongue (*Penstemon bicolor* spp. *roseus*), yellow twotone beardtongue (*P. bicolor* spp. *bicolor*), white bearpoppy (*Arctomecon merriamii*), threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*), unusual catseye (*Cryptantha insolita*) and Blue Diamond cholla.

If Blue Diamond cholla, threecorner milkvetch and unusual catseye are identified in a rare plant survey or it is determined their habitat will be affected by any construction or maintenance activities, a permit from the Nevada Division of Forestry (NDF) for the take of plants and/or habitat destruction will be required. NDF has issued a permit to Clark County for take of Las Vegas bearpoppy on non-federal land and NDOT rights-of-way in Clark County. Any of the project areas located on non-federal land would be covered under this permit. However, should Las Vegas bearpoppy be found, NDF will be notified of the number of plants present. If the project area is located on federal land, and Las Vegas bearpoppy habitat or plants will be affected, a permit from the NDF would be acquired before any groundbreaking activities take place.

Figure 3.5-2 summarizes the mapped distribution and habitat of special status plant species confirmed in the Project Area. While the information presented is the most up-to-date and comprehensive information compiled from a number of sources, it should be noted that extensive surveys for many of these species have not been conducted. Therefore, a number of these species could also occur in undeveloped areas elsewhere in the Project Area.

#### 3.5.4.2 Special Status Wildlife

Twenty-nine special status wildlife species are known to occur or have the potential to occur in the Project Area either as residents or as migrants/transients. These species have been identified from a number of sources including: NNHP and USFWS special status wildlife species lists for Clark County, available GIS database locations of observed species and information on the location of special status wildlife species from the 1991 FEIS. These species are listed in Table 3.5-2 and include western burrowing owl, Yuma clapper rail (*Rallus longiosteris yumanensis*), ferruginous hawk (*Buteo regalis*), white-faced ibis (*Plegadis chihi*), long-billed curlew (*Numenius americanus*), loggerhead shrike (*Lanius ludovicianus*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), yellow warbler (*Dendroica petechia brewsteri*), southwestern willow flycatcher (*Empidonax trailii*), Peregrine falcon (*Falco perigrinus*), western least bittern (*Ixbrychus excilis hesperis*), Phainopepla, golden eagle, common yellowthroat (*Geothlypis trichas*), greater western mastiff bat (*Eumops perotis californicus*), spotted bat (*Euderma maculatum*), Townsend's western big-eared bat (*Plecotis townsendii townsendii)*, pallid bat, Allen's big-eared bat (*Idionycteris phyllotis*), California leaf-nosed bat (*Macrotus* *californicus*), western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*M. evotis*), Fringed myotis (*M. thysanodes*), long-legged myotis (*M. vloans*), Yuma myotis, big free-tailed bat (*Nyctinomops macrotis*), desert tortoise, banded gila monster, and chuckwalla.

Three of these species, the Yuma clapper rail, southwestern willow flycatcher and desert tortoise are federally listed under the ESA.

### 3.5.4.2.1 Yuma Clapper Rail and Southwestern Willow Flycatcher

The Yuma clapper rail and southwestern willow flycatcher are extremely rare migrants to the Las Vegas Valley, limited only to suitable habitats along the Lower Las Vegas Wash. Detailed discussions of these, and other sensitive wildlife species can be reviewed in a number of sources including Arizona Game and Fish (2003) and Desert USA (2003).

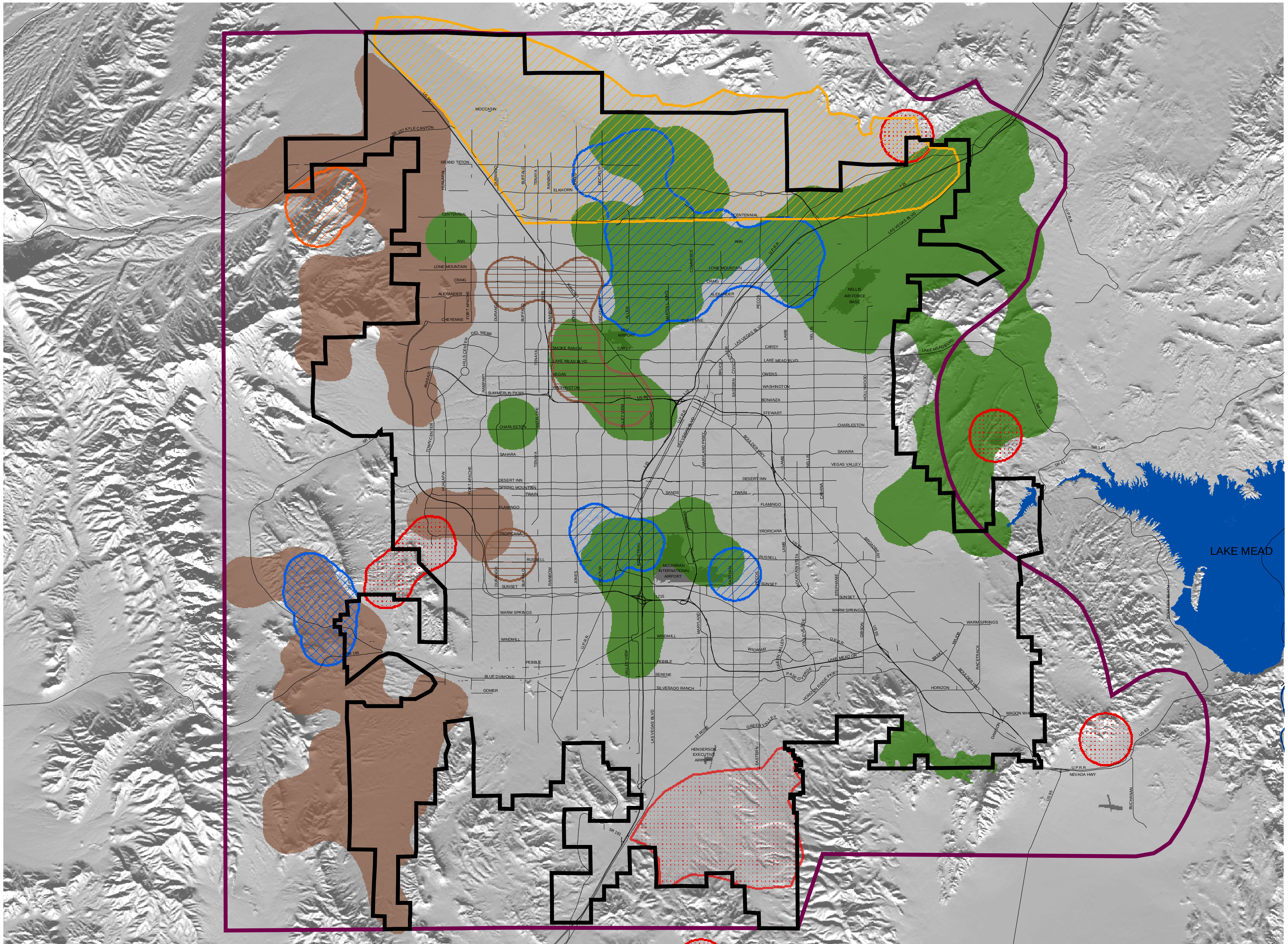
### 3.5.4.2.2 Desert Tortoise

Because of the widespread distribution of desert tortoise in the Las Vegas Valley and the long-standing history of protective measures to promote recovery of the species, the desert tortoise is discussed here in some depth. The desert tortoise is an herbivorous reptile whose native range includes the Sonoran and Mojave deserts of southern California, southern Nevada, Arizona, extreme southwestern Utah and Sonora and northern Sinaloa, Mexico. In Nevada, desert tortoises are typically associated with gravelly flats or sandy soils with some clay with the most favorable habitat occurring between elevations of 1,000 to 3,000 feet (305 to 914 m) (Luckenbach 1982; Schamberger and Turner 1986). Desert tortoises are most active in Nevada during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rainstorms. Desert tortoises spend the remainder of the year in burrows, escaping extreme desert conditions. Current distribution throughout the historic range has become patchy and spotted, primarily due to habitat loss and degradation resulting from urbanization, roads and highway development, agricultural practices, recreational uses, mining, military training and livestock grazing (USFWS 1994).

***Tortoise Populations in the Immediate Area.*** The species' range in Clark County is located primarily within the creosote-bursage scrub and salt desert scrub habitats at elevations below 4,000 feet (1,219 m). Further information on the range, biology, and ecology of the desert tortoise can be found in Burge (1978), Burge and Bradley (1976), Hovik and Hardenbrook (1989), Luckenbach (1982), Weinstein et al. (1987) and USFWS (1994).

In the Project Area, desert tortoises are found widely distributed across all public lands and in some areas of private land that are undeveloped. Current distribution and population estimates for the desert tortoise in the Las Vegas Valley are difficult to ascertain due to the lack of up-to-date survey information. The latest systematic attempt to determine the distribution and density of the desert tortoise in the Las Vegas Valley was made in 1990 by Karl (Karl 1990). In this effort, it was determined that outside the urbanized core of the Valley, habitat quality varied. The lowest tortoise densities were found along the eastern and northern portions of the Las Vegas Valley. Habitat supporting densities in excess of 35 tortoises per square mile could be found along the southern and western portions of the Valley, while the remaining habitat in the south, southwest and northwest portion of the Valley supported densities of more than 100 tortoises per square mile (Karl 1990).

***Project History and Summary of Consultation Activities for the Desert Tortoise.*** In 1991, an EIS was prepared for CCRFCD's proposed 10-year Master Plan for flood control facilities throughout Clark County Nevada. Since its inception, the Master Plan has undergone a series of updates that have been subject to a number of previous consultations with the USFWS under Section 7 of the ESA. On August 29, 1990, the USFWS issued a biological opinion on CCRFCD's Master Plan for flood control facili-




CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

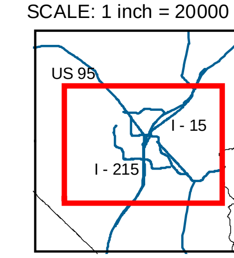
## Legend

- Ultimate Development Boundary
- Project Area Boundary
- Major Street Centerline
- Mojave Milkvetch Habitat
- Blue Diamond Cholla Habitat
- Bearpoppy and Buckwheat
- Las Vegas Buckwheat
- Rosy Twotone Beardtongue
- White Bearpoppy
- Las Vegas Bearpoppy
- Yellow Twotone Beardtongue

N W E S

Feet
0 10,000 20,000

SCALE: 1 inch = 20000 feet




KNOWN DISTRIBUTIONS OF SENSITIVE PLANTS

FIGURE 3.5-2

SWCA ENVIRONMENTAL CONSULTANTS

Data sources: Clark County GIS Management Office spring 2003 - Major Street Centerline, BLM Disposal Boundary, Airports, Open Water, Watershed Boundary \ BLM 2003 - Project Area Boundary\ CCRFCD 2002 Master Plan Update - Species Distributions

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ties for the desert tortoise (File No. 1-5-90-F-25). The format of this biological opinion necessitated numerous amendments (October 18, 1990; February 7, 1991; February 15, 1991; June 21, 1991; November 27, 1991; December 2, 1991; February 2, 1992; and June 25, 1992).

On April 28, 1993, the USFWS prepared a biological opinion, which issued a non-jeopardy opinion with specific terms and conditions that would be appropriate for implementation with the project to reduce the take of desert tortoises. The specific terms and conditions of the 1993 biological opinion allow for the loss of up to 5,120 acres of desert tortoise habitat and the take of (i.e., harassment by removal from harms way prior to or during construction, operation or maintenance) of 525 tortoises.

All subsequent MPUs prepared and adopted after the issuance of the 1993 biological opinion were subject to the recommendations and requirements contained in the document. The BLM is reinitiating consultation to get a district-wide programmatic biological opinion that complies with the USFWS's new programmatic guidance. The CCRFCD will continue to operate under the 1993 biological opinion, until the district-wide programmatic biological opinion is issued by the USFWS.

## 3.6 CULTURAL RESOURCES

The National Historic Preservation Act (NHPA), as amended in 1992 (16 U.S.C. 40 et seq.), requires government agencies to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places (NRHP). The National Park Service defines archeological and historic resources as "the physical evidences of past human activity, including evidences of the effects of that activity on the environment. What makes cultural resources significant are their identity, age, location, and context in conjunction with their capacity to reveal information through the investigatory research designs, methods, and techniques used by archeologists." Ethnographic resources are defined as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (National Park Service Director's Order No. 28).

### 3.6.1 Cultural Resource Identification and Evaluation Process

The process begins with an identification and evaluation of cultural resources for NRHP eligibility, followed by an assessment of effect on those eligible resources and concluding after a consultation process. If an action (undertaking) could change in any way the characteristics that qualify the resource for inclusion on the NRHP, it is considered to have an effect. No historic properties affected means that no cultural resources are affected. No adverse effect means there could be an effect, but the effect would not be harmful to those characteristics that qualify the resource for inclusion on the NRHP. Adverse effect means the effect could diminish the integrity of the characteristics that qualify the resource for the NRHP.

Because this SEIS is programmatic and does not evaluate the potential effects of any specific action, there is no discussion of properties eligible for inclusion in or already listed on the NRHP. The discussion is limited to a more general description of the types and significance of cultural resources in the area.

## 3.6.2 Las Vegas Valley Prehistory

Although the Las Vegas Valley is typically grouped within the Great Basin culture area (d'Azevedo 1986), it is situated along the edge of a number of major culture areas with a number of significant prehistoric cultures, including both the Anasazi and the Fremont. Because the area is situated at the crossroads of several distinct cultural traditions, it is difficult to assign a comprehensive sequence of phases for the entire area. A substantial body of research has resulted in the production of a number of chronologies, many of which incorporate and summarize previous research (Ahlstrom and Roberts 1999; Blair et al. 1999 and 2000; Ezzo et al. 1995; Fowler and Madsen 1986; Fowler et al. 1973; Kelly et al. 1990; Lyneis 1982 and 1995; Seymour 1999; D. Seymour et al. 1996; G. Seymour et al. 1996; Shutler 1961; Warren and Crabtree 1986). For the purposes of outlining the prehistoric culture history, we will utilize a variant of the terminology employed by Fowler and Madsen (1986), which divides the period into a Pre-Archaic (henceforth Paleoindian) Period, the Archaic Period, the Horticultural Period or Saratoga Springs Phase and the Numic Period.

### 3.6.2.1 Paleoindian

Human occupation of the Las Vegas Valley began in the Paleoindian period, perhaps as early as 10,000 to 12,000 years ago. The period has been defined in the immediate Project Area as the Lake Mojave Period (Lyneis 1982; Warren and Crabtree 1986). Some of the earliest excavated evidence of occupation in the area is from the Tule Springs site (Wormington and Ellis 1967), where large mammal remains were found along with artifacts. No fluted projectile points were present and the association of faunal material and artifacts is not clear (Ahlstrom and Roberts 1999).

### 3.6.2.2 Archaic Period

Cultural changes have been characterized continent-wide through use of the term "Archaic" for a pre-horticultural period of hunting and gathering focusing on the new environments of the Holocene (Willey and Phillips 1958). In southern Nevada, the two major defined sub-periods are the Pinto (5000 to 3000 B.C.) and the Gypsum (3000 B.C. to 500 A.D.) periods. The Pinto Period is characterized in material culture by the bifurcated-stem Pinto point (Amsden 1935; Harrington 1957), as well as other points, scrapers, drills and flat and concave milling stones (Warren and Crabtree 1986, p. 187). The Pinto Period is poorly represented in the Project Area, although some levels of O'Malley Shelter (Fowler et al. 1973) and Etna Cave (Wheeler 1942) date to this period.

The subsequent Gypsum Period is characterized by a wider variety of point types in the area, including Elko points (Elko Eared, Elko Corner-notched, Elko Side-notched), Humboldt Concave Base points, Gypsum Points and Gatecliff Split-stem points. Pit structure dwellings appear during this period and milling and mortar stones become more common (Warren and Crabtree 1986). Split twig figurines date to this period as well (Fowler and Madsen 1976, pp. 174-175). Sites in the area that date to this phase include Gypsum Cave (Harrington 1933), Stuart Rockshelter (Shutler et al. 1960), site 26Ck4580, Corn Creek Dunes, the Beland site and a variety of sites in the Las Vegas Wash and Duck Creek areas (Ezzo 1995, pp. 44-45).

### 3.6.2.3 Horticultural Period

In many areas the Archaic Period arguably extends well into the historic period. However, there are important cultural manifestations of horticulture occurring at approximately 1500 B.C. In the greater West this happened predominantly in several major areas and the project region lies at the juncture of the spatial distribution of three of these cultures: the Anasazi, the Fremont and the Patayan. The Anasazi were primarily centered east of the region, in the San

Juan Basin, southwest Colorado, southeast and south-central Utah and northern Arizona (Cordell 1984). However, a major and relatively well-known branch of the Anasazi culture, termed the Virgin Anasazi, occupied the Moapa valley and the Virgin River area near the project region (Lyneis 1995). The Fremont are best known from occupations in Utah, but Fremont occupations are also known in the Project Area (Fowler and Madsen 1986; Madsen 1989; Marwitt 1986; Warren and Crabtree 1986). Patayan occupation is primarily centered on the extreme southern portion of the Colorado River drainage in Nevada, but Patayan ceramics are occasionally found at sites in the Project Area. It is difficult to sort out the relationships and potential interactions of these groups. For example, at O'Malley Shelter in the vicinity of the current project, both Fremont and Virgin Anasazi pottery was recovered (Fowler et al. 1973, p. 55).

### 3.6.2.4 Numic Period

Beginning at around A.D. 1200 throughout the Great Basin, small triangular arrow points (Desert Side-notched and Cottonwood Triangular) become more common along with a distinctive brownware pottery called "Intermountain Brownware" or "Shoshonean Ware." The appearance of these ceramics and other aspects of material culture have been taken as evidence of an expansion of Numic speaking peoples into the region from the Mojave Desert area (Madsen 1975; see also Lamb 1958; Bettinger and Baumhoff 1982; Rhode and Madsen 1994). The model is premised on the fact that Numic-speaking groups were present in the area at the time of contact, as well as glotto-chronological evidence that suggests that the languages spoken by these groups (primarily Shoshone, Paiute and Ute) shared a common origin and began to diverge approximately 1,000 years ago (Rhode and Madsen 1994). However, whether the changes noted in the material culture (e.g., the appearance of new projectile point types and pottery) represents replacement of local populations, absorption into new linguistic and cultural groups or simply cultural change by indigenous populations remains an open debate (Ikons and Weatherization 1986; Lyneis 1982).

### 3.6.2.5 Historical Period

The historical record of southern Nevada extends as far back as the early Spanish explorations of the 1500s and began as part of the Spanish Empire. It later became part of independent Mexico. During the years of Mexican ownership, Jedediah Smith became the first American explorer to venture through the region. From 1826 to 1827 he passed through extreme southeastern Nevada, skirting east of Bunkerville and Moapa along the Virgin and Colorado Rivers (Elliott 1987, p. 35; Hulse 1990, p. 33). This route through Nevada was later lightly utilized as a southern branch of the Old Spanish Trail. Two years later, Antonio Armijo completed a route between New Mexico and the California coast. The trail exited southern Utah, crossing through extreme northwestern Arizona before entering Nevada near Bunkerville. From here, the route wended its way to the southwest, passing through the future site of Las Vegas before entering Alta California (Elliott 1987, p. 35; Hulse 1990, p. 33). The route immediately became a major component of the trade network between the west coast and the interior country. The Old Spanish Trail also became known as the Mormon Trail.

Members of the Church of Jesus Christ of Latter-Day Saints (Mormons) were the first Euro-American group to settle in southern Nevada. The new settlement, Las Vegas, was founded in 1855 by 30 male members of the church who were called by Brigham Young as missionaries to the Paiute Indian population in and around the area (Hulse 1990, pp. 73-77; Rowley 1989, pp. 1-3 and 1-4). After arriving in the Las Vegas Valley, the men constructed a stone and adobe fort along the creek south of the Three-Springs area, and began to develop irrigation networks for farming the land (Swanson 1995, p. 80). In 1857, only 2 years after sending missionaries to the Las Vegas Valley, Brigham Young released the settlers from their mission and dissolved the settlement (Swanson 1995, p. 83).

Though the area was experiencing an economic boom due to the discovery of gold, silver and lead throughout Nevada, much of southern Nevada including the Las Vegas Valley still was largely devoid of permanent Euro-American residents. The Nevada territory was granted statehood in 1864. This, along with the Homesteading Act, allowed for the resettlement of southern Nevada. Agricultural activities soon became the life's blood of the Las Vegas Valley as expansive farms with vast irrigated fields and large ranches with substantial numbers of livestock dominated the area. The community became a major supply stop on the now well-traveled Mormon Trail. Despite the community's new focus on agriculture and its recovered role as an important traveler's way station, Las Vegas remained a generally small and quiet settlement. That is, it remained so until the arrival of the railroad.

Prior to 1900, the UPRR had surveyed and laid claim to a possible railroad between Salt Lake City and Los Angeles, essentially following the route of the Mormon Trail (Hulse 1990, p. 205). Although some minor track building had taken place in Utah around that time, most of the route, including that passing through Nevada was temporarily abandoned. In 1901, William A. Clark, a senator and railroad magnate from Montana, formed the San Pedro, Los Angeles & Salt Lake City Railroad Company (SP, LA & SL) with the goal of constructing a major rail line along the UPRR's previously surveyed route (Swanson 1995, pp. 92-93). At the same time, the Oregon Short Line Company (OSL), which had been a subsidiary of the UPRR when it failed financially in the 1890s, emerged as a competitor for the route. The OSL claimed that they had obtained the rights to the route through Nevada's Clover Valley from the UPRR as part of the financial dealings to re-establish the two companies. The SP, LA & SL, and the OSL sent work crews to the area to both begin construction of their own lines and to destroy the work of the other line (Hulse 1990, p. 206). A few weeks later, a federal court ruled that the OSL was the rightful owner of the route and ordered the SP, LA & SL to withdraw. However, by 1903, a partnership had developed between the OSL and William Clark's SP, LA & SL resulting in the two companies working together to construct the line (Swanson 1995, p. 93). Work on the line proceeded quickly and the tracks were completed by January 1905. The first train to travel the route did so on January 5 of that year (Hulse 1990, p. 207; Swanson 1995, p. 93). (For an exceptionally thorough account of the rail line see White et al. 1997.)

Despite a few minor stumbles, southeastern Nevada, particularly Las Vegas, thrived through to the 1920s. This was due in large part to the federal government's proposal to construct a large dam (Boulder/Hoover Dam) as part of the new Colorado River Compact. The prospect of the dam and its potential affects on the region led to large-scale land speculation throughout the area. Real estate prices for land lots in Las Vegas rose dramatically, ranging $10,000-$30,000 (Blair et al. 1999, p. 41).

With the help of the federal government southeastern Nevada fared better than most areas of the nation during the years of the Great Depression. The government again played a key role in the region's development when World War II began in Europe. The federal government supplied funding for construction of the magnesium processing facility that became a joint effort between a British company, Magnesium Electron, and an American company, Basic Refractories, Incorporated, who formed a partnership called Basic Magnesium, Inc. (BMI) (Elliott 1987, p. 310; Hulse 1991, pp. 213-214). Work on the plant began in September 1941.

America's entry into the war meant that it needed its own supply of magnesium (in addition to what it was supplying to Britain). Plans were made to expand the size of the BMI operation and 10 identical facilities were built at the Las Vegas complex (Hulse 1990, pp. 232-234). The plant began production in July 1943 under the management of the Anaconda Copper Mining

Company, which had taken over the complex in late 1942. At the peak of its operation, the BMI facility employed more than 10,000 workers. The influx of this many workers over such a short period of time created a housing shortage in Las Vegas. Forced to remedy the situation, BMI constructed a townsite for its workers southeast of Las Vegas. The new community, first called Basic Townsite, then Henderson, originally contained 300 residential units (Swanson 1995, p. 124). A second, slightly larger housing development containing 324 units was built in Henderson shortly thereafter. This section of the community was reserved for segregated African-American workers who were being recruited by BMI from Arkansas and Louisiana (Swanson 1995, p. 124).

Ironically, the ending of World War II with America's atomic bombing of Hiroshima and Nagasaki, Japan, signaled the beginning of a new era of military involvement in Nevada. An area north of Las Vegas was selected as an "ideal" location for nuclear testing, and in January 1951, the Nevada Test Site was created (Idyll 1994, p. 219). For over a decade after its creation, the Nevada Test Site served as the location of numerous aboveground nuclear tests. Testing was moved underground in 1963, after President John F. Kennedy signed the Limited Test Ban Treaty with the Soviet Union (Udall 1994, p. 239).

The post-war period in southeastern Nevada has brought about other changes as well. During this time, the area's economy has shifted dramatically from one focused on industry and agriculture to one dominated by tourism. The impact of the 1931 legalization of gambling in the state did not become apparent until the late 1940s. In 1946, the Golden Nugget, the Frontier and the Flamingo Hotel were all opened in Las Vegas. It was the Flamingo Hotel, built on the Strip by infamous mobster Benjamin "Bugsy" Siegel, which marked the new direction for the future of the city. As the "most lavish resort in Nevada's history," the Flamingo Hotel attracted both Hollywood's elite and the East Coast's gangsters alike (Elliott 1987, p. 317). Despite a slow financial start, the casino soon became a huge success, offering glamorous decor and lavish entertainment. This opulent style became the trend for the many new resorts that sprang up along the Strip seemingly overnight. As the casinos, and their accompanying attractions became more spectacular, Las Vegas grew in popularity as a tourist and convention mecca. By 1990, the city was welcoming 1.5 million convention-attendees each year (O'Connor 1994, p. 561). In 1998, over 30 million people visited Las Vegas. As elaborate, futuristic new resorts appear on the Las Vegas Strip, the historic casinos of the city's downtown area become more and more a part of Nevada's past.

# 3.7 TRANSPORTATION

## 3.7.1 General Transportation

Transportation in the region is coordinated through the Regional Transportation Commission (RTC) of southern Nevada that publishes a "Regional Transportation Plan for 2004-2025" and "Transportation Improvement Program, Fiscal Years 2004-2006" (RTC 2003). The former document presents an integrated transportation program for pedestrian, bicycle and vehicular related issues forecast looking forward over the next two decades. As one of most rapidly growing metropolitan areas in the nation, Las Vegas will continue to plan for rapid expansion of its transportation networks.

## 3.7.2 Transportation Infrastructure

The Las Vegas Valley contains a large network of roads. The city of Las Vegas is focused around Interstate 15, U.S. 93 and U.S. 95. Interstate 15 runs northeast to south from Utah to California. Highway 95 runs northwest to south from northern Nevada to southern California. U.S. 93

is the same road as Interstate 15 in North Las Vegas, but it branches off northeast of the city to head northbound in Nevada. It is also the same as Interstate 515 in Las Vegas until it branches off and heads southeast of the city toward Boulder City and Arizona, and ends at Boulder Highway in Henderson. Interstate/Clark County 215 is the Las Vegas Beltway that is planned to be completed by the end of 2003. This freeway bypasses the city around the southern, western and northern sides.

### 3.7.3 Vehicle Traffic

Traffic in the Las Vegas Valley is becoming progressively more congested. This is due to the large increase in the number of people moving to and vacationing in the city. Residents use single-occupant vehicles as their primary mode of travel and tourists often walk or use taxi services (FTA and RTC 2002). Most people (about 94 percent) use private vehicles to travel in the city. Only 2 percent use public transit, such as the City Area Transit (CAT) bus system, and 4 percent walk or use some other mode of transportation. More people (7 percent) in the downtown area use other modes of transportation (e.g., walk, taxi, limousine, etc.), but many (90 percent) still prefer a private vehicle. The RTC of Southern Nevada has completed a Resort Corridor Transportation Master Plan, which they adopted in 1997 and have prepared a Draft EIS (FTA and RTC 2002). This plan will help minimize traffic in the downtown area and provide tourists and other visitors to the area alternative modes of transportation.

The Texas Transportation Institute (TTI 2002), a part of Texas A&M University, publishes an Urban Mobility Report that provides data for the performance of major urban areas' transportation services. This report includes Las Vegas and shows how the city's growth trends compare to traffic congestion. In 2000, Las Vegas had an average of 7.6 hours of traffic congestion on a daily basis. This average ranked Las Vegas nineteenth in the nation (out of 75 urban areas). The travel rate index for Las Vegas in 1999 was 1.35, which means that it took 35 percent longer to travel under congested conditions (rush hour) than at freeflow speeds (TTI 2001). This index ranked Las Vegas ninth in the nation (out of 68 urban areas). Another, more accurate, index calculated for the Urban Mobility Report is the travel time index. This index compares peak period travel to freeflow travel, like the travel rate index, but the travel time index includes recurring and incident conditions, which provides a value closer to the number calculated by automated data collection systems. In 1999 Las Vegas had a travel time index of 1.34 (sixteenth) and in 2000 the index was 1.35 (eighteenth) (TTI 2001 and TTI 2002).

The growing population of the Las Vegas Valley is leading to an increase in the number of vehicles using the streets. Many of the city's streets are not suitable for the large amounts of vehicles that are currently using them and that will be using them in the near future. Construction projects are ongoing to expand highways and interstates and maintain the surface streets. Some current projects include: placement and operation of dynamic message system signs on Interstate 515, Interstate 15, and U.S. 95; creation of an integrated traffic system; widening Interstate 15; expanding U.S. 95 to 10 lanes; and completing the Interstate/Clark County 215 (Beltway) by 2003 (NDOT 2002). Nevada Department of Transportation (NDOT) is also contributing to the widening of Interstate 15 from Barstow to Victorville and the reconstruction of Interstate 15 and Interstate 40 in California.

# 3.8 AIR QUALITY

The FEIS summarized the climate and meteorology for the Project Area (BLM/CCRFCD 1991). This section utilizes the data presented in the FEIS to describe the climatic conditions of this project. The climate of Clark County is classified as desert. It is characterized by bright sunshine, small annual precipitation, dry air and large ranges of daily temperature. This climate is controlled primarily by the state's rugged and varied topography. The prevailing westerly winds move warm, moist Pacific air over the western slopes of the Sierra Nevada Range where the air cools, condensation takes place and most of the moisture falls as precipitation. As the air descends the eastern slopes, compressional warming occurs and very little precipitation falls. The result is that the lowlands of Nevada are largely desert or steppes. The number of days with inclement weather varies from year to year. Severe storms and tornadoes are rare in Clark County.

Long-term records of meteorological data are available from McCarran International Airport. Air quality data are available from Clark County Department of Air Quality Management (CCDAQM). The following section describes the environmental conditions of the project vicinity based on data from these sources.

## 3.8.1 Winds

The prevailing wind direction in Clark County is from the southwest. Winds in this area are generally light in the morning (0-3 miles per hour are most common about 8 a.m.) and stronger in the afternoon. This is due to the differential heating of the ground during the day.

The average monthly wind speed varies from 7.2 miles per hour in December to 11.0 miles per hour in April and June. The average wind speed is higher in summer due to the differential heating of the ground noted earlier.

Clark County occasionally experiences strong winds under the influence of large-scale weather patterns or localized thunderstorm activity. Some of the thunderstorm activities have resulted in significant damage to property. Dust or sand storms occasionally occur during periods of high winds. The maximum wind gust recorded in Las Vegas was 64 miles per hour with an unofficial gust of 100 miles per hour. An annual wind distribution for Las Vegas is in Table 3.8-1.

## 3.8.2 Stability and Mixing Heights

Stability is an atmospheric property that reflects convective overturning and atmospheric mixing. In general, turbulence, atmospheric mixing and dispersion are enhanced in less stable atmospheres. Low-level inversions are layers of stable air that restrict mixing. Mixing height is the height of the atmospheric layer at which convection and mechanical turbulence promote mixing. Good ventilation results from a high mixing height and at least moderate wind speeds within the mixing area.

A summary of surface atmospheric stability using the Pasquill-Turner classification is shown in Table 3.8-2 for Las Vegas. Classes, A, B and C represent unstable conditions (Class A is the most unstable) with good atmospheric dispersion, D is neutral, Classes E, F and G are stable (Class G being the most stable) with poor atmospheric dispersion. Stable conditions occur frequently during early morning hours with low wind speeds that occur. Unstable conditions generally occur during daylight hours with clear skies and low winds. Neutral conditions generally occur under overcast skies or during strong winds. Stable conditions are prominent year round in Las Vegas, with records indicating stable conditions over 40 percent of the time during all months of the year peaking at over 66 percent of the time in November and December.

**TABLE 3.8-1. Wind Speeds and Directions**

| Month | Mean Wind Speed (MPH) | Prevailing Direction | Highest Recorded Speeds (MPH) | Wind Direction |
|---|---|---|---|---|
| January | 7.4 | W | 52 | SW |
| February | 8.4 | SW | 60 | NW |
| March | 10.0 | SW | 52 | NW |
| April | 11.0 | SW | 52 | SW |
| May | 10.9 | SW | 54 | SW |
| June | 11.0 | SW | 52 | SW |
| July | 10.2 | SW | 64 | NE |
| August | 9.5 | SW | 62 | NE |
| September | 8.8 | SW | 54 | NW |
| October | 8.0 | WSW | 52 | NW |
| November | 7.5 | W | 63 | SW |
| December | 7.2 | W | 54 | SW |
| Annual | 9.1 | SW | 64 | NE |

Source: Ruffner (1985).

**TABLE 3.8-2. Las Vegas Surface Atmospheric Stability Using the Pasquill-Turner Classification**

| Month | Stability Class (Month Percent) | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G |
| January | 0.0 | 2.9 | 9.9 | 21.5 | 24.9 | 16.2 | 24.2 |
| February | 0.1 | 5.7 | 10.6 | 21.2 | 23.2 | 16.1 | 23.0 |
| March | 0.1 | 8.6 | 10.5 | 21.5 | 22.5 | 13.9 | 22.7 |
| April | 1.2 | 9.5 | 13.7 | 22.4 | 17.5 | 14.2 | 21.4 |
| May | 2.9 | 11.6 | 17.0 | 18.5 | 16.4 | 13.2 | 20.3 |
| June | 2.4 | 12.3 | 17.9 | 20.5 | 11.9 | 13.6 | 21.3 |
| July | 2.9 | 12.2 | 17.8 | 19.8 | 11.6 | 12.3 | 23.2 |
| August | 2.1 | 13.1 | 15.3 | 17.3 | 10.6 | 12.4 | 29.1 |
| September | 0.5 | 12.0 | 11.6 | 19.1 | 13.6 | 14.5 | 28.7 |
| October | 0.4 | 10.1 | 12.8 | 16.6 | 13.2 | 14.9 | 31.8 |
| November | 0.1 | 5.0 | 11.2 | 17.1 | 19.6 | 17.5 | 29.5 |
| December | 0.0 | 3.6 | 9.7 | 20.0 | 20.5 | 16.6 | 29.4 |

Source: National Weather Service (1988).

Unstable conditions are less frequent, and range from a low of 12.8 percent of the time in January to a high of 32.9 percent of the time in July.

Low-level inversions that restrict mixing height occur frequently above the Las Vegas area during the winter season and during most morning hours in the fall, spring and summer seasons. Inversions near the surface are often formed by nocturnal drainage flow or by nocturnal cooling in the surface under clear skies.

Afternoon mixing heights generally reflect the strong daytime heating of the ground. Morning mixing heights generally reflect the existence of surface cooling or drainage flow. Average mixing heights for Las Vegas are given in Table 3.8-3.

## 3.8.3 Temperature

Temperatures in Clark County are related to the desert climate. There is strong surface heating during the day and rapid night cooling due to dry air and clear skies. This generally results in large ranges in daily temperatures. Table 3.8-4 summarized mean monthly maximum and minimum temperatures in Clark County. The highest mean monthly maximum temperatures are 104ºF (40ºC) Las Vegas; the lowest mean monthly minimum temperatures are 33ºF (0.6ºC) at Las Vegas. The warmest month is July and the coolest is January.

## 3.8.4 Precipitation and Severe Storms

Precipitation in the project vicinity is spread fairly uniformly throughout the year with maximums occurring in January and August. During the winter, the precipitation is primarily associated with storms that move eastward from the Pacific Ocean. During the summer, the precipitation is associated with storms that move south - southeast from the Gulf of Mexico and the Pacific Ocean. During the summer, the precipita-

**TABLE 3.8-3. Average Mixing Heights**

| Season/Months | Mixing Heights (m) | |
|---|---|---|
| | Morning | Afternoon |
| Winter (December, January, February) | 321 | 1,152 |
| Spring (March, April, May) | 433 | 2,875 |
| Summer (June, July, August) | 292 | 3,693 |
| Fall (September, October, November) | 276 | 2,106 |
| **Annual** | **331** | **2,434** |

Source: Holzworth (1972).

**TABLE 3.8-4. Monthly Temperature and Precipitation**

| Month | Mean Monthly Temperatures | | Total Precipitation (inches) |
|---|---|---|---|
| | Minimum (°F) | Maximum (°F) | |
| January | 36.8 | 57.1 | 0.59 |
| February | 41.4 | 63.0 | 0.69 |
| March | 47.0 | 69.5 | 0.59 |
| April | 53.9 | 78.1 | 0.15 |
| May | 62.9 | 87.8 | 0.24 |
| June | 72.3 | 98.9 | 0.08 |
| July | 78.2 | 104.1 | 0.44 |
| August | 76.7 | 101.8 | 0.45 |
| September | 68.8 | 93.8 | 0.31 |
| October | 56.5 | 80.8 | 0.24 |
| November | 44.0 | 66.0 | 0.31 |
| December | 36.6 | 57.3 | 0.40 |
| **Annual Average** | **56.3** | **79.9** | **4.49** |

Source: National Weather Service Internet Web Page: http://wwww.wrh.noaa.gov/lasvegas/motemps.shtml.

tion is primarily associated with thunderstorms, some severe, when tropical moisture is advected into the region. Las Vegas averages 23 days with precipitation of 0.01 inch (0.03 cm) or greater.

The average annual rainfall in Las Vegas is 4.49 inches (11.40 cm). Snowfall is rare in the project vicinity. Table 3.8-4 summarizes mean monthly precipitation in the Las Vegas Valley and Boulder City.

Most of Clark County's flash flood events result from severe thunderstorms. Thunderstorms are observed in Las Vegas an average of 14 times per year. In general, the production of severe flash flood producing storms can be described below.

These organized thunderstorm systems may originate in Arizona or California and persist for periods of 6 to 72 hours as they cross the Western United States. It is speculated that this storm system type produces many of the most intense flash floods in Clark County. About two-thirds of the flash flood events since 1959 have occurred in either July or August. In general, the flash flood season can be considered to begin in late June and to conclude in September.

A final characteristic of these storms is the peak rainfall production. Observations of rainfall during these severe storms at McCarran Field suggest that intense rainfall generally last 30 minutes or less but could persist for up to 90 minutes. Observations and predictions of peak storm rainfall suggest that many of these storms produce over 2 inches (5 cm) of rain with a high end approaching 4 inches.

## 3.8.5 Air Quality Standards

Air quality is determined primarily by the type and amount of contaminants emitted into the atmosphere, the size and topography of the air basin and the meteorological conditions. In Clark County, stable atmospheric conditions, low mixing heights and light winds common during nighttime and morning hours provided opportunities for contaminants to accumulate as emissions are emitted. Atmospheric dispersion of pollutants generally improves by mid-afternoon.

The effects of the ambient air quality within an air basin depend mainly on the characteristics of the receptors and type, amount and duration of exposure. Air quality standards specify the concentration and duration for which pollutants may cause adverse health effects.

The U.S. Environmental Protection Agency (EPA) has developed the National Ambient Air Quality Standards (NAAQS) for criteria pollutants to ensure the public health and welfare. The criteria pollutants include nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), carbon monoxide (CO), ozone ($O_3$) and particulate matter less than 10 microns ($PM_{10}$). The primary NAAQS define levels of air quality, with an adequate margin of safety, to protect the public health. The secondary NAAQS define levels of air quality, with an adequate margin of safety, to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Establishment of ambient air quality standards in Clark County is the responsibility of the EPA, the State of Nevada, and the CCDAQM. Air quality is generally considered acceptable if pollutant levels are less than or equal to established standards on a continuous basis and are considered in attainment. In these areas, moderate emission increases due to growth can occur without jeopardizing the attainment status of the area. Areas where the ambient concentrations exceed the NAAQS are considered non-attainment and, as such, are regulated more strictly to reduce emissions in order to meet the NAAQS pollutant levels. Where differences in local and national standards exist, the more stringent standards apply. The Clark County air quality standards are shown in Table 3.8-5.

The Las Vegas Valley is in attainment for all criteria pollutants except for CO, PM10 and ozone. As required by the EPA, CCDAQM has developed State Implementation Plans (SIPs) for

**TABLE 3.8-5. Clark County Air Quality Standards**

| Pollutant | Averaging Time | Clark County Standard | Federal Standard |
|---|---|---|---|
| Carbon Monoxide | One-Hour | 40,000 μg/m³ (35.0 ppm) | 40,000 μg/m³ (35.0 ppm) |
| | Eight-Hour | 10,000 μg/m³ (9.0 ppm) | 10,000 μg/m³ (9.0 ppm) |
| Nitrogen Dioxide | Annual Arithmetic Mean | 100 μg/m³ (0.053 ppm) | 100 μg/m³ (0.053 ppm) |
| Ozone | One-Hour | 235 μg/m³ (0.12 ppm) | 235 μg/m³ (0.12 ppm) |
| | Eight-Hour | 157 μg/m³ (0.08 ppm) | 157 μg/m³ (0.08 ppm) |
| Sulfur Dioxide | Three Hour | 1,300 μg/m³ (0.5 ppm) | 1,300 μg/m³ (0.5 ppm) |
| | Twenty-Four Hour | 260 μg/m³ (0.10 ppm) | 365 μg/m³ (0.14 ppm) |
| | Annual Arithmetic Mean | 60 μg/m³ (0.02 ppm) | 80 μg/m³ (0.03 ppm) |
| Particulate Matter ($PM_{10}$) | Twenty-Four Hour | 150 μg/m³ | 150 μg/m³ |
| | Annual Arithmetic Mean | 50 μg/m³ | 50 μg/m³ |
| Particulate Matter ($PM_{2.5}$) | Twenty-Four Hour | 65 μg/m³ | 65 μg/m³ |
| | Annual Arithmetic Mean | 15 μg/m³ | 15 μg/m³ |
| Annual Arithmetic Mean | | 50 μg/m³ | 50 μg/m³ |

Source: CCDAQM (2003).
μg/m³ = micrograms per cubic meter; ppm = parts per million.

CO and $PM_{10}$ to reduce emissions countywide. For each of the plans, the CCDAQM must identify the emissions within the region, potential mitigation to reduce emissions, demonstrate that the emission reductions are sufficient to meet the NAAQS at specified future dates and how the CCDAQM will implement the control measures. On April 30, 2004, EPA announced designation of Clark County as a non-attainment area for the new national 8-hour ozone standard (EPA 2004). Clark County was classified as marginal non-attainment, which is the least severe of the possible classifications (CCDAQM 2004a). In order to meet Clean Air Act requirements, Clark County will be required to submit to EPA a SIP by April 2007, which describes the approach to reducing ozone levels in the air and emissions of ozone precursors (VOCs and oxides of nitrogen). Possible approaches may include new regulations to control emissions from motor vehicles, fueling stations, dry cleaners and other sources found to be contributing to Clark County's ozone problems (CCDAQM 2004b).

In 2000, the CCDAQM approved the CO SIP, Las Vegas Valley Non-attainment Area (Clark County 2000). The predominant source for CO in the region is associated with the combustion exhaust from mobile sources. The plan reviewed control measures for on-road mobile sources, off-road mobile source and stationary sources. Due to the practicality and cost effectiveness of the control measures, only measures associated with on-road mobile sources were adopted. These include clean burning gasoline, transportation demand management, technician training and certification and alternative fuels program for government fleets.

The $PM_{10}$ SIP was passed by the governing board in 2001 (Clark County 2001). Fugitive dust is the primary component for emissions of $PM_{10}$. Due to the dry climate, construction and operation in dry dusty areas create the significant portion found in the air. As part of the SIP, the CCDAQM has developed several new rules, Sections 90 through 94, in order to reduce the amount of fugitive dust that enters the atmosphere. Included in the rules are dust mitigation plans required for areas over 10,000 square feet (929 m²) in size; no unpaved parking lots, no visible dust off-site, paved roads with 3,000 daily vehicle trips, and at construction sites, paving of all unpaved roads stabilizing shoulders of paved roads, and the use of dust suppression products on vacant lands.

**TABLE 3.8-6. Estimated Annual Average Emissions for Clark County**

| Source Category | Annual Average Emissions (tons/year) | | | |
|---|---|---|---|---|
| | CO[a] | $PM_{10}$[b] | NOx[c] | VOC[d] |
| Stationary Point Sources | 2,383 | 1,298 | 8,551 | 262 |
| Area Sources | 3,091 | 266,022 | 789 | 2,641 |
| Non-Road Mobile Sources | 21,436 | 741 | 9,700 | 2,320 |
| On-Road Mobile Sources | 147,941 | 65,072 | 3,575 | 14,200 |
| **Total** | **174,851** | **333,133** | **22,615** | **19,423** |

Sources: a. CCDAQM (2000) SIP; b. CCDAQM (1996) SIP; c. CCDAQM (2001); d. CC Department of Comprehensive Planning (1980).

Because the Las Vegas Valley has been designated non-attainment for both CO and $PM_{10}$, emission increases for individual projects in any part of the valley will have a potential impact on allowing the valley to "come into attainment." As such, any emissions increase must be considered potentially significant for this area.

## 3.8.6 Emissions

The CCDAQM maintains a regional emissions inventory by source category and specific major sources of criteria pollutants within Clark County. The pollutants tabulated by CCDAQM include CO, $PM_{10}$, $NO_2$ and volatile organic compounds (VOC), the latter two being precursors to the formation of ozone. Pollutant source emissions are regulated by the CCDAQM pursuant to the CCDAQM Rules and Regulations. Limitations on pollutant emissions are delineated in Section 12 (Pre-construction Review For New or Modified Sources) and in Section 14 (New Source Performance Standards) of the regulations.

The major sources of CO are motor vehicles and titanium manufacturing. Timet Corporation in Henderson is a major titanium manufacturer. The major sources of $NO_2$ are motor vehicles and power plants. Nevada Power operates two power plants in metropolitan Las Vegas, Clark Station and Sunrise Station, both east-southeast of the city center. The major sources of $PM_{10}$ are fugitive dust and gravel crushing and screening. These sources are dispersed throughout Clark County. Table 3.8-6 lists the estimated annual average emissions for Clark County.

## 3.8.7 Ambient Air Quality

Ambient air quality data for ozone, CO, $NO_2$, $PM_{10}$ and visibility are available for the Las Vegas Valley (CCDAQM 1999-2001). The following subsections summarize the ambient air quality for each pollutant. Table 3.8-7 summarizes the ambient data from 2001 for the following pollutants.

### 3.8.7.1 Ozone

Ozone is a secondary pollutant, formed as a result of oxides of nitrogen (NOx) and reactive organic gases (ROG) being mixed in the atmosphere in the presence of sunlight, causing a series of chemical reactions. As such, ozone is considered to be of regional concern, rather than having potential localized effects like compounds being directly emitted from sources. Ozone is measured at two locations in the Las Vegas Valley for 2001. The maximum 1-hour ozone concentration measured during the year was 0.116 parts per million (ppm), which is below the NAAQS of 0.12 ppm. EPA intends to revoke the 1-hour ozone standard on June 15, 2005, and instead rely on an 8-hour standard in order to protect the public from longer periods of exposure. EPA has designated Clark County as a non-attainment area for the 8-hour ozone standard (EPA 2004). Maximum 8-hour ozone

**TABLE 3.8-7. Ambient Air Quality Data for the Las Vegas Valley, 2001**

| Site | Pollutant Concentrations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ (μg/m³) | | $PM_{2.5}$ (μg/m³) | | CO (ppm) | | $O_3$ (ppm) | | $NO_2$ (ppm) | $SO_2$ (ppm) | | |
| | 24-hr Mean | 24-hr High | 24-hr Mean | 24-hr High | 1-hr High | 8-hr High | 1-hr High | 8-hr High | Anl Mean | 3-hr High | 24-hr High | Anl Mean |
| City Center | 40 | 131 | - | - | 6.56 | 4.38 | 0.103 | 0.083 | - | - | - | - |
| Craig Road | 43 | 151 | 12 | 25 | 2.02 | 1.35 | 1.102 | 0.078 | - | - | - | - |
| Crestwoode | - | - | 11 | 30 | 6.44 | 4.51 | - | - | - | - | - | - |
| E. Flamingo | 30 | 122 | - | - | 6.57 | 4.31 | - | - | - | - | - | - |
| E. Sahara | 34 | 111 | 12 | 27 | 7.89 | 6.28 | - | - | 0.022 | 0.014 | 0.008 | 0.000 |
| Freedom Park | - | - | - | - | 7.75 | 5.27 | - | - | 0.018 | - | - | - |
| Green Valley | 35 | 213 | 9 | 25 | 2.71 | 1.55 | - | - | 0.021 | - | - | - |
| Health District | - | - | - | - | 5.95 | 4.99 | - | - | - | - | - | - |
| JD Smith | 48 | 267 | 9 | 25 | 8.93 | 5.63 | 1.102 | 0.080 | 0.002 | - | - | - |
| Joe Neal | 41 | 232 | - | - | - | - | 1.112 | 0.094 | - | - | - | - |
| Lone Mountain | 26 | 93 | - | - | - | - | 0.110 | 0.090 | - | - | - | - |
| Microscale | 38 | 118 | - | - | - | - | - | - | - | - | - | - |
| Palo Verde | 23 | 79 | 6 | 22 | - | - | 0.110 | 0.091 | 0.006 | - | - | - |
| Paul Meyer Park | 33 | 114 | - | - | 2.85 | 1.09 | 0.106 | 0.085 | - | - | - | - |
| Pittman | 34 | 87 | - | - | 7.17 | 2.42 | - | - | - | - | - | - |
| S. Las Vegas Blvd | - | - | - | - | 6.17 | 3.67 | - | - | - | - | - | - |
| S.E. Valley | 33 | 123 | - | - | 4.65 | 1.44 | 0.091 | 0.076 | - | - | - | - |
| Sunrise Acres | - | - | - | - | 8.92 | 6.48 | - | - | - | - | - | - |
| Walter Johnson | 24 | 92 | - | - | - | - | 0.111 | 0.092 | - | - | - | - |
| Winterwood | - | - | - | - | 5.52 | 4.47 | 0.116 | 0.085 | - | - | - | - |

concentrations measured in the Las Vegas Valley have exceeded the NAAQS standard of 0.08 ppm. Clark County will be required to prepare a SIP to reduce ozone levels in Clark County by 2007 (EPA 2004). The Las Vegas Valley is currently considered to be in attainment of the standard. It should be noted, however, that the EPA is currently developing an 8-hour ozone standard for the United States. As such, it is uncertain whether the Las Vegas Valley can meet the attainment of the proposed standard.

### 3.8.7.2 Nitrogen Dioxide

$NO_2$ is a pollutant that is both directly emitting from combustion processes, as well as indirectly formed, when $NO_X$ is converted to $NO_2$ in the atmosphere. The major sources of $NO_2$ are associated with fuel combustion from industrial sources and mobile sources, such as automobiles, trains and airplanes. As seen from Table 3.8-7, the maximum annual average $NO_2$ concentration occurred in 2001, with a value of 0.022 ppm, which is well below the NAAQS of 0.053 ppm. The Las Vegas Valley is considered in attainment of the $NO_2$ standard.

### 3.8.7.3 Sulfur Dioxide

Fossil fuel combustion at industrial operations is the primary source of sulfur dioxide. Due to the direct nature of the emissions, maximum concentrations are generally found in close proximity of these sources. The maximum 3-hour $SO_2$ concentration for 2001 was 0.19 ppm, well below the 0.053 ppm 3-hour standard. Similarly, the 23.8-hour maximum value was well below the respective standard (0.01 ppm) with a value of 0.008 ppm. The maximum annual $SO_2$ concentration was less than 0.001 ppm for all locations.

#### 3.8.7.4 Carbon Monoxide

Motor vehicles are the major concern with CO concentrations. In the Las Vegas Valley, the highest CO concentrations are generally found in the morning hours during winter conditions, when there is a low inversion and relatively stagnant conditions. The maximum 1-hour CO concentration reported during 2001 was 8.9 ppm, which is well below the 1-hour NAAQS of 35 ppm. However, the maximum 8-hour concentration has exceeded the 8-hour CO NAAQS of 9.0 ppm with a maximum of 6.5 ppm. During the last 3 years reported, the Las Vegas Valley experienced no exceedences of the 8-hour CO standard. As such, the Las Vegas Valley may come into attainment of the CO Federal standard.

#### 3.8.7.5 $PM_{10}$

Windblown fugitive dust is the primary source of $PM_{10}$ in the Las Vegas Valley. These can occur from unpaved roads, disturbed areas and stockpiles during construction activities. The maximum annual mean within Clark County during the 2001 period was reported as 47.4 $\mu g/m^3$. This is below the federal standard of 50 $\mu g/m^3$. The maximum 23.8-hour $PM_{10}$ concentration was measured in 2001 with a value of 173 $\mu g/m^3$, which exceeds the NAAQS of 150 $\mu g/m^3$. Due to the exceedences, the Las Vegas Valley is considered to be non-attainment for $PM_{10}$.

#### 3.8.7.6 Visibility

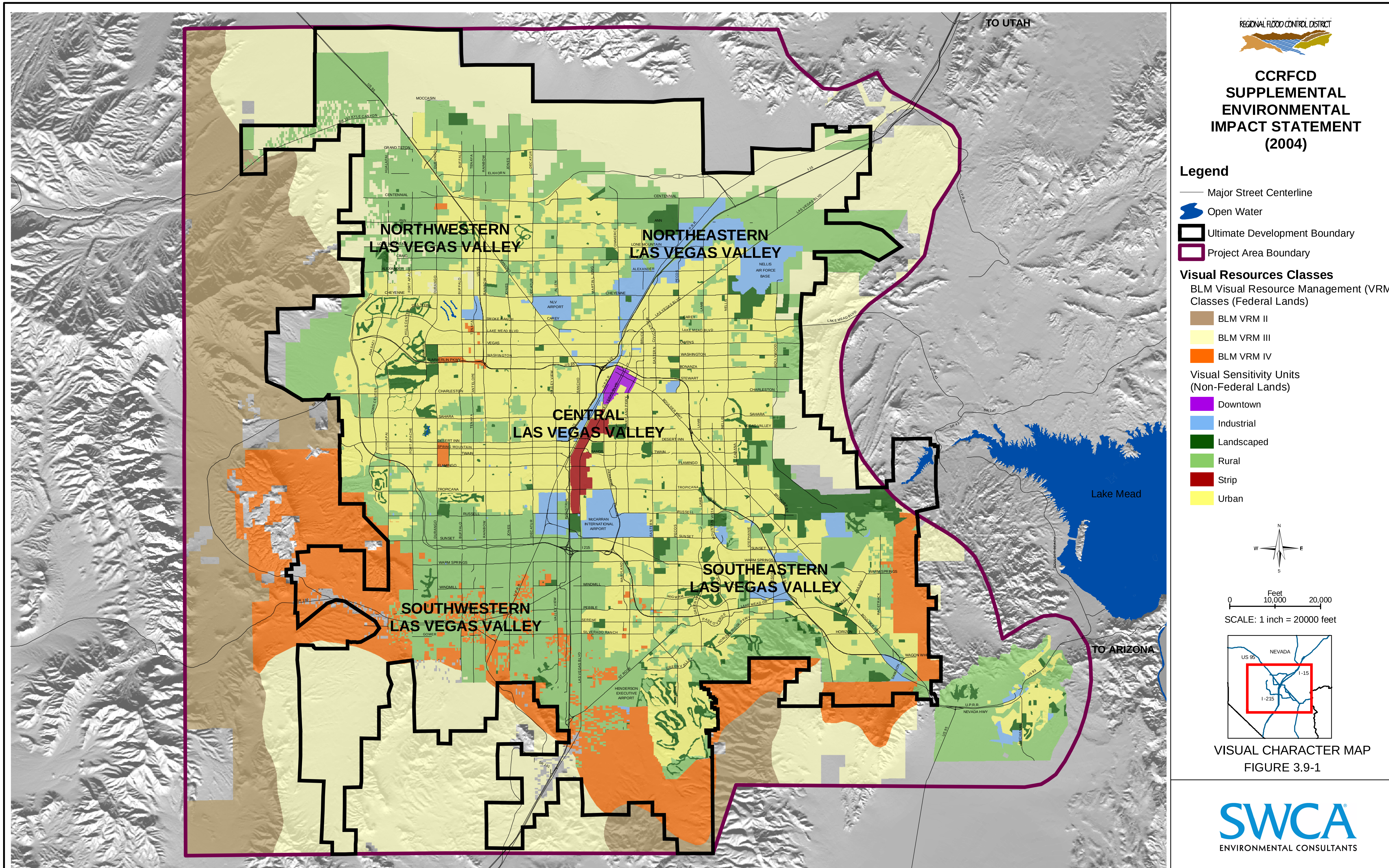
Visibility is affected by both particulates and gases. Clark County classifies a haze day as an average measurement for 1 hour or more between 5:00 a.m. and 12:00 a.m. when the visual range is less than 12 miles (19.3 km). Haze is classified as intense if the visual range for 1 hour is less than 4.8 miles (7.7 km). Typically, the highest haze levels occur in the late fall and winter during low-inversion, stagnant conditions. The maximum number of haze days occurring during the 2001 time period was only 9 days per year. Although there are no standards for haze days, the trend shows that visibility is generally improving in the Las Vegas Valley.

## 3.9 VISUAL RESOURCES

The information in this section provides an update to visual resources from that presented in the FEIS Flood Control Master Plan for the CCRFCD (BLM/CCRFCD 1991). The visual character of the Project Area has changed since the publication of the 1991 FEIS due to the continued expansion and development of the Las Vegas metropolitan area. Urban areas with their associated visual character, sensitivity and features have spread throughout the valley, which has changed the overall visual character from a rural dominance, to an urban landscaped dominant viewshed (Figure 3.9-1).

### 3.9.1 Background

Visual resources consist of the natural and man-made features that give a particular environment its aesthetic qualities. These features may be natural appearing or modified by human activities. Together, they form the overall impression of an area, referred to as its visual character. Landforms, water surfaces, vegetation and man-made features are treated as characteristic of an area if they are inherent to the formation, structure and function of the landscape. Visual character is evaluated to assess whether a proposed project would appear compatible with the existing setting or would contrast noticeably with the setting and appear out of place.




VISUAL CHARACTER MAP
FIGURE 3.9-1

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Visual resources also have a social component; that includes public values, goals, awareness and concern regarding visual quality. The social aspect is addressed as visual sensitivity or the relative degree of public interest in visual resources and concern over adverse changes in the quality of that resource. Visual sensitivity is key in assessing how important an effect on the visual resource would be and whether it represents a significant impact. Recreational and residential uses are generally considered to have high visual sensitivity, as are views from scenic routes or corridors.

## 3.9.2 Regional Overview

The overall visual character of the Project Area is dominated by urban and rural development, which is surrounded by a number of rugged mountain ranges. These mountains serve as a backdrop, providing scenic vistas of the desert landscape. The visibility is generally open due to the gently sloping terrain. The color of the landscape ranges from dark browns and grays to light tans and light greens. Textures are medium to coarse in mountain/hill areas, and smooth to fine in valley, alluvial fan and wash areas.

The urban character of the Project Area is typified by one-story and two-story developments surrounding the downtown and strip areas. Much of the city is uniform in appearance and is comprised of high-density multi- and single-family communities, which reflect either desert or selected mission style architecture. Apartments and commercial development are common along major thoroughfares. Various elements of urban development have grown into adjacent rural areas extending to the foothills in the northwest, west (abutting Red Rock National Conservation Area), south and southwest. These include a number of master planned communities with associated high activity areas such as urban malls, convention facilities, golf courses and country clubs. Rural development within the Project Area occurs on the outer perimeter of the urban areas. These developments are primarily older homes, desert ranches or large custom homes. Concrete block and stucco are the primary building materials.

The vertical elements of the downtown area and the Las Vegas Strip act as focal points for the surrounding urban and rural areas. The Strip is characterized by a number of contemporary casinos and hotels with associated neon signs and lights that visually dominate the views adjacent to Las Vegas Boulevard. The downtown area remains compact with primarily older architecture. Through urban renewal the visual character of the area is dominated by the Fremont Street experience and the construction of the multi-use facility of Neonopolis. Emphasis on contemporary design and landscape enhancement connected with the projects has increased the visual character of the downtown area. Pockets of visual focal areas are also found as a number of larger casinos, shopping areas and malls have expanded into outlying areas of the valley.

The Project Area now has three major transportation corridors: Interstate 15 that traverses in a northeast to southwest direction, U.S. 95 that crosses the valley from the northwest to the southeast, connecting to Boulder City, and the Interstate/Clark County 215 Beltway that currently extends from U.S. 95 (at Lake Mead in Henderson) and continues around the southern portion of the valley to the west, turning north to Cheyenne Avenue. Once completed, the Interstate/Clark County 215 Beltway will continue around to Interstate 15 in the northeast portion of the valley. These corridors provide views of distant vistas and the downtown core, but may also create visual barriers to the distant views of the desert landscape.

## 3.9.3 Environmental Setting

### 3.9.3.1 Northeastern Las Vegas Valley

The Northeastern Las Vegas Valley area includes the City of North Las Vegas, most of the community of Sunrise Manor and a small portion of the

City of Las Vegas. While the area is still bordered on the north and east by open undeveloped desert, this area is now characterized by higher density urban development. Higher density housing is mainly located in the North Las Vegas and Sunrise Mountain drainage areas. These newer constructed areas are characterized by curvilinear street layouts and the urban development includes introduced landscape vegetation that contrasts with the native character of the rural and natural areas. Parks, golf courses and schools are scattered throughout this area. Commercial, office, retail and casino areas generally lie along the Las Vegas Boulevard corridor in North Las Vegas. Medium sized neighborhood casinos (in relation to the strip casinos) contrast with the monotony of the surrounding urban neighborhoods. Nellis AFB is located within the area, and still represents one of the dominant developments in the section and a major part of the airfield and heavy industrial sites in the Las Vegas Valley. The far northwestern section of the area is relatively unchanged since 1990 and is dominated by low-density housing and undeveloped land. It is characterized by desert scrub and low profile vegetation.

The Las Vegas Dunes Recreation area, located north of the Nellis AFB, is now part of the Muddy Mountain Wilderness Study Area (BLM 2001). A large portion (59,320 acres) has been recommended for non-wilderness use, and the visual character of this area remains distinct with variations in topography and soil color. The Sunrise Mountain Natural Area, located to the far east, has been added since the publication of the 1991 FEIS.

### 3.9.3.2 Southeastern Las Vegas Valley

The southeastern Las Vegas Valley area includes the City of Henderson, town of Whitney, Boulder City and a small portion of the communities of Paradise, Enterprise and Winchester. Because this area was already highly urbanized, the northwestern section of the area has not changed significantly since publication of the 1991 FEIS. The Henderson area, once dominated by a large industrial complex and older residential neighborhoods, is now the fastest growing city in Nevada and is highly developed. In 1990, Henderson was classified as consisting of mostly older residential neighborhoods and the visual characteristics were dominated by the heaving industrial complex north of the downtown area. The visibility to the industrial site was high with no screening. Between 1990 and 2000, this area of the valley has experienced a 187 percent increase in population growth. The dominant pattern of growth is characterized by curvilinear street layouts and the urban development includes introduced landscape vegetation that contrast with the native character of the outlying rural and natural areas. Parks, golf courses and schools are scattered throughout this area. Overall the landscape within the urban areas is visually insignificant. Upper elevations and changes in topography function as a visual backdrop for the inner city views.

The recently constructed Clark County Wetlands Park and the Lower Las Vegas Wash are visible as a meandering green strip through this area. Public interest concerning the visual aspects of the lower wash has risen since 1990 and the area now provides a visual green belt along the southeast boundary of the valley. Significant erosion of the washes occurred during a flood event on July 8, 1999, which widened the channel in the main wash as much as 300 feet (91 m) in some areas. Restoration efforts are ongoing.

The dominant visual resources in the southeastern portion of the valley are the Frenchman and Sunrise Mountains. Henderson also contains the planned community of Lake Las Vegas, which has the only large body of water in the entire valley. Undeveloped, open areas lie to the south and east of Henderson, of which 48,438 acres have been designated as a Conservation Area in the McCullough mountain range to the south of Henderson.

Although Boulder City has grown by 22 percent, the city has a policy of controlled growth that limits the number of building permits issued per year, and strong emphasis is placed on landscape planting for public and private applications. The general visual character of the city has not significantly changed since the publication of the 1991 FEIS.

### 3.9.3.3 Central Las Vegas Valley

The central Las Vegas Valley area includes the majority of the communities of Paradise and Winchester along with a small portion of the City of Las Vegas. The downtown urban core and the Strip primarily dominate the area. Through urban renewal, the visual character of the downtown area is dominated by the Fremont Street experience and the construction of the multi-use facility of Neonopolis. Emphasis on contemporary design and landscape enhancement connected with the projects has increased the visual character of the downtown area.

The Las Vegas Strip is characterized by a variety of thematic, contemporary casinos and hotels providing a highly visually active area. Massive neon signs visually dominate the views adjacent to Las Vegas Boulevard. Since 1990, several major hotel casinos have been constructed, adding to this area as the central visual focal point in the valley. The McCarran Airport, University of Nevada Las Vegas and Convention Center have also expanded and/or added a number of large structures since the publication of the 1991 FEIS.

### 3.9.3.4 Southwestern Las Vegas Valley

The Southwestern Las Vegas Valley area includes all of the communities of Spring Valley and Summerlin South, the majority of the community of Enterprise, and a small portion of the community of Paradise. The overall visual character of the area is dominated by rural development, which is bordered on the south and west by open undeveloped desert. Mountains to the west of the area serve as a backdrop, providing scenic vistas of the desert landscape. Much of the area consists of low-density residential development with newer, contemporary construction. These newer constructed areas are characterized by curvilinear street layouts, and the urban development includes introduced landscape vegetation that contrasts with the native character of the rural and natural areas. A small number of parks, golf courses and schools are scattered throughout this area.

The Red Rock Canyon National Conservation Area is located along the entire western edge of the Southwestern Las Vegas Valley Area. Approximately 198,208 acres of highly scenic lands occur within the Red Rock Canyon National Conservation Area, as this area is managed primarily for its visual resources. Red Rock Canyon offers views of multicolored sandstone formations, which feature an array of arches, domes, potholes and other interesting features.

### 3.9.3.5 Northwestern Las Vegas Valley

The northwestern Las Vegas Valley area includes all of the community of Lone Mountain and a large portion of the incorporated City of Las Vegas. The northwest portion of the Las Vegas Valley is one of the most dynamic growth areas in the Project Area. This area is unique because there are substantial incorporated lands within the City of Las Vegas as well as unincorporated lands remaining in the Las Vegas Valley area. The unincorporated areas are predominately low-density residential development and vacant lands while the areas inside the city are rapidly developing in higher density urban uses.

Construction of housing units in the outlying areas has also changed the visual character of the Northwestern Las Vegas Valley area. Housing units have been constructed in many areas and are characterized by curvilinear street layouts. The urban development includes introduced landscape vegetation that contrast with the native character of the outlying rural and natural areas. Parks, golf courses and schools are scattered throughout this sub area.

The major residential development within this area is the 22,000-acre master-planned community of Summerlin, which is located along the western rim of the Las Vegas Valley. The nearby

Spring Mountain range and the Red Rock Canyon National Conservation Area provide a dramatic backdrop and exceptional views for the residents. Summerlin is comprised of a number of individual village communities, each centered on its own major park or golf course. Currently, there are 15 villages in various stages of development. Eventually, the community will be home to 30 distinct villages, each featuring dozens of planned neighborhoods comprised of homes, town homes, condominiums and apartments. Each Summerlin village has its own distinctive style of architecture and design, evident in streetscapes, landscaping and village walls. The Nevada State Demographer (NSD) reports that this planned development will eventually contain 45,000 people that will transform the natural character of this area from rural to an urban dominant neighborhood (NSD 2002).

### 3.9.3.6 Visual Resources on Non-Federal Lands

This section defines the character and sensitivity levels of the visual units identified on non-federal lands within the Las Vegas Valley and Boulder City areas relative to the Clark County Department of Comprehensive Planning (CCDCP) Comprehensive Plan.

In 1980, in response to a combination of influences, including a high growth rate and changes to Nevada Revised Statutes, the Board of County Commissioners directed the CCDCP to create a new general plan. In 1983 the Comprehensive Plan was completed. Since that time, the CCDCP has adopted additions to the plan, referred to as elements, which address changing conditions and future needs of Clark County. The Comprehensive Plan guides development, promotes responsible use of natural resources and balances diverse interests to create a dynamic, livable community (CCDCP 2002).

Sensitivity levels are a measure of public concern for scenic quality. Lands are assigned high, medium or low sensitivity levels by analyzing the various indicators of public concerns, based on the facilities' compatibility with the setting and the ability to absorb the proposed flood control structures. The sensitivity ratings are defined as follows:

- High sensitivity rating indicates the area has a limited ability to absorb proposed facilities.
- Moderate sensitivity indicates the area has some compatibility and absorption ability.
- Low sensitivity indicates the area is highly compatible and able to visually absorb the proposed facilities.

These units have sensitivity level ratings of High, Moderate or Low based on their ability to absorb new focal changes. Table 3.9-1 summarizes the six visual resource units applied to non-federal lands. The location and extent of these units are depicted in Figure 3.9-1.

### 3.9.3.7 Visual Resources on Federal Lands

A considerable portion of the Project Area consists of public lands. The BLM is responsible for the management of nearly 3.7 million acres of land within the Stateline Resource Management Planning Area, which is comprised of Clark County and a portion of southern Nye County (BLM 1998). The BLM has the basic stewardship responsibility to identify and protect visual resources on public lands. To accomplish this task, the BLM has created four Visual Resource Management (VRM) classes to provide a set of visual management standards for the design and development of future projects and for rehabilitation of existing projects. The VRM classification system rates visual character from the most sensitive (VRM Class I) to the least sensitive (VRM Class IV). Each of the VRM classes is described below.

- Class I: Exclusive to areas congressionally designated as wilderness. None are located in the Project Area.
- Class II: Areas managed to retain the existing character of the landscape. The Red Rock Canyon National Conservation Area has received this designation.

**TABLE 3.9-1. Visual Sensitivity Units Used on Non-Federal Lands**

| Unit | Definition of Visual Character | Sensitivity Level |
|---|---|---|
| Airfield/Heavy Industrial | Includes developments such as airports, military bases, chemical plants and all major industrial uses. | Low, based on the units' ability to absorb new focal changes. |
| Downtown | Older multi-story buildings composed of concrete or brick with limited steel and glass structures. The area has a more dense, compact and pedestrian oriented image than other areas. | Moderate, based on the density of the area that provides limited ability for a long distance view. |
| Landscaped | Open areas with a strong emphasis on planned landscaping. | High, based on the low ability to absorb visual disturbances. |
| Rural | Mainly the outer perimeters of the urban areas, with a few inner city rural areas. | High, based on the lower densities of visual focal points and additional open space. |
| The Strip | Noted for the high-rise hotels and casinos with neon signs, which equal or surpass the building heights. The atmosphere creates a highly active environment with flashing lights and pedestrian traffic. | Moderate, due to the high level of visual activity and constant changing focal points. |
| Urban | Relatively uniform one and two story developments, primarily consisting of high-density multi, and single-family communities surrounding the downtown and Strip areas. | Moderate, due to the dominance of structures, lack of open space and visibility. |

Source: Modified from CCRFCD (1991).

- Class III: Areas managed for the partial retention of the landscapes existing character. The area east of Sunrise and Frenchman Mountain, including Rainbow Gardens and portions of the River Mountains, has received this designation.
- Class IV: Areas managed to allow activities that require major modification of the existing character of the landscape.

VRM classes and significant visual resources within the Project Area are illustrated in Figure 3.9-1.

Approximately 198,208 acres of highly scenic lands occur within the Red Rock Canyon National Conservation Area and along the foothills of the Spring Mountains. This area is managed primarily for its visual resources.

The Sunrise Mountain, Frenchman Mountain and Rainbow Garden area(s) are contained within the Sunrise Mountain Area of Critical Environmental Concern (ACEC). ACECs contain significant physical, cultural, scenic or biological values, which are more than locally significant and warrant special management considerations to prevent their degradation or loss. The 31,400-acre Sunrise Mountain ACEC contains scenic and geologic values consisting of red-hued volcanic outcrops contrasting with black volcanics.

Approximately 10,240 acres of land west of, and including, Sunrise Mountain occurs within the Sunrise Mountain Natural Area. A "natural area" is land managed for retention of its typical or unusual plant or animal species, or its outstanding scenic, geologic or aquatic features or processes. Frenchman Mountain, a widely recognized landmark on the eastern Las Vegas horizon, forms a dominant feature of this area. In addition, Frenchman Mountain has been designated as a major landmark in the City of North Las Vegas General Plan (North Las Vegas 1993).

# 3.10 NOISE

The FEIS Flood Control Master Plan for the CCRFCD (BLM/CCRFCD 1991) did not include a noise section. This section is intended to document existing noise standards and to provide background information for predominant noise sources and levels in the Project Area.

## 3.10.1 Background

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale, expressed in decibels (dB) is used to keep sound intensity numbers at a convenient and manageable level.

Noise is an unwanted sound that usually is caused by human actions and interferes with normal activities or otherwise diminishes the quality of the environment. Noise can be either stationary or transient. Stationary sources generally are related to land developments such as housing tracts and industrial plants. Transient sources move through the environment either along established paths such as railroads and highways, or randomly through the environment, such as low-flying aircraft outside of established flight paths. The total acoustical environment at a site is the blend of the background or natural acoustics with man-made noise.

Another aspect of sound is the quality described as its pitch or frequency. Because the human ear is not equally sensitive to all frequencies within the entire spectrum of sound, noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process known as A-weighted sound levels, expressed in A-weighted decibels or dBA. Community noise is usually characterized in terms of the A-weighted sound level. Table 3.10-1 illustrates the A-weighted levels of common sounds.

The range of human hearing extends from about 0 dBA for young healthy ears (that have not been exposed to loud noise sources) to about 140 dBA. When sounds exceed 110 dBA, there is a potential for hearing damage, even with relatively short exposures. In quiet suburban areas far from major freeways, the noise levels during the late night hours will drop to about 30 dBA. Outdoor noise levels lower than this only occur in isolated areas where there is a minimum of natural noises, such as leaves blowing in the wind, crickets and/or flowing water.

Human response to noise varies widely depending on the type of noise, time of day and sensitivity of the receptor. Noise-sensitive receptors are those locations where activities that could be affected by increased noise levels occur and include locations such as residences, motels, hotels, churches, schools, parks, libraries and wilderness areas. The effects of noise on humans can range from temporary or permanent hearing loss to mild stress and annoyance due to such things as speech interference and sleep deprivation. Prolonged stress, regardless of the cause, is known to contribute to a variety of health disorders. Noise, or the lack of it, is a factor in the aesthetic perception of some settings, particularly those with religious or cultural significance.

Another characteristic of environmental noise is that it is constantly changing. The noise level increase when a train passes is an example of a short-term change. Average noise levels during night-time hours, when activities are at a minimum, are usually lower than noise levels during daytime hours. This is an example of daily patterns of noise level fluctuation. Because of these fluctuations, the A-weighted sound level

**TABLE 3.10-1. Typical Noise Levels (dBA)**

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|---|---|---|
| Jet fly-over at 304 m (1,000 feet) | 110 | Rock band at 5 m (16 feet) |
| Gas lawn mower at 1 m (3 feet) | 100 | Inside subway train (New York) |
| Diesel truck at 15 m (50 feet), at 80 km/hr (50 mph) | 90 | Food blender/Garbage disposal at 1 m (3 feet) |
| Noisy urban daytime | 80 | Shouting at 1 m (3 feet) |
| Gas lawn mower at 30 m (100 feet) | 70 | Vacuum cleaner at 3 m (10 feet) |
| Commercial area heavy traffic at 90 m (300 feet) | 60 | Normal speech at 1 m (3 feet), large business office |
| Quiet urban daytime | 50 | Dishwasher, next room |
| Quiet urban nighttime<br>Quiet suburban nighttime | 40 | Small theater/Large conference room (background) |
| Quiet rural nighttime | 30 | Library/Bedroom at night, concert hall (background) |
| | 20 | Broadcast/Recording studio (background) |
| | 10 | |
| Lowest threshold of human hearing | 0 | Lowest threshold of human hearing |

Source: Caltrans (1998).

at any one time is insufficient to describe the overall acoustic environment. More useful noise descriptors average noise levels over time to provide an indication of the overall noise environment. Equivalent sound level ($L_{eq}$) is a widely used descriptor for environmental noise. The $L_{eq}$ is a measure of the average noise level during a specified period of time. For example, $L_{eq}$(h), expressed in dBA, is used for the average noise over 1 hour adjusted for human hearing.

Day-Night Sound Level, $L_{dn}$ is an energy average of the instantaneous sound levels over a 24-hour period. An $L_{dn}$ of 55 dB is recognized by many federal agencies, including the EPA, as an outdoor limit for protecting public health and welfare in residential areas. This noise level has been established by scientific consensus and is not a regulatory criterion. A level of 65 dB is the noise level at which residential land use becomes questionable for structures with average or below average acoustic insulation. Noise levels exceeding 75 dB are considered by many federal agencies to be unacceptable for residential areas.

The EPA, Federal Aviation Administration (FAA), Federal Housing and Urban Development (HUD), Federal Highway Administration (FHA), Occupational Safety and Health Administration (OSHA) and the Federal Railroad Administration (FRA) all regulate noise generation from specific sources. Clark County regulates noise through rules generally based on the federal regulations. The federal law that directly affects noise control is the Noise Control Act of 1972, as amended by the Quiet Communities Act of 1978 (42 U.S.C. § 4901-4918). This act requires federal agencies to conduct their programs in a manner that promotes an environment free of any noise that could jeopardize public health or welfare.

Clark County Unified Development Code (CCUDC) 30.68.020 requires that excessive noise be muffled so as not to be objectionable due to intermittence, beat frequency, shrillness or volume. This code sets specific noise standards for facility operations and other uses. Section 30.68.020(h) states that no noise provision would be applied to temporary construction or demolition activities when conducted during daytime hours (CCUDC 2002).

### 3.10.2 Existing Noise Levels

The predominant noise sources in the Project Area include vehicular traffic associated with interstate highways and major arterial streets, rail traffic, aircraft associated with McCarran International Airport and Nellis AFB, power generation plants and industrial facilities, the Las Vegas Speedway and local air tour business aircraft. Background sound levels for many of these sources are typically in the 40 to 70 dBA range, depending on the proximity of the receptor to major noise sources.

Ambient noise measurements taken at or near sensitive receptor areas at 21 locations within the Las Vegas Valley in 1995 indicate that noise levels averaged 56.9 dBA with a 38.5 to 69.5 dBA range (BLM 1996).

Measurements at each location were comprised of a number of different sources including: local and distant traffic, aircraft and construction. Aircraft were generally associated with the highest noise levels, although no measurements were made in areas directly adjacent to airports. Adopted noise contour data for McCarran International Airport suggests that some areas in the immediate vicinity of the airport may experience sustained noise levels that approach or often exceed 75 dBA (Clark County Department of Aviation 1990). It has been suggested that some neighborhoods experience even higher aircraft associated noise levels, often exceeding 90 dBA. These areas include Green Valley and others located south of Sahara Avenue and west of Interstate 15. In late 2001, McCarran changed its 30-year old airline departure routes permanently, whereby those planes departing to the west of McCarran now turn south instead of turning north. The new air-route changes negatively affect residents southwest of McCarran, due to a substantial increase in noise levels, but are a plus for the more populated areas to the northwest.

## 3.11 RECREATION

The information in this section provides an update to recreational resources presented in the FEIS Flood Control Master Plan for the CCRFCD (BLM/CCRFCD 1991). The spectrum of recreational opportunities has not changed significantly since the publication of the 1991 FEIS; however, more land is now devoted to development or urban recreational activities and demand for recreational opportunities has increased due to the expansion of the Las Vegas metropolitan area.

### 3.11.1 Background

The CCRFCD MPU (2002) was developed to be consistent, to the fullest extent possible, with the SNRPP dated February 22, 2001, developed by the SNRPC. The SNRPC was formed in 1999 following passage of State of Nevada Assembly Bill 493, which required communities in the Las Vegas Valley and Boulder City to work together to form a comprehensive plan for sustainable development. The coalition consists of members from jurisdictional agencies of Clark County, the cities of Boulder City, Henderson, Las Vegas and North Las Vegas and the Clark County School

District (CCSD). This coalition was directed to produce a regional policy plan, which includes addressing conservation, open space and conservation of resources. As part of this legislation, growth and development is favored in areas with existing public facilities, along with the conversion of rural lands in a well-planned manner (SNRPC 2001). The SNRPP promotes the use of flood control facilities as corridors for trail systems and other recreational amenities as appropriate as well as for the safe conveyance and detainment of flood flows. The policy of the CCRFCD is to encourage early planning to identify and take advantage of multi-use opportunities afforded by flood control facilities included in the master plan.

The CCRFCD MPU identifies the use and direction of detention basins in conjunction with recreational use. The CCRFCD has developed policy statements and criteria to regulate the use of master plan facilities for recreation or other multi-use opportunities. These policy statements and criteria are available in the CCRFCD Hydrologic Criteria and Drainage Design Manual (December 2001 Revision). The recreational improvements are usually implemented near the end of a flood control construction project and several of the natural washes in the Las Vegas Valley have been identified for use to provide recreational opportunities.

There is an abundance of federally owned lands in the region but a shortage of close-in, easily accessible local parks and trails when compared to most other major western cities. The Nevada Legislature recognized this deficit when it formed the SNRPC. The coalition subsequently recommended increasing the local parks to people ratio through a variety of measures including developing a regional trails plan and adherence to the Clark County Parks Master Plan. This recommendation is outlined in the SNRPP (2001).

In addition to the SNRPP, the SNPLMA designated certain acreage within Clark County for disposal by the BLM and directs the allocation of no more than 25 percent of collected disposal funds for development of parks, trails and natural areas in Clark County (SNPLMA 1998).

### 3.11.2 Existing Conditions

Developed or urban recreation occurs primarily on private land and represents the principal opportunity available to residents and visitors within the Project Area and surrounding region. These resources include the local zoo and botanical gardens, golf courses, parks, campgrounds, motor-sports park, casinos, recreation centers, pools, senior centers, athletic fields, health clubs and various other public and private facilities in the Las Vegas metropolitan area.

The Clark County Parks and Community Service Department (CCPCS) manages 56 urban parks within the Project Area. These parks include three designated dog parks, six special interest facilities, six skateboard parks and one wetlands park. There are 11 public pools that are managed by Clark County (Clark County 2002). The City of Las Vegas has 19 leisure or recreational facilities including community centers, pools, cultural centers, senior centers and sports facilities (City of Las Vegas 2002). Currently, the city has 50 parks and 759 acres of developed programmable park acres, which is an average of 2 acres per 1,000 residents. The city also has 10 recreation projects either under construction or in the planning phase. These projects include a number of parks, a golf course and a community center (City of Las Vegas 2002b). The City of North Las Vegas has 28 recreation facilities consisting of a golf course, recreation centers, pools, a sports complex, playground and the (City of North Las Vegas 2002). The City of Henderson has 41 recreation facilities consisting of parks, recreation centers, pools, senior centers, and ball fields. There are 11 planned recreational developments for the City of Henderson (City of Henderson 2002). Boulder City manages 17 recreation facilities, which include several recreation centers community pools, softball fields, tennis courts and two municipal golf courses (Boulder City 2003). Boulder City also has a constructed wetland area that was built through a joint effort with the Conservation District of Southern Nevada.

In addition to public recreation facilities, the spectator sports in the Las Vegas Valley include a 1,600-acre motor-sports park located in the northeast portion of the valley, one minor league baseball team, arena football and sports teams from the University of Nevada Las Vegas. There are also a large variety of private and semi-private recreation facilities.

In contrast to developed recreational activities, undeveloped or casual recreation is more dispersed, occurring primarily on public lands. Public lands within the Project Area and surrounding region contain ecologically diverse landscapes that offer residents and vacationers a variety of year-round casual recreational opportunities that promote a higher degree of solitude, self-reliance and challenge.

In the ROD for the Las Vegas RMP, the BLM designated eight Special Recreation Management Areas (SRMAs) within Clark County (BLM 1998). The BLM is directed to concentrate the majority of its recreation management program efforts to the SRMAs and has outlined management objectives for each area. Three of the SRMAs are within or directly adjacent to the proposed Project Area; the Las Vegas Valley, Nellis Dunes and Sunrise Mountain. Table 3.11-1 outlines the BLM management directions for each of these three areas.

Casual recreation opportunities within these public lands include hiking, photography, wildlife viewing, hunting, primitive camping, automobile touring, caving and rock climbing. Larger scale activities such as competitive and non-competitive off-road events are regulated through a Special Recreation Permit system. Off-highway vehicle use accounts for the greatest single recreational use of the public lands and competitive off-road events are the largest organized recreational activity managed in the area (BLM 1998).

State parks and recreation areas that offer a variety of activities adjacent to the Las Vegas Valley and Boulder City include the Spring Mountains Ranch State Park and the Red Rock Canyon Scenic Drive; both located 15 miles (24

**TABLE 3.11-1. BLM Special Recreation Management Area (SRMA) Directives**

| Management Area | Management Direction |
|---|---|
| Las Vegas Valley | Identify land for reserve recreational trail, open space, parks, etc., as needed prior to land disposals. |
| | Identify public lands on perimeter for recreational use. |
| | Prohibit shooting in the area. |
| | Prohibit camping except were specifically authorized and designated. |
| | Close the area to off-highway vehicle (OHV) list use, except for Nellis Dunes and Nevada 400 course. |
| | Nevada 400 course limited to one event per year. |
| Nellis Dunes | Permit OHV free-plan and high-speed, competitive OHV events on all 10,000 acres. |
| | Prohibit shooting in the area. |
| | Consider concession leases. |
| Sunrise Mountain | Prohibit OHV use on all 37,620 acres. |
| | Allow non-speed events on designated roads, until completion of long-term planning. |
| | Encourage concession leases. |
| | Concentrate major powerline transmission rights-of-way to designated utility corridor. |
| | Prohibit shooting in the area. |

Source: BLM (1998).

km) west of Las Vegas. Lake Mead National Recreation Area near Boulder City has both boating activities and six designated campgrounds located along the shore at Lake Mead (Public Lands Information Center 2002). The Desert National Wildlife Range is directly north of the City of North Las Vegas and is comprised of 1.5 million acres of land designated for camping, hiking, backpacking, horseback riding and limited hunting.

# 3.12 HAZARDOUS MATERIALS

Hazardous materials is a general term used by the State of Nevada to identify a variety of substances which pose a health and safety risk to the environment, humans, vegetation and wildlife. This category includes petroleum products as well as hazardous waste. Relevant state and federal regulations are listed in Table 3.12-1.

## 3.12.1 Petroleum Derived Substances

Commonly used petroleum derived substances that fit the description of hazardous materials are considered regulated substances under NRS 459.816 and include gasoline, diesel fuel, used oil and other petroleum distillates. Petroleum derived substances are complex mixtures of hydrocarbons as well as various additives. These individual constituents may themselves be classified as hazardous and regulated in their own right. Typical hazardous constituents of gasoline and/or diesel fuel include benzene, toluene, ethylbenzene, xylenes and lead. Other petroleum constituents are regulated as a whole, such as total petroleum hydrocarbons (TPH). Although not generally regulated as closely as hazardous wastes, petroleum products nevertheless must be properly dealt with when encountered in the environment as a result of leakage from storage containers or improper disposal.

## 3.12.2 Hazardous Wastes

NRS 459.430 defines hazardous waste as waste that "poses a substantial or potential hazard to human health, public safety or the environment" when improperly handled. Hazardous waste includes wastes subject to regulation under 40 CFR Part 261 and waste containing polychlorinated biphenyls (PCBs) under 41 CFR 101-42.1102-2.

**TABLE 3.12-1. Applicable State and Federal Regulations**

| Regulation | Scope |
|---|---|
| Code of Federal Regulations 40 CFR 261.3 | Identification and Listing of Hazardous Waste-Definition of hazardous waste. |
| Code of Federal Regulations 41 CFR 101-42.1102-2 | Utilization and Disposal of Hazardous Materials and Certain Categories of Property-Polychlorinated biphenyls. |
| Safe Drinking Water Act of 1974 | Establishes maximum contaminant level standards for drinking water. |
| US Code Collection Title 42 U.S.C. 9601 | Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980-Definitions. |
| NRS 459.3816 | Regulation of Highly Hazardous Substances-Designation of highly hazardous substances. |
| NRS 459.428 | Disposal of Hazardous Waste-"Hazardous material" defined. |
| NRS 459.7024 | Handling of Hazardous Materials-"Hazardous material" defined. |
| NRS 459.430 | Disposal of Hazardous Waste-"Hazardous waste" defined. |
| NRS 459.816 | Storage Tanks-"Regulated substance" defined. |

In general, a waste is hazardous if it has at least one of the characteristics of ignitability, corrosivity, reactivity or toxicity as defined below:

- Ignitable: Easily combustible or flammable including a flashpoint of less than 140ºF (60ºC) or an alcohol content of 24 percent or more. Examples include some paints, paint solvents, other solvents and degreasers.
- Corrosive: Corrode metals or other materials burn the skin with a pH of 2 or lower or 12.5 or higher. Examples include rust removers, acid or alkaline fluids and battery acid.
- Reactive: Unstable and react rapidly or violently with water or other materials. Examples include bleaches, oxidizers such as ammonium perchlorate, certain metals, cyanides and explosives such as sodium azide and trinitrotoluene.
- Toxic: Contain certain heavy metals, such as chromium, lead or cadmium, or toxic organic chemicals. Examples include some parts cleaners, chromium-bearing paints and spray booth filters.

Typically encountered hazardous wastes include solvents such as perchloroethylene (PCE) and trichloroethylene (TCE), metals such as chromium and lead, chlorinated pesticides such as chlordane and heptachlor, PCBs and perchlorate.

## 3.12.3 Environmental Site Assessment

Because of the diverse nature and wide usage of hazardous materials, it is difficult to predict whether or not hazardous materials may be encountered during implementation of the project without a detailed Phase I Environmental Site Assessment (Phase I). A Phase I evaluates the likelihood that hazardous materials or other adverse environmental conditions are present at the project site due to past or present use of the site and/or properties in the site vicinity. This evaluation follows the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments Process (Standard E 1527-00).

The Phase I is a two-track process involving:

1. A detailed investigation of past property usage of the project site and neighboring properties.
2. An inspection of the project site, noting present usage of the site and surrounding properties.

Investigation of past property usage typically involves review of available historical records such as city directories and aerial photographs, interviews with knowledgeable individuals and record searches of relevant state and federal databases. Evidence for the presence of hazardous materials identified during site reconnaissance may include the presence of underground or aboveground storage tanks, leaking PCB-containing transformers, stained soil and dead or stressed vegetation. A determination that hazardous materials may be present on the project site can result from one or both of these tracks.

## 3.12.4 Distribution

The presence of hazardous materials on the project site can be the result of either on-site activities or activities on adjacent or nearby property. Hazardous materials identified from either an on-site or off-site source in the Las Vegas Valley or Boulder City area typically consist of petroleum contamination from leaking underground storage tanks (USTs) and surface spills, solvent contamination from dry cleaning or auto repair operations or perchlorate contamination from historical industrial manufacturing and/or illegal dumping. Of course, other hazardous materials may be encountered as well.

Contaminated media can be soil, groundwater or both, depending on the origin of the contamination and other factors. On-site release of hazardous materials generally results in contamination of site soil. Whether or not contamination of site groundwater also occurs will depend on the quantity and nature of the substance released and the depth to groundwater. Contamination of the project site from an off-site source, unless quite large and located very near the project site, will likely result from migration of a groundwater contaminant plume from the source of contamination to the project site. Secondary contamination of soil in the "smear zone" located immediately above the groundwater plume can occur when fluctuations in groundwater levels result in residual dissolved contamination adsorbing to soil particles and remaining behind when the groundwater level drops.

### 3.12.4.1 Petroleum Contamination

Petroleum contamination resulting from surface spills or leaking USTs may be found anywhere in the Project Area. However, a plume of groundwater contamination originating from an off-site source which may no longer exist is more likely to be seen on project sites located in areas that have a long history of development or have had service stations located on adjacent or nearby properties. Petroleum contamination is less likely to be found on sites located in previously undeveloped areas.

Petroleum contamination of soil is usually found in near-surface soils as a result of a surface spill or in the vadose zone soil located vertically between a leaking UST and the underlying groundwater table. Petroleum groundwater plumes can cover a significant area if a large quantity of petroleum product was released at one time or a slow leak went undetected for an extended period of time. Although petroleum constituents are less dense than water and have a tendency to remain near the surface of the water table, even floating as pure petroleum product in sufficient concentrations, they can migrate to significant depths over time. The qualitative nature of a petroleum plume will change over time, based on differing volatilities and mobilities of the various petroleum constituents.

### 3.12.4.2 Solvent Contamination

Solvent contamination generally results from improper disposal of solvents from dry cleaning or auto repair degreasing. Project sites located in areas with a history of these types of activities are at higher risk of solvent contamination while those located in primarily residential or undeveloped areas are at lower risk.

Because of the highly volatile nature of most solvents, significant solvent contamination of soil is not as common a problem as is groundwater contamination, unless a large release has occurred. Highly volatile solvents released to near-surface soils tend to readily evaporate, lessening any cleanup concerns. Solvent groundwater plumes can encompass large volumes as a result of two properties of commonly encountered solvents. First, PCE and other chlorinated solvents are denser than water and will sink into the groundwater as they migrate, expanding the plume vertically as well as horizontally. Second, chlorinated solvents do not dissipate over time but instead decompose naturally as a result of biological action. Leaving behind decomposition products, such as vinyl chloride that may be more hazardous than the initial contaminant. This natural decay changes the composition of the contaminant plume, but may actually render it more hazardous.

### 3.12.4.3 Perchlorate Contamination

Perchlorate contamination of groundwater is localized in the Henderson area and originates from historical manufacturing of ammonium perchlorate for solid rocket fuel. A large co-mingled perchlorate groundwater plume originating from the former American Pacific and Kerr-McGee manufacturing plants runs from approximately the intersection of Lake Mead Drive and Gibson Road northeastward to the Las Vegas Wash. This plume is approximately 2 miles (3.2 km) wide and 4.5 miles (7.2 km) long.

Perchlorate soil contamination is not as widespread a problem as groundwater contamination because perchlorate salts bind only weakly to soil. However, since perchlorate salts are extremely soluble, highly mobile and not significantly degraded in the environment, perchlorate groundwater plumes tend to encompass large areas. Perchlorate from the Henderson plume eventually discharges to Lake Mead via the Las Vegas Wash and is found in low concentrations in the Colorado River below Hoover Dam.

# 3.13 LAND USE

This section identifies land ownership and land use patterns in the Project Area, which contains the cities of Las Vegas, North Las Vegas, Henderson and Boulder City, as well as 10 unincorporated areas. The Project Area encompasses the Las Vegas Valley and the peripheral area of Boulder City and totals about 1,056 square miles (2,735 km²). The area is in Clark County, which is in the southeast corner of the State of Nevada. Clark County is the sixth largest county in Nevada, encompassing about 7,910 square miles (20,4901 km²) or roughly 7 percent of the state's total area (U.S. Census 2001).

Rapid population growth in the Project Area since 1991 has resulted in a rapid increase in development, with accompanying changes in land use. Statistics on growth and development for the Project Area are presented in Section 3.14, Socioeconomics. Rapid growth and development in the area is projected to continue.

## 3.13.1 Topography

Elevations within Clark County range from 450 feet (137 m) above mean sea level along the Colorado River to 11,918 feet (3,600 m) at Charleston Peak. The county has features characteristic of the Great Basin, with mountain ranges extending in a north-south direction and eroding laterally to long, narrow desert valleys. The mountain ranges are generally steep and composed primarily of bedrock. Wide alluvial fans extend from the base of the mountains and level out to basin lowlands. The basin lowlands have been continually filling since the mountains were originally formed and have a surface generally composed of fine sand, silt and clay (CCRFCD 2002).

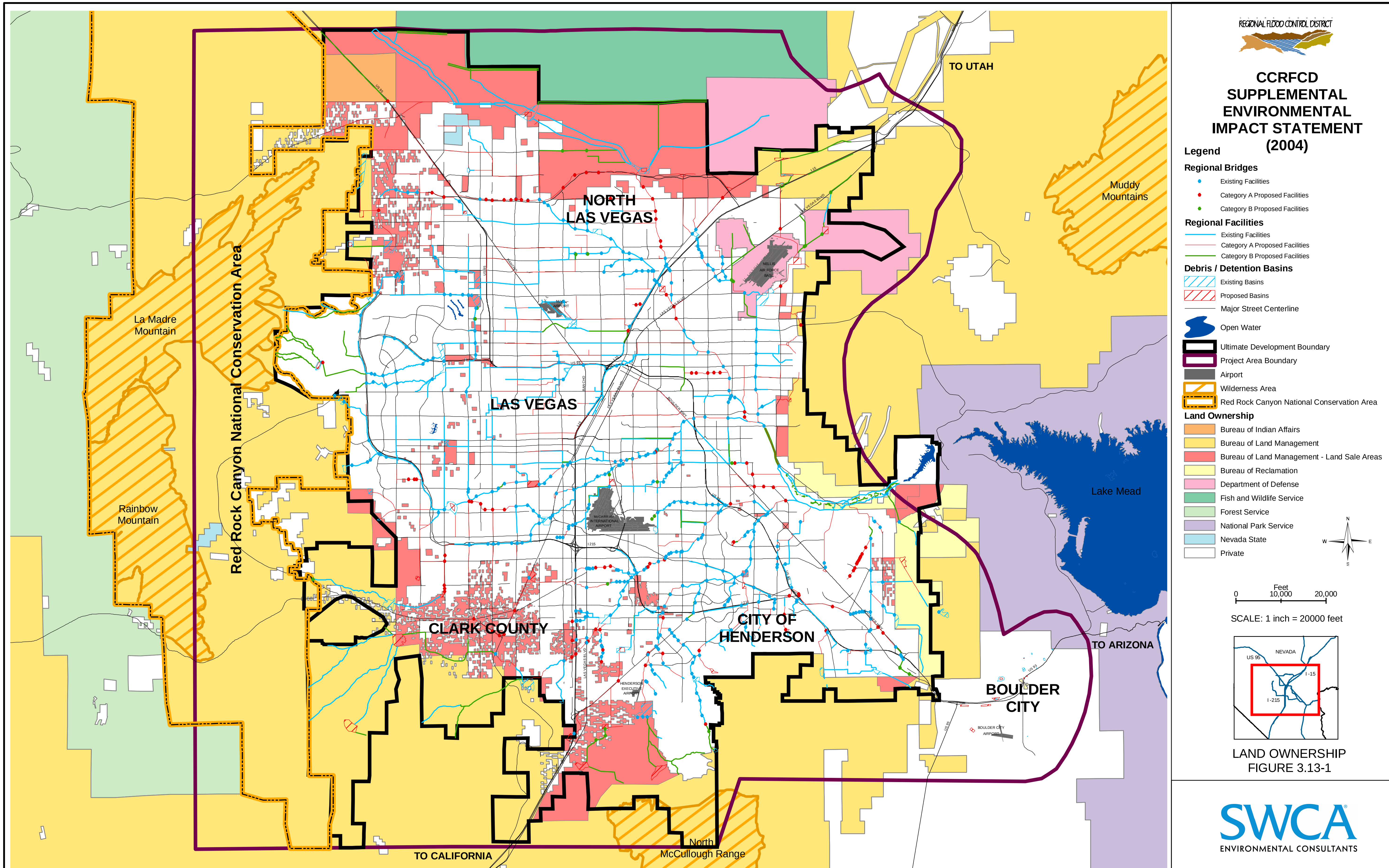
The Las Vegas Valley extends in a northwest-southeast direction with the Spring Mountains to the west; the Pintwater, Desert, Sheep and Las Vegas Mountains to the north; Frenchman Mountain to the east; and the Bird Spring and McCullough mountain ranges to the south. The valley drains toward the south and then easterly through Las Vegas Wash to Lake Mead and the Colorado River. Valley elevations range from 4,500 feet (1,400 m) at the upper boundaries of the alluvial fan to 1,800 feet (550 m) in the basin lowland (CCRFCD 2002).

## 3.13.2 Land Ownership

Clark County encompasses over 5 million acres of land, divided among federal (87.4 percent), state and local governments (2.6 percent), and private landholders (9.8 percent). However, most of the Project Area is privately owned, developed, urban land consisting of residential communities and commercial/industrial areas. The north and northeast portions of the Project Area contain military lands that include Nellis AFB. The Las Vegas Paiute Indian Reservation is located on the northwest edge of the Project Area. Public lands administered by the BLM surround the city of Las Vegas (CCRFCD 2002). Figure 3.13-1 shows land ownership, including lands to be auctioned by the BLM, and the location of current and proposed CCRFCD facilities within the Project Area.

## 3.13.3 Land Use Plans

A number of federal, state, regional and local land use plans and policies are in effect for the Project Area, largely because the NRS mandate the preparation of Comprehensive Plans for regions, cities and counties in Nevada. At the federal level, BLM lands in Clark County are managed in accordance with the 1998 Final Las Vegas RMP. The SNRPP of 2001 promotes the use of flood control facilities as corridors for trail systems and other recreational amenities as appropriate. The Las Vegas Valley Flood Control MPU of 2002, prepared for Clark County, is consistent with the SNRPP and represents a comprehensive approach to flood control in the valley. The Comprehensive Plan for Clark




LAND OWNERSHIP
FIGURE 3.13-1

Data sources: Clark County GIS Management Office Spring 2003 - Major Street Centerline, Landowner, Conservation Areas, Ariports, Open Water \ 1990 SEIS - Project Area Boundary

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County is also in effect in the Project Area. At the local level, each of the cities of Las Vegas, North Las Vegas, Henderson and Boulder City has a comprehensive plan. Master plan communities are common in all of the cities in the Project Area. Additionally, each of the unincorporated areas in the Project Area is governed by a land use plan. Lastly, the City of Las Vegas and Clark County recognized the need for comprehensive planning in the valley by establishing an Interlocal Agreement in January 2002 (CCRFCD 2002; CCDCP 2003a, 2003b).

## 3.13.4 Land Use in the Project Area

As stated above, most land in Clark County is government-owned and predominantly open and undeveloped. Land uses include grazing, recreation, mining and military operations. Most privately owned lands in Clark County are used for residential purposes. The number of farms in Clark County is decreasing, with urban areas increasing (USDA 1997).

Most land in the Las Vegas Valley is privately owned and used for residential purposes, with commercial uses constituting the second largest classification (CCA 2002). Figure 3.13-2 displays 12 general land use classifications for the Project Area, which includes the Las Vegas Valley proper and the peripheral City of Boulder City. The classifications are based on zoning information from local governments in the valley and are listed in the Las Vegas Valley Flood Control (LVVFC) MPU of 2002, prepared for Clark County. The 12 land use classifications are as follows (CCRFCD 2002):

- Commercial, office, retail, casino
- Heavy industrial
- High density residential
- Lakes
- Light industrial
- Low density residential
- Medium density residential
- Parks, golf courses
- Public facility, multi-family
- Rural
- Schools
- Undeveloped land, open desert

The Boulder City Flood Control 2003 MPU designates 16 land use classifications, which contain all of the 12 listed above plus four additional categories. Three of those categories were combined in the county's undeveloped land classification: airport and non-landscaped parks, area outside development boundary and future land use unknown. Boulder City also separated rural residential into low and medium density classifications; however, on Figure 3.13-2 they are reflected simply as rural (consistent with the LVVFC MPU) (CH2M Hill 2003). Table 3.13-1 displays the number of acres, square miles and percentage of land use for each category within the Project Area.

High-density residential areas dominate and are present throughout most of the Project Area. Low and medium density residential areas are less prevalent, but present throughout the area. Commercial areas, public facilities and industrial areas tend to be clustered near major roadways, particularly Interstate 15, U.S. 93, U.S 95, and Las Vegas Boulevard. Schools and parks are dispersed throughout the valley and rural areas are scattered around the periphery. Undeveloped land is scarce within the valley, but dominates the surrounding area.

Specific land use in each of the four incorporated cities within the Project Area, as well as the nine unincorporated areas, is discussed below.

### 3.13.4.1 The City of Las Vegas

The City of Las Vegas is highly urbanized. Land use is composed primarily of high density residential, commercial/industrial and public facilities. A small amount of the city is low density residential. Interstate 15 runs north-south through the middle of the city, paralleled by Las Vegas Boulevard. Interstate 515 lies to the north and east and Interstate/Clark County 215 runs southwest-southeast (CCRFCD 2002).

**TABLE 3.13-1. Land Use within the Project Area**

| Land Use Type | Number of Acres | Number of Square Miles | Percentage of Total |
|---|---|---|---|
| Commercial Office, Retail, Casino | 48,363 | 75.6 | 7.2 |
| Heavy Industrial | 11,986 | 18.7 | 1.8 |
| High Density Residential | 107,811 | 168.5 | 16.0 |
| Lakes | 71 | 0.1 | — |
| Light Industrial | 12,377 | 19.3 | 1.8 |
| Low Density Residential | 37,207 | 58.1 | 5.5 |
| Medium Density Residential | 80,075 | 125.1 | 11.9 |
| Parks, Golf Courses | 22,319 | 34.9 | 3.3 |
| Public Facility, Multi Family | 54,906 | 85.79 | 8.1 |
| Rural | 13,039 | 20.4 | 1.9 |
| Schools | 350 | 0.6 | 0.1 |
| Undeveloped Land, Open Desert | 28,634 | 447.4 | 42.4 |
| **Total** | **417,138** | **1,054.5** | |

The high-density residential areas are clustered on either side of Interstate 15 and the Las Vegas Boulevard commercial strip. Relatively small low-density areas are grouped in the northwest and southwest portions of the city, and generally consist of planned communities such as The Lakes and Peccole Ranch (CCRFCD 2002).

Commercial, office, retail and casino areas predominate along the Interstate 15 and Las Vegas Boulevard corridor. McCarran International Airport is in the southeastern part of the city. Light industrial areas are adjacent to the airport. Heavy industry is west of Interstate 15, and bordered by Tropicana to the north and Sunset Road to the south (CCRFCD 2002).

Population growth and land development has occurred rapidly in the City of Las Vegas since 1990, although other parts of the Project Area have experienced faster development. Future growth and development will be directed by the Master Plan for the City of Las Vegas (City of Las Vegas 2003).

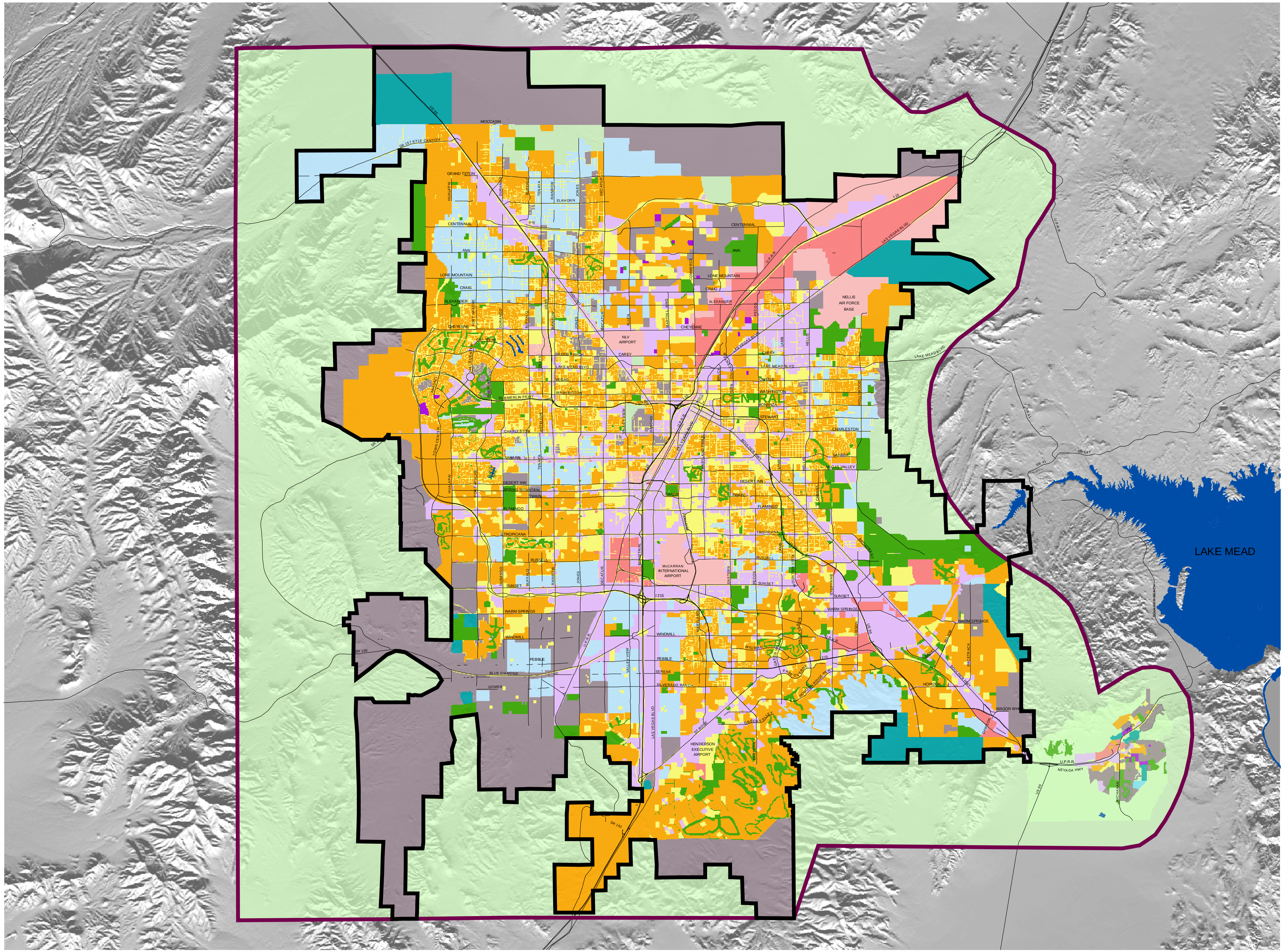
### 3.13.4.2 City of North Las Vegas

North Las Vegas is a mixture of high density residential, commercial/industrial and public facility areas. The major transportation corridors in the City are Interstate 15 bordering the northwestern edge, Las Vegas Boulevard running east of, and parallel to Interstate 15, and Interstate 515 along the southern edge. The residential areas occur primarily between Interstate 15 and Las Vegas Boulevard and south of the boulevard. The industrial and public areas are clustered along Interstate 15. Commercial areas (including office, retail and casino) are largely along Las Vegas Boulevard. Nellis AFB borders the northeastern edge of the city (CCRFCD 2002).

Three new major master plan developments have been built in the City of North Las Vegas since 1990, with a combined total of 9,500 homes, along with designed open space, parks, golf courses, schools, commercial, hotel/casinos and city services. Multi-use projects mixing commercial and industrial uses are planned along major thoroughfares. Rapid development has occurred in the city since 1990 and is expected to continue. Future land use is directed by the master plan for the City of North Las Vegas (2003).

### 3.13.4.3 City of Henderson

The highly urbanized City of Henderson is southeast of the City of Las Vegas and northwest of Boulder City. U.S. 93/95 dissects the middle




# CCRFCD SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (2004)

## Legend

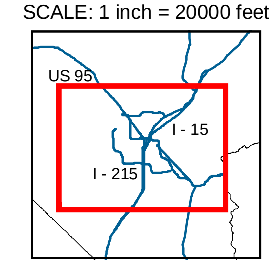
- Ultimate Development Boundary
- Project Area Boundary
- Major Street Centerline

**Existing and Planned land Use**

- Undeveloped Land, Open Desert
- Parks, Golf Courses
- Rural
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Public Facility, Multi Family
- Commercial, Office, Retail, Casino
- Light Industrial
- Heavy Industrial
- Schools
- Lakes

Feet
0 10,000 20,000

SCALE: 1 inch = 20000 feet




GENERAL LAND USE CLASSIFICATIONS
FIGURE 3.13-2

SWCA ENVIRONMENTAL CONSULTANTS

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of the city as it runs northwest to southeast. Interstate 515 runs along the southeastern boundary of Henderson. High-density residential areas dominate the city, with public facilities scattered throughout. Some medium residential areas occur in the southeastern portion of Henderson and the city has 25 master plan communities. A commercial corridor occurs on the west side of U.S. 93/95 and a small heavy industrial area is located southwest of U.S. 93/95 and Interstate 515 (CCRFCD 2002).

Henderson has experienced the most rapid growth of the more incorporated cities in the Project Area. Development is controlled by the master plan for the City of Henderson, which is currently being updated (City of Henderson 2003).

### 3.13.4.4 Boulder City

Land use in Boulder City is relatively balanced. Growth and development have been slower than the rest of the Project Area because of a limit on the number of building permits issued by the city per year. Major access is via U.S. 93. Residential areas are primarily south of the highway and are largely medium density and multi-family developments. Most commercial, industrial and public uses are located along the west side of U.S. 93. Rural land occurs north and southeast of the commercial/industrial area. The city core is surrounded by vacant open land with limited or no development (CCRFCD 2002). Continued growth and development is expected in Boulder City, subject to the Boulder City Master Plan, which is currently undergoing an update scheduled for completion in 2003 (Boulder City 2003).

### 3.13.4.5 Unincorporated Areas

The following 10 unincorporated planning areas are included in the Project Area: Lone Mountain, Sloan, Summerlin, Sunrise Manor, Spring Valley, Enterprise, Winchester, Paradise, Whitney and unincorporated portions of Clark County. Like the incorporated cities in the Project Area, virtually all of these unincorporated planning areas have experienced rapid population growth and land development. The areas are discussed below in the order they occur from roughly north to south and west to east.

#### *3.13.4.5.1 Lone Mountain*

The unincorporated Lone Mountain planning area consists of about 40 acres and includes the unincorporated community of Lone Mountain. The area is located in the northwest part of the Las Vegas Valley and Project Area. The Lone Mountain planning area is generally bounded on the north by Moccasin Road, on the south by Cheyenne Avenue, on the east by Decatur Boulevard and on the west by the La Madre Mountains of the Spring Mountain Range. This low-density residential development has a rural atmosphere, characterized by lots of one half acre or larger, with many residents stabling horses. Growth and development are regulated by the 1997 Lone Mountain Land Use Plan, which was based on the master plan for the City of Las Vegas. Efforts to annex the area are currently underway (CCDCP 2003c).

#### *3.13.4.5.2 Summerlin South*

In the north-central portion of the valley and Project Area is the unincorporated planning area of Summerlin South. The 9.6 square miles (24.9 $km^2$) (unincorporated) are generally bounded by Charleston Boulevard on the north, Russell Road on the south, Hualapai Way on the east and the Red Rock National Conservation Area on the west. The Summerlin West and North developments, which are within the jurisdiction of the City of Las Vegas, are on the northern border. The unincorporated community of Spring Valley lies to the east (CCDCP 2003d).

Summerlin South is a predominately single-family residential area, with a small amount of multi-family dwellings, commercial use and open space. The Summerlin South Land Use and Development Guide was approved in 1995 and is consistent with the CCRFCD Master Plan (CCDCP 2003d).

### 3.13.4.5.3 Sunrise Manor

The Sunrise Manor unincorporated planning area covers approximately 40 square miles (104 km²) in the east and northeast part of the Las Vegas Valley and Project Area. The area includes the unincorporated Town of Sunrise Manor. The Sunrise Manor planning area is (roughly) bounded on the north by Lone Mountain Road; on the south by Desert Inn Road and Harmon Avenue; on the east by Sunrise and Frenchman Mountains; and on the west by Pecos Road, Nellis Boulevard and Boulder Highway. Nellis AFB borders Sunrise Manor to the north, with undeveloped land lying to the east (CCDCP 2003e).

The area is primarily multi-family residential and commercial, including office, retail and casinos. Some single-family residential and industrial areas also exist. The 1999 Sunrise Manor Land Use and Development Guide manages development in the area (CCDCP 2003e).

### 3.13.4.5.4 Spring Valley

The Spring Valley unincorporated area is about 35 square miles (91 km²) and includes the unincorporated Town of Spring Valley. The area is located west and slightly south of the core of the City of Las Vegas and is in roughly the west-central portion of the Project Area. The area is generally bordered by Sahara Avenue on the north; Pebble Road, Warm Springs Road and Sunset Road on the south; Decatur Boulevard on the east; and Hualapai Way on the west. McCarran International Airport lies to the east (CCDCP 2003f).

The Spring Valley area consists primarily of low, medium and high-density residential areas and a few, small commercial and industrial areas primarily near the airport. Open, undeveloped land remains since Spring Valley is currently only about 42 percent developed. The 2001 Spring Valley Land Use Plan regulates land use in the area (CCDCP 2003f).

### 3.13.4.5.5 Enterprise

The unincorporated Enterprise area is in the southwest portion of the valley and Project Area. Enterprise is roughly bordered on the north by Sunset Road, on the south by Larson Lane, on the east by Bermuda Road and on the west by Hualapai Way. The 70-square-mile (181-km²) area has a rural atmosphere, since about 87 percent of the land is undeveloped and largely controlled by the BLM. Enterprise consists primarily of low-density residential areas, mostly in the northeast portion of the unincorporated area. Development is guided by the 1999 Enterprise Land Use Plan (CCDCP 2003g).

### 3.13.4.5.6 Sloan

Planning for the tiny unincorporated Sloan area occurs as part of the Clark County South County Land Use Guide. The area is located at the southern edge of the Project Area, south of the unincorporated Enterprise area and along the Interstate 15 corridor. Sloan is primarily a low-density residential area consisting mostly of mobile homes, with about one unit per every 2 acres. Two casinos are located adjacent to Interstate 15 where very little additional commercial use occurs. Growth and development in Sloan since 1990 has been somewhat slower than other portions of the Las Vegas Valley (Garrity 2003).

### 3.13.4.5.7 Winchester

The unincorporated Winchester planning area is in the central portion of the Project Area and includes the Town of Winchester. The area is generally bounded on the north by Sahara Avenue, on the south by Desert Inn Road, on the east by Boulder Highway and on the west by Decatur Boulevard. Almost all of the roughly 5 acres that comprise the area are developed, making Winchester the most developed area in the Las Vegas Valley. Winchester consists of high-density and multi-family residential and commercial areas that include offices, retail establishments and casinos. The 1994 Winchester Land Use and Development Guide directs growth (CCDCP 2003h).

#### 3.13.4.5.8 Paradise

The 42 square mile (109 km²) unincorporated Paradise planning area is located in the south-central part of the Project Area. The area is roughly bordered on the north by Desert Inn Road, on the south by Sunset Road and Silverado Ranch Boulevard, on the east by Nellis Boulevard and Eastern Avenue and on the west by Decatur Boulevard and Bermuda Road. Paradise is highly developed and one of the most densely populated areas in the Las Vegas Valley. The unincorporated area includes the Town of Paradise. Multi-family and high-density housing dominate, with large commercial and industrial areas, particularly along Las Vegas Boulevard and McCarran International Airport, respectively (CCDCP 2003i).

#### 3.13.4.5.9 Whitney

The unincorporated Whitney area is located in the southeastern portion of the Las Vegas Valley and Project Area. The area is bordered on the north by Desert Inn Road, on the south by Russell Road, on the west by Nellis Boulevard and on the east by Desert Wetlands Park and the City of Henderson. The majority of the 37 square mile (96 km²) Whitney area consists of large amounts of open, undeveloped land administered by the BLM and unavailable for development due to steep terrain. Whitney's residential areas consist of multi family, high and low-density developments. Public facilities are scattered and commercial development is concentrated in the northeast corner. The Whitney Land Use Plan, adopted in 2000, addresses future land use for the area (CCDCP 2003j).

#### 3.13.4.5.10 Unincorporated Clark County

The flood control Project Area includes portions of unincorporated Clark County, which are largely undeveloped with a few scattered residences. These areas occur around the perimeter of the cities and unincorporated areas discussed above, although most of the land is on the west side of the Project Area. The Comprehensive Plan for Clark County governs land use on the majority of the land within the Project Area. The Clark County South County Land Use Guide is in effect for the southern portion of unincorporated county land slated for flood control.

# 3.14 SOCIOECONOMICS

The Project Area for socioeconomic analysis is the Las Vegas Valley metropolitan area located in the south central portion of Clark County, Nevada. The highly developed, fast growing, urbanized valley is the hub of Clark County and southern Nevada, where the majority (70 percent) of the state's population resides (NSD 2002). The Las Vegas Valley metropolitan area contains the incorporated cities of Las Vegas, North Las Vegas, Henderson and Boulder City. Ten unincorporated areas are also located in the Las Vegas Valley: Enterprise, Lone Mountain, Paradise, Sloan, Spring Valley, Summerlin South, Sunrise Manor, Whitney, Winchester and unincorporated portions of Clark County.

## 3.14.1 Population

The U.S. Census Bureau (Census) reports that between 1990 and 2000, Nevada was the fastest growing state in the nation, experiencing a 51 percent growth rate (NSD 2000). Clark County was the fastest growing county in the nation during the year 2000, with a 6.5 percent growth rate that year (Census 2002a). The population of Clark County is expected to grow at an average rate of 2.7 percent annually for the next 10 years (NSD 2002). If current economic growth and in-migration trends continue, Clark County will comprise the majority of the Nevada population for the next 20 years (NSD 2000). The NSD estimated Clark County's population at 1.5 million in July 2002. Table 3.14-1 illustrates the high rate of growth in Clark County and the state of Nevada since 1986 as compared to the overall growth rate of the United States. Table 3.14-2 illustrates the projected populations of Clark County and the State of Nevada through 2015.

Of the four cities of Las Vegas, North Las Vegas, Henderson and Boulder City, the city of Henderson is the fastest growing incorporated city in the valley, with a 201 percent population increase between 1990 and 2002. Boulder City had the lowest growth rate of the four cities during that time period, due at least in part to its policy of controlled growth that limits the number of building permits issued per year (NSD 2003). The unincorporated areas of Enterprise, Lone Mountain, Paradise, Spring Valley, Summerlin South, Sunrise Manor, Whitney and Winchester have grown by 38 percent since 1996, the first year that the NSD began tracking those populations (NSD 2003). Sloan has grown more slowly than the other unincorporated areas but particularly fast growth is occurring in the Summerlin area, which was unpopulated in 1998, had 12,239 residents by 2002, and is projected to grow to 45,000 persons by 2010 (NSD 2002). Table 3.14-3 displays the high rate of growth since 1990 for the four incorporated cities and since 1996 for the nine unincorporated communities in Clark County.

### 3.14.2 Housing

In July 2002, the CCDCP estimated that there were about 611,161 housing units in Clark County, most of which exist in the four incorporated cities and nine unincorporated areas of the Las Vegas Valley metropolitan area (CCDCP 2003a). The majority of the housing (55 percent) consists of single-family detached homes, although a variety of other housing types exist as reflected in Table 3.14-4.

Housing in the Las Vegas Valley metropolitan area has experienced an extraordinary housing boom during the 1990s, driven by relatively low interest rates, a rapidly expanding job market and the area's warm climate (CCDCP 2003a). By

**TABLE 3.14-1. Historical Population Data for Clark County, the State of Nevada, and the United States**

| Locale | 1986 | 1990 | % Change, 1986–1990 | 2002 * | % Change, 1990–2002 |
|---|---|---|---|---|---|
| Clark County[a] | 587,760 | 770,280 | 31.0 | 1,549,657 | 100.1 |
| Nevada[a] | 993,220 | 1,579,150 | 59.0 | 2,206,022 | 40.0 |
| United States[b] | 240,133,472 | 249,439,545 | 3.9 | 288,368,698 | 16.0 |

* July 2002 estimate reflects additional count of unincorporated areas of Enterprise, Lone Mountain, Paradise, Sloan, Spring Valley, Summerlin, Sunrise Manor, Whitney and Winchester.
Sources: a: NSD (2000 and 2003); includes Henderson, Las Vegas, North Las Vegas and Boulder City (data not available for unincorporated areas in 1986 and 1990). b: Census (1998 and 2003).

**TABLE 3.14-2. Population Projections for Clark County and the State of Nevada**

| Locale | Year | | |
|---|---|---|---|
| | 2005 | 2010 | 2015 |
| Clark County | 1,176,614 | 1,969,348 | 2,082,455 |
| State of Nevada | 2,070,000 | 2,611,453 | 2,179,000 |

Source: NSD (2002).

**TABLE 3.14-3. Incorporated and Unincorporated Area Populations, Clark County, Nevada**

| Locale | 1990 Population | 2002 Population* | % Increase |
|---|---|---|---|
| Boulder City | 12,760 | 14,842 | 16 |
| Clark County | 770,280 | 1,549,657 | 101 |
| Henderson | 69,390 | 209,486 | 201 |
| Las Vegas | 268,330 | 514,640 | 92 |
| North Las Vegas | 50,030 | 135,967 | 172 |
| Unincorporated Town Populations ** | 446,502 | 615,028 | 38 |

Source: NSD (2003).
* Estimates
**Towns: Enterprise, Paradise, Spring Valley, Summerlin South, Sunrise Manor, Whitney and Winchester. (Census Count Began in 1996.)

**TABLE 3.14-4. Clark County Housing Mix**

| Housing Type | Number of Units | Percent Occupied |
|---|---|---|
| 2-, 3- and 4-Plexes | 19,385 | 93.0 |
| Apartments | 161,289 | 94.7 |
| Condominiums | 41,234 | 91.4 |
| Mobile Homes | 31,350 | 95.2 |
| Single Family Detached | 333,111 | 93.0 |
| Town Houses | 24,792 | 95.6 |
| Total | **611,161** | **94.5** |

Source: CCDCP (2003a).

2010, an additional 200,235 housing units will be needed in the area to accommodate the projected high growth rate (CCDCP 2001a). Boulder City currently has a policy of controlled growth that limits the number of building permits issued per year to 120 (City of Boulder City 2002a).

In 2002, new home sales were estimated at 22,502 with a median sales price of $182,832. An estimated 38,621 homes were resold with a median sales price of $157,000 (CCDCP 2003a).

## 3.14.3 Employment and Personal Income

The Nevada Department of Employment, Training, and Rehabilitation (NDETR) tracks employment by industry for the State of Nevada (by county). The service industry is the single largest employment sector in Clark County, dominated by hotels, gaming and recreation. The retail trade, government and construction sectors also employ large numbers of persons, with government employing about 10 percent of the workforce in the metropolitan area. About 34.9 percent of adults over 16 are not in the labor force, due in part to the growing number of retirees in Clark County (Census 2000). The statistics for Clark County are listed in Table 3.14-5.

Not surprisingly, the industries with the largest number of employees also have the largest payrolls; namely, services, retail trade, government and construction. The total annual payroll in Clark County was $22,245,982 in 2000 and $23,329,494 in 2001 representing a 0.05 percent increase in annual payroll in 1 year (NDETR 2002). Clark County's average annual per capita

**TABLE 3.14-5. Employment by Industry in Clark County, Nevada, 2000 and 2001**

| Industry Sector | Year 2000 Numbers | | Year 2001 Numbers | |
|---|---|---|---|---|
| | Employees | Establishments | Employees | Establishments |
| Services * | 329,038 | 11,552 | 331,328 | 12.095 |
| Trade (wholesale/retail) | 149,050 | 8,479 | 154,384 | 8,851 |
| Government | 68,958 | — | 72,473 | — |
| Construction | 64,848 | 2,840 | 68,059 | 2,824 |
| Transportation and public utilities | 39,777 | 1,126 | 40,352 | 1,176 |
| Finance, insurance, and real estate | 34,612 | 4,062 | 36,773 | 4,229 |
| Manufacturing | 20,993 | 922 | 22,275 | 1,002 |
| Mining | 677 | 40 | 525 | 41 |
| **Total** | **707,953** | **29,021** | **726,169** | **30,218** |

* Includes agricultural services, forestry, fishing, and unclassified establishments.
Source: NDETR (2000 and 2001).

**TABLE 3.14-6. Earnings by Industry in Clark County, Nevada**

| Industry Sector | 2000 Annual Payroll ($1,000) | 2001 Annual Payroll ($1,000) |
|---|---|---|
| Services * | 9,770,922 | 10,120,089 |
| Trade (wholesale/retail) | 3,550,851 | 3,801,297 |
| Government | 2,769,076 | 2,979,022 |
| Construction | 2,556,434 | 2,627,125 |
| Transportation and public utilities | 1,399,894 | 1,415,131 |
| Finance, insurance, and real estate | 1,380,309 | 1,515,864 |
| Manufacturing | 787,375 | 847,721 |
| Mining | 30,121 | 22,244 |
| **Total** | **$22,245,982** | **$23,329,494** |

* Includes agricultural services, forestry, fishing, and unclassified establishments.
Source: NDETR (2002).

income in 2000 was $32,131 (CCDCP 2000). Table 3.14-6 illustrates earnings by industry for Clark County in 2000 and 2001.

Table 3.14-7 shows the ten largest employers in the metropolitan Las Vegas area. Although the CCSD has the highest number of employees, the gaming/hotel resorts are the largest collective employers in Clark County.

During the 10 years from 1990 to 2000, employment in the metropolitan Las Vegas area increased 88 percent, from 375,142 persons to 705,144. From 2000 to 2001, employment increased by another 30,000 jobs in 1 year (NDETR 2002). In December 2002, the unemployment rate for the area was 5.0 percent, down from its post-September 11, 2001 peak of 6.7 percent reported in November 2001 (NDETR 2002).

According to the Center for Business and Economic Research at the University of Nevada Las Vegas (UNLV), 35.8 million persons visited the Las Vegas metro area in 2001 and generated approximately $7.6 billion in gross gaming revenue (UNLV 2002a). Although Nevada and Clark County have partially recovered from the 2001 recession and the aftermath of September 11, 2001, recovery is not yet complete according

**TABLE 3.14-7. Ten Largest Employers in Clark County, March 2002, First Quarter***

| Ranking | Employer Name | Number of Employees |
|---|---|---|
| 1 | CCSD | 26,700 - 26,799 |
| 2 | Nellis AFB | 10,000 - 10,099 |
| 3 | Bellagio Hotel and Casino | 8,300 - 8,399 |
| 4 | Clark County | 8,200 - 8,299 |
| 5 | MGM Grand Hotel, Inc. | 7,200 - 7,299 |
| 6 | Mirage Hotel and Casino | 5,800 - 5,899 |
| 7 | Mandalay Bay Resort and Casino | 5,000 - 5,099 |
| 8 | State of Nevada** | 4,900 - 4,999 |
| 9 | University of Nevada - Las Vegas | 4,800 - 4,899 |
| 10 | Caesars Palace Hotel and Casino | 4,400 - 4,499 |

Source: CCDCP (2003k).
* Latest data available.
** One of multiple sites.

to economic indicators. Visitation rates were 6.7 percent lower in 2001 than in 2000, with a corresponding drop in gaming revenues of 8 percent. This trend has continued through 2002, with a 4.5 percent decline in visitation and 9.1 percent decline in gaming revenue from 2001 figures (UNLV 2002a).

## 3.14.4 Government Revenues and Expenditures

Both the state and county levy taxes in Nevada. Tax rates are reported through the Nevada Department of Taxation (NDT). Taxes are levied on property, gasoline and a variety of general sales and use. By state constitution designation, there are no personal income taxes in Nevada and there is no sales tax on food items used for home consumption or prescribed medical goods (NDT 2002a).

### 3.14.4.1 State Taxes (Retail Sales)

Sales tax is charged at retail on the sale of tangible personal property unless exempt by statute. According to the NDT, all counties in Nevada charge taxes as follows:

- Sales general fund (2 percent)
- Local school support (2.25 percent)
- Basic city council relief (0.5 percent)
- Supplemental city-county relief (1.75 percent)

Gasoline and gasohol are taxed at 23 cents per gallon, with diesel fuel at 27 cents per gallon (NDT 2002b). Motor vehicle tax is assessed with valuation of the vehicle at 35 percent of the manufacturer's suggested retail price, without accessories. In accordance with the NRS, vehicle value is depreciated to 84 percent after the first year and graduated down to 5 percent after 9 years (NRS 2002).

### 3.14.4.2 County Taxes

In addition to statewide taxes, Clark County charges taxes on:

- Sales and use (7.25 percent)
- Public mass transportation and construction of roads (0.25 percent)
- Flood control (0.25 percent)
- Infrastructure (0.25 percent)

Currently, 87 tax districts exist in Clark County. The tax rates are levied by the Clark County Assessor (CCA) and are based on the amount of monies budgeted for the maintenance and improvement of district facilities and for other public services. The tax monies collected pay for schools, police and fire protection and other services from local governments (CCA 2002b).

#### 3.14.4.3 Property Taxes

Nevada's constitutional limit on property tax (ad valorem) is \$5 per \$100 of assessed valuation while the statutory limit is \$3.64 per \$100. Assessment is at 35 percent of taxable value, and the tax rate is applied to the assessed value. The 2002-2003 assessed property tax rates in the Project Area vary from \$3.3809 per hundred dollars of assessed value, in tax district 254, to \$2.427 per hundred dollars of assessed value, in tax district 510 (CCA 2002b). Total estimated real property taxes for 2002 to 2003 for Clark County were \$1,089,054.353. These figures rise to \$1,205,703.811 for 2003 to 2004 (CCA 2002c).

### 3.14.5 Property Values

Property values in Clark County, including both cities and unincorporated areas, have been increasing along with population growth in the county. The Clark County Assessor estimates that net assessed value of real property in Clark County will be \$40,141,956,673 for fiscal year 2003-2004. This represents an increase in value of 8.68 percent and over 3.2 billion dollars from 2002-2003 figures. The largest percentage increases in the metropolitan area for the same time period are 13.06 percent in the City of North Las Vegas and 12.83 percent in the City of Henderson (CCA 2002c).

### 3.14.6 Public Services

#### 3.14.6.1 Police Protection

The Las Vegas Metropolitan Police Department (LVMPD) provides law enforcement for the Las Vegas Valley, which encompasses 8,000 square miles (20,720 km²) of Clark County and includes Las Vegas, North Las Vegas, Henderson, Boulder City and unincorporated areas. City law enforcement departments overlap the jurisdiction of the LVMPD in North Las Vegas, Henderson and Boulder City (LVMPD 2002).

#### 3.14.6.2 Fire Protection

Each of the four incorporated cities of Las Vegas, North Las Vegas, Henderson and Boulder City has their own fire department. The remaining communities and unincorporated areas of the county are served by the Clark County Fire Department (City of Las Vegas 2002).

The Las Vegas Fire and Rescue Department (LVFD) provides emergency services to approximately 514,640 people in the 112.5 square miles (291.4 km²) that constitute the City of Las Vegas. The LVFD currently operates with 584 employees and 12 fire stations. Three new stations are planned for construction in 2003 (City of Las Vegas 2003).

The North Las Vegas Fire Department (NLVFD) provides emergency services for the 78 square miles (202 km²) within the City of North Las Vegas, and its population of 123,000. The NLVFD operates with 112 total employees and four fire stations (NLVFD 2002).

The Henderson Fire Department serves over 204,000 residents. The Department operates from nine stations, covering 93.6 square miles (242.4 km²), and provides automatic and mutual aid to surrounding areas (City of Henderson 2002).

The Boulder City Fire Department serves the entire population of approximately 15,000 from one fire station located within Boulder City (City of Boulder City 2002b).

#### 3.14.6.3 Water

Water supplies in the Las Vegas Valley are obtained from a combination of approximately 80 percent Colorado River water stored in Lake Mead and 20 percent groundwater. The available

Colorado River water supply is approximately 300,000 acre-feet per year plus return flow credits from other sources (LVVWD 2003).

The water supply from Lake Mead is managed by the SNWA, a regional entity that manages water conservation, water quality and water resource issues for Southern Nevada. SNWA members include the LVVWD, the cities of Las Vegas, North Las Vegas, Henderson, and Boulder City, the Big Bend Water District in Laughlin and the Clark County Water Reclamation District (SNWA 2003). The SNWA operates the Southern Nevada Water System, which delivers water to five major jurisdictions in the Las Vegas Valley. The LVVWD provides water to people within the city of Las Vegas and the unincorporated areas of the valley (LVVWD 2003). The cities of North Las Vegas, Henderson and Boulder City each have their own water department.

### 3.14.6.4 Sewer

Each of the incorporated cities in the metropolitan area collects and treats wastewater within their jurisdictions. The Clark County Water Reclamation District performs wastewater treatment in the unincorporated areas of Clark County (CCWRD 2003).

### 3.14.6.5 Natural Gas

The Southwest Gas Corporation supplies natural gas for Las Vegas, North Las Vegas, Henderson and Boulder City, as well as the unincorporated areas in the valley. Two gas pipelines enter the valley, one from the south and one from the northeast (Gapp 2003).

The current capacity of the system is 927,164 million cubic feet per day. Peak use occurs during the winter equivalent to the system capacity. Average daily use is about 250,000 to 400,000 million cubic feet per day. Expansion has been occurring and is expected to continue to accommodate the rapid growth in the valley (Gapp 2003).

### 3.14.6.6 Electricity

Nevada Power, a subsidiary of Sierra Pacific Resources, provides electricity for approximately 670,000 customers in southern Nevada, including all of the Las Vegas Valley. Nevada Power generates about 1,700 MW of fossil-fueled capacity, purchases power from the Hoover Dam and elsewhere, and markets excess wholesale power. Sierra Pacific Resources' plans to sell Nevada Power's generation assets have been delayed, as has deregulation in Nevada (Nevada Power 2003).

### 3.14.6.7 Telephone Service

Telephone and other telecommunications services for the Las Vegas Valley metropolitan area are provided by Sprint, a member of the Nevada Telecommunications Association (NTA). The NTA provides a forum for communication between local exchange carriers and other telecommunications service providers (NTA 2003).

### 3.14.6.8 Solid Waste

Republic Services Inc. (Republic) provides the collection and disposal of solid waste for the cities of Las Vegas, North Las Vegas and Henderson, in addition to unincorporated areas in the valley. Silver State Disposal Company had previously provided these services; however, Republic purchased that company several years ago (Vellutini 2003).

The solid waste collected by Republic is deposited in the 2,540 acre Apex Landfill, located northeast of Las Vegas that Republic owns and operates. The Apex Landfill began operating on October 9, 1993 and replaced the Sunrise Landfill, which had previously serviced the valley, and closed on October 8, 1993 (Vellutini 2003).

Boulder City Disposal, Inc., collects solid waste in Boulder City and deposits the waste in a city-owned landfill. The company also manages the landfill (Boulder City 2003).

#### 3.14.6.9 Flood Protection

In 1985, the Nevada Legislature created the CCRFCD in response to severe flooding problems in Clark County. The CCRFCD is responsible for developing and implementing a comprehensive flood control master plan to alleviate flooding. The original flood control master plan was developed in 1986, and in accordance with Nevada state law, has been updated at 5-year intervals (CCRFCD 2002).

The 2002 MPU is the most recent amendment. The MPU serves as a planning tool for the implementation of the flood control system in the Las Vegas Valley and the design and construction of master plan facilities. Many of the existing and proposed flood control facilities are located on federal lands managed by the BLM. Consequently, NEPA requires environmental analyses for federal actions; this SEIS is being prepared to update the 1991 SEIS that was prepared for CCRFCD Master Plan. The flood control system identified and described in the 2002 MPU may be subject to further amendments and revisions in the future as detailed analyses are completed for individual facilities (CCRFCD 2002).

#### 3.14.6.10 Medical Facilities

Currently, 16 hospitals (including five specialty hospitals), 14 quick care centers, and seven hospices exist in the Las Vegas Valley metropolitan area (NDA 2003).

## 3.15 ENVIRONMENTAL JUSTICE

On February 11, 1994, President Clinton issued Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The EO, along with its accompanying cover memorandum (memo), requires federal agencies to incorporate environmental justice into their missions. The order mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their actions, programs or policies on minority and low-income populations. The memo specifically mentions the importance of procedures under the NEPA for identifying and addressing environmental justice concerns (CEQ 1997).

Both the CEQ and the EPA have oversight of federal agency compliance with EO 12898 and NEPA and, consequently, have developed guidelines for evaluation of environmental justice under NEPA. The CEQ guidelines provide an overview of EO 12898 with respect to NEPA, and discuss environmental justice in terms of specific phases of the NEPA process. The EPA guidelines are similar to the CEQ guidelines but provide greater detail on preparing and evaluating environmental impact assessments (CEQ 1997). The evaluation of environmental justice in this SEIS is consistent with both sets of guidelines.

The guidance for implementing the EO defines both minority and low-income populations as follows (CEQ 1997):

- *Minority:* Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.
- *Minority population:* The minority population of the affected area exceeds 50 percent or is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.
- *Low-income:* Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Census.

The existence of a minority or low-income population within the Project Area must be compared with a geographic unit; typically the smallest governmental unit that encompasses the Project Area and generally known as the community of comparison (COC). For this analysis, the COC is Clark County.

### 3.15.1 Minority Populations

The racial composition of the population for the Project Area was determined and that number was compared to figures for Clark County to determine if a minority population exists, as defined above. The racial profile for each city or unincorporated area in the Project Area is displayed in Table 3.15-1. Statistics that compare the racial profile of Clark County residents and the Project Area (as a whole) are displayed in Table 3.15-2. The Project Area consists of the cities of Las Vegas, North Las Vegas, Henderson and Boulder City as well as the unincorporated communities of Enterprise, Lone Mountain,

**TABLE 3.15-1. Racial Population within Each City and Unincorporated Area in the Project Area**

| City/ Unincorporated Area | Number (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Caucasian | Black or African American | American Indian or Alaskan Native | Asian | Native Hawaiian or Pacific Islander | Other | Two or More Races |
| Boulder City | 14,149 (94.5) | 107 (0.7) | 108 (0.7) | 107 (0.7) | 24 (0.2) | 190 (1.3) | 281 (1.9) |
| Enterprise | 12,078 (82.3) | 464 (3.2) | 118 (0.8) | 762 (5.2) | 80 (0.5) | 593 (4.0) | 581 (4.0) |
| Henderson | 148,181 (84.5) | 6,590 (3.8) | 1,236 (0.7) | 6,983 (4.0) | 728 (0.4) | 5,549 (3.2) | 6,114 (3.5) |
| Las Vegas | 334,230 (69.9) | 49,570 (10.4) | 3,570 (0.7) | 22,879 (4.8) | 2,145 (0.4) | 46,643 (9.7) | 19,397 (4.1) |
| North Las Vegas | 64,591 (55.9) | 21,970 (19.0) | 943 (0.8) | 3,740 (3.2) | 610 (0.5) | 18,224 (15.8) | 5,410 (4.7) |
| Paradise | 134,927 (72.5) | 12,260 (6.6) | 1,424 (0.8) | 12,135 (6.5) | 1,097 (0.6) | 15,568 (8.4) | 8,659 (4.7) |
| Spring Valley | 85,224 (72.6) | 6,214 (5.3) | 701 (0.6) | 13,164 (11.2) | 567 (0.5) | 6,036 (5.1) | 5,484 (4.7) |
| Summerlin South | 2,946 (78.9) | 155 (4.1) | 22 (0.6) | 375 (10.0) | 16 (0.4) | 106 (2.8) | 115 (3.1) |
| Sunrise Manor | 102,212 (65.5) | 20,117 (12.9) | 1,529 (1.0) | 8,445 (5.4) | 713 (0.5) | 15,814 (10.0) | 7,290 (4.7) |
| Whitney | 13,200 (72.2) | 1,247 (6.8) | 203 (1.1) | 697 (3.8) | 82 (0.4) | 2,605 (9.7) | 827 (4.5) |
| Winchester | 19,364 (71.8) | 1,895 (7.0) | 234 (0.9) | 1,445 (5.4) | 119 (0.4) | 2,605 (9.7) | 1,296 (4.8) |

Source: Census (2000).
*Figures are for 2000 (latest available).

**TABLE 3.15-2. Racial Population within Clark County and the Project Area**

| Racial Group | Number (Percentage) | |
|---|---|---|
| | Clark County | Project Area |
| Caucasian | 984,796 (71.6) | 931,102 (71.3) |
| Black or African American | 124,885 (9.1) | 120,589 (9.2) |
| American Indian or Alaskan Native | 10,895 (0.8) | 10,088 (0.8) |
| Asian | 72,547 (5.3) | 69,732 (5.3) |
| Native Hawaiian and Other Pacific Islander | 6,412 (0.5) | 6,181 (0.8) |
| Other race | 118,465 (8.6) | 113,345 (4.2) |
| Two or more races | 57,765 (3.7) | 55,454 (4.2) |
| **Total Population** | **1,375,765** | **1,306,491** |

Source: Census (2000).
* Figures are for 2000 (latest available).

Paradise, Spring Valley, Summerlin South, Sunrise Manor, Whitney and Winchester. Lone Mountain is not addressed individually by the census; the unincorporated community is included in the overall Clark County census count.

The racial profile data in Table 3.15-2 show that no minority populations for any of the cities or unincorporated areas within the Project Area exceed 50 percent. The racial profile data in Table 3.15-2 show that the minority population percentage in the Project Area is not meaningfully greater than the percentage in Clark County. Therefore, according to the guidelines for implementing the EO on environmental justice, a minority population does not exist in the Project Area.

## 3.15.2 Low Income Populations

According to the guidance for implementing EO 12898 on Environmental Justice, low-income populations are defined as those with incomes below the poverty threshold as determined by the Census (CEQ 1997). Table 3.15-3 shows that low-income populations do exist in all of the cities and unincorporated areas within the Project Area. Table 3.15-4 compares the number and percentage of families living in poverty in Clark County with each of the cities and unincorporated areas within the Project Area. The poverty and income data for Clark County and the Project Area do not indicate a meaningful difference. An average of 7.0 percent of families in Clark County live in poverty. In the Project Area, an average of 7.3 percent of all families are in poverty. However, the median household income and per capita income are slightly higher in the Project Area than in Clark County.

**TABLE 3.15-3. Poverty and Income Status within the Project Area ***

| Community/Area | Number (Percentage) of Families in Poverty | Median Annual Household Income | Per Capita Annual Income |
|---|---|---|---|
| Boulder City | 202 (4.7) | $50,523 | $27,770 |
| Enterprise | 254 (6.6) | $50,667 | $25,063 |
| Henderson | 1,847 (3.9) | $55,949 | $26,815 |
| Las Vegas | 10,166 (8.6) | $44,069 | $22,060 |
| North Las Vegas | 3,202 (11.8) | $46,057 | $16,023 |
| Paradise | 3,569 (8.1) | $39,376 | $21,258 |
| Spring Valley | 1,451 (4.8) | $48,563 | $26,321 |
| Summerlin South | 15 (1.3) | $64,784 | $69,250 |
| Sunrise Manor | 4,039 (10.4) | $41,066 | $16,659 |
| Whitney | 365 (8.2) | $36,536 | $16,969 |
| Winchester | 682 (11.4) | $32,251 | $20,615 |

Source: Census (2000).
* Figures are for 1999 (latest available).

**TABLE 3.15-4. Poverty and Income Status for Clark County and the Project Area ***

| Community/Area | Number (Percentage) of Families in Poverty | Median Annual Household Income | Per Capita Annual Income |
|---|---|---|---|
| Clark County | 26,886 (7.0) | $44,616 | $21,785 |
| Project Area | 2,345 (7.3) | $46,349 | $26,255 |

Source: Census (2000).
* Figures are for 1999 (latest available).

# CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

## INTRODUCTION

This chapter analyzes the programmatic environmental impacts and effects of implementing the Proposed Action and No-Action Alternative described in Chapter 2. The environmental baseline used for projecting impacts is the current condition or situation described in Chapter 3, Affected Environment. Each programmatic action that could impact resources or resource uses has been analyzed, and the conclusions of these analyses are described under the resource consequence sections that follow. In contrast to the FEIS, this document does not present programmatic and detailed project specific information.

### Analytical Assumptions

The following assumptions and guidelines were used to guide the analysis of environmental consequences:

1. The analytical horizon for the SEIS was the 10-year planning framework for the Master Plan.
2. The long-term analytical horizon for cumulative impacts is 20 years (i.e., beyond the near-term planning horizon of the Master Plan).

### Types of Impacts

This chapter describes the programmatic-level, direct, indirect and cumulative impacts of implementing the Proposed Action and No-Action Alternatives. The analysis of impacts describes the possible impacts, both adverse and beneficial, that continued flood control development action or inaction would have on the resources being analyzed. The impacts are assessed compared with the current conditions. It is important to note here that this document is being performed at a programmatic level and as such the impacts reported will be at a higher, more general level. Project-specific impacts will be assessed on a case-by-case basis using the procedures outlined in Chapter 8 of this document.

This SEIS focuses on examination of environmental factors on a Las Vegas Valley/Boulder City-wide basis in order to provide a programmatic level of understanding decision making for planners. As a programmatic SEIS, this document will be useful in the implementation of the master plans allowing for the consideration of environmental factors in the secondary planning processes for individual facilities. Project-specific impacts will be assessed on a case-by-case basis using the procedures outlined in Chapter 8 of this document.

Direct impacts are those that would be attributed as a direct result of the Proposed Action (e.g., the potential removal of species habitat by land shaping). Indirect actions are those that would be attributed to the Proposed Action through an intermediate process (e.g., flood control facilities would reduce the risk of flooding in an area of the city resulting in an increase in population resulting in the increased socioeconomic demand on schools and other infrastructure).

Cumulative impacts are described at the end of the chapter (Section 4.16). This section describes impacts that the alternatives could have in interrelation with other past, current and reasonably foreseeable future actions in and adjacent to the planning area. The period of potential cumulative impact is defined as 20 years.

# 4.1 GEOLOGY AND SOILS

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect the geological and soils resources within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses will be conducted on a case-by-case basis following the process presented in Chapter 8.

## 4.1.1 Proposed Action

### 4.1.1.1 General Impacts

There are no unique or special geologic or soil resources in the Project Area that would be adversely affected by the Proposed Action. In a few isolated places, planned facilities are near or adjacent to exposed bedrock. Therefore, the possibility exists that bedrock would be encountered during construction. This may cause difficulties in grading, site preparation, excavation and trenching.

Soils would be disturbed, mixed, compacted and exposed to erosion during construction. Temporary increases in soil erosion and windblown dust during construction would be expected, but, if appropriate mitigation measures were employed, these impacts would be minor.

Over the long term, erosion may also occur in the Project Area from heavy rains and associated sheet flow. The potential for increased bank erosion during flood events would be significant in the event that proposed facilities increase the velocity and volume of runoff in unlined channels. Detention basins would reduce the velocity and volume of runoff in channels downstream; however, once water has been impounded and can deposit its sediment load, it carries increased erosive power into facilities and unlined channels downstream. Deposition of storm water sediment load in areas of changing slopes, flood water detention, or on outlet or culvert screening devices (trash racks) could create an additional effect requiring the need for additional facility design, planning and maintenance.

### 4.1.1.2 Direct Construction and Operational Impacts

A number of geologic and soil conditions have the potential to impact the construction and operation of flood control facilities. While most EISs solely address impacts to the natural environment, this document examines these impacts because of the potential for impacts on downstream facilities, property, human life and biological systems. These are discussed below.

#### *4.1.1.2.1 Strong Ground Motion*

The Project Area is located in an area of potentially active faults that may generate seismicity that could create potentially strong ground motion. The result may be damage to facilities that may also impact the function of downstream facilities (e.g., damage of detention basin could result in downstream flooding). During the geotechnical investigation for each facility an appropriate probabilistic seismic risk analysis should be developed as part of the design phase of each facility. Analysis of the possible failure of a facility on downstream flooding conditions should also be performed to assist in the design of facilities downstream.

Short-term impacts could result from strong ground motion during facility construction. Damage to equipment or injury to construction personnel could occur from falling debris initiated by ground motions. Construction will occur over a brief period of time, in comparison to the frequency of strong ground motion, so the probability that strong ground motion would occur during this period is quite low.

#### *4.1.1.2.2 Surface Rupture and Land Subsidence*

Sources of surface rupture include active fault traces, fissures and subsidence-related features (i.e., underground voids) that may have adverse impacts on proposed facilities. These impacts could range from minor damage repaired through routine maintenance to catastrophic failure, particularly during a flood event. Each proposed facility site, particularly those located near faults or areas of known fissuring, should be investigated by a qualified engineering geologist as part of the design activities, so that adequate mitigation can be incorporated into design, construction and operation.

If potential surface rupture features are identified, or if conditions exist for their formation, further investigation, such as exploratory trenching, should be conducted to establish position, size, nature and relative age and timing (slow formation over time; rapid adjustment caused by an earthquake) of the feature in order to assess and mitigate the potential hazard. Facilities located in especially risky areas (proximal to known faults, subsidence depressions or fissures) should also be re-evaluated by flood engineers as to the impact of failure of this facility on downstream flows.

#### *4.1.1.2.3 Soils*

Soil types present varying challenges to geotechnical evaluation of sites and to the design and construction of facilities. Expansive (i.e., hydrous clays, sodium sulfate salts) and collapsible soils (i.e., porous, low density, low moisture and/or soluble) would impact design, construction and long-term operation of facilities owing to differential soil movement. Liquefaction would reduce the shear strength of soils that are generally quite competent (i.e., granular soils) due to an increase in water pressure during seismic shaking. Caliche formation in soils would result in such strong cementation that rock excavation techniques are often needed.

Chemical and physical reactions between soils and construction materials can impact project facilities by causing premature deterioration of construction materials. In particular, soils high in gypsum and sodium sulfates occur in the Project Area and these soils can be corrosive to some types of cements and steel. This corrosion can decrease the strength of certain construction material causing damage to structures founded within or on them. The presence of problematic soils can be determined by geotechnical evaluations of each facility site and the appropriate mitigation technique applied so as to minimize the impact level to insignificant.

#### *4.1.1.2.4 Slope Instability*

Potential impacts associated with slope instability include damage to equipment, facilities and personnel during construction and operation. Areas of significant slope instability are not identified in the Project Area, but minor slope instability does exist (see Section 3.1.8). Long-term impacts to facilities are not considered significant because standard engineering and geotechnical design can mitigate anticipated damages. Short-term impacts to facilities during construction are minor because of the relatively short time frame of facility exposure to slope instability hazards and mitigations that can be used during construction to minimize impacts.

### 4.1.1.3 Mineral Resources

The only mineral resources in the Project Area are sand and gravel for construction and the Blue Diamond Gypsum Mine. The Blue Diamond Gypsum mine is located within the Project Area, but no facilities are planned in the mining area or on properties adjacent to the mine. Therefore no impacts to the gypsum mine are anticipated and the gypsum mine presents no impacts to project facilities.

Sand and gravel quarries occur within the Project Area, and planned facilities occur on these sites. These resources are not unique or rare. Therefore, any loss of sand and gravel resources due to location, construction of or operation of proposed facilities is a relatively minor impact.

### 4.1.2 No-Action Alternative

The No-Action Alternative is continued implementation of the 1996 MPU, a plan generated on the existing information available at that time. The No-Action Alternative would not have any beneficial impacts to the geologic environment. Local impacts to geology and soils would increase commensurate with the increase in the population of the Las Vegas Valley area. As major developments proceed, the topography and soils would change from the rural undisturbed landscape to a primarily urban landscape with a modified topography, compacted soils and less infiltration area. All new developments would be required to include flood control facilities in their projects but these developments would not be responsible for the installation of regional-scale detention facilities. As a result, adverse impacts could consist of increased erosion from increased runoff as well as cumulative damage to existing flood conveyance and detention systems downstream. Because water retention/detention facilities would be undersized, increased erosion would also be experienced in the Las Vegas Wash, ultimately resulting in increased sediment loads delivered to Lake Mead.

## 4.2 PALEONTOLOGICAL RESOURCES

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect the paleontological resources within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action. The FEIS did not present an examination of paleontological resources. Project-specific analyses will be conducted on a case-by-case basis following the process presented in Chapter 8.

### 4.2.1 Proposed Action

Construction activities have the potential to encounter the fossil bearing geologic units. The geologic units discussed have high potential to contain fossils, but their paleontological sensitivity is not likely to be high, unless Pleistocene-occupied caves (similar to Gypsum Cave, which occurs several miles east of the Project Area) are encountered. Pleistocene caves may be found in the Paleozoic carbonate rocks (Sultan, Monte Cristo, Bird Spring and Kiabab Formations). Given the proximity of these sites to the Las Vegas area, it is likely that these sites would have already been disturbed and thus the scientific credibility may be questioned.

Most of the facilities and construction activities will occur in younger alluvium on the valley floor. While not all the alluvium is anticipated to be paleontologically sensitive, excavation of this material may expose potentially fossiliferous alluvial units underneath (either the Quaternary Las Vegas Formation or the Tertiary Muddy Creek Formation). Some construction will occur in exposed potentially fossiliferous alluvial units.

However, the scientific value of fossils is in the information they contain, not in the fossilized material themselves. Therefore, proper mitigation measures would reduce impacts to an insignificant level.

### 4.2.2 No-Action Alternative

Under the No-Action Alternative, implementation of the 1996 MPU would proceed. Facilities would be constructed in accordance with this previous plan and the potential exists to encounter paleontological resources during excavation and facility construction. The potential to encounter Pleistocene-aged fossils is higher in the northern part of the valley in the North Las Vegas Wash Watershed, where 1996 MPU facilities are reduced in comparison to the Proposed Action, so it is possible that the No-Action Alternative would result in fewer impacts to paleontological resources than that of the Proposed Action.

## 4.3 SURFACE WATER HYDROLOGY

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect the surface water resources within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses would be conducted on a case-by-case basis following the process presented in Chapter 8.

### 4.3.1 Construction Impacts

#### 4.3.1.1 Proposed Action

Construction of flood control facilities may have temporary adverse environmental impacts on surface water resources such as:

- Interruption in water and wastewater distribution/collection due to unintended line break.
- Interruption in wastewater treatment operations due to unintended damage to wastewater facilities.
- Interruption in flows during storm events from dredge or fill of jurisdictional waters.
- Increase in suspended sediment loading as a result of construction exposed soils during a storm event.

#### 4.3.1.2 No-Action Alternative

Under the No-Action Alternative, fewer impacts would be anticipated as a result of implementation of the 1996 MPU, which calls for fewer facilities to be constructed.

### 4.3.2 Operational Impacts

#### 4.3.2.1 Storm Water Runoff

##### *4.3.2.1.1 Proposed Action*

Environmental consequences to the Project Area's surface water hydrology from the Proposed Action occur because the flood control facilities are designed and created to channelize and deliver flood flows to the Lower Las Vegas Wash and to Lake Mead by artificial and enhanced-natural conveyances and detention facilities. Because of the Las Vegas Valley and Boulder City's development, infiltration of runoff is reduced as a result of increased impervious area, creating potentially larger volume flood flows. These flows are intercepted by detention and conveyance facilities that may result in either increases or decreases in runoff volumes and velocities.

- Increases result from facilities that are designed to concentrate flows, resulting in flow depths and velocities that are more hazardous and have a higher potential for erosion.
- Decreases in peak flow volumes and velocities downstream from attenuation facilities would result in lower potential for erosion.

In each of the nine Las Vegas Valley watersheds, hydrologic analyses performed for the 2002 MPU resulted in increased peak flows over those determined in the 1996 MPU (CCRFCD 1996). Increases in peak flows occurred in all watersheds due to changes in land use and greater amounts of impervious area. In some watersheds, other factors also contributed to increased peak flows: refinement of sub-basin modeling (i.e., larger sub-basins divided into more uniform smaller sub-basins), standardization of modeling parameters (i.e., precipitation values, lag times), inclusion of increased storm flows from up-gradient watersheds, adjustments in watershed boundaries and facilities therein, and new storm-centerings. New and proposed bank protection and erosion control structures constructed by SNWA in the Lower Las Vegas Wash were included in the 2002 analysis.

In the Boulder City watershed, hydrologic analyses performed for the 2003 MPU were based on hydrologic models from the 1998 MPU with modifications reflecting updated land use and facility development since 1998. The 2003 analyses used new drainage studies from new developments, new aerial photography, improved or altered topography and adjustments to basin boundaries to model affects of facilities and ultimate development.

As a result of the increased peak flows calculated in the Project Area, the Proposed Action would result in the construction of additional detention basins or expanded capacity in existing basins, newly proposed collector facilities and modified channels and pipelines to convey outfall from these basins (CCRFCD 2002). These facilities would reduce the flood hazard potential in developed areas by detaining flows in up-gradient areas and releasing smaller volumes of water over longer times. Erosion in natural channels would be reduced and potential damage to natural and constructed storm water conveyance facilities would be reduced. Potential erosion damage of the Lower Las Vegas Wash would be reduced, as well as the sediment load carried by flood waters through Lower Las Vegas Wash and into Lake Mead.

#### *4.3.2.1.2 No-Action Alternative*

The No-Action Alternative is the unmodified implementation of the 1996 MPU for Las Vegas Valley (CCRFCD 1996) and the 1998 MPU for Boulder City (PBS&J 1998). This alternative, in each watershed described below, would have the potential for negative impacts to surface water runoff and flooding in both areas. Facilities that were previously planned were designed to manage flood flows that were predicted based on outdated land use criteria and ultimate land development plans, as well as less flood flow monitoring data. For example, the flood event of July 1999 produced a new record for flood flow volumes and amounts of runoff throughout the planning area and eventually into the Lower Las Vegas Wash.

The No-Action Alternative would not meet the objectives of controlling flooding in the Las Vegas and Boulder City urban areas and, thus, would negatively impact the hydrology of the Project Area. The existing system, with current development, would not be adequate to safely manage a 100-year storm event, as evidenced by the property damage and loss of one life to drowning in the Flamingo Wash (Sutko 1999). Because flood flows would increase in terms of velocity and volume as a result of continued land development, natural and man-made conveyance facilities (e.g., channels, pipelines, culverts, etc.) would be subject to increased erosion and higher potential for damage and failure. Detention facilities would not be adequate to detain and release lower volumes of storm water runoff to downstream detention and conveyance facilities. Damage and possible failure of detention facilities may occur. Erosion, damage and/or failure of flood control facilities would result in increased maintenance and operating costs.

### 4.3.2.2 Water Quality

#### *4.3.2.2.1 Proposed Action*

The Proposed Action would result in increased facilities to manage storm water runoff. These facilities would also better transmit dry weather flows from the urban areas to Las Vegas Wash, or Hemenway Wash, and ultimately to Lake Mead. Dry weather flows potentially contain pollutants such as fertilizers, nutrients, urban chemicals, suspended solids (i.e., trash and dirt) and metals. However, as discussed in Section 3.3.5.3, wet weather flows are the more important contributor of short-term high pollutant concentrations in the Lower Las Vegas Wash.

Wet weather flows contain higher amounts of bacteria, suspended solids, hydrocarbons, surfactants, nutrients and heavy metals than dry weather flows because rainwater runoff flows over landscapes, streets, vacant lots, construction projects and parking lots on its way to the storm drain. Higher suspended solids loads can be entrained and carried by higher volume and swifter water that occurs during wet weather. The Proposed Action would construct additional conveyance facilities and line additional channels. Any portion of the system where channel improvements reduce infiltration and increase flow rates has the potential to carry contaminates further downstream. The Proposed Action would not increase the slopes of channels, so increased water velocities, which produce more turbulent flow allowing for more erosive power, would not occur as a result of slope increases. On the other hand, better-armored natural conveyance channels may reduce the concentration of suspended solids in the storm water runoff by reducing erosion of more susceptible natural, unlined channels. Benefits to water quality may also be incurred as a result of increased conveyance channels because storm water would spend less time flowing overland or on roadways where the water may accumulate urban chemicals, debris or sediment.

Detention of flood flows may result in the settlement of suspended solids of the storm water. While this may improve water quality, it may also result in a negative impact if the clear releases erode downstream unlined channels.

The Proposed Action has the potential to also decrease erosion in the Lower Las Vegas Wash. If floodwaters are successfully detained and released as lower volume, lower velocity flows, then the vulnerable receiving, mostly natural, channel of the Lower Las Vegas is less likely to sustain erosion. Facility design within the Lower Las Vegas Wash watershed also took into account existing and planned erosion control structures within the wash to better ensure decreased erosion from storm water flows. With reduced erosion of the Las Vegas Wash, less sediment would be transported into Lake Mead.

Although the Proposed Action has the potential to reduce pollution concentration in wet weather flows, the increasing development and occupation of the Project Area still has the potential to increase pollutant loads of runoff water.

#### *4.3.2.2.2 No-Action Alternative*

The No-Action Alternative has the potential to increase pollution concentration and pollution loading in runoff water because, without the Proposed Action, flooding would increase due to increased development and reduced infiltration area. Increased developed area and occupation would result in increased pollutants in roadways, parking lots, construction sites and landscaped areas, and runoff would continue to carry these pollutants through the Las Vegas Valley and Boulder City Areas to Lake Mead.

Under the No-Action Alternative, there is the potential that existing facilities would not be able to detain and transmit all storm flows. Therefore, higher volume, higher velocity flows have the potential to increase erosion in unlined channels or create new channels in lower elevations and to increase the scouring and erosion in Lower Las Vegas and Hemenway Washes. With this increase in erosion, higher suspended solid loads and concentrations would result.

#### 4.3.2.3 Perennial Low Flows

##### *4.3.2.3.1 Proposed Action*

The Proposed Action can affect perennial low flows in a number of ways, and these affects are facility dependent. Therefore, no quantification of the overall impact of the proposed project on perennial low flows can be performed or estimated in this document. Potential, facility-dependent impacts must be evaluated on a case-by-case basis and are:

- Lining of unlined channels may result in similar or increased perennial low flows caused by shallow groundwater seeps because holes are placed in the lining to allow shallow groundwater to seep into the channel.
- Increased perennial low flows by installing de-watering facilities and flood control facilities constructed within the area of shallow groundwater.
- Increased groundwater seepage in the Lower Las Vegas Wash.

In most instances decreasing or increasing perennial low flows would occur only in lined channels. There is little impact to water resources in general (i.e., use of water by native vegetation). Decreasing groundwater seepage has the potential to increase shallow groundwater levels, which may impact adjacent lands' improvements (discussed further in Section 4.4). Decreasing groundwater seepage has the potential to increase shallow groundwater seepage in the Lower Las Vegas Wash (refer to Section 4.4).

##### *4.3.2.3.2 No-Action Alternative*

Under the No-Action Alternative, perennial low flows would not be affected by flood control plans and facilities.

### 4.3.3 Colorado River Return Flow Credit

#### 4.3.3.1 Proposed Action

The Las Vegas Valley and Boulder City obtains most of their water supply from Lake Mead. Any water that originates from the Colorado River system (Lake Mead) that is not consumptively used is returned to Lake Mead via Las Vegas Wash and a return flow credit is given that allows SNWA to withdraw more water from Lake Mead. Most of the water that is not consumptively used is water used indoors and returned to the wastewater treatment plants; outdoor water use is generally consumptive. No return flow is received from Boulder City because the wastewater treatment plant discharges to Eldorado Valley, not to Lake Mead. Because return flow credits do not involve storm water flows, the Proposed Action would not directly impact Colorado River return flow credits.

#### 4.3.3.2 No-Action Alternative

The No-Action Alternative would not have any impact on Colorado River return flow credits.

## 4.4 GROUNDWATER HYDROLOGY

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect the groundwater resources within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses would be conducted on a case-by-case basis following the process presented in Chapter 8.

## 4.4.1 Construction Impacts

### 4.4.1.1 Proposed Action

Construction activities under the Proposed Action may affect, and be affected by, the shallow groundwater system in Las Vegas Valley. Some uncertainty exists in predicting potential impacts to the shallow groundwater system and predicting impacts of the shallow groundwater system to the Proposed Action. In the area of shallow groundwater in Las Vegas Valley, these impacts may be considered potentially important in facility and overall project design and appropriate specific mitigation measures should be considered.

No consequence to deeper groundwater resources would result from the Proposed Action for two reasons:

1. Facility construction and operation would not require excavations deeper than 30 feet (9 m) below land surface (maximum depth of what is defined as shallow groundwater).
2. In general, deeper aquifers are confined, or isolated, from infiltration and contamination by surface waters; recharge to these groundwater aquifers begins in the surrounding mountains where infiltration largely occurs in structural and solution enlarged cracks in bedrock.

No evidence now exists to indicate that surface water in the Las Vegas Valley has previously infiltrated deeply enough to reach deeper aquifer zones (Brothers and Katzer 1988; Hines et al. 1993; Bevans et al. 1998) but the possibility cannot be entirely ruled out.

### 4.4.1.2 No-Action Alternative

Under the No-Action Alternative no impacts would be anticipated.

## 4.4.2 Operational Impacts: Recharge of Groundwater

### 4.4.2.1 Proposed Action

#### *4.4.2.1.1 Shallow Groundwater*

Recharge to the shallow groundwater zone may occur from surface water runoff (i.e., wet or dry weather flows), direct infiltration of precipitation and upward flow from deeper aquifers. Due to high evaporation rates in bare soils in the desert southwest, direct infiltration of precipitation to the groundwater system does not occur until 8 to 10 inches (20 to 25 cm) of precipitation is available (Donovan and Katzer 2000). Historically, upward flow from deeper aquifers was thought to be the principal means of recharge to the shallow groundwater zone (Brothers and Katzer 1988; Hines et al. 1993). It has been suggested that recharge to the shallow groundwater zone has occurred since the 1960s from runoff and over-irrigation of landscape (Brothers and Katzer 1988; Hines et al. 1993).

Recharge to shallow groundwater is not necessarily a desirable condition because it may elevate groundwater levels. Elevated shallow groundwater levels negatively impact construction in terms of foundation placement and design, and rising shallow groundwater levels may cause geotechnical damage to existing structures, damage root systems in landscape areas or may result in an increased potential for downward leakage of the poorer quality shallow groundwater to the principal aquifer.

The Proposed Action may impact infiltration of surface water and subsequent recharge to shallow groundwater. For example, facility construction, such as lining channels with concrete, could reduce groundwater recharge but detention facilities located in the area of shallow groundwater may increase recharge to the shallow zone by ponding runoff water for longer periods of time.

#### *4.4.2.1.2 Deeper Groundwater*

No impacts to recharge of deeper groundwater would be anticipated because recharge to this aquifer occurs in the surrounding mountains at elevations greater than about 3,500 feet (1,067 m) above mean sea level (Donovan and Katzer 2000:Figures 2-5 and Table 4), where the amount of precipitation increases to greater than 8 to 10 inches (20 to 25 cm) per year.

#### 4.4.2.2 No-Action Alternative

No environmental effects related to groundwater recharge would be anticipated under the No-Action Alternative.

## 4.4.3 Discharge of the Shallow Groundwater Zone

#### 4.4.3.1 Proposed Action

Some types of facility construction (i.e., channel or wash lining with concrete, box culverts) have the potential to decrease discharge of shallow groundwater, while other facilities may result in increases of shallow groundwater discharge due to dewatering in either the short-term (i.e., during construction) or the long-term (i.e., construction and operation).

Decreasing discharge of shallow groundwater may produce undesirable impacts if a concomitant rise in shallow groundwater levels occurs. In addition to the effects listed in Section 4.4.1.1 and 4.4.2.1, decreasing shallow groundwater discharge may result in decreased perennial low flows, which may potentially impact wetland or riparian vegetation in areas such as Lower Las Vegas Wash. Any inhibition of shallow groundwater discharge could result in increased discharge in other locations and, in this case, it would be possible that no rise in shallow groundwater levels could occur.

#### 4.4.3.2 No-Action Alternative

No environmental effects related to groundwater discharge are anticipated under the No-Action Alternative.

# 4.5 BIOLOGICAL RESOURCES

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect biological resources within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. All biological resources would be subject to a site-specific analysis as described in Chapter 8.

Impacts are categorized and described in general terms without reference to facility type or any site-specific resources. An impact to biological resources would be considered to occur if construction and/or operation of the proposed facilities would cause substantial changes to the existing abundance, diversity, distribution or habitat value of existing plants or wildlife.

## 4.5.1 Proposed Action

### 4.5.1.1 Vegetation Communities

Construction and operation of the proposed flood control facilities would result in direct and indirect impacts to both natural and developed/urban vegetation communities within the Project Area (Table 4.5-1). Over the life of the project approximately 4,308 acres of vegetation would be cleared under the Proposed Action (see Table 4.5-1). These acreages are based on current facility locations and descriptions in the Master Plan. However, the actual acreages may vary from these estimates depending on the final plan design of individual facilities. Of the total construction disturbance associated with the Proposed Action, approximately 2,132 acres of developed/urban, 1,886 acres of creosote-bursage scrub, 162 acres of salt desert scrub - mesquite/acacia, 86 acres of Mojave desert mixed scrub, and less than 1 acre of riparian-wetland vegetation and blackbrush scrub vegetation would be impacted.

Direct effects to vegetation communities would occur from the disturbance or removal of vegetation at the facility sites, as well as access roads to these facilities. Areas adjacent to proposed structures would experience temporary disturbance associated with equipment access, materials, stockpile locations and workspace requirements. Although these temporarily disturbed areas are expected to eventually recover, recovery in arid environments is extremely slow. Consequently, these disturbances are viewed as a long-term impact.

Implementation of the Proposed Action also would increase the potential for occurrence of indirect effects. Disturbances from construction would increase the potential for the limited invasion and establishment of noxious weed species. Noxious weeds tend to be aggressive colonists of disturbed areas where the native vegetation has been removed. Therefore, disturbances associated with construction of many of the proposed facilities and associated access roads would provide opportunities for noxious weeds to invade and become established. Additional indirect construction related impacts could include soil compaction, disruption of microphytic crusts and an increased potential for wind and water erosion of disturbed surfaces prior to reclamation. However, indirect disturbance effects from construction would be reduced to non-significant levels with the implementation of recommended and required mitigation measures.

### 4.5.1.2 Wildlife

Construction and operation of the proposed flood control facilities would result in direct and indirect impacts to wildlife resources. The principal impacts to terrestrial wildlife likely to be associated with the proposed project include:

- The loss of certain wildlife habitats due to construction activities such as earth-moving at facility sites and access roads
- The loss of certain wildlife habitats due to dredge or fill of jurisdictional waters
- Habitat fragmentation
- Direct mortality and/or displacement of some wildlife species
- An increase in the potential for illegal kill and harassment of wildlife

The magnitude of impacts to wildlife resources would depend on a number of factors including the type and duration of disturbance, the species of wildlife present, time of year and implementation of required and recommended mitigation measures.

Wildlife habitat removal includes activities such as:

- Ground surface grading and excavation
- Lining drainages used as wildlife travel corridors
- Tree or shrub removal
- Scraping of road surfaces that disturbs surface and subsurface soils

## TABLE 4.5-1. Potential Disturbances to Vegetation Communities by Facility Type

| Facility Type | Facility Description | Total Area (Acres) | Creosote-Bursage Scrub | Mojave Desert Mixed Scrub | Salt Desert Scrub - Mesquite/ Acacia | Riparian-Wetland | Developed/ Urban | Blackbrush Scrub |
|---|---|---|---|---|---|---|---|---|
| A | Earth Channel | **4.2** | 3.1 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 |
| | Concrete Channel | **250.9** | 114.7 | 8.2 | 4.2 | 0.2 | 123.2 | 0.0 |
| | Riprap Channel | **49.4** | 30.5 | 1.5 | 0.0 | 0.0 | 17.4 | 0.0 |
| | Gabion Channel | **25.1** | 9.3 | 0.8 | 0.0 | 0.0 | 14.9 | 0.0 |
| | Grass Lined Channel | **3.5** | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 | 0.0 |
| | Unlined Levee | **0.1** | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert | **232.7** | 32.2 | 0.1 | 4.7 | 0.0 | 195.9 | 0.0 |
| | Reinforced Concrete Pipe Culvert | **23.1** | 8.5 | 0.2 | 1.3 | 0.0 | 13.1 | 0.0 |
| | Bridge | **0.2** | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| | Energy Dissipater | **1.0** | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Junction Structure | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Detention Basin | **1181.1** | 896.2 | 52.0 | 28.9 | 0.0 | 204.0 | 0.0 |
| | Debris/Sediment Basin | **50.4** | 34.7 | 15.5 | 0.0 | 0.0 | 0.2 | 0.0 |
| | Transition Basin | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | **0.3** | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | **4.5** | 3.0 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL ALL A FACILITIES** | | **1826.3** | **1133.6** | **79.8** | **39.1** | **0.2** | **573.5** | **0.0** |
| B | Earth Channel | **4.2** | 3.1 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 |
| | Concrete Channel | **79.8** | 37.7 | 11.3 | 9.2 | 0.0 | 14.2 | 7.3 |
| | Riprap Channel | **169.7** | 147.5 | 7.7 | 0.0 | 0.0 | 14.4 | 0.0 |
| | Gabion Channel | **33.1** | 28.7 | 0.5 | 0.0 | 0.0 | 3.9 | 0.0 |
| | Rock Lined Levee | **20.0** | 18.8 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 |
| | Erosion Control Structure | **16.5** | 12.8 | 0.0 | 0.0 | 2.9 | 0.7 | 0.0 |
| | Reinforced Concrete Box Culvert | **29.2** | 2.6 | 0.0 | 0.4 | 0.0 | 26.2 | 0.0 |
| | Reinforced Concrete Pipe Culvert | **3.5** | 2.4 | 0.5 | 0.0 | 0.0 | 0.6 | 0.0 |

NOTE: Estimates are based on facility descriptions in the Master Plan. Actual acreages may vary based on final plan design.

### TABLE 4.5-1. Potential Disturbances to Vegetation Communities by Facility Type (Continued)

| Facility Type | Facility Description | Total Area (Acres) | Creosote-Bursage Scrub | Mojave Desert Mixed Scrub | Salt Desert Scrub - Mesquite/ Acacia | Riparian-Wetland | Developed/ Urban | Blackbrush Scrub |
|---|---|---|---|---|---|---|---|---|
| | Bridge | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **TOTAL ALL B FACILITIES** | | **356.0** | **253.1** | **19.8** | **9.5** | **2.9** | **61.8** | **7.3** |

NOTE: Estimates are based on facility descriptions in the Master Plan. Actual acreages may vary based on final plan design.

Each of these activities could effectively remove existing habitat, thereby reducing its availability to local wildlife populations. Permanent and temporary loss of habitat as a result of construction activities could affect some small mammal, reptile and/or amphibian species with very limited home ranges and mobility. However, most of these species would be common and widely distributed throughout the area and the loss of some individuals as a result of habitat removal would have a negligible impact on populations of the species throughout the region.

In addition to these direct effects, some less mobile species (e.g., reptiles, amphibians and a number of smaller mammals) may be sensitive to the potential fragmentation of habitat associated with the installation of linear facilities, such as flood channels, that may act as a barrier to the movement of these animals. Dry washes are known to be an important habitat for many species of wildlife.

Direct loss of small mammals, reptiles and other less mobile species would result primarily from the use of construction equipment and vehicles involved in the transportation of materials and equipment to and from the job site. Surface disturbance during construction and reclamation of the proposed project could result in a potential loss of less mobile individual animals and/or burrows. Clearing, grading, excavating and/or burying habitats could also lead to direct mortality of small mammals and reptiles with eggs or young, resulting in an adverse but less than significant impact. Bird nests and young, in vegetation and in ground nests, could also be affected by clearing and ground disturbing activities.

Indirect effects due to displacement of wildlife would also occur as a result of construction activities associated with the proposed project. In response to the increase in human activity (equipment operation, vehicular traffic and noise) wildlife may avoid or move away from the sources of disturbance to other habitats. This avoidance or displacement could result in under utilization of the physically unaltered habitats adjoining the disturbances. The net result would be that the value of the habitats near the disturbances would be decreased and previous distributional patterns would be altered. The habitats would not support the same level of use by wildlife as before the onset of the disturbance. Additionally, some wildlife would be displaced to other habitats leading to some degree of overuse and degradation of those habitats.

Public vehicle use of roads built to access facilities and use of the facilities themselves can have a similar, additive or possibly a synergistic influence on reducing wildlife use of adjacent habitats, as well as causing additional impacts. Public access to facilities in the Project Area increases the potential for mortality and general harassment of wildlife. Closure of new and some existing roads to public vehicle use would be one of the most effective measures that could be implemented to offset this impact.

#### 4.5.1.3 Special Status Plant and Wildlife Species

In general, construction and operational impacts of the Proposed Action on special status plant and wildlife species and their habitats would be similar to those discussed in the preceding sections for vegetation communities and wildlife. However, these impacts can be more severe for special status plant and wildlife species, if present, since the distribution and abundance of many of these species are limited in the Las Vegas Valley and surrounding region.

With regard to special status plant species, impacts from the construction of proposed facilities would likely be greatest in the northern and western portion of the Project Area because these areas contain the highest concentration and diversity of special status plant species. Las Vegas bearpoppy, Las Vegas buckwheat and yellow and rosy twotone beardtongue have a wider distribution throughout this area. Therefore, the magnitude of impacts to suitable habitat for these species is likely to be greater than for other species with a narrower distribution (e.g., Blue Diamond cholla, Mojave milkvetch and white bearpoppy) whose habitats can be more easily avoided. Impacts to special status plant species and their habitats as a result of construction activities would be potentially significant. However, these would be mitigable by pre-construction surveys and avoidance measures as described in Chapter 5. Where Las Vegas buckwheat cannot be avoided, they will be salvaged and transplanted out of harms way, as directed by the BLM botanist. Other special status plant species may have seed collections performed prior to land disturbance and soils may be salvaged. In addition, cacti and yucca species will be salvaged and appropriately transplanted within the Project Area. All actions will be coordinated with the BLM botanist.

Sensitive wildlife species most likely to be adversely affected by construction activities associated with the installation of the proposed facilities include the desert tortoise, banded gila monster and western burrowing owl. Construction activities could directly kill and injure these species through vehicle strikes and through animals becoming crushed or buried as a result of construction, digging and earth-moving activities. These activities could also affect the desert tortoise, banded gila monster and western burrowing owl by substantially reducing or eliminating associated habitat for these species. Activities could also affect the desert tortoise and gila monster by creating a barrier to movement. This could result in increased habitat fragmentation and a barrier to gene flow. The facilities could also present a hazard to wildlife that may become trapped in the facility.

Any potential adverse impacts to the desert tortoise would be mitigated by implementation of the specific terms and conditions issued in the April 28, 1993, biological opinion by the USFWS to reduce the take of desert tortoises. The specific terms and conditions of the biological opinion allow for the loss of up to 5,120 acres of desert tortoise habitat and the take of (i.e., harassment by removal from harm's way prior to or during construction, operation or maintenance) 525 tortoises (USFWS 1993).

Many of the other special status wildlife species listed in Table 3.5-2 may experience both direct and indirect effects from implementation of the Proposed Action. Disturbance and displacement affects could occur as a result of increased noise and human activity at proposed facility sites, with the largest number of sensitive wildlife species occurring along the Lower Las Vegas Wash. Construction of Category B facilities (i.e., erosion control and bank protection facilities, gradient control weirs and riprap levees) in this area has the potential to impact the greatest number of special status wildlife species due to the fact that many of these species are limited only to riparian-wetland habitat and are found nowhere else on the Project Area. These species include the Yuma clapper rail, white-faced ibis, long-billed curlew, loggerhead shrike, western yellow-billed cuckoo, yellow warbler, southwestern willow flycatcher, western least bittern, phainopepla, common yellowthroat and a number of bat species. Potential direct and indirect impacts to special status wildlife species and their habitats as a result of construction of the proposed flood control facilities would be mitigable by pre-construction surveys and avoidance as described in Chapters 5 and 8. In addition, a facility-specific analysis will be completed for each facility following specific protocols outlined in Chapter 8. These analysis will require site-specific surveys for special status wildlife species and the incorporation of appropriate mitigation measures to reduce or eliminate impacts to these species.

### 4.5.2 No-Action Alternative

Impacts to biological resources would be expected to increase commensurate with the increase in the population of the Las Vegas Valley. Biological resources would be subject to the loss of up to 145,000 acres of habitat on private lands in Clark County under the existing MSHCP. The MSHCP would continue to provide coverage for federal and state listed species and candidates (including desert tortoise, southwestern willow flycatcher, yellow-billed cuckoo, Blue Diamond cholla, Las Vegas bearpoppy, threecorner milkvetch and sticky buckwheat) through funding and coordination of conservation measures in habitats of these species. Management of all other biological resources would continue under the existing management plans, policies and directions of BLM, USFWS, NPS, NDOW, and other agencies and entities with resource management authority.

# 4.6 CULTURAL RESOURCES

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect the cultural resources within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Cultural resources include prehistoric or archaeological resources, historic resources and ethnographic resources. All cultural resources would be subject to a site-specific analysis as described in Chapter 8.

The CCRFCD anticipates the construction and operation of flood control facilities within the Las Vegas Valley and Boulder City area. While much of this area has been and will continue to be disturbed due to development, the potential for cultural resources exists in many parts of the Project Area. Cultural resources are subject to impacts generally through any ground disturbing activities, including clearing and construction, and road development/maintenance, among others.

## 4.6.1 Proposed Action

### 4.6.1.1 Archaeological Resources

Since the FEIS, development has continued to expand throughout the valley. In the FEIS, areas of archaeological sensitivity were defined consisting of high, moderate or low sensitivity. More recently, the Finding Of No Significant Impact (FONSI) and Decision Record, October 18, 1996 (EA Log No. NV-054-96-117) for the Bureau of Land Management Programmatic Environmental Assessment for Realty Actions in Las Vegas Valley, September 30, 1996, as amended (File No. 1-5-96-F-23R) addresses the procedure for projects on BLM land in the Las Vegas Valley. The Nevada State Historic Preservation Office (NSHPO) and the BLM agreed that for projects on BLM land that are less than 200 acres in size do not require additional surveys, with four notable exceptions. These exceptions include projects located within or adjacent to:

- Duck Creek Drainage
- Eglington Escarpment
- The Old Spanish Trail/Mormon Road corridor
- Tule Springs

Projects on private, city, county, state or under any other federal land management will require cultural resource surveys. As a precaution, an initial consultation should be conducted with the land management agencies prior to deciding that no surveys are necessary, regardless of land status.

### 4.6.1.2 Historical Resources

Historical resources are any cultural resource over 50 years, including buildings, bridges, houses, railroads, roads, etc. Historical resources are subject to the same laws and protections as archaeological resources and are also subject to the same impacts. However, for the purposes of this SEIS, historic resources are not evaluated individually as in the earlier FEIS.

Several historic resources are known in the Las Vegas Valley due to their listing on the NRHP. Included in these resources are: the Tule Springs Ranch, the Kyle Ranch, Las Vegas Mormon Fort, the Las Vegas Springs site, the Old Spanish Trail/ Mormon Road, the Sandstone Ranch and the Boulder City Historic District. This is not a comprehensive listing of historic sites on the NRHP but is meant to illustrate the presence and types of historic resources in the Project Area.

#### 4.6.1.3 Ethnographic Resources

The 1992 changes to the NHPA placed major emphasis on the role of Native American involvement when actions involve tribal property or properties to which tribes attach religious and/ or cultural significance, as discussed in 36 CFR Part 800.14. These Traditional Cultural Properties (TCPs) are described in the Guidelines for Evaluating and Documenting Traditional Cultural Properties (National Register Bulletin No. 38). A TCP is a property where significance is derived from the role the property plays in a community's historically rooted beliefs, customs and practices. A TCP can be a location associated with traditional ceremonial, medicinal or religious activities of a Native American group, a rural community whose buildings or patterns of land use reflect cultural traditions valued by its long-term residents, or an urban neighborhood that is the traditional home of a particular group. These types of sites may be difficult to identify without contact with the tribal groups because a TCP can be a mountaintop, a lake, a neighborhood, a field or a stretch of river.

In summary, a TCP is eligible for inclusion in the NRHP as a historic property because of its association with cultural practices or beliefs of a living community that (1) are rooted in that community's history and, (2) are important in maintaining the continuing cultural identity of the community.

Ethnographic Resources, including but not limited to TCPs, are resources that are important to communities for their cultural value. This definition does not limit itself to Native American groups, although that has been the traditional application under EO 13007. These resources can include a wide range of properties, including places of ceremonial or religious significance to areas of traditional food gathering.

Ethnographic resources and TCPs have been identified in the Las Vegas Valley. The earlier FEIS identified Sunrise Mountain and Frenchman Mountain as ethnographically sensitive areas. Both of these areas are largely outside of the ultimate development boundary, but within the study area.

### 4.6.2 No-Action Alternative

The No-Action Alternative would not necessarily be beneficial to cultural resources. Cultural resources are subject to impacts due to flooding through the increase of erosion or inundation. Additionally, many of the cultural resources in the Las Vegas Valley are located on private lands. Cultural resources located on private land are not protected under the NHPA, and could be subject to impact or complete destruction due to private development. The analysis of cultural resources, regardless of land ownership, in association with the Proposed Action could be considered beneficial as all resources will be evaluated on a site-specific basis, ultimately providing information that is beneficial to increasing our knowledge of the past or to the preservation of cultural resources.

## 4.7 TRANSPORTATION

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect transportation within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. All transportation would be subject to a site-specific analysis as described in Chapter 8.

## 4.7.1 Proposed Action

### 4.7.1.1 Construction Impacts

Construction activities associated with flood control facilities would involve the movement of personnel, equipment and material to and from project sites on a daily basis. These activities would have the potential to cause a direct additive impact on the current traffic congestion in the Valley. Construction of facilities adjacent to transportation corridors has the potential to disrupt traffic patterns through detours causing route changes. At a programmatic level the transportation impacts are considered relatively minor because the individual projects would be distributed over a span of time that would minimize the transportation impacts on a specific area from construction.

### 4.7.1.2 Operational Impacts

Operational activities associated with the flood control system would have minor impacts on the transportation system. Maintenance of the flood control system would require the use of vehicular crews to conduct work throughout the Clark County area that would contribute to the traffic flows. This additional vehicle traffic would have a paltry impact on the valley's traffic volumes and flows.

## 4.7.2 No-Action Alternative

Under the No-Action Alternative, transportation would continue to be a major issue in the Las Vegas Valley as the metropolitan area continues to develop at record pace. It would be hindered by the ability to implement and integrate the comprehensive CCRFCD Master Plan, and the RTC's Transportation Improvement Plan and Regional Transportation Plan Fiscal Year 2002-2025.

# 4.8 AIR QUALITY

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect air quality within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. All air quality resources would be subject to a site-specific analysis as described in Chapter 8.

## 4.8.1 Proposed Action

The development of the additional 26 detention basins and 420 miles (676 km) of conveyance will emit pollutants into the atmosphere during the construction phase, and to a much lesser extent, during operation. During construction, pollutants would be emitted from commuter traffic, transport truck traffic, construction equipment activities and fugitive dust. Maintenance operations of the flood control facilities would result in emissions from equipment necessary to service the facilities. Fugitive dust from sediment removal may also occur over the life of the project.

The following subsections summarize the air quality impacts from the construction and operations of the additional flood control facilities. Because CO and $PM_{10}$ have been identified as pollutants of primary concern throughout the study area, the impacts will focus on these pollutants. However, because of the recent designation of Clark County as a non-attainment area for ozone, a discussion of ozone precursor emissions is also warranted.

#### 4.8.1.1 Construction

The construction of the facilities associated with the Proposed Action involves the installation of major detention basins in upper reaches of major drainage systems, generally small channels through existing developed area, and some small debris basins and detention basins at various locations through the study area. Sources contributing to the construction phase air emission impacts include diesel and gasoline powered mobile construction equipment, automobiles, trucks and additional wind-blown fugitive dust during construction activities.

The types of equipment typically used during construction of flood control facilities are listed in Table 4.8-1, along with representative emission rates. On a typical daily basis, several thousand gallons of diesel fuel, and to a lesser extent, gasoline will be consumed. Thousands of cubic yards of soil will be disturbed during the handling process. Generally, these types of construction projects involve approximately 20,500 square feet (1,905 m²) of area being disturbed daily.

Internal combustion engines used during construction would emit VOCs, $NO_2$, $SO_2$ and CO. These emissions are expected to be less than significant under most circumstances, but may be considered significant in areas already exceeding CO standards. Supply trucks and automobiles would have similar emittants. Fugitive dust during clearing grading and road construction would be considered potentially significant.

Although the actual size and conditions for any of the detention basins are not certain at this time, the master plan indicates that approximately 38 basins will be constructed and/or expanded. The estimated area disturbed per basin ranges from 4.7 to 140 acres, with an average disturbance of 31 acres. Table 4.8-2 summarizes the quantitative impacts of CO and $PM_{10}$ impacts from the construction of the largest anticipated detention basin (140 acres) under this project. It was assumed that approximately 20,500 square feet (1,905 m²) of surface area are disturbed per day. As seen from the table, this would result in average daily $PM_{10}$ and CO emissions from the construction of a typical detention basin of 99.1 pounds per day and 504.2 pounds per day, respectively, resulting in the total emissions shown in Table 4.8-2. The construction of the largest planned detention basin would result in approximately 14.8 tons for $PM_{10}$ and approximately 74.8 tons for CO. It should be noted that these represent maximum emissions, or emissions that would occur if no mitigation measures were applied. CCDAQM ($PM_{10}$ SIP) reports that the overall control efficiency of 35 percent for fugitive dust occurs on flood detention basin construction, so the actual emissions may well be 35 percent less than shown in Table 4.8-2. Pursuant to the federal general conformity regulations at 40 CFR 93.150-160, the thresholds applicable to the Clark County non-attainment area for CO and $PM_{10}$ are 100 tons per year and 70 tons per year, respectively. The emissions in Table 4.8-2 do not exceed the thresholds for CO and $PM_{10,}$ but construction of this nature will require construction permits from the CCDAQM. Under these permits, emissions will be controlled for all fugitive dust operations.

For the same largest anticipated detention basins, estimates are made in Table 4.8-3 for ozone precursor emissions. Average daily emissions are 0.021 and 0.267 pounds/hp-hr for VOC and $NO_2$, respectively, resulting in total emissions of 8.72 and 111.37 tons over the 298-day construction period. These estimates represent maximum emissions without mitigation measures. VOC emissions are well below the conformity

### TABLE 4.8-1. Emission Rates for Construction Equipment Used for Flood Control Projects

| Facility/Activity | Equipment | AP-42 Emissions Factors (g/hp-hr) | | | | |
|---|---|---|---|---|---|---|
| | | VOC | $NO_2$ | $SO_2$ | CO | $PM_{10}$ |
| Detention Basins/ Excavation | Bulldozer | 0.71 | 7.81 | 0.85 | 2.15 | 2.15 |
| | Grader | 0.34 | 7.14 | 0.87 | 1.54 | 0.65 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Trucks | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Grade All | 0.34 | 7.14 | 0.87 | 1.54 | 0.63 |
| | Compactor | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Scraper | 0.52 | 7.46 | 0.90 | 2.45 | 0.79 |
| | Water Truck | 0.35 | 8.15 | 0.89 | 2.28 | 0.50 |
| Debris Basins/Excavation | Bulldozer | 0.71 | 7.81 | 0.85 | 2.15 | 2.15 |
| | Grader | 0.34 | 7.14 | 0.87 | 1.54 | 0.65 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Trucks | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Grade All | 0.34 | 7.14 | 0.87 | 1.54 | 0.63 |
| | Compactor | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Scraper | 0.52 | 7.46 | 0.90 | 2.45 | 0.79 |
| | Water Truck | 0.35 | 8.15 | 0.89 | 2.28 | 0.50 |
| Floodways/Excavation and Shaping | Bulldozer | 0.71 | 7.81 | 0.85 | 2.15 | 2.15 |
| | Grader | 0.34 | 7.14 | 0.87 | 1.54 | 0.65 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Trucks | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Grade All | 0.34 | 7.14 | 0.87 | 1.54 | 0.63 |
| | Compactor | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Scraper | 0.52 | 7.46 | 0.90 | 2.45 | 0.79 |
| | Water Truck | 0.35 | 8.15 | 0.89 | 2.28 | 0.50 |
| Concrete Box/Excavation and Shaping | Excavator | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Truck | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Crane | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| Pipeline/Pipe Placement | Excavator | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Truck | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| Unlined Channels/ Excavation and Shaping | Bulldozer | 0.71 | 7.81 | 0.85 | 2.15 | 2.15 |
| | Grader | 0.34 | 7.14 | 0.87 | 1.54 | 0.65 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Trucks | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Grade All | 0.34 | 7.14 | 0.87 | 1.54 | 0.63 |
| | Water Truck | 0.35 | 8.15 | 0.89 | 2.28 | 0.50 |

Source: AP-42, Fourth Edition.

### TABLE 4.8-1. Emission Rates for Construction Equipment Used for Flood Control Projects (Continued)

| Facility/Activity | Equipment | AP-42 Emissions Factors (g/hp-hr) | | | | |
|---|---|---|---|---|---|---|
| | | VOC | $NO_2$ | $SO_2$ | CO | $PM_{10}$ |
| Lined Channels/ Excavation and Shaping | Bulldozer | 0.71 | 7.81 | 0.85 | 2.15 | 2.15 |
| | Grader | 0.34 | 7.14 | 0.87 | 1.54 | 0.65 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Trucks | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Grade All | 0.34 | 7.14 | 0.87 | 1.54 | 0.63 |
| | Water Truck | 0.35 | 8.15 | 0.89 | 2.28 | 0.50 |
| Unlined Dikes/Excavation and Shaping | Bulldozer | 0.71 | 7.81 | 0.85 | 2.15 | 2.15 |
| | Grader | 0.34 | 7.14 | 0.87 | 1.54 | 0.65 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Trucks | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Grade All | 0.34 | 7.14 | 0.87 | 1.54 | 0.63 |
| | Compactor | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Scraper | 0.52 | 7.46 | 0.90 | 2.45 | 0.79 |
| | Water Truck | 0.35 | 8.15 | 0.89 | 2.28 | 0.50 |
| Lined Dikes/Excavation and Shaping | Bulldozer | 0.71 | 7.81 | 0.85 | 2.15 | 2.15 |
| | Grader | 0.34 | 7.14 | 0.87 | 1.54 | 0.65 |
| | Loader | 0.92 | 8.81 | 0.86 | 2.71 | 0.81 |
| | Hauling Trucks | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Grade All | 0.34 | 7.14 | 0.87 | 1.54 | 0.63 |
| | Compactor | 0.96 | 11.01 | 0.93 | 4.60 | 0.90 |
| | Scraper | 0.52 | 7.46 | 0.90 | 2.45 | 0.79 |
| | Water Truck | 0.35 | 8.15 | 0.89 | 2.28 | 0.50 |

Source: AP-42, Fourth Edition.

### TABLE 4.8-2. Air Quality Quantitative Impacts Associated with 140-acre Detention Basin Project

| Construction Area (acres) | Area Disturbed (feet²) | Construction Daily Rate (feet²) | Construction Length (days) | $PM_{10}$ Daily Emissions (lb/day) | CO Daily Emissions (lb/day) | Total $PM_{10}$ (tons) | Total CO (tons) |
|---|---|---|---|---|---|---|---|
| 140 | 6,111,000 | 20,473 | 298 | 99.06 | 14.8 | 21.8 | 75 |

1. Construction rate is the same rate used in the 1991 FEIS (BLM/CCRFCD 1991).
2. Emission factor is from $PM_{10}$ Attainment Demonstration Plan, Las Vegas Valley Non-attainment Area, Clark County, NV. $PM_{10}$ emission = 0.42 tons/acre-month.
3. The calculation determines pound per typical 8-hour workday.

### TABLE 4.8-3. VOC and $NO_2$ Emissions Associated with 140-acre Detention Basin Project

| Construction Area (acres) | Area Disturbed (feet²) | Construction Daily Rate (feet²/day) | Construction Length (days) | VOC Emissions* (lb/day) | $NO_2$ Emissions* (lb/day) | Total VOC (tons) | Total $NO_2$ (tons) |
|---|---|---|---|---|---|---|---|
| 140 | 6,111,000 | 20,473 | 298 | 58.5 | 747.5 | 8.72 | 111.37 |

* Emission factor is the total per 8-hour period for construction vehicles listed in Table 4.8-1 assumed to be used in the detention basin construction (3 scrapers, 3 bulldozers, 1 grader, 1 loader, 4 hauling trucks, 1 grade all and 1 water supply rig).

threshold established in 40 CFR 93.153 of 50 tons per year of VOC; however, $NO_2$ emissions are above the conformity threshold of 100 tons per year. Therefore, this project, if approved by BLM after June 15, 2005, would be subject to a conformity determination.

The calculations above are based on an example of the largest proposed detention basin. Construction of all of the proposed flood control facilities would involve more surface disturbance and create more particulate and gaseous emissions. For example, the total number of acres of proposed detention basins under the Proposed Action within the Las Vegas Valley is approximately 1,175 acres. Additional disturbance is required for pipelines, culverts, lined and unlined channels, levees and bridges. Emission estimates depend upon the amount of disturbance per day, which can be estimated on project type basis, but cannot be estimated for all of the proposed facilities that will be constructed over the next 10 years. It would be erroneous to assume that all facilities would be constructed at the same time, as it would also be erroneous to insert 1,175 acres into Table 4.8-2, because the calculation would assume that the disturbance is happening as a single project and thus would take approximately 5.5 years. Thus, an emission calculation for the entire project depends upon when facilities would be constructed. At this time, during the programmatic evaluation, these estimates cannot be made.

However, prior to construction each facility is evaluated under the EA. If a proposed project, or group of projects, results in emissions that are above conformity thresholds levels (e.g., Table 4.8-3), a Conformity Determination will be required.

#### 4.8.1.2 Direct Maintenance

Direct maintenance of the detention/conveyance systems will be associated with sediment and debris removal from the detention basins, which is expected to occur every 8 to 10 years. Generally, air quality impacts generated from this activity should be minimal compared with the baseline inventory for the areas affected. These sources and their related pollutants are summarized in Table 4.8-4.

#### 4.8.1.3 Indirect Impacts

Sources contributing to indirect maintenance activity air emission impacts include diesel and gasoline powered vehicles. These emissions may be caused by traffic congestion, which may result from temporary traffic detours. Generally, these detours are expected to be minimal. However, the magnitude, coupled with existing congestion in specific locations, may become significant if multiple projects are constructed simultaneously.

### 4.8.2 No-Action Alternative

No impacts are anticipated under the No-Action Alternative to the Las Vegas Valley air quality.

**TABLE 4.8-4. Pollutants Associated with Facility Operations**

| Source Type | Pollutant | | | | |
|---|---|---|---|---|---|
| | VOCs | $NO_x$ | $SO_2$ | CO | $PM_{10}$ |
| ***Internal Combustion Construction Equipment*** | | | | | |
| Diesel Powered | | X | X | | X |
| Gasoline Powered | X | X | | X | X |
| ***Construction Activities*** | | | | | |
| Grading | | | | | X |
| Clearing | | | | | X |
| Earth/Soil Disturbance | | | | | X |

# 4.9 VISUAL RESOURCES

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect visual resources within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. All visual resources would be subject to a site-specific analysis as described in Chapter 8.

Impacts to the visual resource will occur where patterns of area, line, form, color and texture in the characteristic landscape would be contrasted by construction equipment, flood control facilities, and/or construction related disturbance to vegetation, topography or other visible features.

The visual resource analytical methodology used in the original 1991 FEIS was based on the BLM's VRM system, which is used for the evaluation of public lands (and projects on public lands), administered by the BLM. However, the development of VRM classifications and subsequent VRM-system based analysis conducted for the 1991 FEIS is only marginally relevant to a project that is composed almost entirely of private and non-federal lands that would not be subject to BLM VRM prescriptions. While VRM was common in the early 1990s, more integrative visual resource methodologies are used for projects on non-federal lands, especially in suburban and urban settings.

## 4.9.1 Proposed Action

### 4.9.1.1 Construction Impacts

During construction, impacts to visual resources are primarily caused by disturbance of the existing landscape. The factors related to these impacts are the presence of heavy-duty construction equipment, disruption of the color and texture of the soil and removal of existing vegetation. Vehicles, heavy equipment, facility components and workers would be visible during site clearing, grading, facility construction and site clean-up and restoration. Construction equipment and activities would be seen by various viewers in close proximity to individual sites including nearby residents, recreationists on trails and roads and motorists.

Ground excavation during construction of individual facilities would expose different colors and textures of the soil, thereby causing impacts to the existing visual continuity of the setting. The excavation process and the movement of equipment across open areas of bare soil would also create visual impacts by creating dust. This would potentially impact the adjacent visual character of the area and attract attention from adjacent areas with distant views of the construction.

Visual impacts related to the construction of the facilities are generally short term and can potentially be mitigated. Disrupted soils may be replaced and appropriately graded after the completion of each facility. This will reduce the impacts and allow for the facility to be more compatible with the existing color and texture of the surrounding setting. Dust control measures are included in project construction procedures and as mitigation measures under air quality (Section 5.8).

#### 4.9.1.2 Operational Impacts

The potential impacts that would occur during the operation of the proposed flood control facilities would depend on a number of different factors including: the specific type of facility, the existing visual character of the surrounding setting, the distance between the facility and observer viewpoints and whether local barriers and topography provide visual screening. Some of the facilities such as concrete pipes, precast boxes, floodways, drop structures and natural channels are assumed to have little to no impact on the visual character of the surrounding setting, based on their below-grade characteristics. Where visible, most of these facilities would appear co-dominant with other existing structures and facilities and view impairment would be insignificant given the background presence of the surrounding residential and commercial landscape.

When compared to below-grade facilities, above-grade facilities such as detention and debris basins are more easily viewed from distant areas and are more likely to contrast with the adjacent visual character units. Considering the high level of dominance for these facilities, the ability of these structures to be absorbed is relatively low. The size of the structures increases the potential for dominating the urban and natural characters for both adjacent and distant views. However, most of the major detention basins are located outside of existing developed residential areas, which may help mitigate impacts to some degree.

Many of the proposed flood control facilities also have a potential beneficial impact associated with enhancement of the surrounding visual character and increased recreational opportunities. Linear features provide prime locations for trail systems and buffering from adjacent contrasting visual character units (i.e., heavy industrial and commercial strip development). Also, many detention basins and floodways can be developed as multiuse park facilities (Section 4.13) and could provide substantial recreation opportunities enhancing the visual character of the surrounding setting.

### 4.9.2 No-Action Alternative

Under the No-Action Alternative, no visual impacts would occur due to the lack of change to the initial visual character of the Project Area. Local visual impacts would increase commensurate with the increase in the population of the Las Vegas Valley area. As major developments proceed, the visual character of outlying areas would change from a rural dominated landscape to a primarily urban dominated viewshed. All new developments would likely be required to include flood control facilities in their project design. Because developers would not likely install regional-scale detention facilities, protection of major developments would likely emphasize a number of smaller facilities that are more discontinuous in nature.

## 4.10 NOISE

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect noise within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses will be conducted on a case-by-case basis following the process presented in Chapter 8.

The EPA (1974) has established an average 24-hour noise level ($L_{dn}$) of 55 decibels as the maximum noise level that does not adversely affect public health and welfare. No laws concerning noise levels have been established by the State of Nevada or the BLM. Qualitative statutes concerning noise as a nuisance factor have been established by Clark County. Clark County planning and zoning noise standards (CCDCP 1993) provide guidelines for planning and land use compatibility with noise sources. Where any use or facility is within 500 feet (152 m) of any residential use or zone, noise-generating activities are limited to approximately 61 decibels during the daytime and approximately 56 decibels during the evening. The ordinance exempts temporary construction work, which is defined by the County as construction work over the duration of a valid permit (Murray 1994). Any excessive construction noise would be considered under (disturbing the peace) statutes. Thus, construction noise may be considered exempt unless it is excessive to the point of disturbing the peace.

## 4.10.1 Proposed Action

### 4.10.1.1 Construction Impacts

Construction of Proposed Action facilities would result in temporary increases in noise in the vicinity of the individual construction areas. Primary noise generating activities would include excavation, grading and scraping from the operation of heavy-duty diesel and gasoline powered construction equipment. Vehicle traffic traveling to and from each job site and trucks transporting material and equipment to staging or construction areas may also affect noise in the area, but to a lesser degree. The magnitude of construction related noise impacts would depend on the specific type of construction activity, the noise level generated by various pieces of construction equipment, the duration of the activity, the distance between the activity and sensitive noise receptors and whether local barriers and topography provide shielding effects.

Noise from construction activities would likely dominate the noise environment in the immediate area. The temporary construction noise impacts would vary depending on the type of equipment being used. Earth-moving equipment noise typically ranges from about 75 to 90 decibels at 50 feet (15 m) from the source and drops to below 70 decibels by about 500 feet (152 m) from the source. Equipment likely to be used during construction and their associated noise levels at 50 and 500 feet (15 and 152 m) from the source are identified in Table 4.10-1.

**TABLE 4.10-1. Noise Levels of Various Types of Construction Equipment**

| Equipment | Typical Noise Level (decibels) 50 Feet from Source | Typical Noise Level (decibels) 500 Feet from Source |
|---|---|---|
| Backhoe | 85 | 65 |
| Grader | 85 | 65 |
| Front-end Loader | 85 | 63 |
| Roller | 75 | 60 |
| Bulldozer | 85 | 69 |
| Truck | 88 | 68 |
| Scraper | 89 | 67 |

Source: Federal Transit Administration (1995).

It is anticipated that on-site construction noise would be relatively short-term, lasting for no longer than a few weeks at any one given location for most facilities. Sensitive receptors greater than 500 feet (152 m) from construction sites are not likely to experience noise levels above 70 decibels due to project construction. However, since the majority of the facilities would be constructed near residential areas, construction equipment is expected to be closer than 500 feet (152 m) from noise-sensitive receptors in most cases, and noise levels would likely be greater than 70 decibels over the short term.

The construction of detention basins associated with the proposed project may require blasting with explosives in some areas to excavate rock. Blasting activities would result in a temporary increase in noise levels during daytime hours. Blasting noise varies according to a number of factors, which include the type of explosive material and method of detonation, the amount and weight of explosive material, the type of rock and earth material to be blasted, and the depth the charge is placed in the ground. While these factors may vary from site to site, the typical sound level for blasting measured at 50 feet (15 m) from the source is 94 decibels (Hoover 1996). Table 4.10-2 shows estimated blasting noise levels in the vicinity of an active blasting site. As indicated in Table 4.10-2, sensitive receptors within approximately 1,500 feet (457 m) of a blasting site could be exposed to increases in noise levels, assuming a background sound level of approximately 61 decibels.

### 4.10.1.2 Operational Impacts

The only noise sources associated with operation of the proposed facilities would be from vehicles used to inspect facilities on an annual basis or after a major storm event. In some cases, a limited amount of earth moving equipment would be used to maintain floodways and detention and debris basins.

## 4.10.2 No-Action Alternative

Under the No-Action Alternative, existing noise levels in most residential areas are expected to remain the same, with noise levels along major

**TABLE 4.10-2. Estimated Noise Levels Associated with Blasting Activities in the Project Area**

| Distance Attenuation | |
|---|---|
| **Distance to Receptor (feet)** | **Sound Level at Receptor (decibels)** |
| 50 | 94 |
| 100 | 88 |
| 200 | 82 |
| 400 | 75 |
| 600 | 71 |
| 800 | 69 |
| 1,000 | 66 |
| 1,500 | 62 |
| 2,000 | 59 |
| 2,500 | 56 |
| 3,000 | 53 |
| 4,000 | 49 |
| 5,280 | 45 |

Source: California State Water Resources Control Board (2002).

arterial highways and adjacent to airports exceeding 70 decibels in some areas. Noise levels in many of the urban and unincorporated areas are expected to increase commensurate with the increase in the population of the Las Vegas Valley. Building substantial numbers of new residences or other sensitive receptors along remote highway corridors such as the 215 beltway would likely contribute to this effect by increasing traffic above current levels and bringing people into areas of increasing levels of noise.

# 4.11 RECREATION

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect the recreation within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses will be conducted on a case-by-case basis following the process presented in Chapter 8. Impacts to recreation resources are considered significant if they substantially change, degrade or benefit the existing recreation opportunities within the Project Area.

## 4.11.1 Proposed Action

### 4.11.1.1 Construction Impacts

Construction of Proposed Action facilities would remove some land currently available as open space that is used for recreation. Construction related activities might also temporarily restrict or impede access to recreation areas. This would provide an actual or perceived separation of recreational opportunities in the general area of construction, even if existing access is preserved or alternate access is provided. Construction of facilities along roadways could lead to delays due to closing of traffic lanes within these areas. While traffic delays may occur during construction of some of the proposed facilities, severing or severe restriction of access is not expected.

### 4.11.1.2 Operational Impacts

When completed, many of the proposed flood control facilities would provide potential beneficial impacts associated with enhanced recreational opportunities. Detention basins may be developed as multiuse park facilities and could provide substantial recreation opportunities in outlying areas that would not otherwise be available. CCRFCD funds would not be utilized for the construction, operation or maintenance of the recreational facilities. Debris basins may provide similar opportunities. Floodways may provide opportunities for nature preserves. The maintenance roads along the floodways may also provide for a variety of other recreational interests, including pedestrian and equestrian trails and bikeways. These areas may offer a significant local amenity in areas of perennial flow if riparian and wetland vegetation is allowed to establish within the floodway.

## 4.11.2 No-Action Alternative

Under the No-Action Alternative, the participation in and demand for recreation is expected to increase commensurate with the increase in the population of the Las Vegas Valley area. Dispersed recreational pursuits on public lands would continue under existing recreation management guidelines, subject to specific management in ACECs, SRMAs, restrictions in wilderness areas and within the Spring Mountains National Recreation Area (NRA), Lake

Mead NRA and Red Rock Canyon and Sloan Canyon National Conservation Areas (NCAs). Overall recreational opportunities would not diminish as a result of urban development in the Las Vegas Valley or elsewhere on private lands in Clark County. Urban recreation opportunities would likely increase as local governments develop park infrastructures to match demands of the growing population.

# 4.12 HAZARDOUS MATERIALS

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect, and are affected by, hazardous materials within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. This discussion differs from others in this section, because it addresses matters applicable to generic site-specific issues associated with hazardous materials. Project-specific analyses would be conducted on a case-by-case basis following the process presented in Chapter 8.

## 4.12.1 Proposed Action

The potential consequences of encountering hazardous materials on a project site are dependent upon the nature of the hazardous material, the quantity and the media in which it is encountered. In the majority of cases, mitigation of soil and/or groundwater contamination would likely be completed either prior to initiation of construction activities or during construction. Under certain circumstances mitigation efforts would continue into the operational phase of the project. In rare cases the extent or nature of the contamination may raise the estimated cost of mitigation above what the public benefit of the project would justify. In such a situation, alternative project locations would be evaluated. Various other, less extreme, scenarios are discussed in the following sections.

### 4.12.1.1 Construction Impacts

Hydraulically operated heavy equipment, powered by diesel fuel or gasoline, would generally be present on all project sites during the construction phase. It is possible that a direct release of a hazardous petroleum product may result from operation of this equipment during construction activities. However, the likelihood that a release of any significant quantity would occur in this manner is considered low. It would be much more likely that, if hazardous materials were encountered during the construction phase, it would be the result of historical releases either on the project site or on nearby property.

#### *4.12.1.1.1 Soil Contamination*

Construction activities may involve excavation and movement of relatively large volumes of soil on the project site. Soil contaminated with hazardous materials may be disturbed during these activities and expose workers to contamination or migrate off-site via wind or water erosion. Aside from mitigation strategies for hazardous material contamination of soils, discussed in Table 5.12-1, mitigation of soil erosion may be required.

#### *4.12.1.1.2 Groundwater Contamination*

Groundwater occurs in the Las Vegas Valley and Boulder City area in a complex series of aquifers generally ranging from 0 to more than 700 feet (213 m) below land surface. The shallow aquifer is the only aquifer likely to be encountered during project construction, making it the only aquifer of significance in evaluating proposed flood control facilities. By definition, the shallow aquifer is groundwater present from the surface to approximately 30 feet (9 m) below land surface. This aquifer is most commonly found in the eastern and southeastern portions of the Las Vegas Valley and discharges to Las Vegas Wash and its tributaries.

Excavation of detention basins and conveyances in areas of shallow groundwater contaminated with petroleum products or other hazardous materials may expose workers to this contamination. Breaching of naturally occurring aquicludes or aquitards, which function as vertical barriers to groundwater migration, during construction could facilitate downward migration of groundwater contamination into previously uncontaminated aquifers. In addition, dewatering of project site excavations may result in release of contaminated water to the Las Vegas Wash and, eventually, Lake Mead. Groundwater mitigation strategies are discussed in Table 5.12-1.

Due to the increase in elevation from the Las Vegas Valley to Boulder City, the shallow aquifer is not present in the Boulder City subarea.

### 4.12.1.2 Operation and Maintenance

It is expected that, in the event that hazardous material contamination is discovered on the project site, mitigation strategies would be employed to remove, remediate or immobilize the affected contaminated medium prior to operation of the facility. Therefore, once flood control structures have been constructed, it is anticipated there would be limited additional risk from hazardous materials being present on the project sites. In situations where mitigation occurs concurrently with construction and is not completed during the construction phase, continued risk from hazardous material may exist during operation of the facility. Additionally, environmental consequences apparently unrelated to the threat posed by hazardous materials may, over time, operate to expose soil or groundwater contamination that might otherwise have remained undisturbed.

#### *4.12.1.2.1 Soil Contamination*

Increased erosion resulting from the altering of baseline flow patterns of surface water caused by operation of flood control structures is discussed in Section 4.3. This increased erosion could expose contaminated soil remaining after the construction phase has been completed and facilitate its movement off-site.

#### *4.12.1.2.2 Groundwater Contamination*

Temporary impoundment of water within porous-floored flood control detention basins in the eastern and southeastern portions of the Las Vegas Valley may increase infiltration of water into the shallow aquifer located in this area. If this water encounters residual soil contamination beneath a detention basin, hazardous material may become dissolved in the water and result in contamination of the shallow aquifer. While the above scenario is a possibility, it is unlikely for the following reasons:

1. Residual soil contamination is not likely to occur because if contaminated soil occurred in the construction site it would have to be remedied in accordance with procedures and oversight of the NDEP.
2. Detention/retention times of water impoundment is relatively short in duration and infrequent due to short-lived and infrequent flood events.
3. Within the area of shallow groundwater in the Las Vegas Valley soils and subsurface layers are generally fine-grained and/or cemented and do not readily transmit water due to the poor vertical hydraulic conductivity of these materials.

Increased infiltration of surface water may induce a localized "mounding" of groundwater, resulting in a radial groundwater flow pattern beneath the facility. This radial flow pattern may cause existing groundwater contamination to migrate in directions other than the prevailing groundwater flow direction, resulting in artificial expansion of any existing groundwater contamination plume.

Flood control basins and conveyances lined with non-porous materials may intersect the shallow aquifer, where present, and interfere with local groundwater flow. A groundwater contaminant plume migrating onto a project site from property upgradient may be forced toward the ground surface upon encountering the lining of the flood control facility. The resultant exposure of previously subsurface contaminated water could pose an increased risk to plants, animals and humans.

#### 4.12.1.3 Indirect Impacts

In the event that some hazardous material contamination remains on the project site following construction, some risk of indirect operational impact may exist.

##### *4.12.1.3.1 Soil Contamination*

Mobilization, through wind or water erosion, of soil contaminated with hazardous materials remaining after construction may have an indirect and negative effect on plant, animal and human life located at some distance from the project site.

##### *4.12.1.3.2 Groundwater Contamination*

The groundwater mounding effect may result in induced migration of existing contaminated groundwater onto adjacent properties that would otherwise not have been affected. Similarly, non-porous flood control structures intersecting the shallow aquifer located in the eastern and southeastern portions of the Las Vegas Valley may deflect contaminated groundwater onto adjacent properties.

### 4.12.2 No-Action Alternative

Under the No-Action Alternative, there would be no direct impacts because no specific actions would be taken to disturb ground surfaces which may contain hazardous materials. This does not mean that hazardous materials would not be encountered by private development contractors while emplacing flood control facilities for individual developments leading to similar contamination issues as discussed above.

## 4.13 LAND USE

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect land use and ownership within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses would be conducted on a case-by-case basis following the process presented in Chapter 8.

This section discusses potential impacts on land ownership and use that could occur as a result of the proposed flood control project. The Project Area encompasses the cities of Las Vegas, North Las Vegas, Henderson, and Boulder City, eight unincorporated areas and undeveloped land within Clark County.

### 4.13.1 Proposed Action

#### 4.13.1.1 Effects on Land Ownership

Minimal effects, if any, are expected to occur on land ownership as a result of the proposed project. Most of the Project Area (largely the Las Vegas Valley) is privately owned, developed, urban land consisting of residential communities and commercial/industrial areas. Some undeveloped land exists within the project boundaries, particularly in the western portion, and a portion of these lands are under the jurisdiction of the BLM. This ownership is largely expected to continue. Reduction of flood risk in some currently undeveloped areas administered by the BLM could influence future land exchanges, particularly if development interest exists. No ownership effects are expected on military or Native American lands.

#### 4.13.1.2 Effects on Land Use

No major effects on land use are expected as a result of the proposed project. Most privately-owned lands in Clark County are used for residential purposes. Government-owned lands are used for grazing, recreation, mining and military operations. These uses, and use patterns, are expected to continue.

The rapid population growth and development that has occurred in the Project Area since 1990 is expected to continue with or without the implementation of the proposed project. Consequently, the land use changes that have been occurring as a result of development are also expected to continue.

Some minor, and largely temporary, effects on land use are likely as a result of the proposed flood control project. Some possible temporary effects include noise, dust, traffic detours, safety concerns and unsightly views during the construction process. These effects could inhibit or otherwise affect normal land uses and/or operating procedures; however, mitigation measures would largely reduce or eliminate these effects.

Potentially, long-term effects on land use could also occur, with mitigation less likely to completely eliminate the effect. The creation of barriers from the construction of detention and conveyance facilities could cause changes in land use patterns. Locating a flood control facility within an existing land use unit such as a residential area could also disrupt the integrity of a unit. Operating noise from facilities may be permanent. Some long-term effects on aesthetics near the facilities would likely occur. Lastly, construction of flood control facilities would preclude another land use on that parcel in the future, unless there is a potential for multiple use (e.g., recreational).

Positive effects on land use are expected as a result of the Proposed Action. The flood risk to life and property would be reduced within the Project Area, allowing safer use of existing developed areas. Lastly, some of the flood control facilities would offer opportunities for the development of recreational amenities such as parks, nature trails and bikeways.

### 4.13.2 No-Action Alternative

Under the No-Action Alternative there is the potential for impacts on land use as a result of flood risk to property and a reduction of safe use of existing developed areas.

## 4.14 SOCIOECONOMICS

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect socioeconomics within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses would be conducted on a case-by-case basis following the process presented in Chapter 8.

Overall, the effects on the socioeconomics of the Project Area are expected to be predominantly minimal and positive. Displacement or disturbance of currently developed properties would be minimal, if it occurs at all. The labor and materials needed for construction would likely be available within the Project Area without importation of either. Local government expenditures would likely occur; however, tax revenues would likely increase as a result of increased property values.

## 4.14.1 Proposed Action

### 4.14.1.1 Effects on Population

The rapid population growth that has occurred within the Project Area and Clark County since 1991 would be expected to continue. Growth and development apparently have not been constrained by the existing lack of flood control in some areas. The implementation of flood control facilities would not be likely to have a large direct effect on population growth in the area.

### 4.14.1.2 Effects on Employment and Personal Income

The cost of the Proposed Action and potential effects on employment and personal income would be determined on a facility-by-facility basis. Jobs would likely be created over the 10-year project horizon. The total number of jobs created, as well as the number per year, would depend on the duration of each construction project and their scheduling relative to one another. The largest direct effect by industry sector would be expected within the construction industry. Some indirect effects would also be likely on other sectors. Generally, the overall impact on employment and personal income within the Project Area would be expected to be minimal and the job growth that has occurred within the Project Area since 1991 would be expected to continue.

### 4.14.1.3 Effects on Government Revenues and Expenditures

Some local government expenditures would likely occur as a result of the Proposed Action. Government revenues would also likely increase due to increased property values and resulting increased property tax revenues. State taxes could potentially increase as a result of increased retail sales associated with construction and positive effects on employment and personal income.

#### *4.14.1.3.1 State Taxes (Retail Sales)*

The small increase in spending related to increased personal income that would likely result from the Proposed Action would also result in a small increase in sales tax revenue. Sales of construction materials, which would mostly be purchased locally, would also have a small positive effect on tax revenue.

#### *4.14.1.3.2 Property Taxes*

Property tax revenues would likely increase from increased property values on parcels receiving flood control. Tax revenues could decrease if some parcels were transferred from private to public ownership for the purpose of facility construction, thereby removing those parcels from the tax rolls. However, the net effect would likely be a slight increase in property tax revenues.

### 4.14.1.4 Effects on Property Values

The overall trend of increasing property values within the Project Area would be expected to continue and an additional increase in property values could occur on some parcels from the increased flood protection. However, the value of properties located near flood control facilities may potentially decrease due to visual or other impacts. The effect on property value would be largely dependent upon the final condition of the facility; for example, those facilities that also have recreational development would have a positive effect on nearby property values due to the increased recreational amenities.

#### 4.14.1.5 Effects on Public Services

Minimal effects, if any, are expected on public services as a result of the Proposed Action. Facility construction and operation are not likely to require the importation of workers from outside the Project Area and/or county. Consequently, no direct impacts are expected on police or fire protection, utilities, solid waste services, medical facilities or schools. Impacts on parks and recreation would likely be mixed with some potentially negative impacts on visual resources as well as increased recreational opportunities from the development of parks and trails around facilities.

### 4.14.2 No-Action Alternative

Under the No -Action Alternative, no substantive changes to the socioeconomic systems would be expected to occur.

## 4.15 ENVIRONMENTAL JUSTICE

This section presents a discussion of the programmatic impacts associated with the Proposed Action and the No-Action Alternative as they affect minority and low-income populations within the Project Area. Being programmatic, the presentation is not intended to be at a site-specific level, but rather at a Project Area level. This analytical perspective provides the reader with the overall environmental consequences for the Proposed Action comparable to the analyses conducted in the FEIS (BLM/ CCRFCD 1991). The FEIS presented the environmental baseline for the Las Vegas Valley for which this document provides supplemental information. Project-specific analyses would be conducted on a case-by-case basis following the process presented in Chapter 8.

### 4.15.1 Proposed Action

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their actions, programs or policies on minority and low-income populations. Both the CEQ and the EPA have oversight of federal agency compliance with EO 12898 and NEPA, and have developed guidelines for evaluation of environmental justice under NEPA (CEQ 1997).

The guidelines define disproportionately high and adverse human health effects and environmental effects as follows:

> Disproportionately high and adverse human health effects–three factors must be considered:
>
> 1. Whether the health effects, which may be measured in risks and rates, are significant (as defined by NEPA) or above generally accepted norms.
> 2. Whether the risk or rate of hazard exposure is significant (per NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group.
> 3. Whether health effects occur in a minority population, low-income population or Indian Tribe affected by cumulative or multiple adverse exposures from environmental hazards.

As defined by the CEQ regulations, a minority population does not exist within the Project Area. Therefore, no high and adverse health and/or environmental effects could occur on a minority population for this project.Low-income populations do exist within the Project Area; however, no high and adverse human health and/or environmental effects on the low-income populations are anticipated as result of the proposed project.

### 4.15.2 No-Action Alternative

Under the No-Action Alternative, no changes to the minority or low-income populations in the Las Vegas Valley are anticipated.

## 4.16 CUMULATIVE IMPACTS

The CEQ regulations that implement the procedural provisions of NEPA define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). The term “reasonably foreseeable” refers to future actions for which there is a reasonable expectation that the action could occur, such as a Proposed Action under analysis, a project that has already started or a future action that has obligated funding. Cumulative impacts can result from individually minor but collectively important actions taking place over a period of time. An evaluation of cumulative impacts is necessary for understanding the environmental implications of implementing the Proposed Action and is essential to the development of appropriate mitigation measures and the monitoring of their effectiveness.

Cumulative impacts refer to the environmental consequences of the Proposed Action in combination with past effects and anticipated current and other reasonably foreseeable projects within the same vicinity. For purposes of analysis in this document, potential cumulative impacts are primarily discussed on a regional programmatic basis since the impacts of specific projects would not be known until case-by-case, project-specific analyses are performed. The intent of the discussion is to identify the collective impacts that are projected to occur from the further development within the Las Vegas Valley and Boulder City areas during the time period described in the 2002 Master Plan (CCRFCD 2002) and 2003 Boulder City Flood Control MPU (CH2M Hill 2003). The following sections will present forecasts for the future growth and development within the Las Vegas Valley area and will provide the context for determining cumulative impacts as a result of implementation of the Proposed Project.

Clark County is experiencing unprecedented growth, particularly in the Las Vegas Valley area, which is the fastest growing metropolitan area in the country. The population of the Las Vegas Valley surpassed the 1.4 million mark in 2000 and is projected to reach over 2 million people by 2005. One estimate is that the population will double by 2015.

Aggressive residential development is occurring in many areas, much of which is associated with relatively large master planned communities. As a result, master planning on a valley-wide scale is virtually impossible, and the public sector has been forced to operate in a reactive mode to accommodate both the rate and spread of the developments. One large constraint to valley-wide planning is the lack of tracts of privately owned land within the area. Approximately 50 percent of the Las Vegas Valley is owned by the federal government, which exerts significant influence on the location, type and timing of growth.

In October of 1998, Congress enacted the SNPLMA. This Act provides for the sale of public land in the Las Vegas Valley by the BLM. A key provision directs the BLM to coordinate with local government (with respect to this plan, the State of Nevada, Clark County and various local city governments) to jointly select federal lands for disposal. Since the enactment of the

SNPLMA, some 4,892 acres of public land have been sold and nearly 42,000 acres remain available for disposal in the Las Vegas Valley. Those acres are the remaining lands designated by the 1998 Act and the additional lands designated in the Clark County Conservation of Public Land and Natural Resources Act of 2002.

As the Las Vegas metropolitan area continues to expand and changes in ownership involving the disposal of public lands in the Las Vegas Valley continue, these lands are expected to undergo widespread and rapid conversion, reaching build-out by 2024. At that time, the 42,000 acres of now-vacant public lands, would be expected to be converted into predominantly urban and industrial related land uses.

The subsequent discussions present the cumulative impacts associated with each resource area examined in this programmatic SEIS. Each resource area is examined individually with respect to the cumulative impact criteria and the programmatic impact discussions are presented.

## 4.16.1 Geology and Soils

Cumulative impacts to geological resources in the Valley as a result of the proposed facilities would be negligible because there are no unique or special geological resources in the Project Area. Materials needed for the construction of proposed facilities would be removed from sand and gravel mines in the outlying areas. Lands slated for disposal in the Las Vegas Valley will be removed from any future mineral exploration or development. Historically, however, the only mineral development within the Valley has been for aggregate material (sand and gravel) for construction, and no geological information suggests that more valuable or unique resources exist within the Las Vegas Valley. Aggregate material resources are abundant in the Las Vegas Valley and surrounding region, therefore, loss of some of these lands would not be considered significant.

The Proposed Action will likely contribute to cumulative impacts to soils in the Valley. Soils disturbed during project construction may be susceptible to increased levels of wind and water erosion, as well as compaction. Increased levels of wind and water erosion during construction is a site-specific temporary disturbance that is mitigated by standard practices during construction such as dust control and runoff containment. Soil compaction occurs during construction to prevent future settlement that may affect facilities or roadways.

Construction related soil disturbance from the Proposed Action would be additive to that caused by increased development in the Valley, which is projected to reach build-out by 2024. At that time, potential cumulative soil related impacts as a result of the increased urbanization would be major and would occur to over 40,000 acres of now-vacant public lands that would likely be converted into predominantly urban and industrial related land uses.

## 4.16.2 Paleontological Resources

Increased development, along with the proposed project, in the Las Vegas Valley will result in the potential loss of paleontological resources during construction activities. Construction activities have the potential to encounter the fossil bearing geologic units discussed in Section 3.2. The geologic units discussed have high potential to contain fossils, but their paleontological sensitivity is not likely to be high, unless Pleistocene-occupied caves (similar to Gypsum Cave, which occurs several miles east of the Project Area) are encountered. Pleistocene caves may be found in the Paleozoic carbonate rocks (Sultan, Monte Cristo, Bird Spring and Kiabab Formations), but given the proximity of these sites to the Las Vegas area it is likely that these sites will have already been disturbed and thus the scientific value may be questioned.

Most of the facilities and construction activities will occur in younger alluvium on the valley floor. While not all the alluvium is anticipated to be paleontologically sensitive, excavation of this material may expose potentially fossiliferous alluvial units underneath (either the Quaternary Las Vegas Formation or the Tertiary Muddy Creek Formation). Some construction will occur in exposed potentially fossiliferous alluvial units.

## 4.16.3 Surface Water Hydrology

Urban growth will increase the area of impermeable surface and would be expected to increase surface water runoff conveyed by natural drainage systems and flood control structures. Increasing surface water runoff has the following potential adverse impacts:

- Exposure of a greater number of people to safety hazards and increased property losses associated with flood events.
- Increased erosion in wash channels, particularly in the Lower Las Vegas Wash.
- Increased sediment loads that could degrade water quality and potentially transport more sediment to Lake Mead via the Lower Las Vegas Wash.

The implementation of the proposed project is intended to route the increased runoff through developed areas thereby minimizing the safety hazards and potential property losses. Design of the proposed facilities is expected to mitigate erosion effects by detaining peak flows and releasing lower volume flows that result in less erosion and therefore decreased sediment loads.

Urban growth will also result in increased water supply needs and increased effluent. Effluent from the wastewater treatment plants that is not reused is discharged to the Las Vegas Wash and potentially will interact with flood control facilities as the water is conveyed from the treatment plants through the wash and ultimately to Lake Mead. The Clean Water Coalition Citizens Advisory Committee anticipates that effluent may double in the next 30 years (CWCCAC 2004), which has the potential to significantly impact Las Vegas Wash. The Clean Water Coalition and its member agencies is currently studying ways to mitigate this potential impact. Recent recommendations include systems integration and alternative discharge locations for the effluent. Additionally, if the demand for increased water supply is met with imported water that is not legally part of the Colorado River System, then this water would not be eligible to return flow credit if discharged to the Las Vegas Wash or to Lake Mead at an alternative discharge location. If this effluent is not reused, it will be lost as a resource to the community. Member agencies of the SNWA recognize this and will move toward increasing wastewater reuse.

## 4.16.4 Groundwater Hydrology

Potential cumulative impacts associated with increased development in the Las Vegas Valley could include localized increases in shallow groundwater associated with increased landscape watering and urban runoff. Increases in shallow groundwater have the following potential adverse impacts:

- Rising shallow groundwater levels that have the potential to undermine existing foundation design of facilities, homes and streets and may result in the increased need to dewater for construction or for protection of existing facilities and structures.
- Increased down-gradient seepage of shallow groundwater to the land surface that could add to dry weather runoff water eventually reaching the Lower Las Vegas Wash.
- This water is generally quite saline in the lower elevations of the valley and thus has the potential to degrade water quality in the sensitive Lower Las Vegas Wash
- Increased seepage of shallow groundwater downward into deeper aquifers, which, owing to the increased salinity and potential contaminants contained within shallow groundwater, has the potential to degrade water quality

Rising shallow groundwater levels are a significant potential adverse impact to increased development in the Las Vegas Valley. Section 3.4.5.1 reported that shallow groundwater levels rose in the 1980s (Brothers and Katzer 1988; Converse

Consultants 1985; Wild 1990), but no rise reported in the later study by SNWA (Zikmund 1996). SNWA continues to monitor water levels in the shallow groundwater zone and the Las Vegas Wash Coordination Committee (LVWCC) monitors and reports on water quality of shallow groundwater that discharges in the Las Vegas Wash (seeps).

Construction of flood control facilities is not designed to minimize or mitigate the potential increase in shallow groundwater, but mitigation measures employed in flood control facilities would likely not result in a contribution to this potential adverse impact (see Section 5.4). For example, lined channels may be constructed with weep holes to allow discharge of shallow groundwater, thereby preventing groundwater mounding and unlined channels may be lined to prevent recharge to shallow groundwater in areas where geotechnical investigations suggest that groundwater mounding may be a concern.

If shallow groundwater levels rise, increased down-gradient seepage is a potential impact. Existing and proposed facilities would potentially convey this seepage downstream to the Las Vegas Wash. Although the purpose of the flood control facilities is not to minimize or mitigate this effect, some mitigation measures would ensure that these facilities do not contribute to increasing recharge to the shallow groundwater system, which would drive seepage on the down-gradient end of the shallow groundwater system. For example, lining of an existing unlined channel would reduce infiltration, thereby reducing recharge to the shallow groundwater system, thereby decreasing downgradient seepage.

In areas where flood control facilities do not contribute the conveyance of urban surface water runoff or otherwise prevent the infiltration of surface water runoff, increased seepage of shallow groundwater downward into deeper aquifers is a potential impact. However, this potential impact is not likely to be significantly adverse to the water quality in the deeper aquifer because seepage rates, and thus water volumes, would be very low through fine-grained geologic layers that occur in between the two groundwater zones, particularly in the southeast part of the valley where the shallow groundwater zone occurs (Figure 3.4-1). Also, in this area of the valley, water in the deeper aquifer is naturally more saline and no municipal water supply wells exists; domestic and community wells in this area have been declining for decades because of the presence of the municipal supply and short connection distances. Other than direct contamination of the deeper aquifer through open boreholes or poorly sealed boreholes or direct alteration of groundwater quality through the injection of potable water for drought storage in the deeper aquifer, there is little evidence that shallow groundwater has impacted water quality in the deeper aquifers thus far (refer to discussion in Sections 3.4.4.1 and 3.4.5.3).

## 4.16.5 Biological Resources

Cumulative impacts to natural vegetation communities and general wildlife resources would result from implementation of the Proposed Action. Construction activities associated with the proposed facilities would remove an undetermined amount of natural vegetation and wildlife habitat and result in the direct mortality and/or displacement of some wildlife species. Cumulative loss of wildlife and habitats would also occur, although at a greater degree, with the continued expansion and development within the Las Vegas Valley. Losses would be limited primarily to creosote-bursage vegetation community and wildlife species associated with this habitat.

Implementation of the Proposed Action is not expected to induce substantive cumulative effects to any of the special status species of plants or wildlife described in this document. Avoidance and mitigation measures recommended in Section 5.5.3 will ensure minimal adverse effects to these species. Impacts to a number of special status species (including the desert tortoise) as a result of increase growth and development of the Las Vegas Valley are mitigated by implementation of the MSHCP. Under the plan, non-federal entities, such as the county and cities participating in the plan, would be issued incidental take permits pursuant to Section 10(a)(1)(B) of the ESA, 16 U.S.C. §1539(a)(1)(B), that would allow future development projects to be approved quickly and with predictable measures to minimize and mitigate the incidental take associated with their projects. Federal agencies, such as the BLM, would consult with the USFWS pursuant to Section 7(a)(2) of the ESA, 16 U.S.C. §1536(a)(2), on the implementation of the plan. By virtue of developing and analyzing a county-wide ecosystem plan such as the MSHCP, a cumulative effects analysis has largely been completed. The MSHCP has already taken into account future development on private lands that are subject to the 10(a) permit, as well as all future land disposals in the Las Vegas Valley by the BLM. CCRFCD's Master Plan updates and BLM's plan for land disposals have ben revised since finalization of the MSHCP. Consistency with the MSHCP will be ensured through the site-specific evaluation process.

### 4.16.6 Cultural Resources

Overall impacts to cultural resources will be determined on a site-specific basis, with avoidance and protection being the preferred mitigation. However, avoidance will not be possible in all cases, and there will be cumulative impacts to cultural resources. Most cultural resources in the Las Vegas Valley are important primarily for the potential for data that adds to the knowledge of the past. The identification and mitigation of cultural resources around the valley will add to that pool of knowledge. The impacts to cultural resources will come from the loss of the individual resources, which can be mitigated through compliance with Section 106 of the NHPA and appropriate data recovery efforts in consultation with the BLM and the NSHPO. However, cultural resources affected by actions not requiring compliance with Section 106 may receive little or no protection under local and state laws, and would therefore be subject to a greater degree of cumulative impacts.

### 4.16.7 Transportation

Cumulative impacts to the regional transportation system over the next 20 years would result from implementation of the Proposed Action. In most cases the impacts would be beneficial resulting in the removal of surface water from streets and freeways allowing for safer movement of traffic. Negative impacts over time would be the potential for increased traffic accidents and congestion associated with construction projects (e.g., workers commuting, equipment movement and detours).

### 4.16.8 Air Quality

The cumulative effects on air quality include the potential impacts from the proposed project-related emissions in relation to emissions from existing and future sources within the surrounding area. This would include both construction and operational emissions. One measure to assess the cumulative impacts for air quality is to evaluate whether the overall impacts would contribute to the prevention of the attainment of the NAAQS. Another measure is to determine conformity with the general air quality plan of the region.

Due to the Las Vegas Valley being non-attainment for CO and $PM_{10}$, any emissions beyond the existing levels would have a significant impact on the attainment status of the region, since the region does not currently meet the NAAQS. As such the CCDAQM is required by the EPA to develop SIPs that defines the controls necessary to reduce overall regional emissions in order to meet the NAAQS.

In 2000 and 2001, respectively, the CCDAQM developed the Carbon Monoxide SIP and the $PM_{10}$ SIP for Las Vegas Valley (CCDAQM 2000 and 2001). The SIPs demonstrate the acceptable emission levels for various major sources that will be necessary to achieve attainment with the respective NAAQS. The planned emission control and reduction strategies of the SIPs are intended to be implemented within the constraints of predicted future growth in the region. Thus, projects having emissions within the SIP limits are designed to not interfere with the achievement of the standards. In addition, projects with emissions with the SIP limits would be in compliance with the overall air quality goals of the district.

Cumulative effects to air quality would result from the construction and operation of the additional flood control facilities. Because CO and $PM_{10}$ have been identified as pollutants of primary concern throughout the study area, the impacts will focus on these pollutants.

The construction of the facilities associated with the Proposed Action must be evaluated on a cumulative basis with other emissions within the region. As stated in the CO SIP, regional emissions of approximately 21,400 tons per year (see Table 3.8-6) have been demonstrated to result in maximum CO concentration that would meet the NAAQS. However, it should be noted that the level of construction activities remaining constant from the baseline year (1996) through the demonstration year (2000) in combination with emission reductions of approximately 22 percent (9.77 tons per day versus 7.61 tons per day, respectively), resulting from the use of oxygenated fuels (CCDAQM 2000). Based upon the most recent audited ambient air quality data for CO in the Las Vegas Valley (calendar year 2001), the implementation of the SIP is meeting the air quality goals, showing no exceedences of the 1-hour or 8-hour CO standards (CCDAQM 2001).

Because construction emissions are transient in nature, accurate estimates of construction emissions at any given time are difficult, if not impossible, to assess. Since the construction of the detention basins will be varying and the emission sources associated with construction will only have localized effects, impacts from multiple construction projects are not expected to have an additive effect. As seen in Section 4.8, the daily CO emissions from a typical detention basin are expected to be 504.2 lb/day (0.25 tons per day). This is approximately 3 percent of the acceptable emission limits defined in the CO SIP for construction activities and would be in conformity with the CO SIP.

As discussed in Section 4.8, the CO SIP evaluated various control measures to reduce the CO emissions from construction activities and have defined and implemented feasible control measures, which are currently in operation. As such, any construction project within this EIS will utilize these controls and, therefore, no additional mitigation measures for CO will be necessary.

Similar to CO, the CCDAQM has developed the $PM_{10}$ SIP to define the county's strategy to bring the Las Vegas Valley into attainment with the $PM_{10}$ standard. The project daily emissions for the base year (2001) was calculated to be 719.8 tons per day, which would result in predicted exceedences of the 24-hour $PM_{10}$ standard. Incorporating the control identified in the $PM_{10}$ SIP, the target year controlled daily emissions were 199.3 tons per day, resulting in compliance with the 24-hour $PM_{10}$ standard. This allows for 13.0 tons per day to be associated with construction activities.

As with CO emissions, $PM_{10}$ construction emissions are widely variable, especially on a daily basis, due to the transient nature of construction projects and the specific activity that may occur at any given time. Since the construction emissions from projects associated with the flood control SIP program are localized, the construction emissions from each basin and conveyance system is not expected to be additive. The predicted daily $PM_{10}$ emissions from the construction of a typical detention basin is only 99 lb/day (0.05 tons per day), which represents less than 0.5 percent of the overall acceptable daily emissions. Thus, the cumulative emissions are not expected to interfere with the $PM_{10}$ air quality goals for the Las Vegas Valley. It should be noted that the BLM, in conjunction with the CCDAQM, is currently in the development of an extensive emissions inventory for $PM_{10}$ emissions in the Las Vegas Valley. The data are not expected to be available until later this year. As data become available, a direct comparison of the predicted emissions from the proposed project with the emissions from the inventory to verify the compliance with the $PM_{10}$ SIP allocation.

It should be noted that the $PM_{10}$ SIP has developed a series of control measures for construction activities to ensure the overall Las Vegas Valley emissions will be met. These measures have been formalized in the CCDAQM Regulation 94 and detailed as Best Management Practices in the CCDAQM Section 94 Handbook. The control measures for construction activities have been identified in Sections 4.8. and 5.8. The construction of each detention basin and conveyance system will be required by the CCDAQM to obtain a construction permit for each project and must comply with CCDAQM Regulation 94. As such, each construction project will be in conformity with the $PM_{10}$ SIP.

As stated in Section 4.8, there will be no routine direct emissions from the operation of the detention/conveyance systems. Emissions associated with sediment and debris removal from the detention basins, which is expected to occur every 8 to 10 years, may occur and will be minimal compared with the baseline inventory for the areas affected and will not contribute to a cumulative significant impact.

## 4.16.9 Visual Resources

Cumulative impacts to visual resources in the Valley as a result of the proposed facilities would be minor. Development of the proposed facilities would result in a potential for growth accommodation and setting the urban framework for future development in outlying communities. The initial visual character of the Valley would likely change based on the potential visual impacts previously described in Section 4.9. However, as development continues to grow in the Valley, the transition of rural areas to an urban-landscaped-dominant viewshed will effectively increase the visual absorption capacity, thus decreasing the overall visual sensitivity in these areas. As a result, there could be increased opportunities and interest to develop a number of the detention basins and floodplains into multiuse facilities, further enhancing the visual character of the surrounding area.

## 4.16.10 Noise

Cumulative noise effects would be unlikely in the Las Vegas Valley area under implementation of the Proposed Action. Cumulative noise impacts could occur if noise from construction activities is combined with existing background noise levels that are already at or near the level that would be considered as a "nusiance factor" by statutes established by Clark County. Although Clark County planning and zoning provides guidelines for noise generating activities, which are limited to 61 dBA during daylight hours, the ordinance exempts temporary construction work. Any excessive construction noise would be considered under “disturbing the peace” statutes. Thus, there would be no project-related cumulative noise impacts from construction unless it is excessive to the point of disturbing the peace.

## 4.16.11 Recreation

Despite the minimal short-term impacts to recreation resources from construction associated with the Proposed Action, long-term operational impacts of proposed facilities would provide potential beneficial cumulative impacts associated with enhanced recreational opportunities. The transfer of public lands will remove many recreation areas in the Las Vegas Valley from the public domain. Depending on future management and use of those lands, there could be losses in many casual-use recreation opportunities. The population growth to over 2 million people during the next decade would create millions of additional visitor days' use on the surrounding public lands in the Valley. This additional use could result in increased user conflicts, overcrowding and possibly resource degradation in other areas of public lands that currently do not receive recreational use. Enhanced recreation opportunities as a result of the Proposed Action would help alleviate this situation, if only marginally.

## 4.16.12 Hazardous Materials

Cumulative impacts associated with hazardous materials over the next 20 years may result from the potential for concentration of material concentrations in the downstream regions of the Project Area due to increased surface flows. At specific project locations any hazard material issues would be mitigated by specific measures prior to the initiation of construction in order to alleviate contamination.

## 4.16.13 Land Use

Past development patterns in the Las Vegas Valley do not indicate that flood-related constraints have been particularly effective as development control. For this reason, the implementation of the Proposed Action is considered as growth accommodating rather than growth inducing, and, therefore, is not expected to appreciably contribute to cumulative land use impacts in the Valley.

## 4.16.14 Socioeconomics

Implementation of the Proposed Action would provide potential beneficial cumulative socioeconomic effects associated with a substantial increase in the number of jobs associated with facility construction, increased property values and decreased flood insurance rates for residents in the Valley.

## 4.16.15 Environmental Justice

Because no impacts on minority or low-income populations are expected from implementation of the Proposed Action, the project would not contribute to a cumulative impact on those populations within the Valley.

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# CHAPTER 5: MITIGATION MEASURES

## INTRODUCTION

This chapter presents the programmatic mitigation measures associated with the impacts identified in Chapter 4. Mitigation is defined by NEPA regulation (40 CFR 1508.20) to include:

- Avoiding an impact altogether by not taking a certain action or parts of an action
- Minimizing impacts by limiting the degrees or magnitude of an action and its implementation
- Rectifying an impact by repairing, rehabilitating, or restoring the affected environment
- Reducing or eliminating over time by preservation and maintenance operations during the life of an action
- Compensating for an impact by replacing or providing substitute resources or environments

At the programmatic level, this document examined impacts that were not specific individual facilities. However, mitigation measures point to more specific level actions focused on the resolution of general and specific impacts. Implementation of specific mitigations for individual projects would be conducted on an as-required basis. Each specific project in the Master Plan will require a comprehensive environmental review that will take into consideration all relevant environmental factors. All appropriate mitigations will be implemented on a case-by-case basis for each project.

## 5.1 GEOLOGY AND SOILS

This section describes procedures to mitigate potential impacts from geological hazards on facility construction and/or operation and to mitigate potential impacts from facilities on geologic and soil resources.

Mitigation of geologic impacts, hazards and constraints is accomplished by condition detection, removal of condition, engineering design or relocation of facility. While most EISs solely address impacts to the natural environment, this document examines these impacts because of the potential for impacts on downstream facilities, property, human life and biological systems. Condition detection occurs during the site evaluation process. It is during this initial site evaluation that relocation should be considered; it is possible that relocation is superior and more cost effective than site mitigation. The preliminary stages of site mitigation are the same for all facilities.

1. During conceptual planning of a facility, proposed location should be plotted on the environmental planning database (EPD) to determine the proximity of a site to known subsidence related features or to faults, as well as, soil types, soil hazards and shallow groundwater conditions (important in terms of liquefaction). An examination of site topography is the first step in any examination of slope stability issues.
2. Once possible geologic hazards and constraints are identified, facility relocation can be considered, as well as an estimate of the type and degree of mitigation required. As an alternative to facility relocation, mitigations involve several steps:
    a. Review additional existing information that may not be included in the EPD but may be available in recent, public documents (e.g., more recent geologic data and reports, nearby flood control facility site evaluation, geotechnical recommendations).
    b. Perform an environmental evaluation of conditions at the proposed site to determine the impact of the proposed facility

and determine if more extensive environmental investigation is required to comply with NEPA.

c. Perform a geotechnical investigation at each proposed facility, which should include, but not be limited to, detailed geologic mapping, subsurface soil sampling and laboratory testing of soil samples. In the case of faults or subsidence features on the site, trenches should be excavated across the site to determine the attitude, extent and, possibly, the relative age of the feature. Geometry and attitude of bedding should be documented in areas of potential slope instability.
d. Subsurface soil samples obtained during soil borings at pertinent locations throughout the proposed facility site are used to determine the subsurface stratigraphy, degree of saturation and for laboratory testing of physical characteristics of soils (e.g., grain size, moisture content, density, strength, plasticity, consolidation and/or corrosivity).
e. Develop site-specific engineering mitigations for geologic hazards and constraints.

Discussions of mitigations for geologic hazards and constraints are discussed below.

### 5.1.1 Strong Ground Motion

1. Facilities may be relocated to avoid or minimize unfavorable soil conditions that would amplify effects of strong ground motion.
2. Impacts due to seismic shaking could be reduced to insignificance by proper design and construction of proposed flood control facilities.
3. Development of pertinent seismic design parameters, based on an evaluation of strong ground motion at the site and consistent with criteria used for similar facilities, should reduce to insignificant levels the potential impacts from earthquake induced strong ground motion to proposed flood control facilities.
4. Minor damage to facilities such as lined and unlined channels, dikes/levees and debris basins could be mitigated by routine repair procedures.

### 5.1.2 Surface Rupture

1. Mitigation of surface rupture hazards in areas where flood control facilities are proposed can generally be accomplished by establishing appropriate setback requirements from potentially active faults.
2. Creation of design modification and construction of facilities to allow for movement of the magnitude likely to occur during the lifetime of a facility could also reduce potential impacts from surface rupture.
3. Setbacks and design modifications should be based on the results of the site-specific investigation, recommendations of a qualified engineering geologist or geotechnical engineer and approval by appropriate agencies.

### 5.1.3 Slope Instability

1. Mitigation of potential slope instability in areas where flood control facilities are proposed can be accomplished by relocating facilities to avoid areas of potential slope instability.
2. Potential slope instability can also be mitigated using standard engineering methods such as slope modification or buttressing. The methods implemented should be based on the results of the geotechnical investigation and recommendations of a qualified geotechnical engineer or engineering geologist.
3. Indirect effects associated with modified flow velocities and sediment loads at discharges into natural channels with unstable sideslopes should also be mitigated (further discussion is available in Section 5.1.8).

### 5.1.4 Subsidence

1. Mitigation of subsidence related hazards in areas of proposed flood control facilities can be accomplished by relocating facilities to areas not susceptible to subsidence.
2. Potential subsidence related hazards could also be mitigated using standard engineering methods developed by a qualified geotechnical and/or structural engineer based on the results of the site-specific investigation.

### 5.1.5 Collapsing Soils

1. Mitigation of potential hazards associated with collapsing soils in areas where flood control facilities are proposed can be accomplished by relocation of the proposed facilities to areas with more favorable soil conditions.
2. Collapsing soils may also be mitigated by use of standard engineering measures such as over excavation and recompaction of soils or other measures to minimize potential for saturation of these soils. Recompaction serves as both a method of soil improvement and protection against water infiltration. It should be noted that in rare cases distress to structures has been known to occur despite proper recomposition beneath foundations (Cibor 1983). Bridge foundations can be supported by piles or piers that extend beyond the expansive soils. Potentially collapsible gypsiferous soils may be excavated and replaced with import fill or processed in selected ratios with non-gypsiferous soils prior to recompaction. In addition, collapsing soils should be protected against future saturation.
3. Appropriate engineering measures for mitigation of collapsing soils should be developed by a qualified geotechnical engineer and be based on the results of the site-specific geotechnical investigation.

### 5.1.6 Expansive Soils

1. Mitigation of potential hazards associated with expansive soils in areas where flood control facilities are proposed can be accomplished by relocation of the proposed facilities to areas with more favorable soil conditions.
2. Use of standard engineering measures, such as over excavation and recompaction or replacement of expansive soils, can also be implemented to mitigate potential hazards.
3. In addition, potential hazards associated with salt heave can be mitigated by removal of 1 to 2 feet (0.3 to 0.6 m) of soil and placement of a thermal blanket composed of open-graded gravel.
4. Appropriate mitigation measures should be developed by a qualified geotechnical engineer and be based on the results of the site-specific geotechnical investigation.

### 5.1.7 Liquefaction

1. Mitigation of potential liquefaction hazards in areas where flood control facilities are proposed can be accomplished by relocation of the proposed facilities to areas with more favorable soil conditions.
2. Mitigation of potential liquefaction hazards can also be accomplished by use of standard engineering measures such as replacement or over-excavation and recompaction of loose soils or dewatering.
3. Appropriate engineering measures for mitigation of potentially liquefiable soils should be developed by a qualified geotechnical engineer and be based on the site-specific geotechnical investigation.

### 5.1.8 Erosion and Deposition

1. Mitigation of potential erosion and deposition hazards in areas where flood control facilities are proposed can be accomplished by relocation of the proposed facilities or engineering design modifications.

2. Wind erosion hazards can be reduced by minimizing soil disturbance, use of water or chemical suppressants on disturbed areas, compaction, revegetation, and decorative rock covers. One way to minimize disturbance of sensitive areas is to use small pieces of construction equipment and/or manual labor to the extent possible.
3. Channel erosion hazards at locations where cross structures are situated can be mitigated by implementing standard engineering measures developed by a qualified geotechnical engineer. Erosion of surficial soils disturbed during construction can be minimized by limiting the disturbed area, avoiding soils that are highly susceptible to erosion, conducting construction activities during periods with a low potential for rainfall and reclamation or revegetation of disturbed soils shortly after completion of construction.
4. Indirect erosion impacts can be mitigated by designing outflow structures to direct flows in a manner that will reduce scour or by selecting designs that will reduce flow velocities. In particular, flood control structures that reduce flow velocities could be constructed along the lower portions of major tributary channels to the Lower Las Vegas Wash to minimize the potential for increased erosion where these channels enter the Lower Las Vegas Wash. Erosion control structures could also be installed on affected unstable channel sideslopes.
5. Deposition hazards can be mitigated by relocation of proposed facilities or engineering design modifications to minimize changes in deposition upstream and/or downstream of proposed facilities. Deposition within the facilities can be mitigated by routine maintenance and removal of accumulated sediment.

## 5.1.9 Caliche

Mitigation of constraints associated with caliche in areas where flood control facilities are proposed could be accomplished by relocation of the proposed facilities to areas where less caliche is present or caliche is absent, if feasible. Caliche classified as very stiff, dense or slightly to moderately hard can generally be excavated with conventional equipment and use of a ripper tooth. Excavation of caliche classified as hard to very hard usually requires the use of heavy excavation equipment such as a Ho-Ram or headache ball, or excavation by blasting.

## 5.1.10 Corrosion

1. Mitigation of constraints associated with corrosive soils in areas where flood control facilities are proposed could be accomplished by relocation of the proposed facilities to areas where soil conditions are more favorable or treating or removing the corrosive soils.
2. Engineering modifications that could be implemented include using sulfate resistant Type V cement or equivalent for concrete in contact with corrosive soils or using Type II cement where concrete is underlain by a moisture barrier of gravel and a waterproof membrane could mitigate corrosion of facilities.
3. In addition, high-density concrete, low water/cement ratio, and smooth concrete finish can also provide added resistance to concrete corrosion. Cathodic protection or protective coatings may mitigate corrosion of steel in contact with corrosive soils.

## 5.1.11 Mineral Resources

Mitigation of loss of mineral resources in areas where flood control facilities are proposed can be accomplished by relocating facilities to areas where existing quarries are not present. In addition, quarry owners could be fairly compensated for the loss of mineral resources.

## 5.1.12 Topographic Alteration

Because topographic alteration is considered an insignificant impact and is essential to the proper function of the flood control facilities, no mitigation measures to reduce this impact are considered necessary.

# 5.2 PALEONTOLOGICAL RESOURCES

This section describes procedures to mitigate potential impacts on paleontological resources from facility construction and/or operation.

1. Perform a site-specific review of geological information to determine geologic formations in the project location.
2. Evaluate project location as part of the Chapter 8 review to determine the presence or likelihood of scientifically valuable fossils in the vicinity of the project.
3. If the project is determined to have the potential for paleontological resources, have a qualified paleontologist perform a field survey.
4. If scientifically valuable paleontological resources are identified and documented, develop an appropriate mitigation plan that involves recovery or avoidance, depending on the relative importance of the fossils.
5. If recovery is the selected mitigation plan, implement recovery under the guidance of a professional paleontologist. If avoidance is selected, relocate the facility to avoid the resource.

# 5.3 SURFACE WATER HYDROLOGY

Potentially significant surface water impacts of the proposed project are associated with the engineering details of the facilities themselves. Impacts related to increased flood hazard, flow pattern changes, increased erosion, increased sediment load and other water quality concerns are routinely addressed during final facility design. Impacts associated with the dredge or fill of jurisdictional waters are regulated by the USACE and are addressed on a case-by-case basis. Since the proper function of the flood control system depends on the analysis of these potential effects, it is anticipated that standard engineering practices will reduce potential adverse impacts during construction and operation to levels that are insignificant. Facility-specific analysis is required in Chapter 8 of this SEIS.

# 5.4 GROUNDWATER HYDROLOGY

This section describes procedures to mitigate potential impacts on facility construction and/or operation from intercepting shallow groundwater and increases in shallow groundwater levels due to increased recharge or decreased discharge as a result of facility construction.

## 5.4.1 Mitigation for Impacts of Groundwater on Facility Construction and/or Operation

Each facility and proposed site will need to be evaluated for the presence and depth of shallow groundwater.

1. Comparison of the facility location with the shallow groundwater GIS coverage (shown in Figure 3.4-1) is the first step to determining if a site-specific geotechnical evalua-

tion should be done. If the site lies within the 30-foot (9-m) depth to water level contour, then an investigation must be performed. If the site were outside this contour, then no further mitigation measures would be required.

2. Investigation of groundwater conditions at a site within the 30-foot (9-m) depth to water level contour may indicate that groundwater is deep enough not to affect excavation or placement of materials during construction of that particular facility. If so, then no further mitigation work would be required.
3. If the investigation shows that shallow groundwater will likely impact the facility, then additional investigation and/or special measures must be incorporated into the design of the facility. Such measures may include placement of groundwater barriers, local dewatering or facility redesign.

### 5.4.2 Mitigation for Impacts from a Reduction in Discharge from the Shallow Aquifer

In order to mitigate the potential impacts associated with the lining of channels or washes in areas where groundwater discharge from the shallow aquifer may occur, the following measures outlined below are recommended.

1. Review GIS coverage with regard to the known or possible presence of shallow groundwater (within the 30-foot [9-m] depth to water contour) in a given area (see Figure 3.4-1). If the proposed channel/wash lining project is outside the area of possible shallow groundwater, no further mitigation measures would be required. If the proposed channel/ wash lining project is within the area of possible shallow groundwater, proceed with investigation.
2. Gather available site-specific information regarding conditions in vicinity of proposed channel/wash lining. This information may include water level data, land use information, previous geotechnical investigations and data regarding similar channel/wash lining in the area. Information obtained should be used to evaluate whether the proposed channel/wash lining has the potential to cause water level rises in the project vicinity and whether water level rises have the potential to cause impacts in that area. If the data indicate that no water level rises will occur or that impacts will not be significant, no further mitigations are necessary. If data indicate that the potential for impacts from water level rise are significant in the area, proceed with investigation.
3. Conduct a site-specific geotechnical investigation to evaluate whether shallow groundwater discharges to, or has the potential to discharge to, the channel/wash in question. Based on potential water level fluctuations, shallow groundwater may have the potential to discharge to the channel if it is within 2 feet (0.6 m) of the channel bottom. If the investigation indicates that the shallow groundwater does not have the potential to discharge to the channel/wash, no further investigations are necessary. If the investigation indicates that shallow groundwater may discharge to the channel/wash and that such discharge has the potential to cause impacts, proceed with investigation/mitigation.
4. Recommended mitigation measures to be implemented if data indicate that the project could cause significant impacts from water level rise include:
   a. Resite project into an area where impacts will not occur, or
   b. Design lining to allow discharge to occur by including weep holes, drainage blanket, sections of unlined channel, or use of floodways or unlined channels in extreme cases.
5. Monitoring of groundwater levels would be conducted by periodic observation of water levels in nearby wells completed in the shallow aquifer. If such wells are not available, they may have to be constructed. If monitoring indicates that water level increases are occurring as a result of the project and that these increases could cause adverse impacts in the area, post construc-

tion modification to the lining such as installation of weep holes to allow discharge of groundwater could be conducted.

6. If it is undesirable to conduct long-term monitoring of water levels in the area, the lining should be designed to accommodate groundwater discharge. Such design measures might consist of weep holes or drainage blankets. In extreme cases use of unlined channels or floodways could be substituted for lined channels. Measures employed should accommodate the same amount of discharge that would occur under natural conditions.

# 5.5 BIOLOGICAL RESOURCES

Implementation of the following recommended and prescribed mitigation measures would ensure minimal adverse effects to natural vegetation communities, general wildlife and special status plants, and animals.

## 5.5.1 Vegetation Communities

1. All areas to be disturbed will have boundaries flagged prior to construction and all disturbances will be confined to the flagged areas. All employees will be instructed that their activities must be confined to locations within the flagged areas.
2. Topsoil will be removed to a depth of 2 to 4 inches (5 to 10 cm) in all areas of potential native, non-invasive seed-bearing soil where groundbreaking will take place. If possible, topsoil will be salvaged, stockpiled and used in restoration of the facility. The determination of which soils are potentially seed-bearing will be made during pre-construction surveys conducted at each site.
3. Disturbed areas will be stabilized with appropriate treatments immediately following project facility construction until the areas can be seeded with site-specific mix(es) during the next appropriate planting period (i.e., spring or fall).
4. Seed disturbed natural vegetation communities with BLM-approved seed mixes during the appropriate planting period (i.e., spring or fall).
5. Activities that involve dredge, fill or excavation of jurisdictional waters or wetlands must be coordinated with the USACE and go through the CWA Section 404 permitting process. The USFWS, EPA, NDEP and NDOW would be consulted during the CWA Section 404 permitting process. Mitigation is typically required for impacts to riparian vegetation, waters of the U.S. and wetlands and is included as a condition of the project-specific CWA permit.
6. Avoid disturbance to riparian-wetland vegetation to the extent possible. If disturbance is unavoidable, then some or all of the following measures shall be implemented to minimize impacts to riparian-wetland vegetation:
   a. Minimize the area of disturbance.
   b. Replace affected vegetation in kind on-site if possible.
   c. Construct channels with natural materials or gabions or crib walls and revegetate in kind on banks and channel bed.
   d. Utilize floodways rather than flood channels in areas with well-developed wetlands.
7. Weed monitoring shall occur for species identified by the State of Nevada as well as for additional species specified by Clark County during a given year. Such species comprise the official list of weeds for which a county may cost-share funding for control and removal efforts. Should such species be found during monitoring, control and eradication efforts shall be implemented following County control procedures.

## 5.5.2 General Wildlife

1. To avoid the potential for mortality, displacement, and harassment of wildlife, all firearms and dogs shall be prohibited from the project site.
2. Trash and food items will be disposed of promptly in predator-proof containers with resealable lids. Trash containers will be removed regularly (at least once per week). This effort will reduce the attractiveness of the area to opportunistic predators such as coyotes, kit foxes and common ravens.
3. A maximum speed limit of 25 miles per hour will be maintained while traveling on the construction site, unpaved access roads and storage areas. This effort will reduce the potential for vehicle-wildlife collisions.
4. Following construction, a selected number of access roads that are subject to public vehicle use shall be closed. This effort will reduce the potential for mortality and general harassment of wildlife.
5. A Worker Environmental Awareness Program (WEAP) shall be implemented for construction crews prior to the commencement of construction activities. Training materials and briefings shall include but not be limited to, discussion of the federal ESA, the consequences of noncompliance with this act, identification and values of wildlife and natural plant communities, hazardous substance spill prevention and containment measures, and review of all required and recommended mitigation measures.
6. Any fuel or hazardous waste leaks or spills will be contained immediately and cleaned up at the time of occurrence. Contaminated soil will be removed and disposed of at an appropriate facility.

## 5.5.3 Special Status Plant and Animal Species

1. Prior to construction, comprehensive rare plant surveys shall be conducted for all special status plants that have been identified within the study area and those plants with the potential to occur in the study area (as defined in Table 3.5-1). Surveys shall be conducted within appropriate areas susceptible to surface disturbance by construction activity. Surveys of site-specific facility areas shall be appropriately timed to cover the blooming periods of the special status plant species known to occur or with the potential to occur in the area. If an individual(s) is observed, an avoidance and impact minimization plan will be developed and implemented in coordination with NDF and the USFWS. Maps depicting the results of these surveys will be prepared and will include other recently mapped special status plant occurrences in the area to ensure that the full scope of rare plant habitat associated with all the proposed facilities is delineated.
2. All identified populations of special status plant species will be avoided to the extent possible. If avoidance is not possible, steps will be taken to remove and salvage populations prior to construction. Salvage would be conducted in a detailed reclamation plan approved by the BLM.
3. Pre-construction wildlife surveys (following appropriate survey protocol, as applicable) shall be performed by qualified biologists to locate bird nests, desert tortoise/burrowing owl burrows and/or other special status wildlife identified in Table 3.5-2 that have the potential to occur within the study area. If nests, burrows or individuals are observed, an avoidance and impact minimization plan will be developed and implemented in coordination with NDOW and the USFWS.
4. By default, many of the mitigation measures previously proposed for general vegetation and wildlife, including implementation of a WEAP (Section 5.5.2), will provide de facto mitigation for special status wildlife species.
5. During construction, operation and maintenance of the facility all appropriate and current USFWS, BLM and NDOW protocols for minimizing impacts to the Gila monster, burrowing owl, kit fox, and any other sensitive species will be followed.

#### 5.5.3.1 Desert Tortoise

The following summarizes specific mitigation measures that will be implemented to reduce impacts to the desert tortoise as stipulated in the 1992 Reinitiation Biological Assessment (Dames & Moore 1992) and subsequent Biological Opinion (USFWS 1993).

1. Within 30 days prior to any surface disturbing activities, a qualified biologist, approved by the USFWS and BLM, should survey facility sites.
2. Tortoises should be relocated onto adjacent, undisturbed lands approximately 500 to 1,000 feet (152 to 305 m) from the original capture point. Tortoises will be moved in accordance with the existing Biological Opinion. If removed from a burrow, the animal should be placed in an existing similar, unoccupied burrow. Tortoises that cannot be appropriately relocated should be removed from the area and placed within the Desert Tortoise Conservation Center. Prior to handling any tortoise, permits should be obtained from the appropriate state and federal agencies.
3. After removing tortoises from the area, tortoise burrows found in the construction areas should be blocked or collapsed to prevent tortoise re-entry.
4. Facilities proposed for construction within the Fiscal Year (July 1 to June 30) will be evaluated to determine whether the areas represent suitable tortoise habitat, as determined by the appropriate agency representatives. The CCRFCD will provide compensation for the loss of suitable desert tortoise habitat at the current per acre remuneration rate.
5. Prior to the onset of construction, a desert tortoise education program should be presented to all personnel who will be on site. This program will be part of the overall WEAP as described under Section 5.5.2.
6. A trash abatement program shall be implemented as previously described above in Section 5.5.2.
7. A qualified biologist(s) will act as a biological monitor(s) and be present during all phases of construction during the active season of desert tortoises. Alternatively, an acceptable option to construction monitoring would be the installation of temporary tortoise-proof fencing prior to any ground disturbing activities following the standards described in the Biological Opinion (USFWS 1993).

## 5.6 CULTURAL RESOURCES

Section 106 of the NHPA would guide the mitigation of cultural resources. The BLM would consult with the NSHPO to determine appropriate mitigation measures. The first step in the process is identifying cultural resources.

Following the established practices created by the BLM, many areas of the Las Vegas Valley can be considered exempt from the need for intensive, pedestrian cultural resources inventories. There are certain areas are considered sensitive areas for cultural resources, and these would require an intensive pedestrian inventory (Myhrer 1991).

1. Detailed environmental review will be conducted on a site-by-site basis. Each proposed facility would be evaluated for the need for cultural resources inventories or mitigation in compliance with Section 106 of the NHPA following the process outlined in Chapter 8 of this SEIS. The first step is the identification of cultural resources. This would be accomplished through a detailed file or literature search at the appropriate repository to identify known archaeological sites and historic resources (e.g., sites and buildings). Repositories could include the NSHPO, the NRHP, local historic preserva-

tion groups, libraries, various map sources and individuals knowledgeable about the history of the area.

2. Concurrently, consultation would also be initiated with the Native American Tribes or Groups with interests in this area to determine the location or presence of TCPs and to consult on the project on a government-to-government basis.
3. Proposed facilities located in culturally sensitive areas would require an intensive pedestrian inventory to identify the presence or absence of cultural resources. However, less intensive survey methods would be appropriate in areas that have already been developed, where the ground surface has been disturbed or covered. In areas of low sensitivity, spot checks would suffice to verify the lack of cultural resources.

It is anticipated that cultural resources would be avoided by construction and maintenance activities. If avoidance is not possible, appropriate measures will be taken to mitigate adverse effects. A treatment plan would be developed that would address ways to avoid impacts where possible, or mitigate impacts in an appropriate manner. Mitigation measures would be considered in consultation with the SHPO and Native American Tribes or Groups prior to their implementation.

# 5.7 TRANSPORTATION

The following mitigation measures were developed with respect to transportation resources to minimize the level of impacts resulting from the construction of the proposed flood control facilities.

1. Consult with transportation planning representatives of local jurisdictions to develop alternative traffic flow patterns in the event that it becomes necessary to close traffic lanes along roadways adjacent to proposed facilities.
2. Coordinate facility construction planning schedules with major transportation construction planning schedules to reduce the potential for transportation delays.

# 5.8 AIR QUALITY

This section addresses the potential need for programmatic mitigation measures for CO and $PM_{10}$ and exhaust emissions of CO and ozone precursors. Although no long-term impacts are expected, short-term impacts could be minimized through these mitigation measures:

1. Regular inspection and maintenance of construction equipment to ensure conformance with existing tail pipe exhaust standards, as well as avoidance of unnecessary idling of equipment, vapor recovery control methods, the use of pre-chamber engines, optimizing air-to-fuel ratios and retarding ignition timing on construction vehicles. These inspections shall also ensure that the construction equipment is properly maintained in accordance with manufacturer's specifications and is not modified to increase horsepower except in accordance with established specifications.
2. The 2001 CO SIP has determined that the only practical CO control measures for off-road mobile sources are the Wintertime Cleaner Burning Gasoline and the Oxygenated Fuels programs that are currently in effect. The Wintertime Cleaner Burning Gasoline program includes fuel with low sulfur and low aromatic fuel content. This combination reduces overall sulfur and aromatic levels that increases catalytic

converter efficiency, resulting in lower CO emissions. The Oxygenated Fuels program allows for higher oxygen content in the fuel and allows for more complete combustion of the hydrocarbons in the fuel from CO to $CO_2$, again resulting in lower CO emissions. This measure has been implemented for the Las Vegas Valley.

3. The evaluation of methods to reduce $PM_{10}$ during construction projects is based upon the CCDAQM regulation Section 94. This project will be required to obtain a construction permit from the CCDAQM. As part of the permit, the fugitive dust emissions will be minimized through a series of control measures, designed to minimize windblown fugitive dust from reaching the atmosphere. There are a total of 22 categories requiring control for construction activities. Table 5.8-1 identifies each control category. A summary of the control procedures for each category can be found in Appendix B. The expected overall control efficiency for these controls is expected to be approximately 68 percent, according to the $PM_{10}$ SIP.

Additional best practices can also be used to further reduce exhaust emissions from construction equipment. These practices can be implemented in the event that the project-specific EA indicates that emissions will be significant and will exceed conformity thresholds. Additional measures for reducing exhaust emissions are:

1. Use particle traps and other appropriate controls to reduce emissions of diesel particular matter (DPM) and other air pollutants. Traps control approximately 80 percent of DPM and specialized catalytic converters (oxidation catalysts) control approximately 20 percent of DPM, 40 percent of carbon monoxide emissions and 50 percent of hydrocarbon emissions.
2. Visible emissions from heavy-duty off-road diesel equipment should not exceed 20 percent capacity for more than 3 minutes in any hour of operation. Monitoring during construction would be necessary.
3. Minimize construction-related trips of workers and equipment, including trucks and heavy equipment.
4. Specify the use of newer, cleaner equipment (1996 or a newer model) for project construction.

**TABLE 5.8-1. List of Best Management Practices Categories for the $PM_{10}$**

| Categories | |
|---|---|
| 1. Backfilling–Earthmoving Operations | 12. Dust Suppressant |
| 2. Blasting–Abrasive | 13. Importing Soil, Rock and Other Bulk Materials |
| 3. Blasting–Soil and Rock | 14. Landscaping |
| 4. Clearing and Grubbing | 15. Paving/Subgrade Preparation |
| 5. Clearing Forms | 16. Screening |
| 6. Crushing | 17. Staging Areas |
| 7. Cut and Fill | 18. Stockpiles |
| 8. Demolition–Implosion | 19. Track–Out Prevention |
| 9. Demolition–Mechanical/Manual | 20. Traffic–Construction Related |
| 10. Disturbed Soil | 21. Trenching |
| 11. Disturbed Land–Large Tracts | 22. Truck Loadout |

# 5.9 VISUAL RESOURCES

Implementation of the following recommended and prescribed mitigation measures would ensure minimal adverse effects to visual resources as a result of construction of the proposed facilities.

1. Where proposed facilities are located on designated open space or recreational land, consider and evaluate potential joint use of facilities for both flood control and planned development such as parks, golf courses, etc. Facilities should be developed for joint use where appropriate agreements with local jurisdictions prove feasible and where public safety issues allow. This would greatly decrease the potential for visual impacts.
2. Design of the proposed facilities will be reviewed with planning representatives of local jurisdictions and BLM, as appropriate, during design reviews and permitting to ensure that features, which minimize visible effects, are incorporated as feasible.
3. Ensure that architectural details incorporate materials that blend well with the existing environment.
4. Incorporate coloring techniques such as surface painting or concrete varnishing and/or coloring to blend with the existing environment.
5. Application of water or chemical suppressants to bare soils as to reduce dust.
6. Use earthen berms and incorporate landscape elements such as planting vegetation as appropriate to reduce visual impacts on viewsheds and adjacent communities.
7. Excavated material or other construction materials should be removed from facility sites following construction.
8. No paint or permanent discoloring agents should be applied to rocks or vegetation to indicate survey or construction activity limits. Instead, surveyors flagging or other suitable material should be used to delineate limits.
9. Cacti and yucca required by the BLM for salvage in the Las Vegas Valley will be salvaged and appropriately transplanted within the Project Area. This action will decrease the visual impacts of the project. Salvage operations will be coordinated with the BLM.

# 5.10 NOISE

Although the Clark County noise regulations provide an exemption for temporary construction related noise, the following recommended and prescribed mitigation measures would be implemented when construction activities come within 500 feet (152 m) of noise-sensitive land uses in order to avoid disturbing the peace statutes.

## 5.10.1 General Construction

1. Normally scheduled construction activities will be limited to daytime hours 7 a.m. to 6 p.m. Nighttime or late evening construction will not be allowed. Construction will not begin before 11 a.m. on Saturdays, Sundays and recognized legal holidays.
2. All construction equipment will be equipped with manufacture's standard noise control devices (i.e., mufflers, acoustical lagging and/or engine enclosures), which will normally achieve compliance with the recommended noise limits in most areas.
3. Heavy, noisier equipment will not come closer than 100 feet (31 m) from the property line of any noise-sensitive lands use for any length of time and will avoid coming closer

than 200 feet (61 m) if multiple sources of equipment are operating simultaneously near areas of sensitive noise receptors.

4. In some areas, temporary noise barriers may be required to protect against excessive noise levels in construction activities that occur in an area closer than 100 feet (31 m) to noise-sensitive receptors. Noise barriers can be constructed of plywood, heavy vinyl curtain material, or natural or temporary earthen berms. The amount of noise reduction achievable by the use of barriers is dependent mainly by their height. A typical barrier can be expected to provide from 5 to 10 dB of noise reduction.

### 5.10.2 Construction Blasting

1. Blasting noise will be monitored for all blasts. Efforts will be made to restrict the peak overpressures to 110 dB at any property line and 120 dB at the property boundary of all unoccupied structures. Blast noise is to be measured with a sound level meter equipped with a true peak detector.
2. All rules and regulations of the Uniform Guidelines for Blasting Permits in the City of Las Vegas, City of Henderson, City of North Las Vegas, Boulder City and Clark County are to be followed when any blasting is required in those jurisdictions.

## 5.11 RECREATION

The following mitigative measure was developed with respect to recreation resources to minimize the level of impacts resulting from the construction of the proposed flood control facilities. Where proposed facilities are located on designated open space or recreational land, consider and evaluate potential joint use of facilities for recreation and flood control purposes. Facilities should be developed for joint use where appropriate agreements with local jurisdictions prove feasible.

## 5.12 HAZARDOUS MATERIALS

This section addresses the approach to programmatic mitigation of hazardous materials in soil and groundwater. Because of the constraints imposed on the handling and disposal of hazardous materials by state and federal regulations, the alternatives available for mitigation of hazardous materials are more limited than for other potential hazards. Under most circumstances, hazardous materials present in concentrations exceeding established regulatory action levels would require remedial action to bring those concentrations below those action levels. In general, relevant Maximum Contaminant Levels (MCLs) established in the National Primary Drinking Water Regulations (40 CFR Part 141) determine action levels for water contamination and Preliminary Remedial Goals (PRGs) developed by the EPA determine soil contamination action levels.

Utilizing engineering design to isolate or enclose identified contamination is not generally an option, except in rare situations where it can be demonstrated that due to the concentration or nature of the contamination this strategy would reduce to an insignificant level any further risk to the environment. Aside from this alternative, mitigation of hazards and constraints posed by hazardous materials must be accomplished by either relocation of the project or reduction of contaminant concentrations to below regulatory action levels. Reduction of contaminant concentrations can be accomplished through either in situ remediation or physical removal and proper disposal of the hazardous material.

1. This SEIS should be reviewed during conceptual planning of proposed flood control facilities in order to identify areas of known hazardous materials risk.
2. Following review of the SEIS, the procedure outlined in Section 8.14 of this SEIS for a Phase I ESA should be implemented to collect site-specific information regarding the risks of encountering hazardous materials at the project site.
3. This process would involve a detailed investigation of past property usage of the project site and neighboring properties through review of historical documents, interviews with knowledgeable individuals and record searches of relevant governmental databases. An inspection of the project site, noting present usage of the site and surrounding properties, would also be performed. The results of this Phase I should be used to determine if a Phase II is required.
4. In the event that the Phase I establishes a reasonable suspicion for the presence of hazardous materials on the project site, Phase II environmental testing should be implemented. The Phase II investigation involves installation and sampling of soil borings and/or monitoring wells at pertinent areas of the project site. Analytical tests are selected based on information related to specific contaminants of interest identified during the Phase I.
5. Based on the results of the site-specific Phase II investigation and laboratory testing, appropriate recommendations (e.g., relocation or specific mitigation measures) can be developed and implemented. General mitigation techniques for soil and groundwater contamination are shown in Table 5.12-1. In some cases a combination of the listed methods or additional mitigation methods other than those listed in Table 5.12-1 may be appropriate for a given project site.

**TABLE 5.12-1. Hazardous Materials Mitigation Measures**

| Mitigation Technique | Advantages | Disadvantages |
|---|---|---|
| ***Soil Contamination*** | | |
| Excavation | Fast, directly verifiable. | Causes maximum disturbance, high cost per unit for removal and disposal. |
| Vapor Extraction | Reasonably fast, causes minimal disturbance, can be combined with air sparging to clean groundwater. | May require expensive exhaust gas treatment, effectiveness dependent upon soil conditions, low effectiveness with less volatile compounds. |
| Landfarming | Relatively simple to design and implement, treated soil can be returned to the site, directly verifiable. | May require excavation, requires significant space, may not be effective for high concentrations. |
| Thermal Desorption | Very fast, can mitigate "hot spots," treated soil can be returned to the site. | Requires excavation, requires significant space, saturated soils may require dewatering. |
| Oxygen Releasing Compounds | Reasonably fast, causes minimal disturbance, relatively low cost. | Relatively new method with effectiveness under various conditions still being evaluated. |
| Natural Attenuation | Low cost, causes minimal disturbance, can be used in inaccessible areas. | Relatively slow, not effective against high concentrations. |
| ***Groundwater Contamination*** | | |
| Air Sparging | Competitive costs, causes minimal disturbance, relatively fast, can enhance effectiveness of vapor extraction. | Cannot be used with free product, effectiveness dependent upon soil conditions, may require detailed pilot testing. |
| Vapor Extraction | Competitive costs, capable of mitigating free product, causes minimal disturbance, relatively fast, will simultaneously mitigate soil contamination. | May require expensive exhaust gas treatment, effectiveness dependent upon soil conditions, low effectiveness with less volatile compounds. |

**TABLE 5.12-1. Hazardous Materials Mitigation Measures (Continued)**

| Mitigation Technique | Advantages | Disadvantages |
|---|---|---|
| Bioventing | Relatively fast, causes minimal disturbance, effective against heavier petroleum products, | May not achieve low cleanup levels, usually requires injection permit, effectiveness dependent upon soil conditions. |
| Biosparging | Competitive costs, causes minimal disturbance, relatively fast, can enhance effectiveness of air sparging for wider range of hydrocarbons. | Cannot be used with free product, effectiveness dependent upon soil conditions. |
| Pump and Treat | Effectiveness less dependent upon soil conditions than some other methods. | High installation and operating costs, inefficient, generally ineffective. |
| Hydrogen Releasing Compounds | Relatively low cost, reasonably fast, useful for a variety of compounds. | Relatively new method with effectiveness under various conditions still being evaluated. |
| Oxygen Releasing Compounds | Reasonably fast, causes minimal disturbance, relatively low cost. | Relatively new method with effectiveness under various conditions still being evaluated, subject to rebound of contaminant levels. |
| Dual Phase Extraction | Effective with low-permeability soils, relatively fast, can be used with free product | Can be relatively costly, extracted groundwater must be disposed of, may be expensive to treat vapors and oil-water separation. |
| Bioremediation | Relatively low cost. | Effectiveness unproven, subject to rebound of contaminant levels. |
| Natural Attenuation | Low cost, causes minimal disturbance, can be used in inaccessible areas. | Relatively slow, not effective against high concentrations, constituent migration may occur. |

# 5.13 LAND USE

Mitigation measures would largely reduce or eliminate the minor and temporary effects that would likely occur as a result of the proposed project. Construction noise could be reduced through the use of mufflers on heavy equipment and work could be generally limited to daytime hours. Dust could be reduced by spraying water on soil surfaces and through the use of erosion control materials. Traffic detours could be unavoidable but could be structured to reduce inconvenience as much as possible. Fencing off construction sites and posting signs could address safety concerns. Although unsightly views would likely occur during some parts of the construction process, these effects would be largely temporary.

The potential long-term effects on land use as a result of the construction of detention and/or conveyance facilities would likely be more difficult to mitigate than the potential short-term effects. Possible long-term effects include changes in land use patterns as a result of facilities creating barriers and/or disrupting the integrity of a neighborhood or other unit. However, these potential effects are not expected to occur often, if at all, due to facility placement. Preventing undesirable activities around the facilities, such as the use of off-road vehicles, could be minimized with fences and signs. Preclusion of other uses by the facilities could not be mitigated but would be somewhat offset by the positive effects of construction including reduced flood risk and the creation of recreational opportunities around the facilities.

## 5.14 SOCIOECONOMICS

Since only small, if any, effects on population and growth are expected from the proposed project, mitigation and further monitoring are not required. Overall effects on government revenues and expenditures would likely be positive, and requires no further review. No effects on public services would be likely from the proposed project; hence, no monitoring would be required. A positive net effect on property values would be likely from the increased flood control, although a minor impact could occur on individual properties depending upon the proximity and final condition of a given facility. Monitoring of effects would occur as construction proceeds.

Mitigation for socioeconomic effects would occur when flood control facility construction required the taking of land or structures and/or the acquisition of rights-of-way. Property acquisition would be covered under the federal Uniform Relocation Assistance Act of 1970, which calls for a third party appraisal process, full disclosure of findings and negotiated settlements. Invocation of eminent domain would occur if a property owner would not negotiate. The cost of the impacts would be determined by the loss of property use and relocation costs. Compensation for damages would be based on negotiations or an appraisal under condemnation proceedings. Since site selection and design criteria for the proposed project seek to avoid dislocating or disrupting facilities and activities on developed property, acquisition-related impacts and mitigation are expected to be very minimal. Monitoring of effects on private property would be ongoing as facility construction proceeds.

## 5.15 ENVIRONMENTAL JUSTICE

Since no high and adverse human health or environmental effects are expected on minority or low-income populations or Indian Tribes, no mitigation or monitoring is necessary for environmental justice considerations.

# CHAPTER 6: UNAVOIDABLE ADVERSE IMPACTS, SHORT-TERM USES, LONG-TERM PRODUCTIVITY, AND IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

## INTRODUCTION

This chapter discusses adverse impacts that would remain after the application of mitigation measures. It analyzes the relationship between short-term uses of the human environment and the maintenance and enhancement of long-term productivity, and it identifies irreversible or irretrievable commitments of resources. The chapter presents information drawn from the analysis of the Proposed Action and summarizes and consolidates information from the impact and mitigation analyses in Chapters 4 and 5.

The chapter elaborates only on resource areas for which preceding analyses have identified some potential for unavoidable adverse impacts.

## 6.1 UNAVOIDABLE ADVERSE IMPACTS

This section summarizes potential impacts associated with the Proposed Action that would be unavoidable and adverse and that would remain after CCRFCD implemented mitigation measures discussed in Chapter 5.

### 6.1.1 Geology and Soils

No unavoidable adverse impacts to geology are expected to occur during construction and operation of the Proposed Action.

### 6.1.2 Paleontological Resources

No unavoidable adverse impacts to paleontological resources are expected.

### 6.1.3 Surface Water Hydrology

No unavoidable adverse impacts to surface water hydrology are expected to occur during construction and operation of the Proposed Action.

### 6.1.4 Groundwater Hydrology

Operation of the Proposed Action has the potential to adversely impact groundwater resources by the infiltration of surface water and subsequent recharge to shallow groundwater. However, following implementation of the required and recommended mitigation measures, including site-specific geotechnical investigations and recognizing that flows are infrequent and short lived, no significant unavoidable adverse impacts to groundwater hydrology are expected to occur as a result of construction and operation of the Proposed Action.

### 6.1.5 Biological Resources

There would be loss of natural vegetation, wildlife habitat and individual wildlife species from ground disturbing activities due project construction. Following implementation of the required and recommended mitigation measures, no significant unavoidable adverse impacts to special status plant and wildlife species are expected to occur as a result of construction and operation of the Proposed Action.

### 6.1.6 Cultural Resources

Ground disturbance during construction has the potential to adversely impact documented and previously unknown cultural resources. While these impacts are unavoidable, they can be mitigated to less than significant levels. As a result, there are no unavoidable adverse impacts to cultural resources.

### 6.1.7 Transportation

No unavoidable adverse impacts to transportation are expected due to occur during construction and operation of the Proposed Action.

### 6.1.8 Air Quality

There would be short-term significant unavoidable NOx, CO and PM10 (fugitive dust) impacts from construction activities. These impacts would be temporary and would vary, depending of the type of facility constructed, and the type, duration and quantity of construction equipment at facility sites. The mitigation measures described in Chapter 5 for CO, NOx and $PM_{10}$ emissions would partially ameliorate the situation, but mitigation to insignificance cannot be assured.

### 6.1.9 Visual Resources

There could be short-term significant unavoidable impacts to visual resources from the location of facilities in rural areas. These impacts would be temporary and would vary, depending of the location and specific type of facility constructed. The mitigation measures described in Chapter 5 for visual resources would partially ameliorate the situation, but mitigation to insignificance cannot be assured over the short term. As development continues to grow in the Valley, however, the transition of rural areas to urban landscaped dominant viewsheds will effectively increase the visual absorption capacity of these areas. As a result, there would be no long-term adverse impacts to visual resources as a result of operation of the Proposed Action.

### 6.1.10 Noise

No unavoidable adverse impacts to noise are expected to occur during construction and operation of the Proposed Action.

### 6.1.11 Recreation

No unavoidable adverse impacts to recreation resources are expected to occur during construction and operation of the Proposed Action.

### 6.1.12 Hazardous Materials

No unavoidable adverse impacts from hazardous materials are expected to occur during construction and operation of the Proposed Action.

### 6.1.13 Land Use

No unavoidable adverse impacts to land use are expected to occur during construction and operation of the Proposed Action.

### 6.1.14 Socioeconomics

No unavoidable adverse impacts to socioeconomics are expected to occur during construction and operation of the Proposed Action.

### 6.1.15 Environmental Justice

No unavoidable adverse impacts to environmental justice are expected to occur during construction and operation of the Proposed Action.

## 6.2 RELATIONSHIP BETWEEN SHORT-TERM USES AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term effects of the Proposed Action would be the temporary loss of use or reduction in access to some recreational opportunities, potential loss of cultural resources, construction related impacts (i.e., noise, dust, traffic and an increase in criteria pollutant emissions in a non-attainment area), temporary and permanent loss of wildlife and habitat, alteration of some views-heds, increased construction employment and increased local cash flow from construction activities. Negative effects have been minimized to the greatest extent possible, but some effects remain.

The long-term effects of the Proposed Action would be the loss of vegetation communities and wildlife habitat, cultural resources, air, surface water, groundwater and land use.

The long-term gains of the Proposed Action should more than offset the short-term and long-term effects. These gains include:

- Higher property values
- Increased economic growth potential
- Increased number of jobs
- Increased recreational opportunities
- Lower flood insurance rates for residents
- Minimization of safety hazards
- Reduced potential property losses

These long-term gains satisfy the purpose and need of the proposed project.

## 6.3 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction and operation of the Proposed Action would irretrievably and irreversibly commit a wide range of physical and environmental resources to the project. Irretrievable commitments refer to those resources that are lost for a long period of time. Irreversible commitments refer to resources that are considered permanently lost. The land committed to construct and operate the Proposed Action is considered to be an irreversible commitment.

The Proposed Action would require the use of fossil fuels and electrical energy. These resources are considered to be irretrievably committed to the project. At this time, these resources are not in short supply, and are considered readily available. As a result, the use of these resources is not expected to result in an adverse effect on their continued availability.

Construction of the proposed facilities would also require the use of various types of raw building materials, including cement, aggregate, steel and asphalt, piping and other building materials such as metal, stone, sand and fill material. Additionally, the fabrication and preparation of these construction materials would require labor and natural resources. Utilization of these resources would be irretrievable. However, these resources are readily available at this time, and adverse effects on their continued availability are not expected.

Construction and operation of the proposed facilities would require labor, which would be otherwise unavailable for other projects. This commitment of labor is considered irretrievable. Fiscal resources would also be irretrievably committed to construction and operation of the Proposed Project. These funds would then not be available for other projects and activities.

In addition to the resources utilized in construction and operation of the Proposed Action, there would be irreversible and irretrievable loss of existing resources in the impact area. These resources would include a permanent loss of biological and cultural resources, a short-term alteration of the viewshed in some areas and permanent topographic alteration. Negative effects have been minimized to the extent possible, but some effects remain.

Benefits from the Proposed Project include:

- Higher property values
- Increased economic growth potential
- Increased number of jobs
- Increased recreational opportunities
- Lower flood insurance rates for residents
- Minimization of safety hazards
- Reduced potential property losses

These benefits are considered to outweigh the irreversible and irretrievable commitment of these resources.

# CHAPTER 7: CONSULTATION AND COORDINATION

## INTRODUCTION

Scoping is the process of learning the concerns of individuals, organizations and agencies about a Proposed Action. Scoping is integral to the NEPA review process because it allows interested parties to become involved in the development of listing of issues that will be discussed in the EIS.

In the Notice of Intent (NOI), published in the Federal Register on January 10, 2003 (Appendix F), the study area was identified as hydrographic basins 212 and 167. These basins encompass private and public lands within the Las Vegas Valley and Boulder City, Nevada.

The NOI stated that the SEIS would help to identify issues and concerns including an evaluation of the existing FEIS for the Master Plan in the context of the needs and interests of the public. The Draft SEIS (DSEIS) would contain a Proposed Action and No-Action Alternative. The alternatives will be used to define management options and compare their effects.

The BLM, CCRFCD and their consultant identified a list of resource areas and conditions that may be considered for evaluation in the SEIS. The major resources to be addressed in the SEIS include:

- Air quality
- Cultural and paleontological resources
- Endangered, threatened or species of concern (including federal, state and BLM sensitive species)
- Land use
- Surface water hydrology and water quality
- Visual resources

## 7.1 PUBLIC SCOPING MEETINGS

Public scoping meetings were held on January 22 and 23, 2003, in Las Vegas and Henderson, respectively. The purpose of the meetings was to solicit public comments, views and suggestions to be addressed in the SEIS. The meetings offered the public the opportunity to comment in an open format (formal or informal written comment form. The public scoping meetings were conducted to encourage the public to bring issues and concerns to the attention of the BLM and CCRFCD. These meetings were held during a 30-day public comment period to allow the public time to identify issues and concerns for inclusion in the review.

The objectives of scoping were to:

- Consider and evaluate issues raised by interested parties to assist in the preparation of the SEIS.
- Consider public comments throughout the decision-making and review process.
- Identify and eliminate from a detailed study the issues that are not relevant.
- Identify key resource and land use issues relative to the proposed project.
- Inform and educate the public.
- Invite the participation by local, state and federal governmental agencies, and Native American tribes.
- Involve as many interested parties as possible in the environmental review process.

- Provide clear, easily understood, factual information to potentially affected parties.
- Provide meaningful and timely opportunities for public input.

# 7.2 PUBLIC SCOPING MEETINGS COMMENTS

The scoping process resulted in the written submission of comments from one member of the public and none from any federal, state or local agency staff members.

Two issues were identified for consideration in the SEIS:

- Moving the southern boundary of the study area to include Southwest Pittman detention basin.
- Proposed basin PTEA 0730 is currently located outside the SEIS study boundary and should be included in the SEIS study area.

These related issues have been addressed in the SEIS through the expansion of the southern of the original FEIS Project Area boundary to include the southern extents of the Ultimate Development Boundary Areas of the Pittman and Duck Creek Watersheds (Figure 2.1-1).

# 7.3 PROJECT MANAGEMENT TEAM MEETINGS

A small team of specialists was formed between the lead agency, the project proponent and the SEIS preparers. The team met on an as-needed basis to discuss the SEIS, review work products and provide analytical guidance. The team was composed of representatives from the following entities:

- Bureau of Land Management, Las Vegas Office, Las Vegas, Nevada
- Clark County Regional Flood Control District, Las Vegas, Nevada
- G.C. Wallace, Las Vegas, Nevada
- Montgomery Watson Harza, Brea, California
- Ninyo & Moore, Las Vegas, Nevada
- SWCA Environmental Consultants, Las Vegas, Nevada

# 7.4 AGENCY COORDINATION

## 7.4.1 Federal

### 7.4.1.1 United States Bureau of Land Management

The following members of the BLM were involved in meetings and consultations in the process of developing this SEIS: Adrian Garcia, Michael Johnson, Carrie Ronning, Anna Wharton, Jeff Steinmetz, Kristen Murphy, Stanton Rolf Donn Siebert, Roy E. Lee, Mark R. Chatterton, Beth Tomica, Craig Edgar and Sharon McKelvey. These individuals provided programmatic and technical guidance in the preparation of the SEIS.

### 7.4.1.2 United States Fish and Wildlife Service

Michael Burroughs of the USFWS was consulted regarding wildlife issues on the SEIS.

#### 7.4.1.3 United States Army Corps of Engineers

Grady McNure of the USACE consulted in project meetings to ensure that appropriate citations to laws and regulations (e.g., Section 404 of Clean Water Act) triggering USACE involvement in specific projects were made in the SEIS.

### 7.4.2 Clark County

Tim Sutko of the CCRFCD, Clark County, Nevada provided guidance, consultation and coordination with the CCRFCD on all matters associated with this SEIS.

## 7.5 PERMITS

For this programmatic document, no permits are anticipated; however, individual projects may require permits as necessary based on the review processes outlined in Chapter 8.

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# CHAPTER 8: PROJECT-SPECIFIC PROCEDURES

## INTRODUCTION

This chapter presents the process by which each new CCRFCD facility will be reviewed to ensure full compliance with environmental regulatory requirements and to minimize potential environmental impacts during construction, operation and maintenance. This process is a continuation of one initiated with the Final EIS (BLM/CCRFCD 1991) for project specific environmental reviews that was subsequently modified to reflect changes in the regulatory environment. This project-specific procedure also is modified to be more explicitly aligned with the NEPA process. The analytical process set forth in this procedure follows the general guidelines of the BLM for NEPA compliance (NEPA Handbook H-1790-1, BLM 1988).

## 8.1 INITIAL SCREENING PROCESS

The facility-specific process is designed to allow for an explicit screening of facilities to determine the appropriate level of environmental documentation (i.e., categorical exclusion/memorandum to file, environmental assessment EA, or facility-specific EIS). At the time a facility is being evaluated, an initial screening will be performed to determine the need to perform an EA or EIS. This screening will be determined in large part by the type of facility (i.e., minor facilities such as box culverts may not require EAs) and by the potential for impacts determined by the SEIS. Figure 8.1-1 presents the decision process for making the categorical exclusion/memorandum to file versus EA decisions based on impacts. The context for assessing the impacts is the SEIS level of analysis and the SEIS maps. If the decision is uncertain, it is most likely that the facility will require an EA. Each screening evaluation will require the preparation of a concise report documenting the decision along with supporting information. This level of documentation conforms to the BLM Categorical Exclusion level of NEPA documentation. If the facility has the potential to impact the environment based on the initial review, no preliminary screening report is necessary. Instead, the preparation of a facility-specific EA is required.

## 8.2 EA PROCESS

The facility-specific EA process is presented in Figure 8.2-1. New facility specific EAs will be prepared using this procedure following the release of the ROD for this SEIS. This process is a direct NEPA-based decision process intended to assess the potential impacts associated with a specific facility and to determine the need for mitigation or additional environmental documentation (i.e., project-specific EIS). One important consideration in understanding the NEPA process for the CCRFCD SEIS is that all facility-specific environmental reviews will be performed within the context of the CEQ NEPA regulations for EIS tiering, as described by the following:

> Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement and incorporate discussions from the broader statement by reference and shall concentrate on the issues specific to the subsequent action. The subsequent document

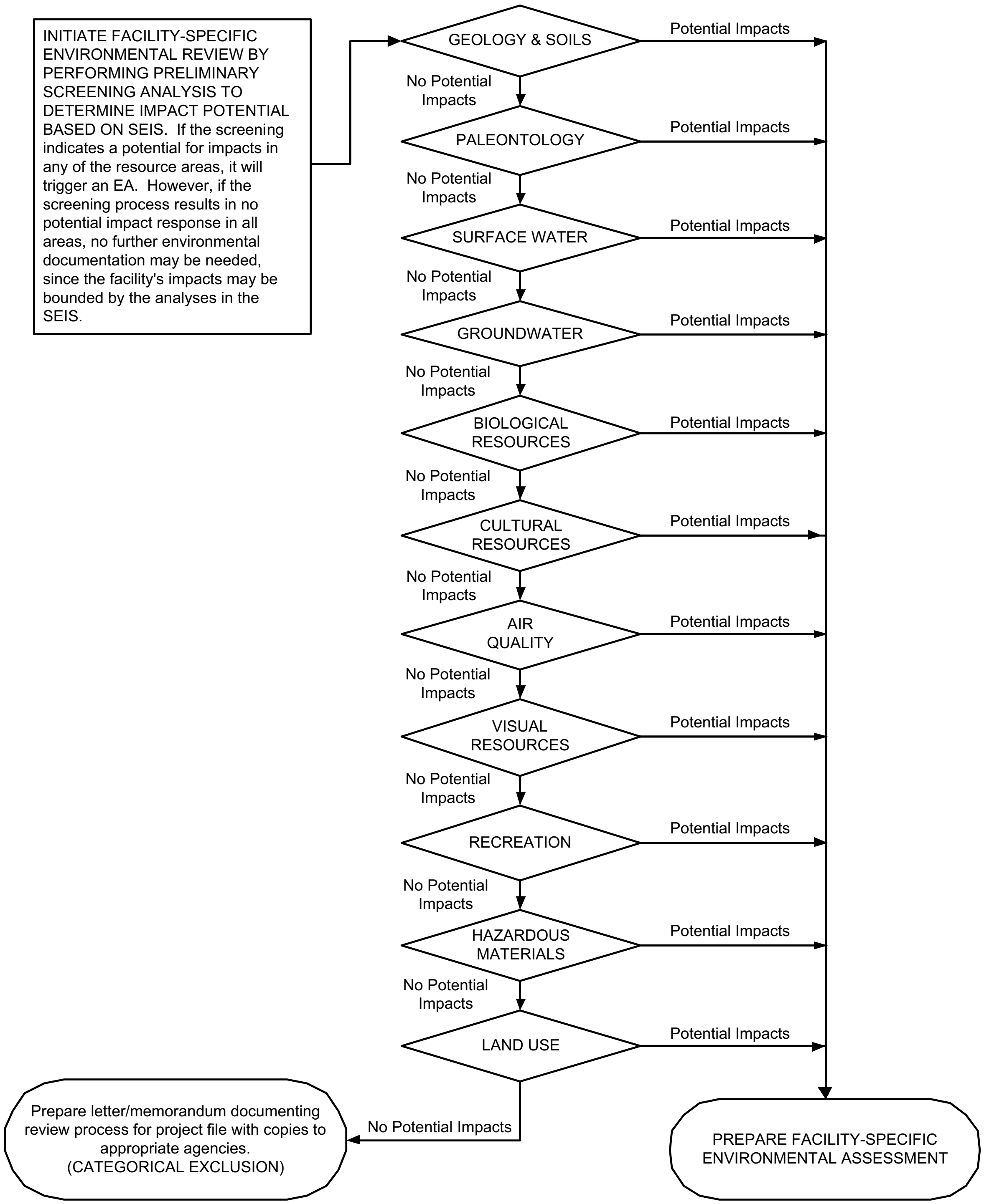


**FIGURE 8.1-1. Preliminary project-specific analysis screening process.**

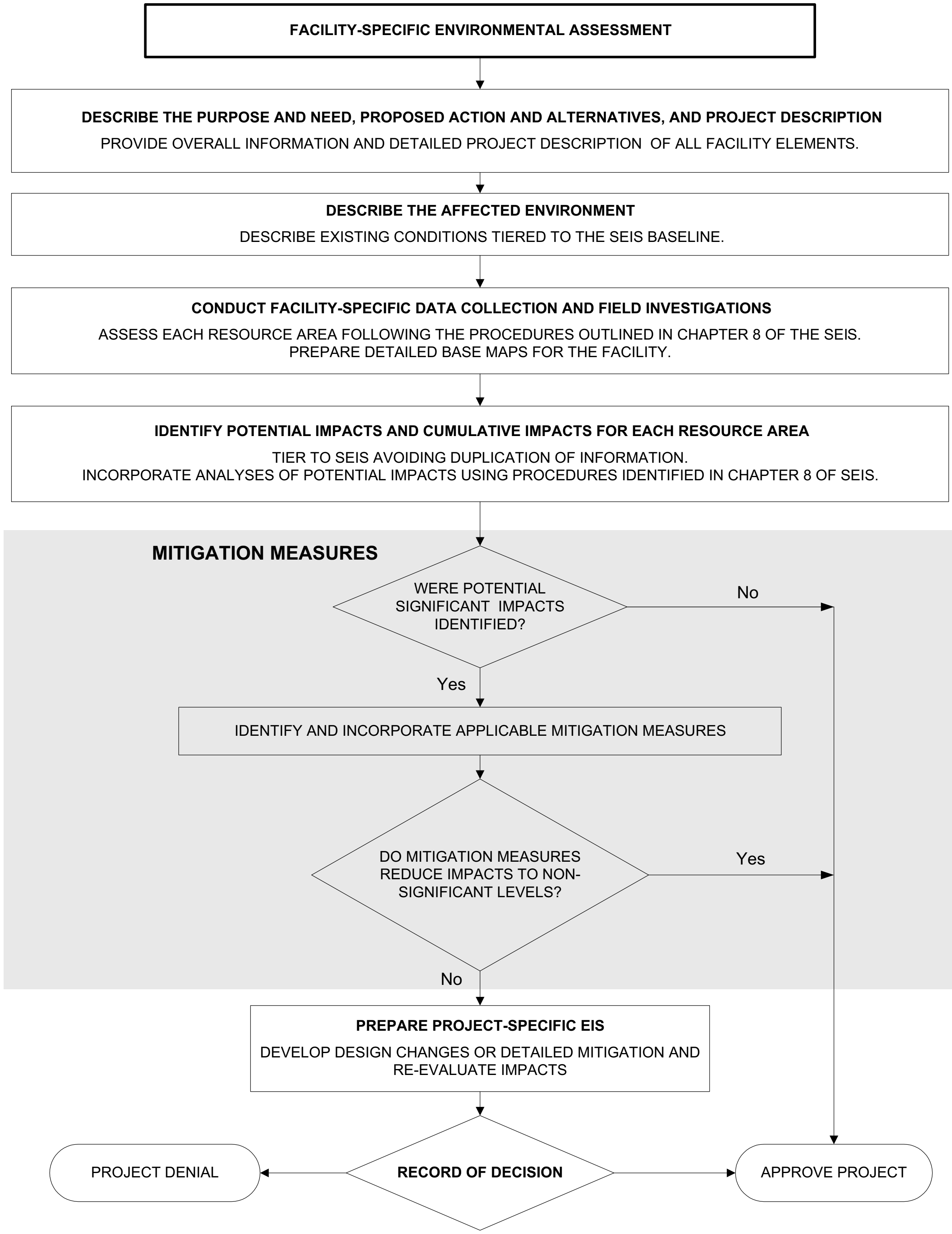


**FIGURE 8.2-1. Environmental assessment process.**

shall state where the earlier document is available. Tiering may also be appropriate for different stages of actions. (40 CFR Sec. 1508.28).

It is with this principle in mind that the EA structure outlined in this chapter has been formulated. The basic principle is that the SEIS provides the environmental baseline in terms of affected environment, environmental consequences and cumulative impacts for the CCRFCD Master Plans. The EAs for new facilities will be prepared using a more formal NEPA format than the previous Section 14 reports. The sections of the EA follow:

1. Purpose and Need
2. Proposed Action and Alternative(s)
3. Project Description
4. Description of Data Collection and Field Investigation Methods (Each resource area may require a brief discussion in this section.)
5. Affected Environment (Includes only discussions of resource areas that have changed)
6. Environmental Consequences (including Cumulative Impacts) The processes outlined in each resource specific discussion in subsequent sections of this chapter will be the primary inputs for this section.
7. Mitigation Measure Recommendations (If potential significant impacts are identified, mitigation measures described in Chapter 5 of the SEIS are applied to the facility and residual impacts are identified.)

The EA document concludes with the recommendations regarding mitigation to reduce any impacts below significant levels. If mitigation measures cannot be determined to reduce impacts, the recommendations to prepare a project-specific EIS will be a decision made by BLM for projects. This EIS would be a tiered NEPA document focused on a more comprehensive analysis of impacts leading to a ROD. In the event that a project-specific EIS is prepared, a ROD is prepared, which could result in either the approval or denial of the project.

The remainder of this chapter will be brief discussions of each resource area with the process site-specific review.

## 8.3 GEOLOGY AND SOILS

The analysis of potential project-specific impacts to geology and soils is illustrated in Figure 8.3-1. The initial step in the process involves the identification of potential geological hazards and soil mapping units at each facility site using information from Figures 3.1-1 and 3.1-2. The preliminary design and construction of facilities is dependent on an evaluation of geologic and soil resources contained in a geotechnical report, which provides important information about geologic and soil properties specific to the design and construction of individual facilities. Background information identified by this report is used to develop an evaluation of the impacts to the facility by geology and soils. Where impacts are significant, special design efforts would be used to reduce or eliminate impacts to non-significant levels.

While soils have the ability to impact a proposed facility, the review procedure also addresses the impact that a particular facility may have on soils, which requires special consideration of the specific environmental properties of soils (i.e., wind and water erosion potential, compaction factor). If soils on the site are impacted by the construction of proposed facilities, specific mitigation measures presented in Section 5.1 can be implemented to reduce or eliminate direct impacts to soils.

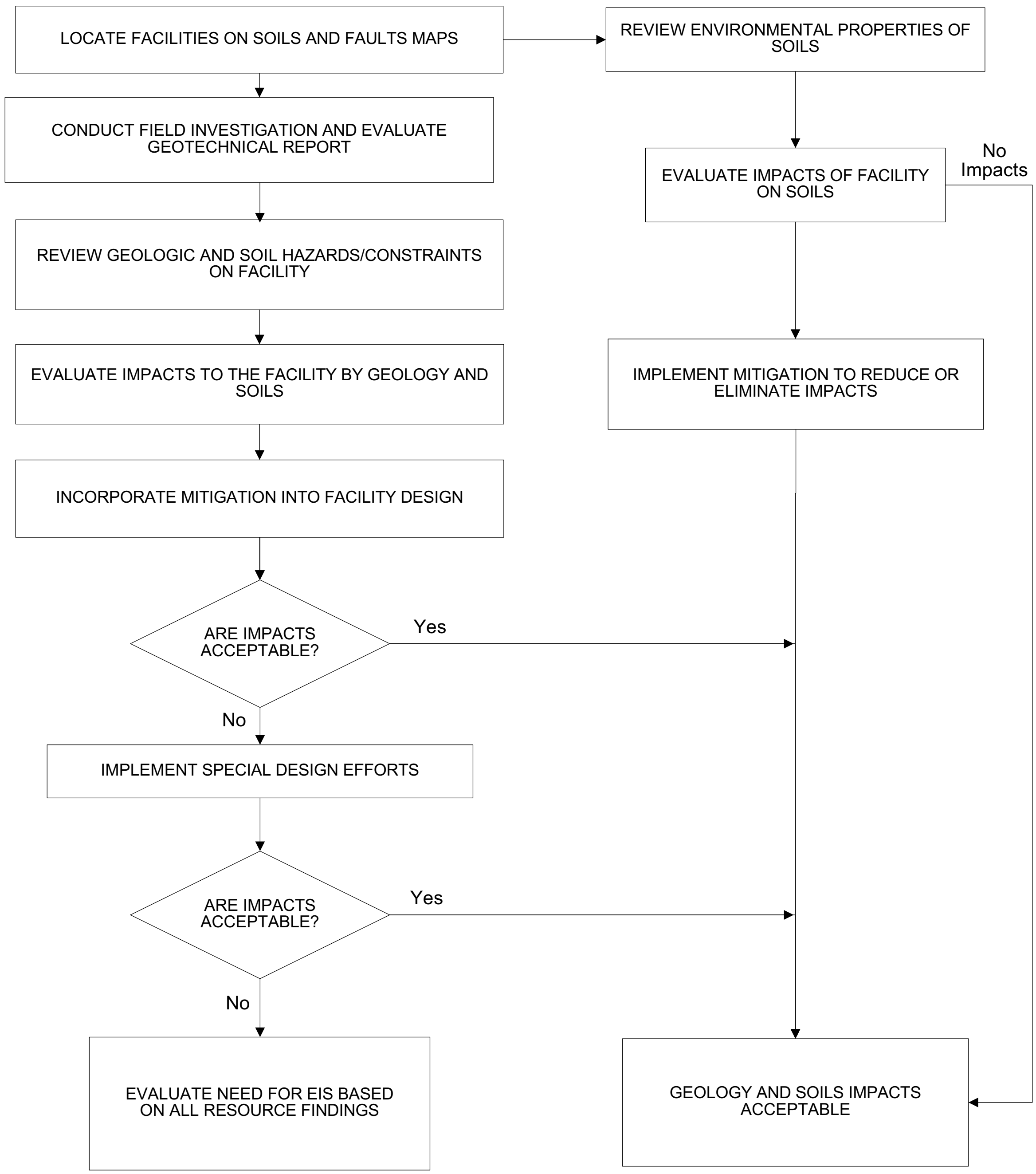


**FIGURE 8.3-1. Project-specific analysis procedure: geology and soils.**

## 8.4 PALEONTOLOGICAL RESOURCES

Paleontological resources are protected on public lands. While not expressly mentioned, fossils have been interpreted by federal agencies to be protected for their scientific or historic value. An area is considered to be paleontologically sensitive if it contains abundant vertebrate fossils or few other (large or small, vertebrate or invertebrate) fossils that may provide new and important scientific information.

Most of the proposed facilities occur in areas of little to no paleontological potential, therefore, there is no project-specific process diagram that has been developed for paleontological resources. The general analysis procedure would initially involve a site-specific review of geologic formations in the vicinity of the project area to determine the presence, or likelihood, of scientifically valuable fossils.

If the project is determined to have the potential for paleontological resources based on a review of the proposed project area with respect to the paleontological resource formations discussed in Chapter 3, then a qualified paleontologist should be contacted to perform a field survey. If scientifically valuable paleontological resources are identified and documented, the analysis procedure requires development of an appropriate mitigation plan that may involve recovery or avoidance, depending on the relative importance of the fossils. If recovery is the selected mitigation plan, implement recovery under the guidance of a professional paleontologist. If avoidance is selected, relocate the facility to avoid the resource.

## 8.5 SURFACE WATER HYDROLOGY

The analysis of potential project-specific impacts to surface water resources is illustrated on Figure 8.5-1. The initial step in the process involves the identification of the facility design and purpose and the existing conditions at the proposed site. One-hundred-year flows predicted to be discharged from each facility should be determined and compared to no project flows. If no flow change is identified, the project may proceed through routine design.

Because flood control facilities are designed to alter surface water flows, most of the impacts related to surface water are reduced during the design phase of the proposed facility. However, the change in surface water flow rates still needs to be evaluated to consider downstream impacts to biological, physical and man-made resources. A field reconnaissance of natural channels immediately downstream of each facility site is necessary to obtain accurate information on the conditions of the channel, vegetation, habitat and other characteristics. The results of the field reconnaissance, in addition to Table G-1 in Appendix G, can then be used to evaluate downstream impacts. If potential impacts to biological resources exist, they should be further evaluated in the biological resources analysis. If impacts to physical and/or man-made resources are considered significant, mitigation should be incorporated into the final design of the facility. If impacts are still significant after reevaluating downstream impacts, an EIS may need to be prepared, depending on the outcome of the other resource disciplines.

Section 404 of the Clean Water Act requires permitting for projects that discharge dredged or fill material into waters of the U.S., including wetlands (Figure 8.5-2). Issuance of these permits is the responsibility of the USACE. Flood control facilities are typically constructed within existing drainages, which are considered waters of the U.S. because they connect to Las

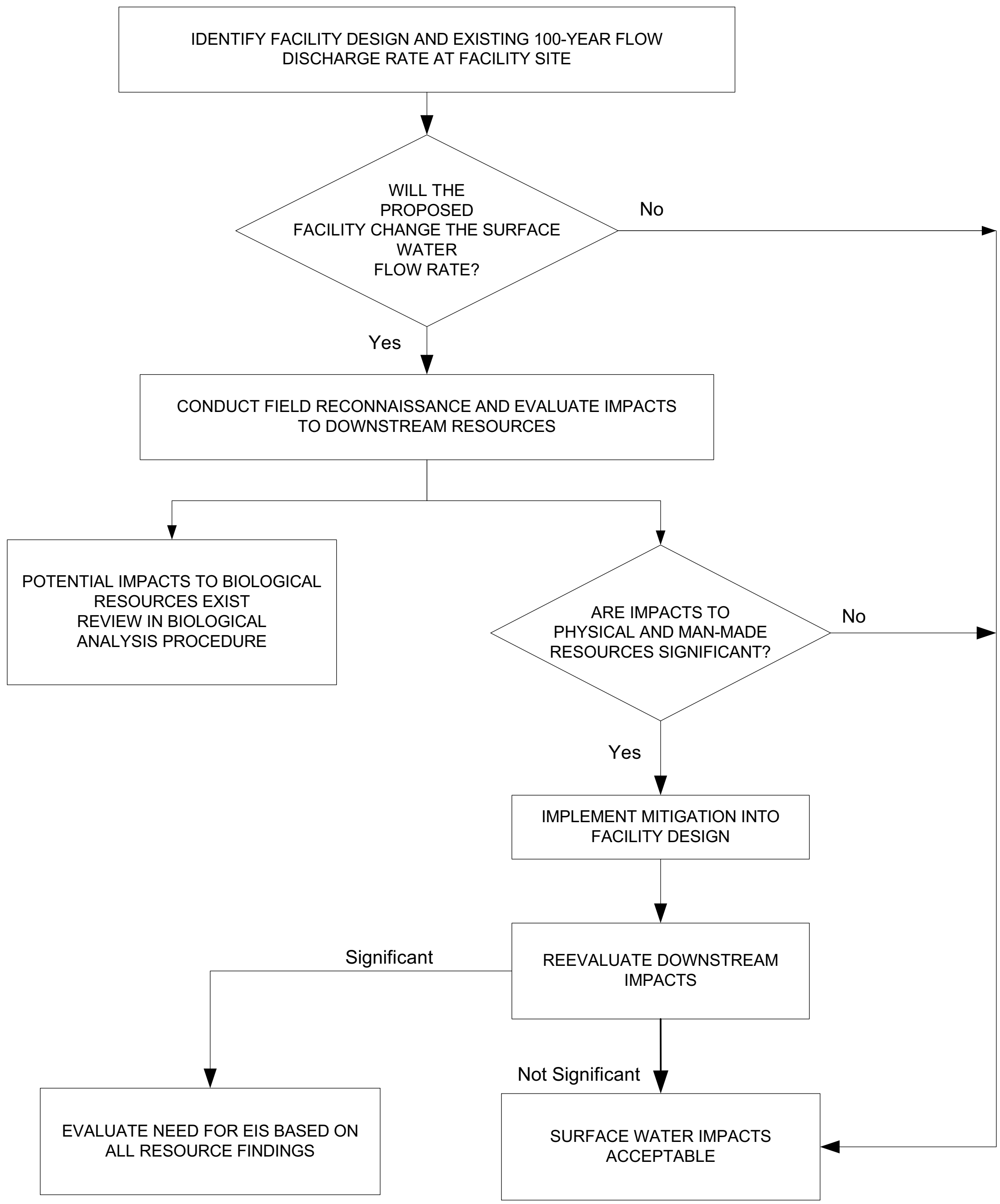


**FIGURE 8.5-1. Project-specific analysis procedure: surface water.**

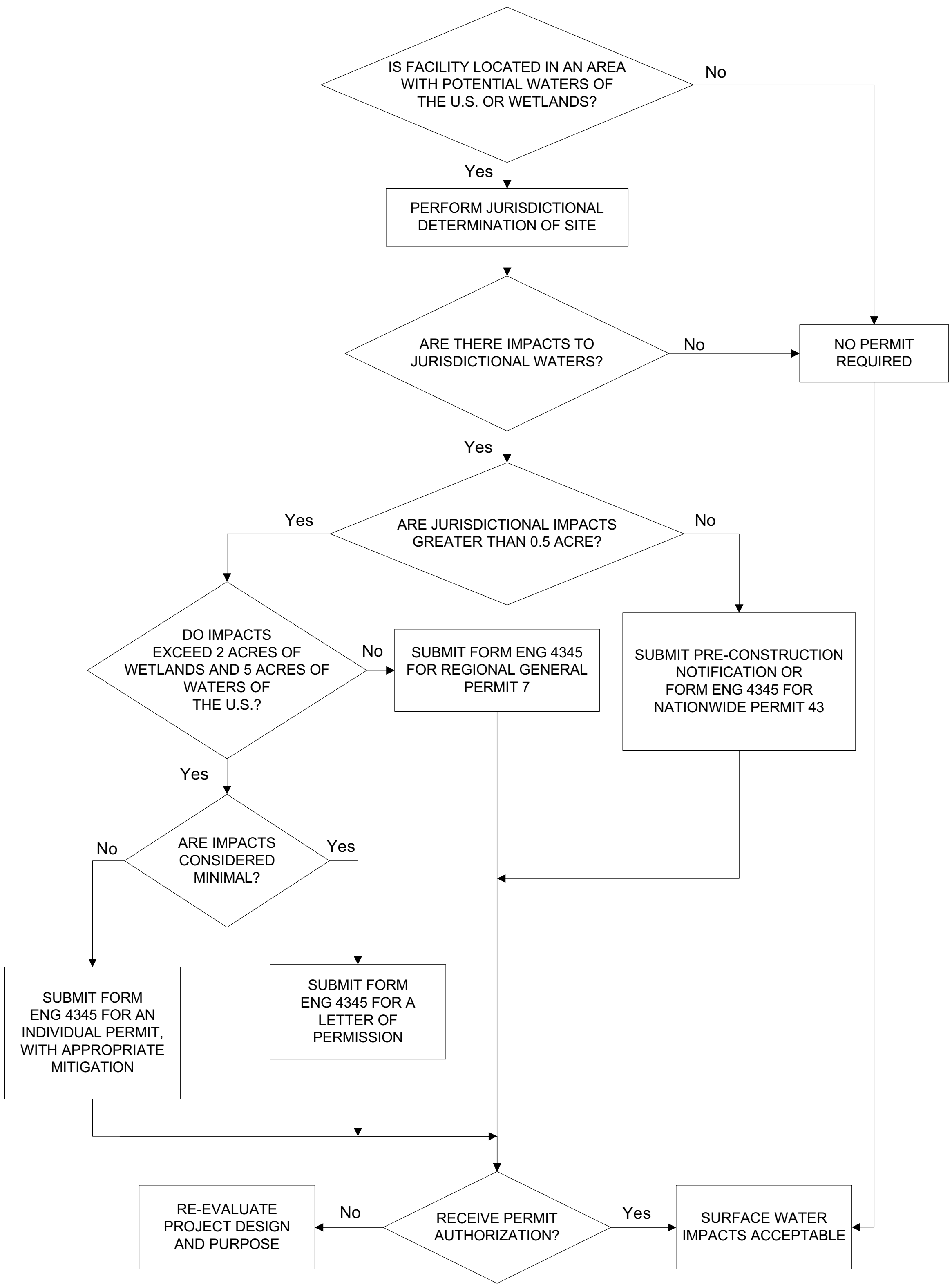


**FIGURE 8.5-2. Project-specific analysis procedure: Section 404 permitting process.**

Vegas Wash then to the Colorado River. The process for analyzing impacts and deciding the appropriate permit for a proposed facility is provided in Figure 8.5-2. The initial step in the process is to use topographic maps and/or aerial photos to determine if the proposed facility is located in an area with waters of the U.S. or wetlands. A field reconnaissance of the proposed project area, including a jurisdictional determination and/or wetland delineation, is necessary to determine the jurisdictional impacts to waters of the U.S. and/or wetlands. Storm drains are not considered to adversely impact waters of the U.S. and do not require 404 permits.

Impacts less than 0.5-acre can be permitted under Nationwide Permit 43 for Stormwater Management Facilities. The application process for this permit includes submitting a Preconstruction Notification, a maintenance plan, if deemed necessary, and an appropriate compensatory mitigation proposal. Form ENG 4345 (application form for Individual Permit) may be used as this notification, but it must clearly state that it is being substituted for the Preconstruction Notification and must include all of the required information of General Condition 13.

Impacts greater than 0.5-acre, but less than 2 acres to wetlands and 5 acres to waters of the U.S. can be permitted under Regional General Permit 7, Construction and Maintenance of Flood Control Facilities in Clark County, Nevada. The process for this permit includes submitting Form ENG 4345 to the USACE at least 45 days prior to initiating work. The permit application must include the information listed in the Special Conditions section of the permit.

Impacts greater than 2 acres to wetlands and 5 acres to waters of the U.S. will require an Individual Permit or Letter of Permission (LOP). The LOP process is abbreviated in comparison to the Individual Permit process because publishing a public notice is not required. A LOP can be obtained for a project with impacts that are considered minimal by the USACE. Impacts that are not minimal require an Individual Permit, and, if impacts are deemed more than minimal after submitting a LOP application, an Individual Permit application would need to be submitted. Both permitting mechanisms require Form ENG 4345 and consultation with the USACE.

Once the required permit has been obtained and appropriate compensatory mitigation has been approved by the USACE, impacts to surface water are deemed acceptable and the proposed project can proceed as planned. If the permit is not authorized, the design and purpose of the facility should be reevaluated and altered as necessary to reduce impacts to waters of the U.S.

# 8.6 GROUNDWATER HYDROLOGY

The analysis of potential project-specific impacts to groundwater is illustrated in Figure 8.6-1. The initial step in the process involves identifying potential groundwater in the project area using information from Figure 3.4-1. If the proposed facility is not located within the 30-foot (9-m) depth to water level contour, mitigation is not necessary and groundwater impacts are acceptable. However, if the proposed facility is located in an area of shallow groundwater, a field investigation and evaluation of the geotechnical report are necessary to determine potential impacts.

Impacts would not be likely and mitigation is not necessary if it is determined that the groundwater in the project area is deep enough that it would not affect the facility. If groundwater impacts are likely, mitigation should be incorporated into the design of the facility. The extent of impacts and related appropriate mitigation measures are discussed in detail in Sections 4.4 and 5.4 of the SEIS.

If identified mitigation cannot be incorporated into the proposed facility design, or if additional information were needed to properly design

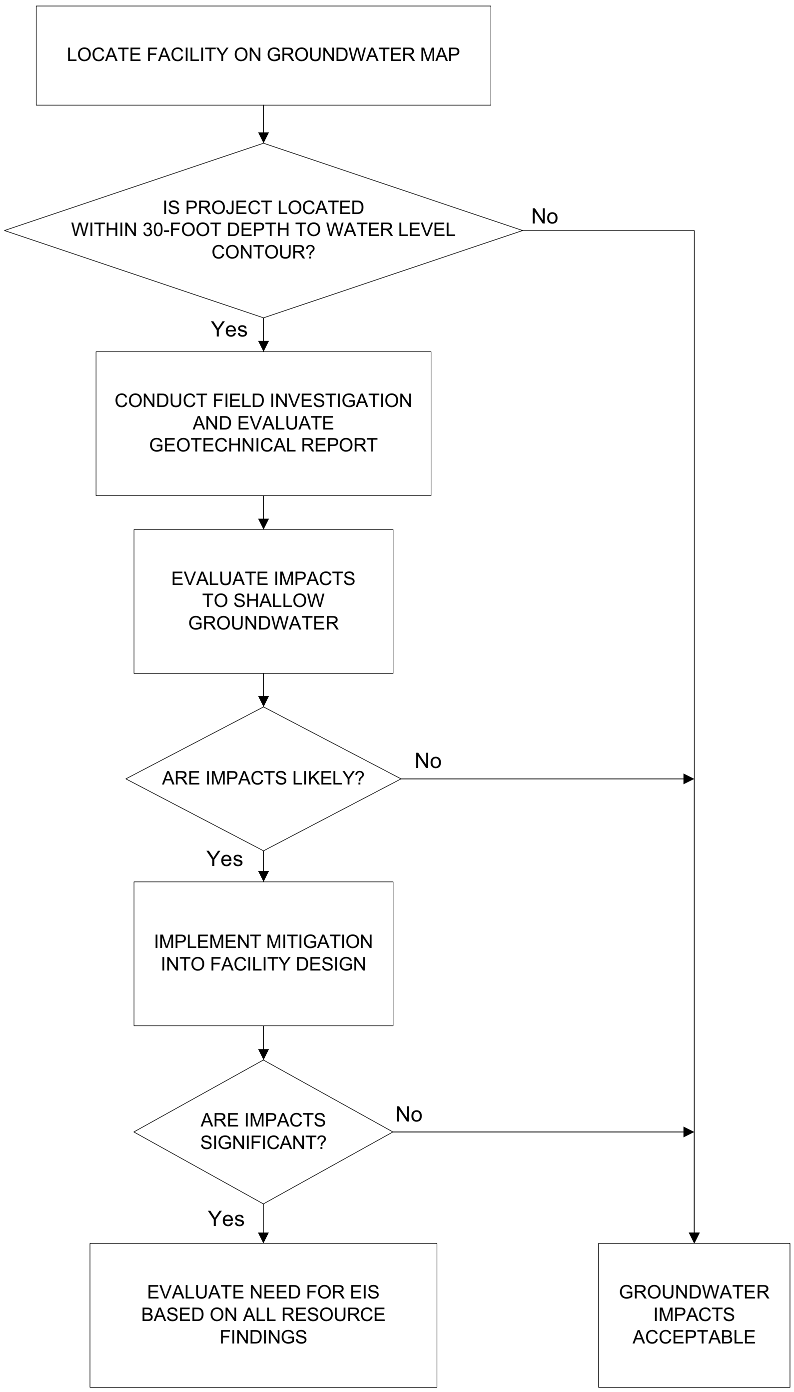


**FIGURE 8.6-1. Project-specific analysis procedure: groundwater.**

drains, a site-specific investigation and additional engineering studies may be conducted to determine appropriate mitigation. If appropriate mitigation cannot reduce impacts to non-significant levels, an EIS may need to be prepared, depending on the outcome of other resource disciplines.

# 8.7 BIOLOGICAL RESOURCES

The analysis of potential project-specific impacts to biological resources is illustrated in Figure 8.7-1. The initial step in the process involves the identification of potentially affected biological resources at each facility site using information from Figures 3.5-1 and 3.5-2 and Tables 3.5-1 and 3.5-2. Background information identified by these sources is used to develop an appropriate field reconnaissance of each facility site by biologists familiar with the local ecological resources in the area. The results of the field reconnaissance are then used to validate and add to the existing information on potentially affected biological resources, as well as refine the assessment of potential impacts associated with the proposed facility.

If there are noxious weeds present on the site, adverse impacts to natural vegetation communities may be reduced by implementation of noxious weed monitoring, control and eradication efforts. If it is likely that federally listed species may occur in the Project Area, the analysis procedure requires involvement with the USFWS. The review pathway includes both informal and formal agency consultation for the determination of a project's potential to jeopardize the continued existence of one or more listed species. If a jeopardy opinion is rendered by the USFWS, then the project would not be able to proceed as planned. If state listed species are identified within the Project Area, recommended and prescribed mitigation measures presented in Section 5.5 must be implemented to reduce impacts to non-significant levels. If the mitigation measures are not found to reduce impacts to listed species to non-significant levels in the Project Area a second-tier environmental analysis, including the development of design changes or detailed mitigation, may need to be prepared, depending on the outcome of other resource disciplines. (Note: If a project is covered by an existing biological opinion for a species, no additional consultation is required.)

The review procedure also addresses biological resources that are not officially federally or state listed, but nonetheless requires special consideration (i.e., riparian areas, wetlands). The review pathway addressing these resources provides for the evaluation of potential impact significance, the application of recommended and prescribed mitigation measures, and may require the need for a second-tier environmental analysis.

# 8.8 CULTURAL RESOURCES

The project-specific analysis procedure for addressing cultural resources involves the consultation with other agencies-such as the SHPO, Tribal Historic Preservation Officer (THPO), and Advisory Council on Historic Preservation (ACHP)-before proceeding with projects that may adversely affect cultural resources. Section 106 of the National Historic Preservation Act legally mandates this process. Because this process is sometimes lengthy, and final conclusions concerning impact significance would be premature prior to its completion, this project-specific analysis procedure is directed toward the efficient compilation of data necessary to implement the consultation process

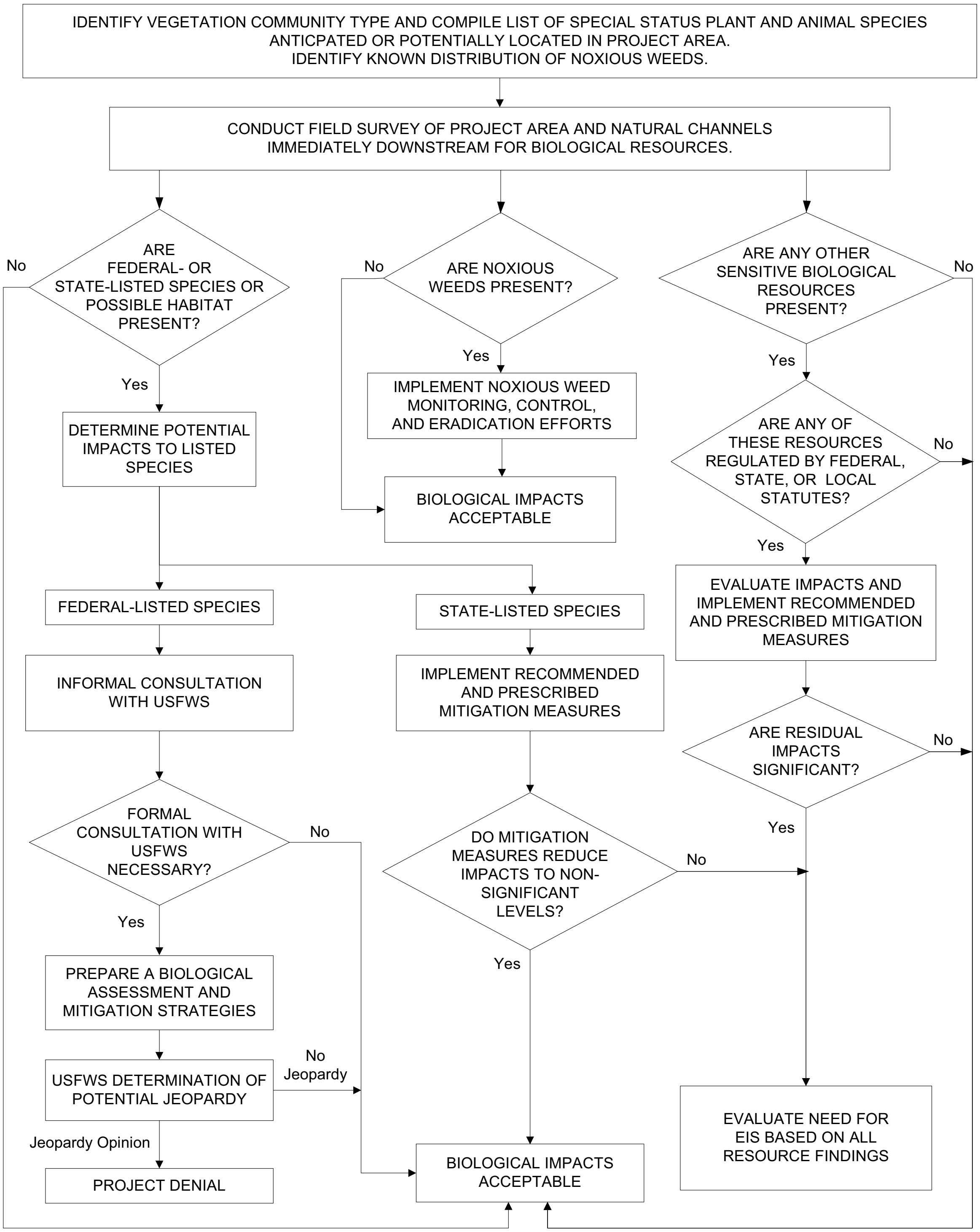


**FIGURE 8.7-1. Project-specific analysis procedure: biological resources.**

Projects on BLM land in the Las Vegas Valley are addressed in the FONSI and Decision Record, October 18, 1996 (EA Log No. NV-054-96-117) for the Bureau of Land Management Programmatic Environmental Assessment for Realty Actions in Las Vegas Valley, September 30, 1996, as amended (File No. 1-5-96-F-23R). Procedures for cultural resources on BLM land in the Las Vegas Valley are described in these documents.

As indicated on Figure 8.8-1, the facility-specific procedure involves an initial consultation with the land managing agency, a site records search and consultation with Native Americans to develop an inventory of potentially affected cultural resources. The report documenting any cultural resources identified will be used to initiate Section 106 consultation between the land managing agency and the SHPO. Depending upon the types of resources identified and potential eligibility for inclusion to the NRHP, preparation of site-specific treatment plans may be required. If the site is important primarily for its information content, adverse impacts may be reduced to acceptable levels by implementing archaeological excavation and analysis plans, or completing detailed architectural recording according to standards developed by the Department of Interior. If the site is significant for values other than its information content, a memorandum of agreement must be prepared for ACHP review. This memorandum will include a detailed analysis of potential project impacts and alternatives to be evaluated prior to the final determination concerning project acceptability.

## 8.9 TRANSPORTATION

At a programmatic level, impacts to transportation resulting from construction and operation of new flood control facilities are considered relatively minor. Construction activities at individual facilities have the potential to cause a direct additive impact on traffic congestion in the immediate area through road detours or closures. Impacts to transportation during operation and maintenance activities of the facilities are also expected to be very minor and last for a brief duration. Cumulatively, the impacts to transportation will be negligible, as transportation will be affected for only brief irregular intervals after the initial construction period has been completed. If traffic impacts are expected to occur at individual facilities, consultation with the appropriate transportation authority regarding procedures for the specific issue must take place before proceeding. No specific screening is necessary for transportation at the project-specific level.

## 8.10 AIR QUALITY

The analysis process of potential project-specific air quality impacts is illustrated on Figure 8.10-1. As indicated on the figure, this analysis is accomplished by locating proposed facilities and determining whether facilities are located in an area where conformity determinations are required. For example, if a proposed facility is located within Hydrographic Basin 212, then conformity regulations require an evaluation of total air quality impacts including temporary, stationary and mobile source emissions. An estimate of the potential emissions resulting from a proposed facility is calculated from a composite tabulation of emission rates that have been developed for typical flood control projects. Table G-2a in Appendix G provides calculations to estimate unmitigated $PM_{10}$ and CO emissions, while Table G-2b (Appendix G) provides a means of estimating ozone precursors. If the proposed project results in emissions that are below the

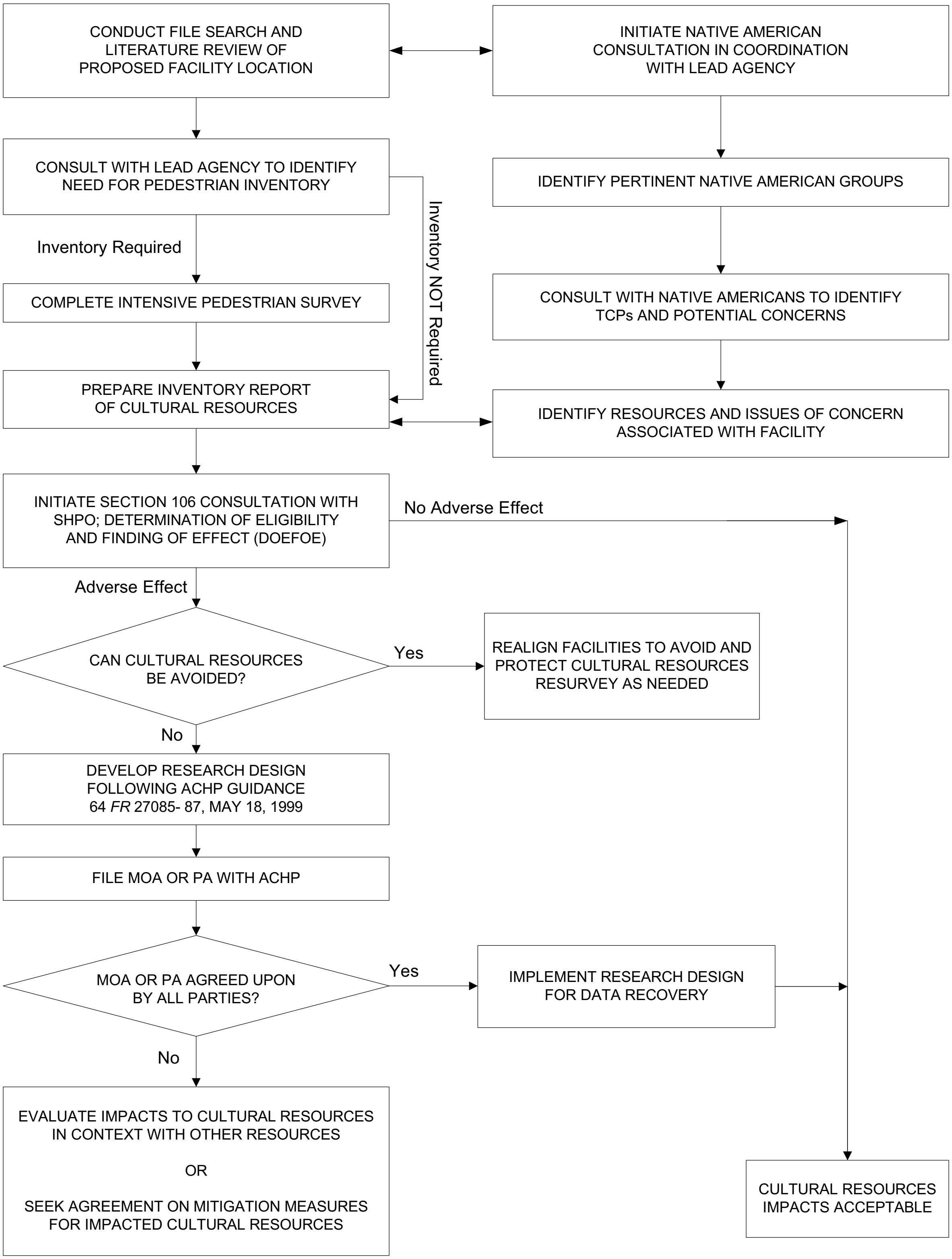


**FIGURE 8.8-1. Project-specific analysis procedure: cultural resources.**

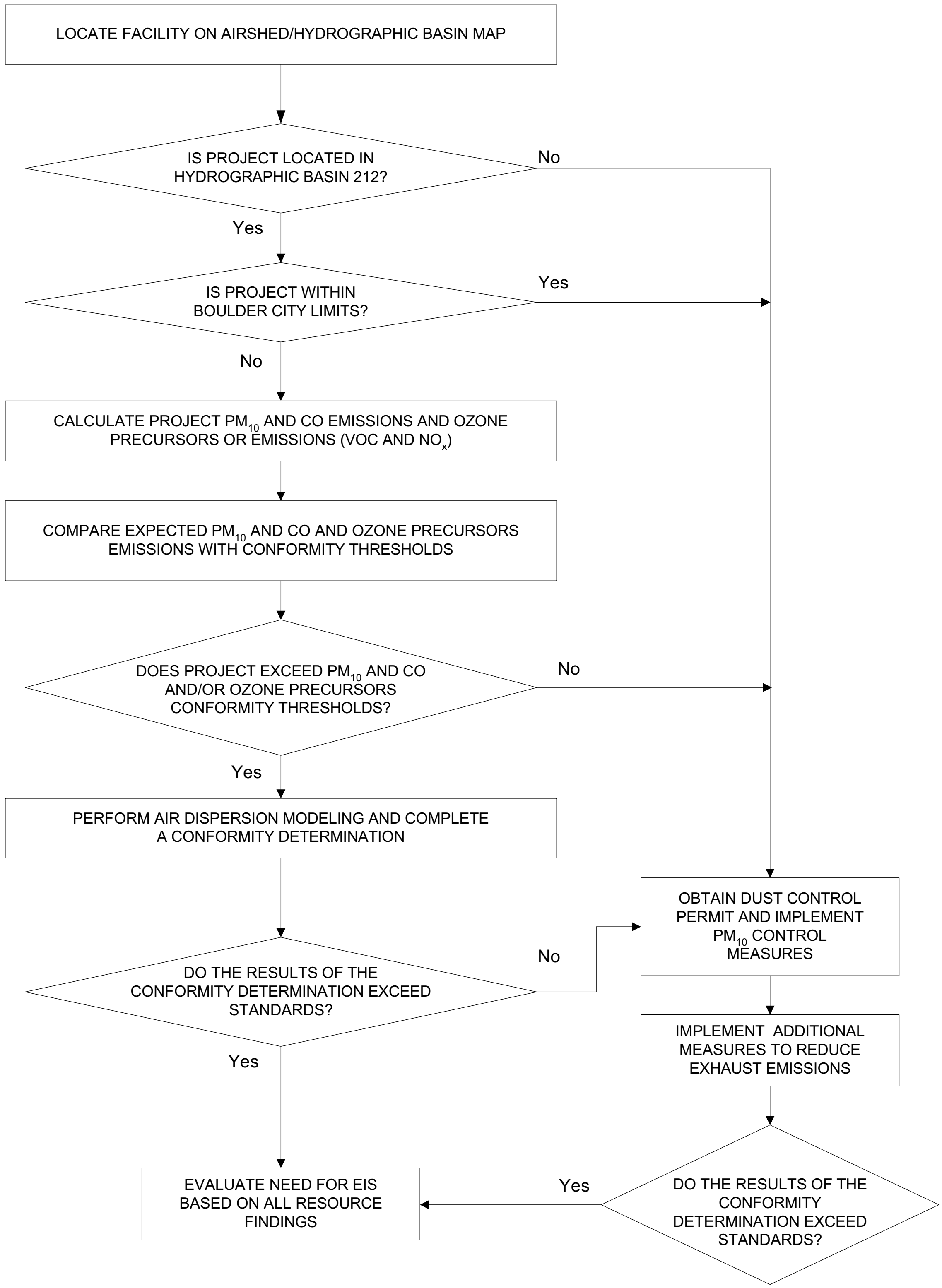


**FIGURE 8.10-1. Project-specific analysis procedure: air quality impacts ($PM_{10}$ and CO and ozone precursor emissions).**

conformity threshold levels, the project may proceed after a Dust Control Permit is obtained from the CCDAQM. If anticipated emissions are above the conformity threshold levels, air dispersion modeling must be performed following EPA guidelines. A subsequent Conformity Determination is then completed to determine whether results will exceed regulatory standards. The object of the Conformity Determination is to demonstrate that emissions will not cause the concentration of the pollutant to exceed standards at any location and to show that the emissions when coupled with other planned actions will not cause the concentration to exceed the standard.

# 8.11 VISUAL RESOURCES

The assessment of visual resources involves a certain degree of subjectivity concerning the amount of landscape modification allowable before a threshold of impact considered significant is reached. In the Project Area, lands owned by the public and private sectors are primarily located in the developed urban areas of Las Vegas, North Las Vegas, Boulder City and Henderson, while most lands that lie outside of these cities are owned by the United States and managed by the BLM. Although potential impacts to visual resources are evaluated under separate rating systems for federal and non-federal lands, the evaluation process for determining impacts on both federal and non-federal lands is the same. The process for identifying potential impacts to visual resources follows and is illustrated in Figure 8.11-1.

The overall analysis begins with characterizing the type of visual unit (i.e. downtown, urban, landscaped) and its corresponding sensitivity level for either federal or non-federal lands. This process is completed to determine the ability of a facility to absorb new focal changes. Federal sensitivity levels are known as VRM classes and will be subject to limitations placed on land disturbance as addressed in the Las Vegas RMP. VRM classes range from Class I to Class IV. Class I is exclusive to areas congressionally designated as wilderness. Areas with this designation have the most limited ability to absorb proposed facilities and none are located in the Project Area. In contrast, Class IV areas can easily absorb proposed facilities. These areas are managed to allow activities that require major modification of the existing character of the landscape. A general description of BLM VRM classes can be found in Section 3.9.3.7.

Visual units on non-federal lands are given a sensitivity rating of high, medium or low. A sensitivity rating of high indicates the area has a limited ability to absorb proposed facilities. Whereas, areas that are highly compatible and able to visually absorb proposed facilities are given a sensitivity rating of low. Section 3.9.3.6 describes the non-federal sensitivity rating system in more detail. The CCRFCD is the compliance authority for visual resources on non-federal projects.

Following visual unit sensitivity level analysis, a general field reconnaissance trip is completed to document site-specific visual characteristics such as, topography and visual screening. Impacts to visual resources are then determined using the documented site-specific visual characteristics and the visual unit sensitivity level. Areas that will not adequately absorb the proposed facility into the existing environment require mitigation measures to reduce visual impacts to non-significant levels.

If impacts are not significantly reduced following mitigation, the significance of the impacts to visual resources will be evaluated in conjunction with any remaining impacts from other resources to determine the need for a second-tier environmental analysis.

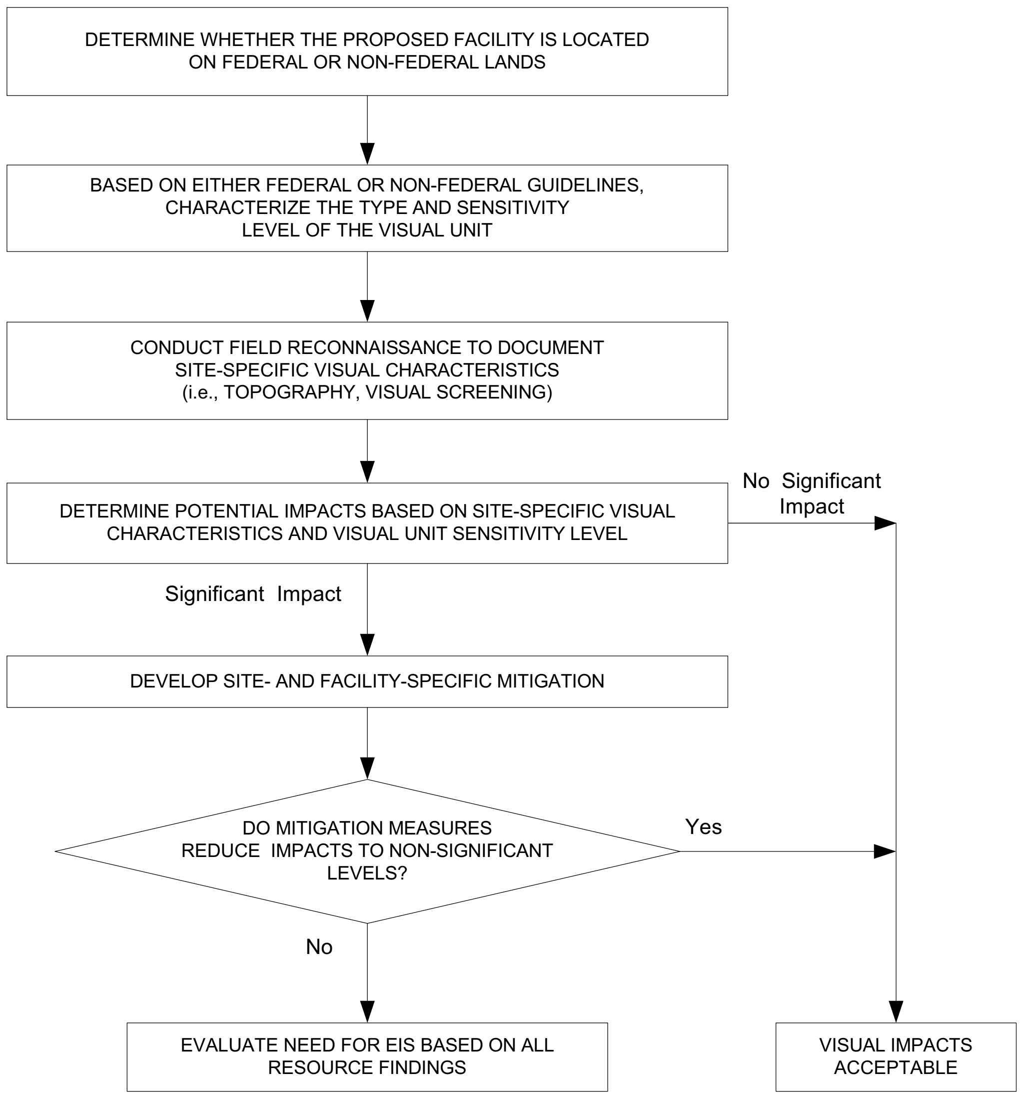


**FIGURE 8.11-1. Project-specific analysis procedure: visual resources.**

## 8.12 NOISE

As discussed in Sections 3.10 and 4.10, there are no laws concerning noise levels that have been established by the State of Nevada or the BLM. Although qualitative statutes concerning noise as a nuisance factor have been established by Clark County, the ordinance exempts temporary construction work, which is defined by the County as construction work over the duration of a valid permit. Therefore, the construction of proposed facilities in compliance with a valid permit is not expected to result in excessive noise levels and would not require detailed project-specific review. No specific screening is necessary for noise at the project-specific level.

## 8.13 RECREATION

Construction and operation of proposed flood control facilities may have both negative and positive impacts on recreation. The impacts on recreation are subjective and often times the positive and negative impacts overlap. Therefore, impacts must be evaluated on an individual facility basis prior to construction. The procedure for evaluating impacts on recreational opportunities from facility construction, operation and maintenance is illustrated in Figure 8.13-1. As indicated in the figure, the analysis of potential impacts on recreation requires a consideration of both existing and proposed recreational opportunities at the facility site, as well as, the nature of impacts associated with the construction and operation of the proposed facility.

Some facilities, such as multi-use park facilities, will have a beneficial impact on recreational opportunities and mitigation is not required. Facilities with possible adverse impacts on recreational opportunities require mitigation measures as addressed in Section 5.11. If the prescribed mitigation measures do not reduce impacts to acceptable levels, the need for a project-specific EIS must be evaluated within the context of the overall resource findings.

## 8.14 HAZARDOUS MATERIALS

The procedure used to evaluate potential risks associated with hazardous materials is summarized on Figure 8.14-1. The initial step in the process involves determining if the proposed facility is located in an area with a known hazardous materials risk. This can be accomplished by using information from Figure 8.14-1 in combination with initiating a Phase I. The Phase I evaluation follows the ASTM Standard Practice for Environmental Site Assessments Process (Standard E 1527-00). The assessment is a two track process involving: (1) a detailed investigation of past property usage at the project site and neighboring properties, and (2) an inspection of the project site, noting present usage of the site and surrounding properties. Investigation of past property usage typically involves review of available historical records, such as city directories and aerial photographs, interviews with knowledgeable individuals, and record searches of relevant state and federal databases. A determination that hazardous materials may be present on the project site can result from one or both of these tracks.

Following establishment of a reasonable suspicion for the presence of hazardous materials on the project site, Phase II environmental testing is implemented. Information related to specific contaminants of interest identified during the Phase I assessment is compared to information concerning hazardous material characteristics.

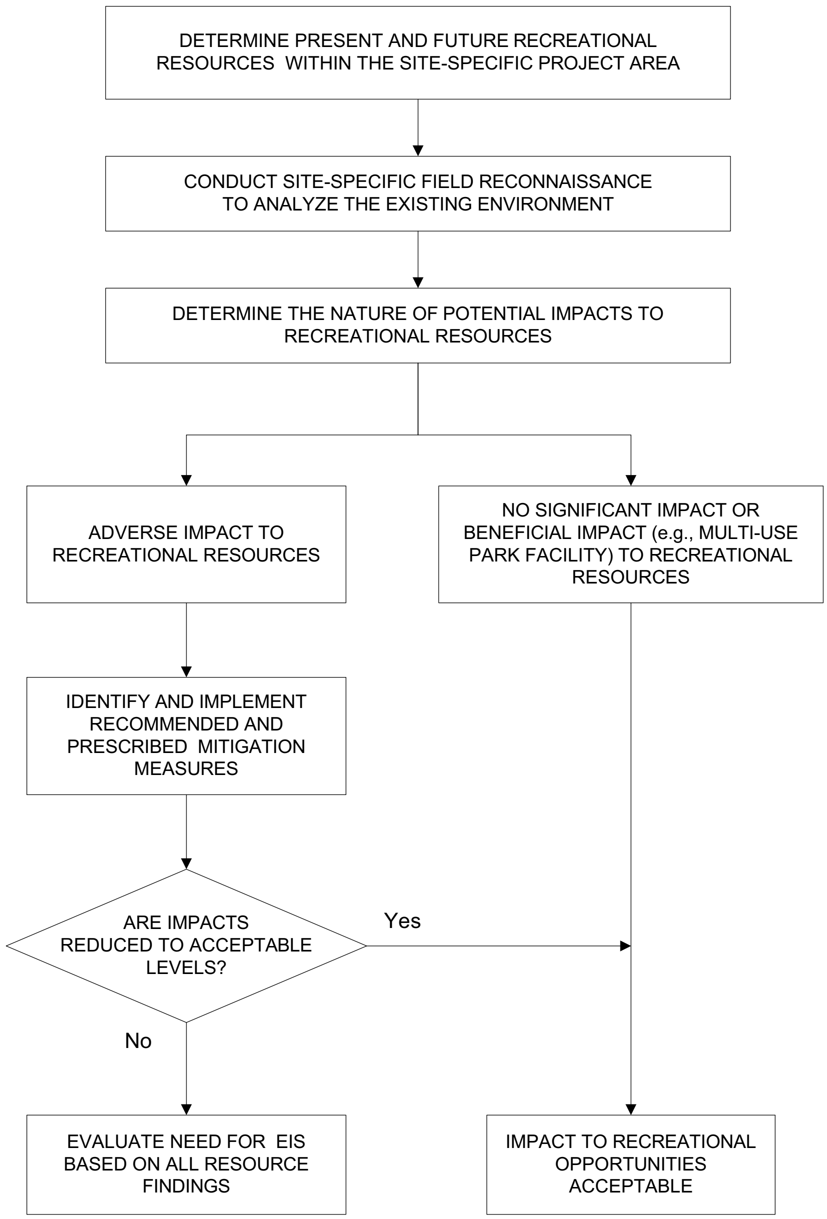


**FIGURE 8.13-1. Project-specific analysis procedure: recreation.**

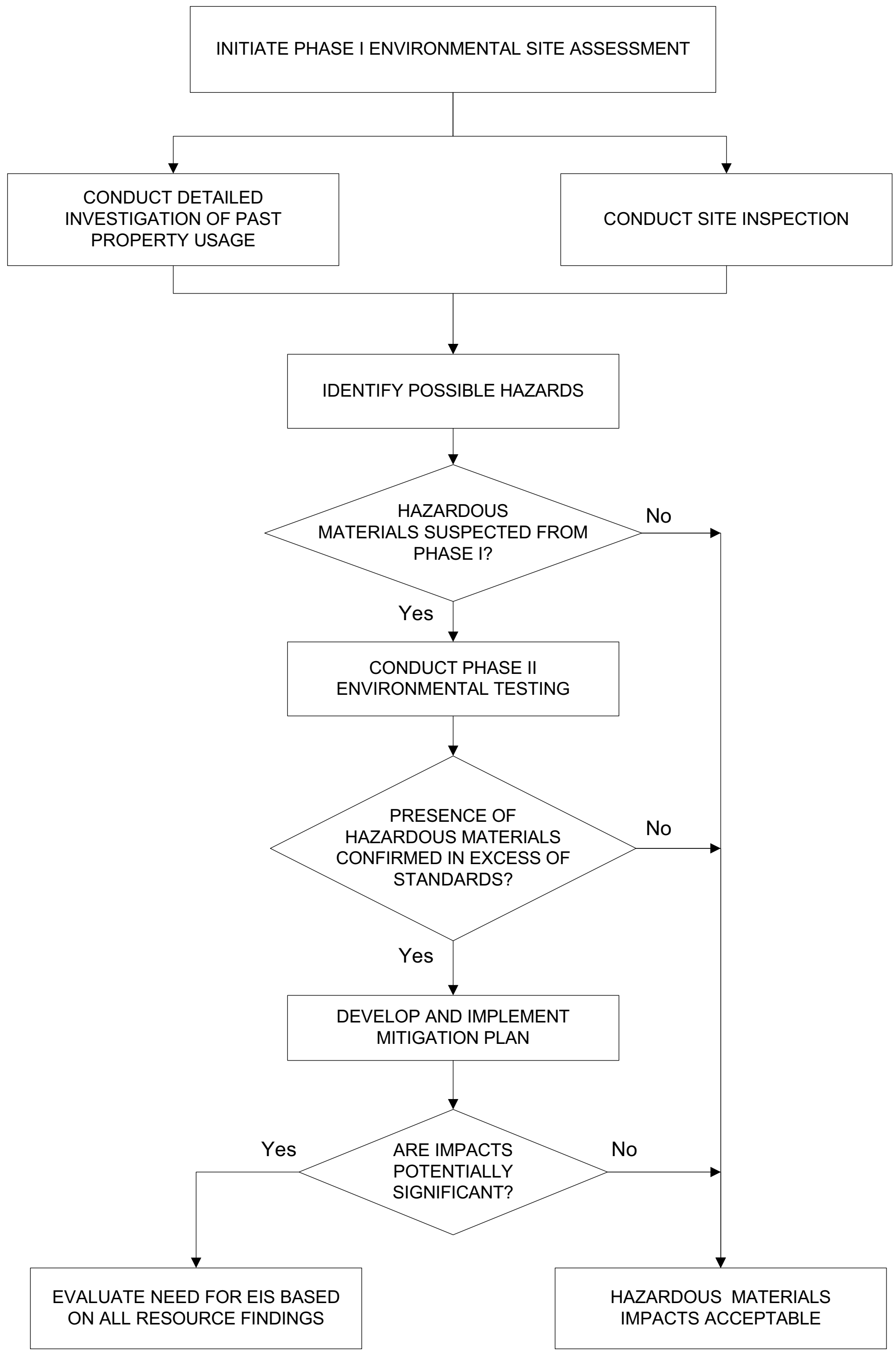


**FIGURE 8.14-1. Project-specific analysis procedure: hazardous materials.**

Specific analytical tests are selected to screen for the suspected contaminants. The analytical information obtained from the Phase II testing is compared with relevant MCLs established in the National Primary Drinking Water Regulations 40 CFR Part 141 for water contamination and PRGs developed by the EPA for soil contamination. If hazardous materials are confirmed in excess of the MCLs, an appropriate mitigation plan would need to be developed. Mitigation measures described in Table 5.12-1 should be incorporated into the plan as they are deemed appropriate. Following determination of the appropriate mitigation, decisions regarding follow-up confirmatory sampling and final conclusions regarding the acceptability of the project site will be made. If mitigation measures cannot reduce the impacts to non-significant levels, an EIS may need to be prepared, depending on the outcome of other resource disciplines.

# 8.15 LAND USE

The analysis of potential project-specific impacts to land use is illustrated in Figure 8.15-1. The review pathway requires a consideration of both existing and proposed land uses at the facility site, as well as, the nature of impacts associated with the construction and operation of the facility proposed. By combining current land use information with impact type and facility impact data presented in Tables G-3 and G-4 (Appendix G), a preliminary assessment of impacts that could be associated with the proposed facility is accomplished. Background information identified by these sources is used to develop an appropriate field reconnaissance of each facility site. This information is then applied to the impact significance level data presented on Table G-5 (Appendix G) to determine the need for appropriate mitigation measures.

The review pathway includes a no- to low-potential impact category and a moderate- to high-potential impact category. If a no- to low- impact determination is reached, mitigation is unnecessary and land use impacts are acceptable. If a moderate- to high-impact determination is made, then recommended and prescribed mitigation measures presented in Section 5.13 must be implemented to reduce impacts to non-significant levels. If the mitigation measures are not found to significantly reduce impacts to land use in the Project Area, an EIS may need to be prepared, depending on the outcome of other resource disciplines.

# 8.16 SOCIOECONOMICS

Each year the CCRFCD uses the criteria outlined in Table 8.16-1 to prioritize its flood control projects as part of the Master Plan. This annual assessment of priorities serves to keep the Master Plan up-to-date with potential year-to-year changes in public needs, impacts, funding levels, development changes, environmental considerations and socioeconomic issues. Since these matters are considered at annual planning and prioritization level, specific assessments of socioeconomic issues related to new facilities are not considered within the scope of the Chapter 8 studies. No specific screening is necessary for socioeconomics at the project-specific level.

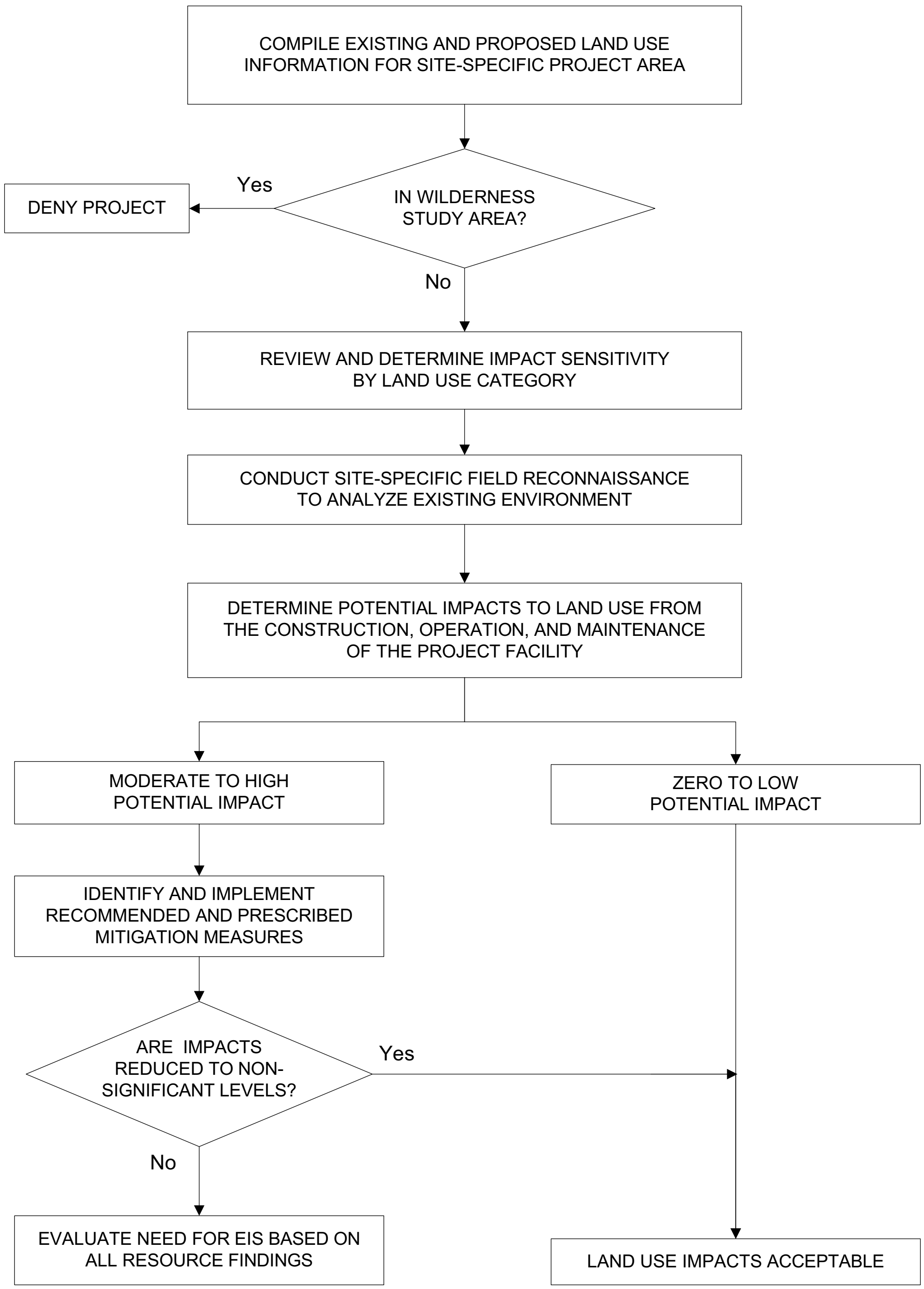


**FIGURE 8.15-1. Project-specific analysis procedure: land use.**

**TABLE 8.16-1. Annual CCRFCD Prioritization Criteria**

| Criteria | Description |
|---|---|
| Population Affected | Refers to the existing population affected by project construction and considers benefits to them by reducing flood hazards. |
| Assessed Land Value Impacts | Review assessed land values for developed and undeveloped land affected by the project, including all structures (public, commercial, or residential). Consider impact on land values related to a reduction of the floodplain area. |
| Public Perception of Need | Evaluate in terms of satisfying the public desire to have their money spent on "worthwhile" projects and the public's perception of need. |
| Emergency Access and Public Inconvenience | Determine project's impact on emergency vehicles accessing their respective substation or station. The evaluation will include an assessment of the project's contribution to the development of an all-weather transportation system and accessibility to flood-isolated areas. |
| Cost Avoidance | Determine the reduction in future costs, including potential damage, construction of over-sized facilities, and the ability to construct, as well as the risk associated with inadequate or under-sized facilities. |
| Availability of Other Funding Sources | Evaluate the potential for funds from grants, developers, and public and private interests. May also involve land donation. |
| Interrelationships to Other Projects | Determine whether project can function independently or is needed to complete or increase the effectiveness of the existing regional and local drainage system. |
| Timing and Implementation | Consider timing and implementation, including availability of right-of-way, permits, and ability to begin a project in a reasonable time frame. |
| Environmental Enhancement | Evaluate benefits derived from improving or mitigating the threat to public health and enhancement of wildlife habitat, recreational opportunities, and water quality. |
| Annual Maintenance Cost | Evaluate costs and determine whether projects have lower maintenance costs than existing facilities or whether maintenance costs will be reduced in the future. |

# 8.17 ENVIRONMENTAL JUSTICE

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed by President Clinton on February 11, 1994, directs federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse affects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. The purpose of environmental justice is to determine whether a disproportionate share of the proposed project's adverse socioeconomic impacts are borne by minority and low-income communities.

Based on this prioritization method discussed in Section 8.16 and the analyses performed in the SEIS that indicate no programmatic environmental justice impacts resulting from the implementation of Master Plan, no facility-specific valuations are believed to be necessary. No specific screening is necessary for environmental justice at the project-specific level.

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# CHAPTER 9: LIST OF PREPARERS

This document was prepared and reviewed by a team of individuals from the BLM, CCRFCD and the SWCA team. They are identified along with their titles and project roles in Table 9.1-1.

**TABLE 9.1-1. List of Preparers**

| Organization | Name | Title | Project Role(s) |
|---|---|---|---|
| BLM | Anna Wharton | Field Office Project Manager | Reviewer |
| BLM | Jeff Steinmetz | Environment Protection Specialist | Reviewer |
| BLM | Adrian Garcia | Realty Specialist | Project Manager/ Reviewer |
| BLM | Michael Johnson | Planning and Environmental Coordinator | Reviewer |
| CCRFCD | Tim Sutko | Senior Hydrologist/Environmental Mitigation Manager | Project Manager, Reviewer |
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| SWCA | Gregory Beck | Senior Staff Environmental Scientist | Hazardous Materials (Ninyo and Moore) |
| SWCA | Erin Cole | Senior Hydrologist | Geology, Soils, Paleontology, Surface and Groundwater |
| SWCA | Cara Corsetti | Program Director - Paleontology | Paleontological Resources (Reviewer) |
| SWCA | Aaron Ferguson | Cultural Resources Program Director | Cultural Resources |
| SWCA | Kyle Gundersen | GIS Analyst | Map Preparation and GIS Analyst (G.C. Wallace) |
| SWCA | Peri Ingertson | Administrative Specialist | Index, Glossary, Distribution List |
| SWCA | Danny Kringel | Principal Scientist | Air Quality (Montgomery Watson Harza) |
| SWCA | Eric Koster | Environmental Specialist | Assistant Project Manager, Reviewer, GIS |
| SWCA | Kelli Nagamine | Administrative Support | Document Support |
| SWCA | Brad Norling | Senior Biologist/GIS Specialist | Biological Resources, Visual, Recreation, Noise, Geographic Information System integration, Chapters 6 and 8 |
| SWCA | Donna Osborne | Technical Editor | Publication |
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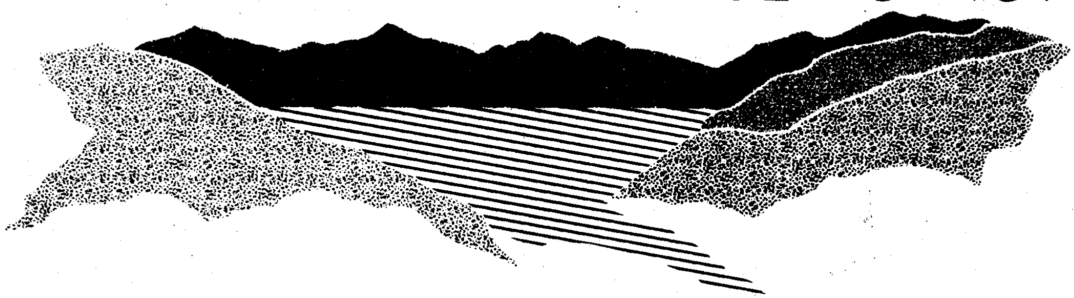
# APPENDIX A: RECORD OF DECISION (ROD)

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BUREAU OF LAND MANAGEMENT

# RECORD OF DECISION
# FINAL ENVIRONMENTAL IMPACT STATEMENT
## Flood Control Master Plan
## Clark County Regional Flood Control District

C L A R K C O U N T Y
REGIONAL FLOOD CONTROL DISTRICT



United States Bureau of Land Management
Stateline Resource Area, Las Vegas District
Las Vegas, Nevada

in cooperation with

Department of the Army
Sacramento District Corps of Engineers
Sacramento, California

**RECORD OF DECISION**

**FINAL ENVIRONMENTAL IMPACT STATEMENT**
**CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT**
**FLOOD CONTROL MASTER PLAN**

***Environmental Impact Statement No. 910106***

United States Bureau of Land Management
Stateline Resource Area, Las Vegas District
4765 Vegas Drive
Las Vegas, Nevada 89126

**in cooperation with**

**Department of the Army**
**Sacramento District Corps of Engineers**
**650 Capital Mall**
**Sacramento, California 95814-4794**

Recommended by:

[signature] Area Manager, Stateline — Date 5/30/91

[signature] Ben F. Collins, District Manager, Las Vegas — Date 5/31/91

Approved By:

[signature] State Director, Nevada — Date 6/4/91

**DECISION**

I approve Clark County Regional Flood Control District's proposed action (Detention/Conveyance System) for the implementation of their Flood Control Master Plan, along with the stipulations and mitigating measures as specified within this Record of Decision (ROD). Approval of this action includes my decision to grant rights-of-way to construct, operate and maintain those Detention/Conveyance alternative facilities identified in the Final Environmental Impact Statement (FEIS) with stipulations, as identified within this ROD, and with the following exceptions:

1. All or portions of facilities 7, 8 and 10 on Figure A2-1; 1 and 9 on Figure A2-2; and 1, 2 and 3 on Figure A2-13 are located within Wilderness Study Areas (WSAs). Facilities identified in Figure A2-1 are within the Quail Spring WSA (NV-050-411), those identified in Figure A2-2 lie within Nellis C WSA (NV-050-4R-15C) and those identified in Figure A2-13 are within LaMadre Mountains WSA (NV-050-412). All actions proposed within WSAs must meet the nonimpairment criteria in the Interim Management Policy (IMP), and if the criteria cannot be met, as is the case with these facilities, the proposed actions must be denied. The IMP is valid until Congress makes a decision regarding the designation or release of the subject lands.

2. Facilities 1 thru 6 on Figure A2-13 are located partially or wholly within the Red Rock Canyon National Conservation Area (RRCNCA). These facilities are not compatible with the mandate for management of the RRCNCA and therefore rights-of-way will not be approved.

Further, it is the intent of the BLM to eventually transfer public lands, upon which flood control facilities are constructed, to the local government entities through the appropriate land disposal mechanism.

**NEED FOR ACTION**

In response to major floods in 1983 and 1984, the Clark County Regional Flood Control District (CCRFCD) was established in 1985 to develop a regional flood control program for the Las Vegas Valley and surrounding environs. As part of the CCRFCD mandate, a comprehensive, regional Master Plan was prepared entitled "Clark County Regional Flood Control District Flood Control Master Plan".

The principal objective of the Master Plan is to provide for the long-term improvement in public safety and property damage protection from flooding events by guiding the siting, design, and installation of flood control facilities to promote the effective functioning of the entire system.

**DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES**

The proposed action and alternatives are described in the following documents which are incorporated by reference:

Clark County Regional Flood Control District Flood Control Master Plan Environmental Impact Statement (BLM, 1991)

U.S. Fish and Wildlife Service Biological Opinion (August 29, 1990)

The FEIS addresses three principal project alternatives; the Detention/Conveyance, All Conveyance, and the No Project alternatives. The Detention/Conveyance alternative was adopted by the CCRFCD as the proposed flood control program based on its flexibility, reliability, and affordability. In addition, the Detention/Conveyance alternative will allow construction of presently needed upslope facilities, unlike the All Conveyance alternative which would have to be built starting in the valley bottom.

The only other alternative considered was the Detention/Conveyance Alternative #3 in the Central Las Vegas Valley. This alternative was the same as the proposed action (Detention/Conveyance Alternative) in the areas upstream of the Angel Park and Gowan Detention basins. However, each of these basins would have had its

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own discharge outfall system under this alternative. This alternative would have resulted in lower detention requirements at the Gowan Detention System, but would have required two additional small detention basins. This alternative was very similar to the proposed action in terms of; flexibility to accommodate changing administrative and development related conditions; degree of reliability and; multi-use potential. However, the planning and construction costs of this alternative would be considerably higher than the proposed action, and therefore was eliminated from further consideration.

The Detention/Conveyance system, as described and analyzed in the FEIS is the selected alternative. Components of the selected alternative include the following:

The selected alternative is characterized by a series of detention basins located around the perimeter of currently urbanized areas. These basins and associated dikes are designed to collect flood flows and release the flows at metered rates that can be handled by downstream conveyance facilities.

Flows from the basins are conveyed to the Las Vegas Wash through a series of conveyance facilities including lined and unlined channels, pipelines, and conduits. Because the velocity of the flows is reduced and release rates are metered, flows can be managed using smaller conveyance facilities than would be required with the All Conveyance alternative. In most cases these flows can be handled by existing facilities with little or no major capacity improvements. Because of the reduced flows there is greater flexibility in interchanging different types of facilities to handle predicted flows. By reducing flow rates, the potential for downstream scouring and erosion is also reduced, resulting in enhanced protection of wetlands and areas with perennial flows.

The Detention/Conveyance alternative is composed of approximately 48 miles of dikes. Four miles, or 9.2 percent more linear feet of dikes will be constructed under this alternative than would be required under the All Conveyance alternative. Dikes are used to collect flood flows and convey them to detention basins for metered releases. In general, dikes vary considerably in size. Many of the dikes proposed range from 1.0 to 1.5 miles in length with most being a minimum of 1,000 feet in length.

Included in the selected alternative are 53 detention basins and 16 debris basins covering a total of 2,155 acres. The average size of a detention basin is 37.74 acres and a debris basin 9.69 acres. The total acreage used to construct basins is slightly over double the acreage required in the All Conveyance alternative.

The Detention/Conveyance alternative utilizes 197 miles of channel. The size of lined and unlined channels is much smaller for the selected alternative than for the All Conveyance alternative. The All Conveyance channels are often substantially wider in order to convey increased flood flows. Channels can be two to ten times greater in width.

A total of 42 miles of existing floodways are proposed to be utilized under the selected alternative. Many of these floodways contain wetland areas.

Under the selected alternative 105 miles of pipeline and box conduits will be used. In general, pipelines and box conduits will be used in urban areas where excavation of channels is not feasible. In addition, 122 bridges and box culverts will be utilized.

As presently estimated, it will require 59 years to construct the Detention/Conveyance alternative. Because of the configuration of the system, initial activities would focus on construction of the upstream dikes and detention basins necessary to convey and reduce flood flows to levels that can be accommodated by existing and upgraded downstream facilities.

The second flood control system addressed in the FEIS is the All Conveyance alternative. Components of this alternative include the following:

The All Conveyance alternative is composed of a series of structures and facilities designed to collect stormwater and convey it out of the area. The system consists of a series of interrelated dikes, lined and unlined channels, floodways, pipeline conduits, bridges and boxes, detention basins, and debris basins located throughout the valley.

The major characteristic distinguishing this alternative from the Detention/Conveyance alternative is that channels have sufficient capacity to convey flows to the Lower Las Vegas Wash at any location in the system. As a result, the All Conveyance system is better suited to handle flood flows resulting from localized storms downstream of flow collecting dikes and detention basins. In most instances, larger channels, pipelines, and conduits are necessary to convey these flows.

Facilities to be constructed under this alternative include 44 miles of dikes, 238 miles of lined and unlined channels, 34 miles of floodways, 99 miles of pipelines and conduits, 182 bridges and box culverts, 6 detention basins and 28 debris basins. Although existing channels and flow paths are used to the extent possible, massive replacement of existing channels and bridges is usually required.

Construction of the All Conveyance alternative is projected to require 97 years based on estimated available funds. The increased time required over the Detention/Conveyance alternative is due to the higher construction costs associated with numerous, larger bridges.

Since operation of the system depends on the ability of downstream conveyances to handle increased flood flows, construction activities would tend to move from downstream to upstream locations. As a result many areas would not experience improved flood protection until the downstream facilities are in place.

Under the No Project alternative no flood control facilities would be constructed under the auspices of the CCRFCD. However, facilities would continue to be built by local developers and by local municipalities without consideration of a system of integrated and standardized facilities. Under this alternative, flood episodes would likely become more severe as urban growth continues, resulting in greater property damage and loss of life.

The U.S. Army Corps of Engineers (COE) is evaluating the feasibility of designing and constructing flood control facilities along the Tropicana and Flamingo washes in the Las Vegas Valley. These future projects, if implemented by the COE would constitute a more intensive variation to the types of facilities envisioned in the CCRFCD's Master Plan. The Master Plan has been designed to accommodate more intensive future projects (such as those being evaluated by the COE) and the impacts of any such projects would be evaluated at the time specific plans are proposed. These second-tier environmental analyses would be prepared by the COE (or other project sponsors) in accordance with the project-specific guidance provided in Section 14 of the FEIS.

**MANAGEMENT CONSIDERATIONS**

My decision to approve the CCRFCD's proposed project rights-of-way as mitigated and monitored will not result in unnecessary degradation. After close examination of the findings of the FEIS and consultation with the U.S. Fish and Wildlife Service (USF&WS), COE and the Nevada State Historical Preservation Officer (SHPO), the proposed action, as mitigated, is consistent with major public land issues and is considered the environmentally preferred alternative. Mitigation measures have been adopted to ensure that all reasonable means to avoid or reduce environmental harm have been incorporated into the proposed project. A summary of the management considerations, which includes a comparison of alternatives, is presented below.

Ground Water

Proposed lining of channels and box conduits may result in a minor reduction in recharge to the shallow aquifer or possibly other aquifers. However, such a reduction in recharge is inferred to be an insignificant amount of total recharge in the area.

Any potential decrease in recharge to aquifers that might occur due to lining of channels would likely be offset by increased recharge to aquifers through percolation at unlined detention facilities. Therefore, the effects of the proposed facilities on recharge to the shallow aquifer or other aquifers are considered to be insignificant.

Recharge of principal aquifers used for local water supplies would not be affected, since recharge of these aquifers mainly occurs in surrounding mountains.

Proposed lining of channels or washes may potentially restrict discharge of ground water from the shallow aquifer. Such restrictions may result in a significant increase in water levels within the shallow aquifer in the vicinity of the lined channel. This could result in:

> Geotechnical problems including damage to foundations or seepage into subsurface structures such as parking garages.
>
> Damaged root systems in landscaped areas due to a rise in water level of poor quality ground water.
>
> Increased potential for discharge of poor quality shallow ground water to underlying aquifers due to increased head from a water level rise.
>
> Decreased baseflow downstream, which may potentially impact wetland vegetation in areas such as lower Las Vegas Wash.

Because of the uncertainty in predicting the amount of water level rise which could occur due to channel lining, potential impacts associated with such a rise should be considered potentially significant unless appropriate mitigation measures identified in the FEIS are incorporated into project design.

There is no significant difference in impacts associated with either the All Conveyance or the Detention/Conveyance alternative. The No Project alternative will not result in any environmental impacts to the groundwater resource.

Through the application of the programmatic mitigation measures, contained in Section 6 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with the ground water resource would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts.

<u>Surface Water</u>

Impacts during construction could be significant especially if a storm occurs during the construction period. Such impacts could include: disruption of domestic water and sewage collection systems and waste water treatment plants, increased potential for erosion; and introduction of petroleum products and debris into runoff waters. In general, the construction process can significantly increase the potential for degradation of surface waters which are exposed to the construction area. These impacts will be temporary and can be significantly mitigated through proper design and construction.

Operation of flood control facilities will probably result in significant changes in how storm water runoff is routed. Water flowing over the surface should be at shallow depths except in those areas of concentration where control facilities have been constructed. At these areas flow depth and velocity may be more hazardous than before the facility was constructed. Along reaches where upstream detention is available, peak flow rates should be lower. Generally for open channels, increases in flow rate are associated with more hazardous conditions and decreases in flow rate are associated with less hazardous conditions. Impacts on sediment transport can also be expected to occur. Detention facilities will settle out much of the sediment entering the facility and discharge much cleaner water. This cleaner water will then result in possible increased erosional processes downslope as will increases in flow velocities such as those resulting from water exiting lined channels. Increased velocities and resultant erosional increases can also be expected from areas witnessing increases in slope. None of the 10-year plan facilities will result in an increase in flow rate over the current situation, therefore, no increase in erosion and resultant sedimentation is anticipated.

Increases in infiltration rates, caused by the installation of flood control facilities, could result in a reduction of the runoff reaching Lake Mead and ultimately may raise a water rights concern within the Colorado River system.

Implementation of the Master Plan will result in a reduction in size of the floodplain boundary below detention facilities. While certain resource values such as intermittent wetlands and some biological habitat will be lost, the overall beneficial impact on existing and planned developments in the original floodplain will be significant. Executive Order 11988 requires action to "reduce the risk of flood loss" and to "minimize the impact of floods on human safety, health and welfare." Although the proposed action will result in the aforementioned losses, the improved protection outweighs such losses.

Except for differences in impacts to perennial low flows and storm water runoff, impacts associated with the Detention/Conveyance and All Conveyance alternative are similar. Unlike the All Conveyance system, the Detention/Conveyance system will result in some modification of the current perennial low flow regime. The All Conveyance system, unlike the Detention/Conveyance system, will exhibit greater storm water flow rates. The Detention/Conveyance system, through the use of detention basins, will impound flood waters and release them into the conveyance system at much smaller metered rates.

The No Project alternative would not affect the current surface water regime. Under this alternative, however, flood episodes would likely become more severe as urban growth continues due to the lack of an integrated and standardized flood control system.

Through the application of the programmatic mitigation measures, contained in Section 7 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with the surface water resource would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts. The afore mentioned impacts are primarily associated with engineering details of the facilities. Proper engineering practices are expected to minimize or eliminate potential adverse impacts. Further environmental analysis will be required for those facilities exhibiting the need for extra design considerations. In the case of wetlands, if significant impacts are identified, mitigation measures will be identified as part of the COE Section 404 permitting process.

Air Quality

Internal combustion engines used during construction activities would emit volatile organic compounds, nitrogen oxides, sulfur dioxide, carbon monoxide, suspended particulate matter, trace amounts of aldehyde, benzene and lead emissions would also result from combustion of leaded and unleaded fuels. These emissions are expected to be less than significant under most circumstances, but may be considered significant in areas already exceeding carbon monoxide and total suspended particulate standards and when inversion layers are prominent. Trucks and automobiles used at the project site and traveling to and from the site would also emit similar pollutants. Fugitive dust would be emitted from earth/soil disturbing activities, such as clearing, grading, and use of unpaved surfaces for vehicle travel. The proposed action (Detention/Conveyance Alternative) will be less impacting than the All

Conveyance Alternative due to less construction activity and, the fact that major earthwork will occur primarily at detention basin sites located far from the existing developed areas in the Las Vegas Valley.

Overall, emissions associated with the operation of the proposed action are considered to be minor. Facility maintenance activities during project operation require sediment and debris removal from the detention basins and debris basins once every eight to ten years. Although this activity will result in more sediment and associated fugitive particulate matter emissions under the proposed action emissions associated with operation of the facilities is considered to be small. Carbon monoxide emissions from vehicle and equipment operation associated with facility maintenance, will represent a very minor component of the basin-wide emissions inventory.

Air quality impacts associated with the No Project alternative could be associated with traffic congestion and major repair activities following flood events that could be significant on a short-term basis, but are probably not significant in the long-term. Although flood-related constraints to development would not be eliminated, growth in the valley in the recent past suggests that this constraint does not effectively limit growth. As a result, this alternative is not expected to result in any cumulative air quality impacts.

Through the application of the programmatic mitigation measures, contained in Section 4 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with the air resource would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts.

Terrestrial and Aquatic Biology

The proposed action can be expected to impact vegetation at varying degrees. The loss of upland vegetation types by construction would create adverse but nonsignificant impacts. The loss of wetlands vegetation types will result in adverse and potentially significant impacts but can be reduced by: the compensating effects of newly created wetlands in detention basins and enhanced wetland quality in engineered floodways; and implementation of project-specific mitigation measures as identified in the FEIS. There are basically two types of wetland vegetation within the Las Vegas Valley; desert marsh and desert wash scrub. If all of the flood control facilities are constructed, a total of 103.6 acres of desert wash scrub and 14.5 acres of desert marsh will be disturbed. A total of 53.6 acres of the desert wash scrub and 7.2 acres of desert marsh is expected to be permanently disturbed.

The above impacts could potentially affect sensitive plant species in both upland and wetland habitats. Individual species would be affected in the same manner as the vegetation types in which they occur. The rarity and protection status of these plants vary greatly but no federally-listed plant species will be affected. Loss of large populations of sensitive plants, particularly state-listed plants, would be a potentially significant adverse impact due to rarity and protected status of such plants. The significance of the impact would depend on the size and areal extent of populations potentially affected. Implementation of mitigation measures identified in the FEIS will minimize the loss of most sensitive species and could reduce the significance of impacts.

The operation and maintenance of the proposed facilities after construction could result in impacts, including the degradation of wetland vegetation due to upstream diversion of flood waters; disturbance of wetland vegetation in downstream areas associated with increased flood flow due to channelization of streams and washes; creation of new, or expansion of existing wetlands in some areas; establishment of weedy vegetation; routine maintenance disturbance associated with vegetation clearing, sediment removal and herbicide application; and loss of sensitive plants due to upstream diversion of flood waters, increased flood flow rates, and/or routine maintenance disturbance.

Sensitive plant species may also be impacted by the operation and maintenance of flood control facilities. Because most of these plants occur in upland areas, impacts to wetlands associated with upstream diversion of flood waters, as well as increased velocities of flood flows will have little impact on sensitive species. Plants that sometimes occur within natural watercourses may be affected on a limited basis. Overall, impacts to sensitive plant species due to upstream diversion of water and increased velocities of flood flows are not expected to be significant. Routine clearing of vegetation in some facilities and access to all structures for maintenance activities could have a direct impact to sensitive species. Because clearing of vegetation and removal of sedimentation would occur mostly in flood channels, floodways and detention basins, sensitive species that may occur in natural watercourses are most likely to be affected. Impacts to sensitive plant species due to the operation and maintenance of other structures is not expected to be significant.

In general, the impacts associated with construction activities are expected to be minimal in the case of nonsensitive wildlife species. Habitat disturbance is expected to be small when compared to the total habitat of the valley, localized and disturbed areas will revegetate following construction activities. Types of impacts could include: direct loss or displacement of individual animals; direct disturbance or loss of wildlife habitats at facility sites; direct loss of important habitat features; creation of beneficial wetlands in floodways and unlined channels; creation of undesirable, weedy habitats; and possible habitat fragmentation associated with the construction of linear features.

Operation and maintenance impacts on nonsensitive wildlife species can be expected to vary from minimally adverse to potentially significant, depending on the location, as well as the amount and type of habitat involved. As a result of diversion of runoff water above natural watercourses some of the wetlands downstream could become degraded over time due to reduced water supplies and thereby pose potentially significant impacts to diverse and regionally significant fauna. Increased flood flow rates caused by channelization of streams and washes could potentially prohibit the reestablishment of wetlands or creation of wetlands in unlined channels. This loss of wetlands habitat as a result of increased velocities would be a potentially significant impact. Conversely, the reduction in flow velocities and retention of water caused by flood control facilities could potentially enhance, or expand existing, desirable wetland habitats in engineered floodways. For example, the reduction of flow rate in the lower Las Vegas Wash could potentially result in temporary retention of water over a greater area, and thus, expand the existing wetland.

Sensitive wildlife species most likely to be adversely affected by construction and operation of flood control facilities include desert tortoise, Gila monster, kit fox and game birds. Potential direct impacts include removal of suitable habitat and loss of individuals. Construction of linear lined flood channels could result in fragmentation of habitat by presenting obstacles to movement. Losses of individuals could potentially occur due to collisions or crushing by vehicles and equipment. Both these impacts are considered to be potentially significant. However, implementation of appropriate mitigation measures, including off-site compensation, will minimize the loss of species and reduce impacts. As a result of the implementation of the 10-year plan facilities, an estimated 1,620 acres of desert tortoise habitat are likely to be disturbed, including 1,292 acres of permanent disturbance and 328 acres of long-term, temporary disturbance.

Both the Detention /Conveyance and All Conveyance alternatives are expected to affect the same biological resources due to construction and operation of the facilities. The magnitude of the impacts will differ however.

The proposed action will result in twenty-one percent less linear disturbance than the All Conveyance alternative due to fewer and narrower flood channels (197 miles versus 238 miles of channel).

Construction of the proposed action will result in nearly twice the amount of temporary and permanent habitat disturbance as would occur with the All Conveyance alternative (2155 acres versus 1057 acres).

Despite less disturbance of the All Conveyance alternative, potential impacts to the desert tortoise could be greater. Although there will be a larger acreage disturbance at the basin sites of the proposed action the All Conveyance alternative, utilizing more miles of channels, will result in more linear disturbance of tortoise habitat and a greater potential to present barriers to tortoise movement. These linear facilities would impact the high estimated tortoise densities of the Southwest Las Vegas and Boulder City subareas. Differences between the two alternatives would probably not result in relative differences in the magnitude and scale of impacts to tortoises for the rest of the project area. There is a possibility that the No Project alternative would ultimately result in more significant impacts than the proposed or All Conveyance alternatives. Flood control facilities would be constructed with each new development in a much less coordinated and programmatic fashion. Therefore, there would be a wide variation in the nature, size and efficiency of these facilities. The level of environmental protection would not be based on an understanding of the regional impacts and therefore the mitigation measures identified in the EIS would not be implemented.

The No Project alternative could also result in major adverse impacts to the Las Vegas Wash. Nearly 80 percent of the wetlands in the wash have been lost due to unchecked erosion. This erosion is expected to continue unless flood control structures are installed to alter the existing hydrologic regime. Continued loss of wetlands would represent a decrease in habitat for aquatic and wetlands-associated plants and wildlife.

Through the application of the programmatic mitigation measures, contained in Section 8 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with the terrestrial and aquatic biology resource would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts. In the case of wetland habitat, if significant impacts are identified, mitigation measures will also be identified as part of the COE Section 404 permitting process.

As part of the Environmental Impact Statement, the U.S. Fish and Wildlife Service (USF&WS) was consulted as required under Section 7 of the Endangered Species Act of 1973, as Amended. The resultant Biological Opinion is included as Section 3 of the FEIS. It is the USF&WS's Opinion that the proposed action will not result in jeopardy to the desert tortoise. As part of this Record of Decision the various mitigation and monitoring requirements in the Biological Opinion are adopted as stipulations.

Cultural Resources

Earth moving required for the construction of project facilities and ancillary disturbances could cause the destruction or loss of cultural materials or the disruption of their integrity with respect to their archaeological context. Design and construction of project facilities may create aural and visual intrusions resulting in adverse impacts to the integrity of historic and cultural settings. This is normally a problem only for sites with architectural, aesthetic, or high cultural values and those with strong associations with important events or people.

During operation, periodic flooding and detention of water in detention basins not requiring subsurface excavation or behind dikes or levees would create an alternating wet-dry regime, highly destructive of organic materials and could result in increased erosion. As a result of maintenance activities disturbance of cultural resources is a possibility.

In remote areas, construction of new maintenance access roads may open previously inaccessible resources to increased impact from recreational activities and unauthorized artifact collection. Because of facilities close proximity to Las Vegas where existing access is generally good, creation of new areas associated with the flood control facilities is likely to have only marginal additional impact.

A BLM Class III cultural resource survey was conducted for all areas within the Area of Potential Effect (APE). As a result of the survey, no cultural resources eligible for nomination to the National Register of Historical Places were found, and a determination of "no effect" for the project was submitted from BLM to the Nevada SHPO. The SHPO concurred with the "no effect" determination (May 13, 1991).

Through the application of the programmatic mitigation measures, contained in Section 12 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with the cultural resource would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts. Potential impacts to cultural resources are considered and will be minimized through the National Historic Preservation Act, Section 106 consultation process as described in 36 CFR 800.

Mineral Resources

Both the proposed action and the All Conveyance alternative are expected to create similar impacts due to construction and operation of the project. Although most environmental impacts are the same for these two alternatives, adverse impact to mineral resource production is greater with the proposed action than with the All Conveyance alternative.

Five of the proposed flood control facilities (facility 13 on Figure A2-7; 55 on Figure A2-4; 4 and 14 on Figure A2-11; and 8 on Figure A2-2) are located on or adjacent to existing gravel pits. Use of these pits as detention facilities will preclude pit operations. With the exception of the Materials Site proposed for a detention basin (facility 14 on Figure A2-11), the impacted pits are presently inactive and do not represent unique features or rare mineral resources that are not found elsewhere in the project area. The removal of these pits from use is therefore not expected to create a significant environmental impact. Fair compensation to claimants and/or permittees will be required prior to the installation of facilities in these areas if claims cannot be declared null-and-void or if the claims can pass a validity examination and permits cannot be canceled.

The No Project alternative would not create any new impacts to the geologic environment beyond the existing impacts related to the current flood control facilities or lack thereof.

Through the application of the programmatic mitigation measures, contained in Section 5 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with the mineral resource would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts.

Visual Resources

The potential impacts which would occur during the construction of the proposed flood control facilities are primarily due to the initial disturbance of the existing landscape setting. Excavation will expose different colors and textures of the soil causing impacts to the existing visual character of the setting as would the production of airborne dust. These impacts generally apply to short-term situations and can be mitigated as identified within the FEIS.

Once constructed, the various structures will result in varying degrees of impact upon the visual character of the landscape. Considering the higher level of dominance for the detention basins, the ability of these structures to be absorbed is relatively low. The size of the structures increase the potential for dominating the urban and natural characters for both adjacent and distant views. Most of the major detention basins are located outside existing developed urban areas, which may help mitigate impacts to some degree. Channels are considered to be visually intrusive. The smaller scale of the channels planned in the proposed action may reduce their dominance and result in improved visual absorption of these facilities.

The major difference between the proposed action and the All Conveyance alternative involves the use of detention basins in the case of the former. Considering the higher level of dominance for the detention basins, the ability of these structures to be absorbed is relatively low. The size of the structures increase the potential for dominating the urban and natural character for adjacent and distant views. Most of the major detention basins are located outside existing developed urban areas, which will help mitigate impacts to some degree. Channels associated with this alternative are generally smaller than those associated with the All Conveyance alternative and therefore can be expected to be somewhat less dominant and absorbed more readily.

The larger channels associated with the All Conveyance alternative would primarily impact distant views. Constructing larger channels and extensive dikes and levees could increase the amount of soil excavation for long linear distances as well as introduce extensive open concrete areas.

The No Project alternative will not directly impact the short term visual character of the area. Because developers will, over time, most likely install flood control facilities similar to those incorporated in the All Conveyance alternative, local visual impacts would be similar to the impacts of the All Conveyance alternative, but regional-scale impacts would be somewhat less due to the discontinuous nature of these new facilities and lack of new flood control structures in areas outside of major new developments.

Through the application of the programmatic mitigation measures, contained in Section 10 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with the visual resource would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts.

Land Use

Both during construction and operation of the flood control facilities major impacts will occur to existing residential, commercial, educational, and emergency response facilities. Impacts upon these resources are potentially significant because their normal use and operation could be significantly disrupted by development and operation of the proposed facilities. Barriers may be created between portions of residential neighborhoods, between residences and schools, or between neighborhoods and emergency response facilities. If located adjacent to existing residential neighborhoods, these areas will be directly impacted if the right-of-way requires portions of land presently used for other purposes, or proposed for other purposes. Where facilities cannot be located to avoid land use conflicts, elimination or division of existing uses may occur. Mitigation measures are proposed within the FEIS that should effectively reduce the level of these impacts. A significant beneficial impact to all land uses will be the improved flood protection afforded by the flood control facilities.

To a lesser degree, recreational, agricultural and livestock grazing use could be impacted. Livestock grazing could potentially be impacted if barriers separated portions of a continuous allotments. However, given the size, current designation and lack of livestock grazing in the last ten to twenty years, such impacts are considered minimal.

With respect to land use , the proposed action would have generally greater levels of impact than the All Conveyance alternative due to the areal extent of the basins, where the detention basins are located in areas of urban development. Because the major detention basins are located in currently undeveloped areas, adverse impacts associated with these structures is considered to be minimal. The relative impacts of conveyance facilities would be lower for the proposed action as a result of the narrower rights-of-way required. Overall, the total amount of developable land involved appears to be greater with the All Conveyance alternative. The major land requirements of the proposed action are associated with detention basins in undeveloped outlying areas and floodways associated with major drainages presently prone to flood events. Land requirements within the existing developed portions of the valley would be less with the proposed action.

The No Project alternative would not affect current land use patterns or opportunities. It also does not provide any additional flood protection, which is considered a significant beneficial impact.

Through the application of the programmatic mitigation measures, contained in Section 9 and Table ES-1 of the FEIS, and any additional measures deemed necessary through individual project analysis, adverse impacts associated with land use would be minimized or eliminated. The mitigation implementation procedures identified in Section 14 of the FEIS will be used during the planning and implementation of individual flood control facilities. These will be used to determine if significant impacts could occur due to the construction and operation of each individual facility, and what (if any) mitigation measures are necessary to minimize or eliminate adverse impacts.

Socioeconomics

In general, socioeconomic impacts would not represent a major criterion for choosing between the Detention/Conveyance or All Conveyance alternatives, nor would the cumulative effects of the projects in terms of adverse impacts be a criterion for selection of one or the other. The potentials for localized negative impacts are very low, given the criteria (Table 11-14 of the FEIS) for prioritization of program elements, while the positive effects would be widely diffused.

Because the source of funds is a sales tax which includes substantial reserves from non-resident expenditures, possible federal funding support, and expenditures primarily associated with local labor and construction materials, adverse impacts associated with local government expenditures are not considered significant. These expenditures may result in positive, but generally not significant effects on local employment and sales. Beneficial effects are small and generally not significant when considered in the context of the economy of the entire Las Vegas Valley. The beneficial effects would be, however, greater for the All Conveyance alternative due to its higher cost. While the proposed action will require large areas of land for detention basins, the channels to convey storm runoff would be narrower than those required for the All Conveyance alternative. The narrower channels will cause less disruption to existing land uses in urban areas. Detention basin locations are proposed for land that is currently vacant or undeveloped. Therefore, the socioeconomic implications of compensating or relocating displaced businesses or residences would be smaller for the proposed action than for the All Conveyances alternative.

Flood control facilities may affect the value of some properties. Property values are expected to increase in both developed and undeveloped areas. The increases, however, would be limited to properties immediately adjacent to the facilities or properties whose flood insurance costs decrease as a result of reduced flooding risks.

The No Project alternative would not commit local governments to a major capital program and would not directly generate the beneficial effects identified for the other two alternatives. Local government expenditures for facility repair following flood events and emergency services during flood events will probably be higher. These activities may not be funded through a sales tax surcharge or federal funds and therefore may result in an overall net negative impact.

**MITIGATION AND MONITORING**

As previously identified in the MANAGEMENT CONSIDERATIONS section of this ROD, all mitigation measures contained in the FEIS are adopted and will be, along with any additional measures deemed necessary, developed into stipulations to the permits and rights-of-way grants for the various individual components of the project. All practicable means to avoid or minimize environmental harm from the selected alternative will be adopted. Monitoring and enforcement programs will be required under the specific permits and rights-of-way. Because the FEIS encompasses not only lands administered by the Bureau of Land Management (BLM) but also other entities, annual progress meetings between the BLM's Authorizing Officer, COE, CCRFCD and those entities in which projects are constructed, will be conducted in order to ascertain compliance with all mitigation and stipulations. In order to ensure that project impacts are reduced through proper implementation, on other than public lands, the CCRFCD will administer the programmatic application of site-specific mitigation measures (see Stipulation No.2).

**STIPULATIONS**

1. The FEIS utilizes a programmatic approach to identify and analyze potential impacts. In addition to containing an overall analysis of the entire Clark County Regional Flood Control District Flood Control Master Plan, it also contains a more specific analysis of the CCRFCD's proposed 10-year construction program. For those projects not included in the 10-year plan and those contained in the 10-year plan but found to present unanticipated impacts, further environmental documentation may be necessary. This determination will be made on a site-by-site basis as outlined in Section 14 of the FEIS.

2. Proper implementation is essential to reducing project impacts. The CCRFCD will, on other than public lands, administer the programmatic application of site-specific analyses and mitigation measures to ensure that all objectives are achieved. The CCRFCD and BLM have agreed that the CCRFCD will, as a condition of funding projects within an entity, require that entity to comply specifically with both the letter and intent of the mitigation measures and stipulations identified in the EIS. This includes those processes necessary to comply with all applicable local, state and federal laws and regulations, including NEPA. On those projects involving BLM permits and/or rights-of-way, BLM will maintain lead responsibility for site-specific NEPA and regulatory compliance.

3. If any modifications are made to the placement and/or design of any individual facility, as identified in the FEIS, an existing data review and evaluative survey must be conducted and Section 106 consultation, as described in 36 CFR 800, completed prior to approval of a right-of-way.

4. The Paleontology resources of the Las Vegas Valley were not initially identified for inclusion in the FEIS. This resource is considered to be significant and warrants analysis and mitigation. In order to meet this need it will be necessary to handle this resource outside the FEIS.

A Work Plan has been submitted and approved by BLM. This plan requires a pre-field literature and records review; and formulation of a field assessment strategy. Once this pre-field effort is completed a fieldwork authorization is to be submitted by the District to the BLM. This submission must legally describe those areas of high probability for paleontological occurrences requiring on the ground inventory and evaluation. Once BLM approves the fieldwork authorization, a technical report is to be prepared, by the CCRFCD. The report will assess the results of pre-field research and field survey as well as present an impact mitigation plan.

5. On BLM administered lands, sand and gravel excavated during construction of flood control facilities will be made available at BLM's discretion. Disposal of these excess materials may be accomplished through Material Site Rights-of-Way, Free Use Permits or Material Sales Contracts.

6. The USF&WS was consulted as required under Section 7 of the Endangered Species Act of 1973, as Amended. The resultant Biological Opinion is included as Section 3 of the FEIS. It is the USF&WS's Opinion that the proposed action will not result in jeopardy to the desert tortoise. As part of this Record of Decision the incidental take, terms and conditions, and reporting requirements in the Biological Opinion are adopted as stipulations. If the allowed incidental take of desert tortoise is reached on any single project or in total, all construction will cease and Section 7 consultation will be reinitiated.

7. Approval of authorizations is conditioned upon the CCRFCD obtaining and complying with all Federal, state, county and local permits and approvals; and complying with all applicable Federal, state, county and local laws and regulations. Major authorizing actions include Section 404 permitting through the COE, Section 7 consultation under the Endangered Species Act with the USF&WS, and Section 106 consultation under the National Historic Preservation Act with the SHPO. Facility construction will also require various project-specific permits and approvals such as:

Encroachment Permit from the Nevada Department of Transportation

Construction Permit from the Nevada Division of Water Resources

Conditional Use Permit from the Clark County Commission

Plot and Grading Study from the Clark County Department of Public Works

Off-Site Permit from the Clark County Department of Public Works

Permission to Disturb Topsoil Permit from the Clark County Health District, Air Pollution Control Division

Authority to Construct Certificate from The Clark County Health District

Operating Permit and Source Registration from the Clark County Health District, Air Pollution Control Division

8. The following stipulations, in addition to those previously identified, will be required with all use authorizations concerning the placement of dams upon lands administered by the BLM.

a. All state and local requirements pertaining to the location, construction, maintenance, major repair work, reconstruction, removal, and emergency action plans shall apply as minimum requirements.

b. Design shall be prepared by a Professional Engineer registered in the State of Nevada.

c. Design and Plans stamped for approval with date and signature by the State of Nevada, Department of Conservation and Natural Resources, Division of Water Resources, State Engineer, shall be submitted to the Authorized Officer of the BLM. The Authorized Officer will provide the permittee with approval to commence construction only after receipt of the approved plans and completion of BLM and other required agencies review.

d. Record drawings and the final inspection shall be provided to BLM within 30 days of completion of construction.

e. Any proposed modification to the structure shall be approved by the Nevada State Engineer's Office and a copy of the approved modification submitted to BLM prior to beginning work.

f. Any changes in ownership must be approved by the Authorized Officer of the BLM in the form of a right-of-way assignment in advance of actual transfer to another party. These stipulations shall be a part of any change in ownership and shall be binding upon the legal owner until such time as the structure is removed to the satisfaction of the Nevada State Engineer's Office and the BLM.

g. An official representative of the BLM may at any time inspect the on-site construction, maintenance, and operation of the dam in connection with the use of public land for reservoir

**purposes. Official representatives of State and other Federal agencies may also inspect such activities if necessary to the performance of official duties which relate to the reservoir. The right to inspect includes the right to use private roads belonging to the permittee in order to reach the site.**

**h. If an inspection reveals that any damage has occurred to the structure, outlet works, spillway, or appurtenances, the damaged area shall be restored to the originally constructed lines and grades with materials and workmanship equal in quality to original construction. Such repairs shall be completed within 90 days following inspection and written notification.**

**i. The permittee, prior to initiation of construction, reconstruction, or major maintenance of facilities on the right-of-way which will involve disturbance of the land or use of heavy construction equipment will notify the BLM of their intent to proceed with such work, the date work is to commence, and the name of the delegated representative of the permittee.**

**j. If the permittee does not perform needed maintenance within 90 days of written notification, BLM will perform the required maintenance and charge the owner for the full cost of this work or; the authorizations previously granted by BLM may be revoked and the structure removed.**

**k. The permittee shall hold the United States, its officers and employees harmless from and indemnify them against any damage, injury, or liability resulting from the construction, operation, or maintenance of the structure being authorized including but not limited to any liability which the United States may have as owner of the land which is the subject of the authorization.**

**l. The permittee shall prepare an emergency action plan for retention or detention dams in accordance with BLM standards for each structure with a high or significant hazard classification. The Authorized Officer will determine the hazard classification following an annual inspection of the downstream potential for property damage and/or loss of life.**

**m. In the event of a breach or major damage in the dam, repair plans shall be submitted by a Professional Engineer registered in the State of Nevada to the State of Nevada for approval. A copy of these plans shall be sent to BLM at the same time. BLM shall also be sent a copy of the approved plans.**

**n. The specific use authorization shall be deemed a non-exclusive right to use the land of the United States for construction, use, improvement, and maintenance of the dam and reservoir area. The public shall have the right to use the land for all activities allowed on public land which do not interfere with the permittee's right to construct and maintain the dam or the right to store and divert water for beneficial purposes in accordance with the Nevada State water permit.**

**o. 1) Prior to termination of the authorization, the holder shall contact the Authorized Officer to arrange a pre-termination conference. This conference will be held to review the termination provisions of the authorization.**

**2) Within a specified time period prior to termination of the authorization, the holder shall contact the Authorized Officer to arrange a joint inspection of the authorization. This inspection will be held to agree to an acceptable termination (and rehabilitation) plan. The Authorized Officer must approve the plan in writing prior to the holder's commencement of any termination activities.**

**p. The authorization may be renewed. If renewed, it will be subject to regulations existing at the time of renewal, and such other terms and conditions deemed necessary to protect the public interests.**

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# APPENDIX B: SUMMARY OF $PM_{10}$ CONTROL MEASURE PROCEDURES BY CATEGORY

Table B-1 summarizes the control procedures identified in the Clark County Department of Air Quality Management, Clark County Air Quality Regulations, Section 94, Permitting, and Duct Control for Construction Activities for each of the construction activity categories.

### TABLE B-1. Summary of Construction Dust Control Procedures

| Activity | Control Procedures |
|---|---|
| Backfilling | Apply dust palliative to backfill material to form crust when not actively handling. |
| | Cover or enclose backfill material when not actively handling. |
| | Dedicate a water truck or large hose to backfilling equipment and apply water as needed. |
| | Empty the loader bucket slowly. |
| | Minimize the drop height from loader bucket. |
| | Mix backfill soil with water prior to moving. |
| | Water the backfill material to maintain material moisture or to form crust when not actively handling. |
| | Water the soil immediately following backfill to form crust. |
| Blasting: Abrasive | A wet method of abrasive blasting, using air as a propellant, must use a sufficient amount of water to effectively limit the visible emissions to no more than an average of 40 percent opacity for any period aggregating three minutes in any 60-minute period. |
| | Abrasive blasting should be conducted within an enclosed structure whenever possible to preclude the release of visible emissions to the atmosphere. |
| | Apply dust palliative to surrounding area following blasting. |
| | Clean particulate material from surrounding area following blasting. |
| | Dry, unconfined blasting with abrasive material must use only those abrasives that are approved and certified by the California Air Resources Board (CARB) for such use. |
| | Hydroblasting, using water as the propellant, must be conducted in a manner to effectively limit the visible emissions to no more than an average of 40 percent opacity for any period aggregating three minutes in any 60-minute period. |
| | Pre-wet surface soils where support equipment and vehicles will be operated. |
| | Use dust palliative on surfaces where support equipment will be operated. |
| Blasting: Soil and Rock | Limit the blast footprint area to no larger than what can be practically stabilized immediately following the blast. |
| | Maintain surface rock and vegetation where possible to reduce exposure of disturbed soil to wind. |
| | Maintain surface soil watering as needed to prevent dust. At completion of work shift stabilize all disturbed soil surfaces to establish crust and prevent wind erosion of soil. |
| | Pre-wet surface soils where drills, support equipment, and vehicles will be operated. |
| | Prior to setting explosive charges in holes, document current and predicted weather conditions as provided by the National Weather Service. If wind advisory (over 25 mph) is current or forecasted for the next 24 hours, do not charge any blast holes. When setting explosive charges, monitor weather forecast for wind advisory on National Weather Service Radio and Internet sites. If a wind advisory is stated, discontinue charging additional blast holes. Limit the blast to holes charged at time the wind advisory is issued. |
| | Use dust palliative to form crust on soil immediately following blast and safety clearance. |
| | Use water to form crust on soil immediately following blast and safety clearance. |

## TABLE B-1. Summary of Construction Dust Control Procedures (Continued)

| Activity | Control Procedures |
|---|---|
| Clearing Rubble/Debris | For areas without continuing construction, maintain live perennial vegetation and desert pavement where possible. |
| | Pre-wet the surface soils where equipment will be operated. |
| | Stabilize the soil surface with dust palliative unless immediate construction is to continue. |
| | Use dust palliative to form crust on soil immediately following clearing and grubbing activities. |
| | Use water to form a crust on soil immediately following clearing/grubbing activities. |
| Clearing Concrete/ Cement Forms | Avoid the use of high-pressure air to blow soil and debris from the forms. |
| | Use hand sweeping and water spray to clear the forms. |
| | Use industrial shop vacuum to clear forms. |
| | Use single stage pours, unless prohibited by engineering design or building code, to minimize form clearing. |
| | Use water spray to clear the forms. |
| Crushing | Apply a dust palliative to the surface soils where support equipment and vehicles will be operated. |
| | Establish a crust on the crushed material to minimize emissions. |
| | Monitor emissions opacity. |
| | Pre-wet the material prior to loading into crusher. |
| | Pre-wet the surface soils where support equipment and vehicles will be operated. |
| | Use dust suppressant to stabilize the material during crushing. |
| Cut and Fill | Pre-water with sprinklers or wobblers to allow time for penetration. |
| | Pre-water with water trucks or water pulls to allow time for penetration. |
| | Dig a test hole to depth of cut or equipment penetration to determine if soils are moist at depth. |
| | Continue to pre-water if not moist to depth of cut. |
| | Use water truck/pull to water soils to depth of cut prior to subsequent cuts. |
| | Apply water to form a crust on the soil following fill and compaction. |
| | Apply a dust palliative to form crust on soil following fill and compaction. |
| Demolition: Implosion | Apply a dust palliative to surface soils where the support equipment and vehicles will be operated. |
| | Apply a dust palliative to form a crust on the wind erodible materials. |
| | At completion of the work shift, water all of the disturbed soil surfaces to establish crust and prevent wind erosionwind erosion of soil. |
| | Maintain the surface soil watering as needed to prevent dust. |
| | Pre-wet the surface soils where support equipment and vehicles will be operated. |
| | Prior to setting explosive charges, obtain and document current predicted weather conditions as provided by the National Weather Service. If wind advisory is current or forecasted for blast period, do not set charges. |
| | Restrict support equipment and vehicles to the existing paved or stable areas. |
| | Water to form a crust on the wind erodible materials immediately following blast and safety clearance. |

## TABLE B-1. Summary of Construction Dust Control Procedures (Continued)

| Activity | Control Procedures |
|---|---|
| Demolition: Mechanical/ Manual | Apply a dust palliative to surface soils where the support equipment and vehicles will be operated. |
| | At completion of the work shift, water all of the disturbed soil surfaces to establish crust and prevent wind erosion. |
| | Cover the wind erodible demolition debris to prevent dust emissions. |
| | Pre-wet the surface soils where support equipment and vehicles will be operated. |
| | Use a dust palliative to form crust on demolition debris. |
| | Use water on the wind erodible demolition debris during handling and after dumping to prevent dust. |
| | Water the area and maintain surface soil stability as needed to prevent dust. |
| Disturbed Soil | Apply a dust palliative based on the soil type. |
| | Apply water to stabilize the disturbed soil throughout construction site. |
| | If interior block walls are planned, install as early in the construction procedure as possible. |
| | Limit vehicle traffic and disturbance on the soils where possible. |
| Disturbed Land: Large Tracts | Install perimeter wind barriers 3 to 5 feet high made of material with a porosity of 50 percent or less. |
| | Pave or apply a surface frock for long-term stabilization. |
| | Plant perimeter vegetation as early as possible. Use of native and drought-tolerant plants with greater than 50 percent silhouette area is encouraged. |
| | Prevent access by constructing fencing, ditches, vegetation, berms, or other suitable barrier(s) or means approved by the Control Officer. |
| | Stabilize disturbed soil with dust palliative for long-term stabilization. |
| | Stabilize the disturbed soil with vegetation for long-term stabilization. |
| Dust Suppressant | Follow all applicable federal and state regulations. |
| | For non-traffic area applications use Table 2: Appropriate Use of Liquid Dust Palliatives and Application Rates. (See regulations, Section 94.) |
| | For traffic area applications use Table 1: Appropriate Use of Liquid Dust Palliatives and Application Rates. (See regulations, Section 94.) |
| | Record dust suppressant and palliative use and retain records as required by Regulation Section 94.8. |
| Importing Soil, Rock and Other Bulk Materials | Check the belly-dump truck seals regularly and remove any trapped rocks to prevent spillage. |
| | Clean wheels and undercarriage of haul trucks prior to leaving construction site. |
| | Keep soils at an optimum moisture content while actively handling. |
| | Limit vehicular speeds to 15 mph on the work site. |
| | Maintain 3 to 6 inches of freeboard to minimize the spillage. |
| | Use tarps or other suitable enclosures on the haul trucks. |
| Landscaping | Apply water to materials to stabilize. |
| | Maintain an effective cover over materials. |
| | Maintain the materials in a crusted condition. |
| | Stabilize the sloping surfaces by using soil binders until the vegetation or ground cover can effectively stabilize the slope. |

## TABLE B-1. Summary of Construction Dust Control Procedures (Continued)

| Activity | Control Procedures |
|---|---|
| Paving/Subgrade Preparation | Maintain at least 70 percent of optimum moisture content for Type II material while Type II aggregate is being applied. |
| | Place a tack coat on Type II aggregate base immediately after Type II is applied. Pre-water the subgrade surface until optimum moisture content is reached and maintained. |
| | Stabilize the adjacent disturbed soils following paving activity by crusting with water. |
| | Stabilize the adjacent disturbed soils following paving activity with a dust palliative application. |
| | Stabilize the adjacent disturbed soils following paving with immediate landscaping activity or installation of a vegetative or rock cover. |
| Screening | Dedicate water truck or large hose to screening operation. |
| | Pre-wet material to be screened to at least 70 percent of optimum moisture content. |
| | Apply a dust suppressant to material prior to screening. |
| | Drop material through the screen slowly and minimize drop height. |
| | Apply water to the material as it is being dropped through the screen. |
| | Apply water to stabilize the screened material and surrounding area after screening. |
| | Apply a dust palliative to stabilize screened material and surrounding area after screening. |
| | Install wind barrier upwind of screen as high as the screen drop point and made of material with a porosity of 50 percent or less. |
| Staging Areas | Apply a dust palliative to surface soils where support equipment and vehicles will operate. |
| | Apply water to the surface soils where support equipment and vehicles will be operated. |
| | Limit the ingress and egress points. |
| | Limit the size of staging areas. |
| | Limit vehicle speeds to 15 mph. |
| Stockpiles | Remove material from the downwind side of the stockpile. |
| | Stabilize the material in stockpile and surrounding area following stockpile-related activities. |
| | Stockpile at the optimum moisture content. |
| | To the extent possible, maintain the stockpile to avoid steep sides or faces. |
| Track-Out Prevention | Install a wheel washer in the event that track-out cannot be controlled with gravel pad and wheel shakers. Maintain wheel washers on a regular basis to maintain effectiveness. |
| | Install gravel pad(s) consisting of 1-to-3-inch rough diameter, clean, well-graded gravel or crushed rock. Minimum dimensions must be 30 feet wide by 3 inches deep; and at minimum, 50 feet, or the length of the longest haul truck, whichever is greater. Re-screen, wash, or apply additional rock in gravel pad to maintain effectiveness. |
| | Install wheel shakers as primary control measures in addition to or in place of gravel pads. |
| | Install wheel shakers in the event that track-out cannot be controlled with gravel pads. Clean wheel shakers on a regular basis to maintain effectiveness. |
| | Install wheel washer as primary control measures in addition to or in place of wheel shakers and gravel pads. |
| | Limit site accessibility to routes with track-out control devices in place by installing effective barriers on unprotected routes. |
| | Pave the construction activity roadways as early as possible. |
| | Record track-out conditions and clean-up actions in daily project records. |

### TABLE B-1. Summary of Construction Dust Control Procedures (Continued)

| Activity | Control Procedures |
|---|---|
| Traffic: Construction Related | Apply a dust palliative to haul routes to stabilize. |
| | Apply a dust palliative to off-road traffic and parking areas and maintain in a stabilized condition. |
| | Apply gravel to the haul routes and maintain in a stabilized condition. |
| | Apply gravel to the off-road traffic and parking areas and maintain in a stabilized condition. |
| | Apply paving as soon as possible to all future roadway areas. |
| | Apply recycled asphalt to the off-road traffic and parking areas and maintain in a stabilized condition. |
| | Apply water to the haul routes to stabilize. |
| | Apply water to the off-road traffic and parking areas and maintain in a stabilized condition. |
| | Limit vehicle speeds to 15 mph. |
| | Supplement dust palliative or aggregate applications with watering, if necessary. |
| Trenching | Presoak the subsurface soils. |
| | Pre-wet the surface soils where trenching and support equipment and vehicles will be operated. |
| | Wash the mud and soil from equipment at completion of trench to prevent crusting and drying of soil on equipment. |
| | Use water to form a crust on excavated soil windrow as it is formed. |
| | Use water and dust palliative to form a crust on excavated soil windrow as it is formed. |
| Truck Loading | Empty the loader slowly. |
| | Keep the loader bucket close to the truck to minimize the drop height while dumping. |

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# APPENDIX C: DISTRIBUTION LIST

NOTE: Throughout this list, codes in parenthesis denote methods of distribution as follows: compact disc (CD) and hard-copy book (HC). If no parenthetical code follows an entry, it indicates distribution via the internet.

## FEDERAL ELECTED OFFICIALS

Berkley, Shelley, United States Congresswoman, United States House of Representatives (CD)

Ensign, John, United States Senator, State of Nevada (CD)

Gibbons, Jim, United States Congressman, United States House of Representatives (CD)

Guiton, Mark, Legislative Director, Office of Congresswoman Berkley (CD)

O'Donovan, Michael, Press Secretary, Office of Congresswoman Berkley (CD)

Office of Senator Ensign.
Attention: Traci Scott, Communications Director (CD)

Office of Senator Reid.
Attention: Teresa Hafen, Press Secretary (CD)

Porter, John, United States Congressman, United States House of Representatives (CD)

Reid, Harry United States Senator, State of Nevada (CD)

Spanbauer, Amy, Press Secretary, Office of Congressman Gibbons (CD)

## FEDERAL AGENCIES

Federal Emergency Management Agency (FEMA).
Attention: Mike Grimm, Hydrologic Engineer (CD)

Federal Highway Administration (CD)

Lake Mead National Recreation Area.
Attention: William Dickinson, Superintendent (HC and CD)

National Archives and Records Service Office of the Federal Register (CD)

NWRS Headquarters (CD)

U.S. Army Corps of Engineers.
Attention: Ed Peterson, Senior Realty Specialist (CD)

U.S. Army Corps of Engineers (CD).
Attention: Robert Joyner, Resident Engineer (CD)

U.S. Bureau of Land Management, Nevada State Office.
Attention: NV-056.
Attention: Field Manager For Lands (CD).
Attention: NV-910, Nevada State Director (CD).
Attention: NV-912, Public Affairs (CD).
Attention: NV-915, Nevada State Office, Printing Specialist (CD).
Attention: NV-932, Nevada State Office, Planning and Environmental Coordinator (CD).
Attention: NV-943, Nevada State Office, Building Board (CD).
Attention: NV-951, Central Files (CD)

U.S. Bureau of Land Management, Las Vegas Field Office.
Attention: Phillip L. Guerrero, Public Affairs (CD).
Attention: Mark Morse, Field Office Manager (CD)

U.S. Bureau of Reclamation, Lower Colorado Regional Office.
Attention: A. Cossels (HC and CD 2 Copies)

U.S. Bureau of Reclamation, Records, and Information Management Team.
Attention: Roy Patterson, Team Leader, (CD)

U.S. Department of Agriculture, Natural Resource Conservation Service (CD)

U.S. Department of Agriculture, Natural Resource Conservation Service (CD).
Attention: Rick Orr (HC)

U.S. Department of Agriculture, Spring Mountains National Recreation Area.
Attention: Steve Holdsambeck, District Ranger (CD)

U.S. Department of Defense, Department of the Air Force, Nellis Air Force Base, Bulls Eye, AFWC PA (CD)

U.S. Department of Defense, Department of the Air Force, Shelia Amos, Natural Resources Manager (CD)

U.S. Department of the Interior, Bureau of Reclamation.
Attention: Realty Officer (HC)

U.S. Department of the Interior, National Park Service, Lake Mead National Recreation Area.
Attention: Realty Division (HC)

U.S. Fish and Wildlife Service.
Attention: Dick Birger (CD)

U.S. Fish and Wildlife Service.
Attention: Sherry Barrett (CD)

U.S. Fish and Wildlife Service.
Attention: Cynthia Martinez, Assistant Field Supervisor (CD)

U.S. Geological Survey.
Attention: Gary Russell, Assistant District Chief, Southern Nevada (CD)

U.S. National Park Service, Nevada Field Office, Rivers, Trails and Conservation Assistance Program.
Attention: Liz Smith-Incer, Director, (CD)

# NEVADA STATE ELECTED OFFICIALS

Guinn, Kenny, Governor, State of Nevada (CD)

Heller, Dean Secretary of State, State of Nevada (CD)

Hunt, Lorraine Lieutenant Governor, State of Nevada (CD)

Krolicki, Brian Treasurer, State of Nevada (CD)

Andonov, Walter Assembly Member, District 21, Nevada Assembly (CD)

Atkinson, Kelvin Assembly Member, District 17, Nevada Assembly (CD)

Beers, Bob Assembly Member, District 4, Nevada State Assembly (CD)

Brown, David, Assembly Member, District 22, Nevada Assembly (CD)

Buckley, Barbara Assembly Member, District 8, Nevada Assembly (CD)

Care, Terry Senator, District 7, Nevada State Senate (CD)

Carlton, Maggie, Senator, District 2, Nevada State Senate (CD)

Cegavske, Barbara Senator, District 8, Nevada State Senate (CD)

Chowning, Vonne, Assembly Member, District 28, Nevada State Assembly (CD)

Christensen, Chad Assembly Member, District 13, Nevada Assembly (CD)

Claborn, Jerry D. Assembly Member, District 19, Nevada State Assembly (CD)

Coffin, Bob Senator, District 10, Nevada State Senate (CD)

Collins, Tom Assembly Member, District 1, Nevada State Assembly (CD)

Conklin, Marcus, Assembly Member, District 37, Nevada State Assembly (CD)

Giunchigliani, Chris, Assembly Member, District 9, Nevada State Assembly (CD)

Goldwater, David, Assembly Member, District 10, Nevada State Assembly (CD)

Griffin, Josh, Assembly Member, District 29, Nevada State Assembly (CD)

Hardy, Joe, Assembly Member, District 20, Nevada State Assembly (HC)

Hardy, Warren Senator, District 12, Nevada State Senate (CD)

Horne, William, Assembly Member, District 34, Nevada State Assembly (CD)

Koivisto, Ellen, Assembly Member, District 14, Nevada State Assembly (CD)

Mabey, Garn, Assembly Member, District 2, Nevada State Assembly (CD)

Manedo, Mark, Assembly Member, District 18, Nevada State Assembly (CD)

McClain, Kathy, Assembly Member, District 15, Nevada State Assembly (CD)

McCleary, Bob, Assembly Member, District 11, Nevada State Assembly (CD)

Mortenson, Harry, Assembly Member, District 42, Nevada State Assembly (CD)

Neal, Joseph, Jr. Senator, District 4, Nevada State Senate (CD)

Nolan, Dennis, Senator, District 9, Nevada State Senate (CD)

O'Connell, Ann, Senator, District 5, Nevada State Senate (CD)

Oceguera, John Wayne, Assembly Member, District 16, Nevada Assembly (CD)

Ohrenschall, Genie, Assembly Member, District 12, Nevada Assembly (CD)

Parks, David, Assembly Member, District 41, Nevada State Assembly (CD)

Perkins, Richard, Assembly Member, District 23, Nevada State Assembly (CD)

Pierce, Peggy, Assembly Member, District 3, Nevada State Assembly (CD)

Rawson, Ray, Senator, District 6, Nevada State Senate (CD)

Schneider, Michael A., Senator, District 11, Nevada State Senate (CD)

Shaffer, Raymond, Senator, District 1, Nevada State Senate (CD)

Tiffany, Sandra, Senator, District 5, Nevada State Senate (CD)

Titus, Dina, Senator, District 7, Nevada State Senate (CD)

VonTobel, Kathy, Assembly Member, District 20, State of Nevada (CD)

Weber, Valerie, Assembly Member, District 5, Nevada Assembly (CD)

Wiener, Valerie, Senator, District 3, Nevada State Senate (CD)

Williams, Wendell, Assembly Member, District 6, Nevada Senate (CD)

# NEVADA STATE AGENCIES

Nevada Bureau of Federal Facilities (CD)

Colorado River Commission of Nevada.
Attention: James Davenport, Division Chief, Water (CD)

Conservation District of Southern Nevada.
Attention: Judy Laws, Board of Supervisors Chair (CD).
Attention: Joann Friedwald, Administrative Specialist (CD)

Desert Research Institute, Southern Nevada Science Center.
Attention: Steve Mizell (CD)

Floyd R. Lamb State Park (CD)

Nevada Bureau of Mines and Geology.
Attention: P. Kyle House, Research Geologist (CD)

Nevada Bureau of Water Pollution Control.
Attention: Icyl C. Mulligan (HC)

Nevada Commission of Tourism (CD)

Nevada Department of Conservation and Natural Resources (CD)

Nevada Department of Environmental Protection (CD)

Nevada Department of Transportation.
Attention: James W. Charters (CD)

Nevada Department of Transportation.
Attention: John Burch (CD)

Nevada Department of Transportation (CD)

Nevada Department of Transportation (CD)

Nevada Department of Transportation (CD).
Attention: Tom Stephens, P.E., Director

Nevada Dept. of Taxation.
Attention: Charles East Chinnock, Executive Director (CD)

Nevada Department of Conservation and Natural Resources, Division of Wildlife.
Attention: Terry Crawforth, Administrator (CD)

Nevada Division of Emergency Management.
Attention: Gwen Hadd, Training / Public Assistance Officer (CD)

Nevada Division of Environmental Protection.
Attention: Allen Biaggi, Administrator (CD)

Nevada Division of Environmental Protection (CD)

Nevada Division of Forestry.
Attention: John Jones, Southern Regional Forester (CD)

Nevada Division of Forestry.
Attention: Mark Hill (HC)

Nevada Division of Minerals.
Attention: Walter Lombardo, Chief, Southern Nevada Operations (CD)

Nevada Division of State Lands (HC)

Nevada Division of State Parks.
Attention: Steve Weaver, Chief of Planning and Development (CD)

Nevada Division of Water Resources.
Attention: Bob Coache (CD)

Nevada Division of Water Resources.
Attention: Jason King (CD)

Nevada Division of Water Resources.
Attention: Kim Groenewold, Program Officer III (CD)

Nevada Parks Division.
Attention: Wayne Perock, Administrator (CD)

Nevada Public Service Commission.
Attention: John Candelaria (CD)

Nevada State Clearing House.
Attention: Heather Elliott (CD)

Nevada State Department of Conservation and Natural Resources.
Attention: Bill Quinn, Water Resources Chief (CD)

Nevada State Division of Agriculture (HC)

Nevada State Historic Preservation Office.
Attention: Alice Baldrica, Deputy (HC)

Nevada State Library and Archives (HC)

Nevada State Office of Community Services (CD)

Nevada Wildlife Commission (HC).
Attention: John T. Moran, Commissioner (HC)

# CLARK COUNTY ELECTED OFFICIALS

Atkinson-Gates, Yvonne, Clark County Commissioner (CD)

Reid, Rory, Clark County Commissioner (CD)

Reilly, Thom, Clark County Manager (CD)

Schofield, Mark, Clark County Assessor (CD)

Vandever, Judith, Clark County Recorder (CD)

Williams, Myrna, Clark County Commissioner (CD)

Woodbury, Bruce, Clark County Commissioner (CD)

Young, Bill, Clark County Sheriff Las Vegas Metropolitan Police Department (CD)

Fitzpatrick, Laura B., Clark County Treasurer (HC)

James, Mark, Clark County Commissioner (CD)

Parraguirre, Shirley, Clark County Clerk (CD)

# CLARK COUNTY OFFICIALS

Bechtel, Jodi, Senior Environmental Planner Clark County Comprehensive Planning (CD)

Buldoc, Marc, Senior Engineer, Clark County Development Services - Major Projects (CD)

Denis Cederburg, Design Engineering Manager (HC)

Clanton, Kevin, Clark County Law Library (CD)

Greene, Earl, Chief, Fire Administration, Clark County Fire Department (CD)

Gregory, Ron, Clark County Department of Comprehensive Planning (HC)

Grey, Hilarie, Public Affairs Manager, McCarran International Airport (HC)

Harper, Cameron, Manager, Clark County Road Maintenance (CD)

Harris, Jeff, Manager, Clark County Parks and Recreation (CD)

Kwalick, Donald, M.D., Chief Health Officer, Clark County Health District (CD)

Levering, Carolyn, Plans and Operations Coordinator, Clark County Emergency Management (CD)

Manning, Martin, Director, Clark County Public Works (HC and CD)

Masto, Catherine Cortez, Assistant Clark County Manager (CD)

O'Brien, Jim, Emergency Management Coordinator, Clark County Emergency Management (CD)

Pappa, Erik, Clark County Director of Public Communications (CD)

Marchese, Patricia, Director, Clark County Parks and Community Services (HC)

Archuleta, Peter Director, Clark County Water Reclamation District (HC)

Pinkerton, Alan, Division Manager, Clark County Comprehensive Planning (CD)

Rosenquist, Phil, Director, Clark County Development Services Department (HC)

Schlegel, John, Director, Clark County Comprehensive Planning (HC and CD)

Sizemore, Jennifer, Public Relations, Clark County Health District (CD)

Valentine, Virginia, Assistant Clark County Manager (CD)

White, Carrie, Comprehensive Planning Department, Clark County (CD)

# CLARK COUNTY GOVERNMENTAL ENTITIES (OTHER)

Clark County Regional Flood Control.
Attention: Tim Sutko (CD)

Clark County School District.
Attention: Pat Nelson, Coordinator, Communications Office (CD)

Las Vegas Convention and Visitors Authority - Public Relations Division.
Attention: Erika Brandvik, Public Relations Administrator (CD)

Las Vegas Valley Water District.
Attention: Patricia Mulroy, General Manager (CD).
Attention: Rights-of-Way (HC)

Regional Transportation Commission.
Attention: Jacob Snow, Director (CD)

Southern Nevada Water Authority.
Attention: Kim Zikmund (CD)

Southern Nevada Water Authority.
Attention: Paul Snipes, (CD).
Attention: Janet Monaco (CD)

Southern Nevada Water Authority (CD)

Southern Nevada Water Authority (CD).
Attention: Southern Nevada Water System (CD)

Southern Nevada Water Authority Resources Department.
Attention: Kay Brothers, Director (HC)

## BOULDER CITY

Anderson, Andrea, Council Woman, Boulder City (CD)

Boulder City Public Information Office.
Attention: Public Information Officer (CD)

Ferraro, Robert, Mayor, Boulder City (HC)

Kenney, Robert, Director, Boulder City Finance Department (HC)

Mayes, Vicki, City Clerk, Boulder City (CD)

Molburg, Dean F., Fire Chief, Boulder City Fire Department (CD)

Nix, Bryan, Councilman, Boulder City (CD)

Pacini, Mike, Councilman, Boulder City (CD)

Sullard, John, City Manager, Boulder City (CD)

Turk, Bill, Chief, Boulder City Police Department (CD)

## CITY OF LAS VEGAS

Brown, Larry, Councilman, Ward 4City of Las Vegas (HC)

Byrge, Ed, City of Las Vegas (HC)

Fretwell, Elizabeth, Deputy City Manager, City of Las Vegas (HC)

Goecke, Richard, Public Works Director, Las Vegas Public Works Department (CD)

Goodman, Oscar, Mayor, City of Las Vegas (CD)

Houchens, Steven, Deputy City Manager, City of Las Vegas (CD)

Kajkowski, Charles, Deputy Director, Las Vegas Public Works Department (CD)

Knight, Christopher, Deputy Director, Las Vegas Department of Planning and Development (CD)

Las Vegas Department of Human Resources.
Attention: Claudette Enus, Director (CD)

Las Vegas Public Works Department.
Attention: Environmental Division (CD)

Las Vegas Public Works Department, Environmental Division.
Attention: Industrial Waste Pretreatment Section (CD)

Mack, Michael Council Member, Ward 6City of Las Vegas (CD)

McDonald, Lynette Council Member, Ward 2 City of Las Vegas (CD)

Reese, Gary Councilman, Ward 3City of Las Vegas (CD)

Ronemus, Roni City Clerk, City of Las Vegas (HC)

Sanchez, Elaine City of Las Vegas, Senior Public Information Officer (CD)

Selby, Doug Manager, City of Las Vegas (CD)

Vincent, Mark Director, Las Vegas Department of Finance and Business Services (CD)

Weekly, Lawrence Councilman, Ward 5City of Las Vegas (CD)

Wilkins, Paul Director, Las Vegas Building and Safety (CD)

## CITY OF NORTH LAS VEGAS

Albright, Kenneth A., Director, City of North Las Vegas, Parks and Recreation (CD)

Bell, James A., Director, North Las Vegas Public Works (CD)

Board of City Councilmen, City of North Las Vegas (CD)

Buck, Shari, Council Member, Ward 4, City of North Las Vegas (CD)

Fritsch, Kurt, City Manger City of North Las Vegas (HC)

Eliason, Robert, Council Member, Ward 1, City of North Las Vegas (CD)

Kristaponis, Donna, Director, North Las Vegas Development Service Department (HC and CD)

Montandon, Michael, Mayor, City of North Las Vegas (HC and CD)

Planning and Development, City of North Las Vegas (CD)

Rights-of-Way, City of North Las Vegas (CD)

Director, North Las Vegas Community Development (CD)

Robinson, William, Council Member, Ward 2, City of North Las Vegas (CD)

Rose, Gregory E., Assistant City Manager/DEV, City of North Las Vegas (HC)

Sevigny, Eileen, Clerk, City of North Las Vegas (CD)

Smith, Stephanie, Council Member, Ward 3, City of North Las Vegas (CD)

Stoeckinger, Phil, Finance Director, City of North Las Vegas, Finance Department (CD)

Tarwater, Dan, Assistant City Manager, City of North Las Vegas (CD)

## CITY OF HENDERSON

Board of City Councilmen, City of Henderson (CD)

Cyphers, Amanda, Council Member, Ward 1, City of Henderson (CD)

Gibson, James, Mayor, City of Henderson (CD)

Hafen, Andy, Council Member, Ward 2, City of Henderson (CD)

Henderson Parks and Recreation Department.
Attention: Director's Office (HC and CD)

Planning and Development, City of Henderson (CD)

Rights-of-Way, City of Henderson (CD)

Simmons, Monica, City Clerk, City of Henderson (HC)

Henderson Fire Department.
Attention: Jim Cavalieri, Fire Chief (CD)

Henderson Public Works.
Attention: Curt Chandler, Land Development Manager, (CD)

Clark, Jack, Council Member, Ward 3, City of Henderson (CD)

Moore, Daryl, Director, Henderson Human Resources (HC)

Kirk, Steven, Council Member, Ward 4, City of Henderson (CD)

Kidd, Christine, Professional Engineer, Henderson Public Works (CD)

Kurt R. Segler, Utility Services Director, Henderson Department of Utility Services (HC)

Murnane, Robert, Public Works Director, Henderson Public Works (HC)

Peck, Mary Kay, Director, Henderson Community Planning and Development (CD)

Speight, Philip, City Manager, City of Henderson (CD)

# ORGANIZATIONS

Citizen Alert.
Attention: Peggy Maze Johnson, Executive Director (CD)

Clark County Public Education Foundation

Judi K. Steel, President, Chief Operating Officer, (CD)

Desert Survivors.
Attention: Steve Tabor, President (CD)

Desert Tortoise Council (CD)

Enterprise Town Advisory Board.
Attention: Mike Shannon, Town Board Liaison, Southwest Area (CD)

Environmental Community (CD).
Attention: Jeff Van Ee

Friends of Red Rock Canyon (CD)

Las Vegas Chamber of Commerce (CD)

Latin Chamber of Commerce.
Attention: Otto Merida, Executive Director (CD)

Lone Mountain Citizens Advisory Council.
Attention: Kim Bush, Town Board Liaison - Northwest Area (CD)

Nevada Black Chamber of Commerce (CD)

Nevada Contractors Association.
Attention: Jack Schaefer, President (HC and CD)

Nevada Environmental Coalition.
Attention: Robert Hall (HC)

Nevada Natural Heritage Program.
Attention: Ed Skudlarek (CD)

Nevada Resort Association.
Attention: Bill Bible, President (HC)

Nevada Taxpayer's Association (CD)

North Las Vegas Chamber of Commerce (HC and CD)

Outside Las Vegas Foundation.
Attention: Alan O'Neil (CD)

Paradise Town Advisory Board.
Attention: M.J. Harvey, Chair (CD)

Red Rock Audubon Society.
Attention: Hermie Hiatt, President (HC)

Red Rock Citizens Advisory Council.
Attention: Evan Blythin, Chair (HC)

Sierra Club, Southern Nevada Group,.
Attention: Gary Beckman, Program Chair (HC)

Southern Nevada Group, Sierra Club.
Attention: Jane Feldman, Conservation Chair, (CD)

Southern Nevada Homebuilders Association.
Attention: Irene Porter, Executive Director (CD)

Spring Valley Town Advisory Board.
Attention: Dorothy Kidd (CD)

The Nature Conservancy.
Attention: Ame Hellman, State Director (CD).
Attention: Rob Scanland, Director of Protection (CD)

Whitney Town Advisory Board.
Attention: Thomas V. O'Connor, Chair (CD)

Winchester Town Advisory Board.
Attention: Dr. Alan W. Feld, Chair (CD)

# BUSINESS / CORPORATE

American Nevada Corporation.
Attention: John Kilduff, President (HC)

American West Development.
Attention: Larry Canarelli, President (HC)

Boulder City Chamber of Commerce (CD)

Broadbent & Walker Inc. (CD)

Del Webb Corporation, Sales Office.
Attention: Tom Hennessy, Vice President of Planning and Development (CD)

Greater Las Vegas Association of Realtors (CD)

Henderson Chamber of Commerce (HC)

Howard Hughes Corporation.
Attention: Jim Harris, Area Leasing Manager (CD)

Las Vegas Business Press.
Attention: Russ Cannon, Publisher (HC)

Las Vegas Commercial, LLC.
Attention: Lawton Powers (CD)

Las Vegas One.
Attention: Bob Stodahl (CD)

Nevada Power Company.
Attention: Lands Service (HC) (2 copies)

Nevada Power Company.
Attention: Eileen Wynkoop (CD)

Prudential American Group, Realtors.
Attention: Mason Harvey (CD)

Signature Homes.
Attention: Richard Plaster (CD)

Southwest Gas Company.
Attention: Jim Dufault, Rights-of-Way (HC).
Attention: Roger Buehrer, Public Communications (CD)

Sprint Telephone.
Attention: Sally Tackley (CD)

The Howard Hughes Corporation (CD).
Attention: John T. Potts, Senior Vice President (CD)

Anthem, Las Vegas.
Attention: Steve Petruska, General Manager (CD)

Development Services of Nevada Incorporated.
Attention: Richard D. Smedley (CD)

## LIBRARIES

Boulder City Library.
Attention: Librarian (CD)

Clark County Library.
Attention: Librarian (CD)

Enterprise Library.
Attention: Judith Gray, Administrator (CD)

James I Gibson Library.
Attention: Librarian (HC)

Las Vegas Library.
Attention: Art Cabrales, Administrator (CD)

North Las Vegas Library.
Attention: Anna Laury, Library Director (CD)

Pittman Library.
Attention: Librarian (CD)

Rainbow Library.
Attention: Librarian (CD)

Sahara West Library.
Attention: Kim Clanton-Greene, Librarian (CD)

Spring Valley Library.
Attention: Marsha Culter, Administrator (CD)

West Las Vegas Library.
Attention: Felton Thomas, Administrator (CD)

Whitney Library.
Attention: Barb Carey, Administrator (HC)

Summerlin Library.
Attention: Kelly Richards, Administrator (CD)

## NEWSPAPERS / PUBLICATIONS

Boulder City News (CD)

Las Vegas Review Journal.
Attention: Mary Hynes, City Editor (CD)

Las Vegas Sun.
Attention: Mary Manning (CD)

# INDIVIDUALS

Beck, Colleen Dr. (CD)

Dondero, Thalia (HC)

Galbraith, Gary (CD)

Hiatt, John E. Dr. (HC)

Maichle, Robert W. (HC)

Mellington, Steve (CD)

Patterson, Ben (CD)

Spies, C.G. (CD)

Weisser, George "John" (CD)

# UNIVERSITY OF NEVADA, LAS VEGAS

UNLV Environmental Research Center (CD)

UNLV Library Government Publications (HC)

UNLV Library.
Attention: Sidney Watson, Documents Librarian (CD)

UNLV Department of Political Science.
Attention: Dr. Steven Parker, (CD)

# NATIVE AMERICAN GOVERNMENTAL ENTITIES AND ORGANIZATIONS

Las Vegas Indian Center (CD).
Attention: Lori Harrison, Chairman of the Board of Directors (CD)

Fort Mojave Tribe.
Attention: Nora Helton, Tribal Chairperson (CD)

Las Vegas Paiute Tribe (CD).
Attention: Gloria Hernandez, Chair (CD)

The Colorado River Indian Tribes.
Attention: Daniel Eddy, Jr., Chairman (CD)

Las Vegas Indian Center.
Attention: Jesse Leeds, Chairman of the Board of Directors (CD)

Chemehuevi Indian Tribe.
Attention: Edward D. "Tito" Smith, Chairman (CD)

Moapa Band of Paiutes.
Attention: Philbert Swain, Chairman (CD)

Pahrump Paiute Tribe.
Attention: Richard Arnold, Chairman (CD)

# APPENDIX D: AREAS OF FACILITIES ON BLM AND PUBLIC LANDS

**TABLE D-1. Area of Facilities on BLM and Public Lands in the C-1 Basin**

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 17.4 | 1.0 | 16.4 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Grass Lined Channel | 0.0 | 0.0 | 0.0 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 0.4 | 0.0 | 0.4 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 1.1 | 0.1 | 1.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 44.0 | 44.0 | 0.0 |
| | Debris/Sediment Basin | 0.0 | 0.0 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 1.9 | 1.9 | 0.0 |
| **Total A Facilities** | | **64.9** | **47.1** | **17.8** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 9.5 | 1.8 | 7.8 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 2.8 | 0.0 | 2.8 |
| | Reinforced Concrete Box Culvert (RCBC) | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.0 | 0.0 | 0.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **12.4** | **1.8** | **10.6** |

## TABLE D-2. Area of Facilities on BLM and Public Lands in the Central Basin

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 12.7 | 0.0 | 12.7 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Grass Lined Channel | 0.0 | 0.0 | 0.0 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 89.1 | 0.0 | 89.1 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 3.5 | 0.0 | 3.5 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 8.0 | 6.4 | 1.6 |
| | Debris/Sediment Basin | 0.0 | 0.0 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **113.3** | **6.4** | **106.9** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 1.6 | 0.0 | 1.6 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 6.7 | 0.0 | 6.7 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.0 | 0.0 | 0.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **8.3** | **0.0** | **8.3** |

## TABLE D-3. Area of Facilities on BLM and Public Lands in the Duck Creek Basin

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 24.6 | 6.7 | 17.9 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 10.6 | 2.3 | 8.3 |
| | Grass Lined Channel | 0.0 | 0.0 | 0.0 |
| | Unlined Levee | 0.1 | 0.1 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 12.0 | 0.0 | 11.9 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 1.7 | 0.2 | 1.4 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 312.7 | 295.0 | 17.7 |
| | Debris/Sediment Basin | 0.0 | 0.0 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **361.7** | **304.4** | **57.3** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 5.5 | 2.7 | 2.8 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 15.1 | 14.4 | 0.7 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 3.1 | 0.5 | 2.6 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 1.1 | 0.3 | 0.8 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **24.7** | **17.9** | **6.8** |

## TABLE D-4. Area of Facilities on BLM and Public Lands in the Flamingo Basin

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 44.2 | 3.4 | 40.8 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 6.4 | 0.1 | 6.3 |
| | Grass Lined Channel | 0.1 | 0.0 | 0.1 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 20.2 | 0.0 | 20.2 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 4.5 | 0.0 | 4.5 |
| | Bridge | 0.1 | 0.0 | 0.1 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.1 | 0.0 | 0.1 |
| | Detention Basin | 131.6 | 69.2 | 62.4 |
| | Debris/Sediment Basin | 23.5 | 23.5 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **230.7** | **96.2** | **134.5** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 1.9 | 0.0 | 1.9 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 4.8 | 0.0 | 4.8 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.2 | 0.0 | 0.2 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **6.9** | **0.0** | **6.9** |

## TABLE D-5. Area of Facilities on BLM and Public Lands in the Gowan Basin

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 12.4 | 6.8 | 5.7 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 1.0 | 1.0 | 0.0 |
| | Grass Lined Channel | 0.0 | 0.0 | 0.0 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 29.9 | 0.5 | 29.4 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 2.2 | 0.6 | 1.6 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 68.7 | 38.1 | 30.6 |
| | Debris/Sediment Basin | 0.0 | 0.0 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **114.2** | **47.0** | **67.2** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 22.3 | 0.1 | 22.3 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 5.8 | 0.0 | 5.8 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 1.4 | 0.8 | 0.6 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **29.5** | **0.9** | **28.7** |

## TABLE D-6. Area of Facilities on BLM and Public Lands in the Lower Las Vegas Wash Basin

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 4.2 | 0.0 | 4.2 |
| | Concrete Channel | 7.7 | 0.0 | 7.7 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Grass Lined Channel | 0.0 | 0.0 | 0.0 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 0.7 | 0.0 | 0.7 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.0 | 0.0 | 0.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 0.0 | 0.0 | 0.0 |
| | Debris/Sediment Basin | 0.0 | 0.0 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **12.6** | **0.0** | **12.6** |
| B | Earth Channel | 4.2 | 0.0 | 4.2 |
| | Concrete Channel | 0.0 | 0.0 | 0.0 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Rock Lined Levee | 4.2 | 0.0 | 4.2 |
| | Erosion Control Structure | 13.7 | 0.0 | 13.7 |
| | Reinforced Concrete Box Culvert (RCBC) | 1.7 | 0.0 | 1.7 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.0 | 0.0 | 0.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **23.8** | **0.0** | **23.8** |

**TABLE D-7. Area of Facilities on BLM and Public Lands in the North Basin**

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 54.5 | 11.2 | 43.3 |
| | Rip Rap Channel | 0.1 | 0.0 | 0.1 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Grass Lined Channel | 1.6 | 0.0 | 1.6 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 52.8 | 8.4 | 44.4 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 7.2 | 2.2 | 5.0 |
| | Bridge | 0.1 | 0.0 | 0.1 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 92.6 | 41.8 | 50.8 |
| | Debris/Sediment Basin | 0.0 | 0.0 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **209.0** | **63.7** | **145.3** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 21.3 | 12.3 | 9.1 |
| | Rip Rap Channel | 96.4 | 44.7 | 51.8 |
| | Gabion Channel | 4.7 | 4.7 | 0.0 |
| | Rock Lined Levee | 15.8 | 15.8 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.0 | 0.0 | 0.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **138.3** | **77.4** | **60.8** |

**TABLE D-8. Area of Facilities on BLM and Public Lands in the Boulder City Basin**

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 0.0 | 0.0 | 0.0 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Grass Lined Channel | 0.0 | 0.0 | 0.0 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.0 | 0.0 | 0.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 54.5 | 0.0 | 54.5 |
| | Debris/Sediment Basin | 2.4 | 0.0 | 2.4 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **56.8** | **0.0** | **56.8** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 0.0 | 0.0 | 0.0 |
| | Rip Rap Channel | 0.0 | 0.0 | 0.0 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.0 | 0.0 | 0.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **0.0** | **0.0** | **0.0** |

### TABLE D-9. Area of Facilities on BLM and Public Lands in the Pittman Basin

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 57.1 | 3.6 | 53.5 |
| | Rip Rap Channel | 4.1 | 0.0 | 4.1 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Grass Lined Channel | 1.4 | 0.0 | 1.4 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 6.3 | 0.0 | 6.3 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 2.2 | 1.2 | 1.0 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 270.3 | 215.2 | 55.1 |
| | Debris/Sediment Basin | 24.6 | 0.0 | 24.6 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.4 | 0.0 | 0.4 |
| | Soil Cement Dike | 0.0 | 0.0 | 0.0 |
| **Total A Facilities** | | **366.4** | **220.0** | **146.5** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 14.3 | 12.6 | 1.7 |
| | Rip Rap Channel | 35.7 | 8.9 | 26.8 |
| | Gabion Channel | 0.0 | 0.0 | 0.0 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 1.3 | 0.0 | 1.3 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.3 | 0.2 | 0.1 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **51.7** | **21.8** | **29.9** |

### TABLE D-10. Area of Facilities on BLM and Public Lands in the Range Basin

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 20.2 | 3.4 | 16.7 |
| | Rip Rap Channel | 50.4 | 26.7 | 23.6 |
| | Gabion Channel | 7.1 | 0.0 | 7.1 |
| | Grass Lined Channel | 0.4 | 0.0 | 0.4 |
| | Unlined Levee | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 21.8 | 0.3 | 21.5 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.6 | 0.4 | 0.2 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Energy Dissipater | 0.0 | 0.0 | 0.0 |
| | Outlet Pipe | 0.0 | 0.0 | 0.0 |
| | Junction Structure | 0.0 | 0.0 | 0.0 |
| | Detention Basin | 199.4 | 89.8 | 109.6 |
| | Debris/Sediment Basin | 0.0 | 0.0 | 0.0 |
| | Transition Basin | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| | Soil Cement Dike | 2.6 | 2.0 | 0.6 |
| **Total A Facilities** | | **302.4** | **122.7** | **179.8** |
| B | Earth Channel | 0.0 | 0.0 | 0.0 |
| | Concrete Channel | 3.3 | 3.3 | 0.0 |
| | Rip Rap Channel | 37.5 | 13.3 | 24.2 |
| | Gabion Channel | 13.3 | 9.5 | 3.8 |
| | Rock Lined Levee | 0.0 | 0.0 | 0.0 |
| | Erosion Control Structure | 0.0 | 0.0 | 0.0 |
| | Reinforced Concrete Box Culvert (RCBC) | 5.9 | 0.1 | 5.7 |
| | Reinforced Concrete Pipe Culvert (RCPC) | 0.4 | 0.4 | 0.1 |
| | Bridge | 0.0 | 0.0 | 0.0 |
| | Concrete Arch Culvert | 0.0 | 0.0 | 0.0 |
| **Total B Facilities** | | **60.4** | **26.6** | **33.8** |

## TABLE D-11. Total Area of Facilities in Watershed Basins

| Category | Type Description | Total Area | BLM Area | Public Area |
|---|---|---|---|---|
| A | C-1 Basin | 64.9 | 47.1 | 17.8 |
| | Central Basin | 113.3 | 6.4 | 106.9 |
| | Duck Creek Basin | 361.7 | 304.4 | 57.3 |
| | Flamingo Basin | 230.7 | 96.2 | 134.5 |
| | Gowan Basin | 114.2 | 47.0 | 67.2 |
| | Lower Las Vegas Wash Basin | 12.6 | 0.0 | 12.6 |
| | North Basin | 209 | 63.7 | 145.3 |
| | Boulder City Basin | 56.8 | 0.0 | 56.8 |
| | Pittman Basin | 366.4 | 220.0 | 146.5 |
| | Range Basin | 302.4 | 122.7 | 179.8 |
| **Total All A Facilities** | | **1832.0** | **907.5** | **924.7** |
| B | C-1 Basin | 12.4 | 1.8 | 10.6 |
| | Central Basin | 8.3 | 0.0 | 8.3 |
| | Duck Creek Basin | 24.7 | 17.9 | 6.8 |
| | Flamingo Basin | 6.9 | 0 | 6.9 |
| | Gowan Basin | 29.5 | 0.9 | 28.7 |
| | Lower Las Vegas Wash Basin | 23.8 | 0 | 23.8 |
| | North Basin | 138.3 | 77.4 | 60.8 |
| | Boulder City Basin | 0.0 | 0.0 | 0.0 |
| | Pittman Basin | 51.7 | 21.8 | 29.9 |
| | Range Basin | 60.4 | 26.6 | 33.8 |
| **Total All B Facilities** | | **356.0** | **146.4** | **209.6** |
| **Total All A+B Facilities** | | **2188.0** | **1053.9** | **1134.3** |

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# APPENDIX E: NEVADA BLM SENSITIVE SPECIES

SENSITIVE SPECIES are taxa that are not already included as BLM Special Status Species under (1) Federally listed, proposed, or candidate species; or (2) State of Nevada listed species. BLM policy is to provide these species with the same level of protection as is provided for candidate species in BLM Manual 6840.06 C, that is, to "ensure that actions authorized, funded, or carried out do not contribute to the need for the species to become listed." The Sensitive Species designation is normally used for species that occur on BLM-administered lands for which BLM has the capability to significantly affect the conservation status of the species through management. The BLM Manual 6840.06 E provides factors by which a native species may be listed as "sensitive":

1. It could become endangered or extirpated from a state, or within a significant portion of its range in the foreseeable future;
2. It is under status review by the USFWS and/or National Marine Fisheries Service;
3. It is undergoing significant current or predicted downward trends in: (1) habitat capability that would reduce a species' existing distribution; and/or (2) population or density such that federally listed, proposed, candidate, or State listed status may become necessary.
4. It typically consists of small and widely dispersed populations;
5. It inhabits ecological refugia, or specialized or unique habitats;
6. It is State-listed, but may be better conserved through application of BLM sensitive species status.

**TABLE E-1. Nevada BLM Sensitive Species**

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| ***Mammals (31 total)*** | | |
| *Antrozous pallidus* | pallid bat | 4,5 |
| *Brachylagus idahoensis* | pygmy rabbit | 1,2,3,4 |
| *Corynorhinus townsendi* | Townsend's big-eared bat | 4,5 |
| *Eptesicus fuscus* | big brown bat | 4,5 |
| *Euderma maculatum* | spotted bat | 1,2,4,5 |
| *Eumops perotis californicus* | greater western mastiff bat | 4,5 |
| *Idionycteris phyllotis* | Allen's lappet-browed bat | 4,5 |
| *Lasionycteris noctivagans* | silver-haired bat | 4,5 |
| *Lasiurus blossevilli* | western red bat | 4,5 |
| *Lasiurus cinereus* | hoary bat | 4,5 |
| *Lontra canadensis* | river otter | 4,5 |
| *Macrotus californicus* | California leaf-nosed bat | 4,5 |
| *Microdipodops megacephalus albiventer* | Desert Valley kangaroo mouse | 5 |
| *Microdipodops megacephalus nasutus* | Fletcher dark kangaroo mouse | 5 |
| *Microtus montanus fucosus* | Pahranagat Valley montane vole | 5 |
| *Microtus montanus nevadensis* | Ash Meadows montane vole | 5 |
| *Myotis californicus* | California myotis | 4,5 |
| *Myotis ciliolabrum* | small-footed myotis | 4,5 |
| *Myotis evotis* | long-eared myotis | 4,5 |
| *Myotis lucifugus* | little brown myotis | 4,5 |
| *Myotis thysanodes* | fringed myotis | 4,5 |
| *Myotis velifer* | cave myotis | 4,5 |

## TABLE E-1. Nevada BLM Sensitive Species (Continued)

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| *Myotis volans* | long-legged myotis | 4,5 |
| *Myotis yumanensis* | Yuma myotis | 4,5 |
| *Nyctinomops macrotis* | big free-tailed bat | 4,5 |
| *Ovis canadensis nelsoni* | desert bighorn sheep | 3,4,5 |
| *Pipistrellus hesperus* | western pipistrelle bat | 4,5 |
| *Sorex preblei* | Preble's shrew | 4,5 |
| *Tadarida braziliensis* | Brazilian free-tailed bat | 5 |
| *Thomomys bottae abstrusus* | Fish Spring pocket gopher | 5 |
| *Thomomys bottae curtatus* | San Antonio pocket gopher | 5 |
| ***Birds (33 total)*** | | |
| *Accipiter gentilis* | Northern goshawk | 3,4,5 |
| *Agelaius tricolor* | tricolored blackbird | 3,4,5 |
| *Aquila chrysaetos* | golden eagle | 4,6 |
| *Asio flammeus* | short-eared owl | 4 |
| *Asio otus* | long-eared owl | 4 |
| *Athene cunicularia* | burrowing owl | 3,4 |
| *Baeolophus griseus* | juniper titmouse | 4,5 |
| *Buteo regalis* | ferruginous hawk | 4,5 |
| *Buteo swainsoni* | Swainson's hawk | 4,5 |
| *Centrocercus urophasianus* | greater sage-grouse | 2,3 |
| *Charadrius alexandrinus* | snowy plover | 3,4 |
| *Chlidonias niger* | black tern | 3,4,5 |
| *Dolichonyx oryzivorus* | bobolink | 3,4 |
| *Falco mexicanus* | prairie falcon | 3,4 |
| *Falco peregrinus* | peregrine falcon | 3,4,5 |
| *Grus canadensis* | sandhill crane | 5 |
| *Gymnorhinus cyanocephalus* | pinyon jay | 3,5 |
| *Icteria virens* | yellow-breasted chat | 4,5 |
| *Ixobrychus exilis* | least bittern | 5 |
| *Lanius ludovicianus* | loggerhead shrike | 2,3,4 |
| *Leucosticte atrata* | black rosy-finch | 5 |
| *Melanerpes lewis* | Lewis's woodpecker | 3 |
| *Numenius americanus* | long-billed curlew | 5 |
| *Oreortyx pictus* | mountain quail | 3,4,5 |
| *Otus flammeolus* | flammulated owl | 4 |
| *Phainopepla nitens* | phainopepla | 5 |
| *Pooecetes gramineus* | vesper sparrow | 3 |
| *Sphyrapicus nuchalis* | red-naped sapsucker | 3 |
| *Toxostoma crissale* | Crissal thrasher | 3,5 |
| *Toxostoma lecontei* | LeConte's thrasher | 3,5 |
| *Tympanuchus phasianellus columbianus* | Columbian sharp-tailed grouse | 1,3,4 |
| *Vermivora luciae* | Lucy's warbler | 3,5 |

## TABLE E-1. Nevada BLM Sensitive Species (Continued)

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| *Vireo vicinior* | gray vireo | 3,5 |
| ***Reptiles (6 total)*** | | |
| *Elgaria coerulea palmeri* | Sierra alligator lizard | 5 |
| *Eumeces gilberti rubricaudatus* | western red-tailed skink | 5 |
| *Heloderma suspectum* | Gila monster | 4,5,6 |
| *Lampropeltis pyromelana* | Sonoran mountain kingsnake | 5 |
| *Phrynosoma douglassii* | short-horned lizard | 5 |
| *Sauromalus obesus* | Chuckwalla | 5 |
| ***Amphibians (3 total)*** | | |
| *Bufo microscaphus* | southwestern toad | 4,5 |
| *Bufo nelsoni* | amargosa toad | 3,4 |
| *Rana pipiens* | northern leopard frog | 1,3,5 |
| ***Fishes (25 total)*** | | |
| *Catostomus clarki intermedius* | White River desert sucker | 5 |
| *Catostomus clarki ssp.* | Meadow Valley Wash desert sucker | 5 |
| *Catostomus latipinnis* | flannelmouth sucker | 3,5 |
| *Catostomus sp.* | Wall Canyon sucker | 3,5 |
| *Crenichthys baileyi albivallis* | Preston White River springfish | 5 |
| *Crenichthys baileyi thermophilus* | Moorman White River springfish | 5 |
| *Gila bicolor euchila* | Fish Creek Springs tui chub | 5 |
| *Gila bicolor isolata* | Independence Valley tui chub | 5 |
| *Gila bicolor newarkensis* | Newark Valley tui chub | 5 |
| *Gila bicolor ssp.* | Big Smoky Valley tui chub | 5 |
| *Gila bicolor ssp.* | Fish Lake Valley tui chub | 5 |
| *Gila bicolor ssp.* | Hot Creek Valley tui chub | 5 |
| *Gila bicolor ssp.* | Railroad Valley tui chub | 3,5 |
| *Gila seminuda (Muddy River population only)* | Virgin River chub | 3,5 |
| *Lepidomeda mollispinis mollispinis* | Virgin River spinedace | 5 |
| *Oncorhynchus clarki bouvieri* | Yellowstone cutthroat trout | 5 |
| *Oncorhynchus clarki utah* | Bonneville cutthroat trout | 5 |
| *Oncorhynchus mykiss gairdneri* | interior redband trout | 5 |
| *Relictus solitarius* | relict dace | 5 |
| *Rhinichthys osculus lariversi* | Big Smoky Valley speckled dace | 5 |
| *Rhinichthys osculus moapae* | Moapa speckled dace | 5 |
| *Rhinichthys osculus velifer* | Pahranagat speckled dace | 3,5 |
| *Rhinichthys osculus ssp.* | Meadow Valley Wash speckled dace | 5 |
| *Rhinichthys osculus ssp.* | Monitor Valley speckled dace | 5 |
| *Rhinichthys osculus ssp.* | Oasis Valley speckled dace | 3,5 |
| *Rhinichthys osculus ssp.* | White River speckled dace | 3,5 |

## TABLE E-1. Nevada BLM Sensitive Species (Continued)

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| ***Snails (26 total)*** | | |
| *Oreohelix nevadensis* | Schell Creek mountainsnail | 5 |
| *Pyrgulopsis aloba* | Duckwater pyrg | 5 |
| *Pyrgulopsis anatine* | southern Duckwater pyrg | 5 |
| *Pyrgulopsis augusta* | elongate Cain Spring pyrg | 5 |
| *Pyrgulopsis basiglans* | large-gland Carico pyrg | 5 |
| *Pyrgulopsis bruesi* | Fly Ranch pyrg | 5 |
| *Pyrgulopsis carinata* | carinate Duckwater pyrg | 5 |
| *Pyrgulopsis cruciglans* | transverse gland pyrg | 5 |
| *Pyrgulopsis deaconi* | Spring Mountains pyrg | 5 |
| *Pyrgulopsis dixensis* | Dixie Valley pyrg | 5 |
| *Pyrgulopsis humboldtensis* | Humboldt pyrg | 5 |
| *Pyrgulopsis landeyi* | Landyes pyrg | 5 |
| *Pyrgulopsis limaria* | squat Mud Meadows pyrg | 5 |
| *Pyrgulopsis micrococcus* | Oasis Valley pyrg | 5 |
| *Pyrgulopsis militaris* | northern Soldier Meadow pyrg | 5 |
| *Pyrgulopsis orbiculata* | sub-globose Steptoe Ranch pyrg | 5 |
| *Pyrgulopsis papillata* | Big Warm Spring pyrg | 5 |
| *Pyrgulopsis peculiaris* | bifid duct pyrg | 5 |
| *Pyrgulopsis pictilis* | ovate Cain Spring pyrg | 5 |
| *Pyrgulopsis sulcata* | southern Steptoe pyrg | 5 |
| *Pyrgulopsis umbilicata* | southern Soldier Meadow pyrg | 5 |
| *Pyrgulopsis villacampae* | Duckwater Warm Springs pyrg | 5 |
| *Pyrgulopsis vinyardi* | Vinyards pyrg | 5 |
| *Pyrgulopsis wongi* | Wongs pyrg | 5 |
| *Tryonia clathrata* | grated tryonia | 5 |
| *T. variegata* | Amargosa tryonia | 5 |
| ***Clams and Mussels (1 total)*** | | |
| *Anodonta californiensis* | California floater | 4,5 |
| ***Ants, Wasps, Bees (2 total)*** | | |
| *Andrena balsamorhiza* | Mojave gypsum bee | 5 |
| *Perdita meconis* | Mojave poppy bee | 5 |
| ***True Bugs (1 total)*** | | |
| *Pelocoris shoshone shoshone* | Pahranagat naucorid bug | 5 |
| ***Beetles (14 total)*** | | |
| *Aegialia crescenta* | Crescent Dune aegialian scarab | 5 |
| *Aegialia hardyi* | Hardy's aegialian scarab | 5 |
| *Aegialia knighti* | aegialian scarab beetle | 5 |
| *Aegialia magnifica* | large aegialian scarab | 5 |

## TABLE E-1. Nevada BLM Sensitive Species (Continued)

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| *Aphodius sp.* | Crescent Dune aphodius scarab | 5 |
| *Aphodius sp.* | Big Dune aphodius scarab | 5 |
| *Aphodius sp.* | Sand Mountain aphodius scarab | 5 |
| *Miloderes sp.* | Rulien's miloderes weevil | 5 |
| *Pseudocotalpa giulianii* | Giuliani's dune scarab | 5 |
| *Serica psammobunus* | Sand Mountain serican scarab | 5 |
| *Serica ammomenisco* | Crescent Dune serican scarab | 5 |
| *Serica humboldti* | Humboldt serican scarab | 5 |
| *Stenelmis calida calida* | Devils Hole warm spring riffle beetle | 5 |
| *Stenelmis moapa* | Moapa warm spring riffle beetle | 5 |
| ***Butterflies (28 total)*** | | |
| *Cercyonis oetus alkalorum* | Big Smoky wood nymph | 5 |
| *Cercyonis oetus pallescens* | pallid wood nymph | 5 |
| *Cercyonis pegala carsonensis* | Carson Valley wood nymph | 5 |
| *Cercyonis pegala pluvialis* | White River wood nymph | 5 |
| *Chlosyne acastus robusta* | Spring Mountains acastus checkerspot | 5 |
| *Euphilotes ancilla giulianii* | Giuliani's blue | 5 |
| *Euphilotes ancilla shieldsi* | Shield's blu | 5 |
| *Euphilotes battoides fusimaculata* | fused battoides blue | 5 |
| *Euphilotes bernadino minuta* | Baking Powder Flat blue | 5 |
| *Euphilotes enoptes primavera* | early blue | 5 |
| *Euphilotes mojave virginensis* | northern Mojave blue | 5 |
| *Euphilotes pallescens arenamontana* | Sand Mountain blue | 5 |
| *Euphilotes pallescens calneva* | Honey Lake blue | 5 |
| *Euphilotes pallescens mattonii* | Mattoni's blue | 5 |
| *Euphilotes pallescens ricei* | Rice's blue | 5 |
| *Euphydryas editha koreti* | Koret's checkerspot | 5 |
| *Euphydryas editha monoensis* | Mono checkerspot | 5 |
| *Hesperia miriamae longaevicola* | White Mountains skipper | 5 |
| *Hesperia uncas fulvapalla* | Railroad Valley skipper | 5 |
| *Hesperia uncas giulianii* | Mono Basin skipper | 5 |
| *Hesperia uncas grandiose* | White River Valley skipper | 5 |
| *Hesperopsis gracielae* | MacNeill sooty wing skipper | 5 |
| *Phyciodes pascoensis arenacolor* | Steptoe Valley crescentspot | 5 |
| *Philotiella speciosa septentrionalis* | Great Basin small blue | 5 |
| *Polites sabuleti sinemaculata* | Denio sandhill skipper | 5 |
| *Pseudocopaeodes eunus alinea* | Ash meadows alkali skipper | 5 |
| *Speyeria hesperis greyi* | Grey's silverspot | 5 |
| *Speyeria nokomis carsonensis* | Carson Valley silverspot | 5 |
| ***Plants (106 total)*** | | |
| *Angelica scabrida* | rough angelica | 5 |
| *Antennaria arcuata* | meadow pussytoes | 5 |

## TABLE E-1. Nevada BLM Sensitive Species (Continued)

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| *Arabis bodiensis* | Bodie Hills rockcress | 5 |
| *Arabis falcatoria* | Grouse Creek rockcress | 5 |
| *Arabis falcifructa* | Elko rockcress | 5 |
| *Arctomecon merriamii* | white bearpoppy; Merriam b. | 3,5 |
| *Asclepias eastwoodiana* | Eastwood milkweed | 4 |
| *Astragalus aequalis* | Clokey milkvetch; equal m. | 5 |
| *Astragalus amphioxys var. musimonum* | Sheep Mountain milkvetch; crescent m. | 5 |
| *Astragalus anserinus* | Goose Creek milkvetch | 5 |
| *Astragalus eurylobus* | Needle Mountains milkvetch; Peck Station m. | 5 |
| *Astragalus funereus* | black woollypod; funeral milkvetch; black m.; Rhyolite m. | 5 |
| *Astragalus gilmanii* | Gilman milkvetch | 5 |
| *Astragalus mohavensis var. hemygyrus* | halfring milkvetch; curvepod Mojave m.; Darwin Mesa m. | 5 |
| *Astragalus mokiacensis* | Mokiak milkvetch | 5 |
| *Astragalus oophorus var. lavinii* | Lavin eggvetch | 5 |
| *Astragalus oophorus var. lonchocalyx* | long-calyx eggvetch; pink e. | 5 |
| *Astragalus remotus* | Spring Mountains milkvetch | 5 |
| *Astragalus robbinsii var. occidentalis* | Lamoille Canyon milkvetch; Ruby m.; Robbin's western m. | 5 |
| *Astragalus solitarius* | lonesome milkvetch; weak m. | 5 |
| *Astragalus tiehmii* | Tiehm milkvetch | 5 |
| *Astragalus toquimanus* | Toquima milkvetch | 5 |
| *Astragalus uncialis* | currant milkvetch | 5 |
| *Botrychium crenulatum* | dainty moonwort; crenulate m. | 5 |
| *Calochortus striatus* | alkali mariposa lily; striped m. l. | 5 |
| *Camissonia megalantha* | Cane Spring evening-primrose | 5 |
| *Chrysothamnus eremobius* | remote rabbitbrush; Pintwater r. | 5 |
| *Collomia renacta* | Barren Valley collomia | 5 |
| *Cordylanthus tecopensis* | Tecopa birdbeak | 5 |
| *Cryptantha schoolcraftii* | Schoolcraft catseye | 5 |
| *Cryptantha welshii* | White River catseye; Welsh c. | 5 |
| *Cusickiella quadricostata* | Bodie Hills draba; four-rib whitlowgrass | 5 |
| *Cymopterus goodrichii* | Goodrich biscuitroot; G. parsley | 5 |
| *Cymopterus ripleyi var. saniculoides* | sanicle biscuitroot; Ripley b. | 5 |
| *Dermatocarpon luridum* | stream stippleback lichen | 5 |
| *Didymodon nevadensis* | Gold Butte moss | 5 |
| *Enceliopsis argophylla* | silverleaf sunray | 5 |
| *Epilobium nevadense* | Nevada willowherb | 5 |
| *Erigeron latus* | broad fleabane | 5 |
| *Erigeron ovinus* | sheep fleabane | 5 |
| *Eriogonum anemophilum* | windloving buckwheat | 5 |
| *Erigeron ovinus* | sheep fleabane | 5 |
| *Eriogonum anemophilum* | windloving buckwheat | 5 |

## TABLE E-1. Nevada BLM Sensitive Species (Continued)

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| *Eriogonum bifurcatum* | Pahrump Valley buckwheat; forked b. | 5 |
| *Eriogonum corymbosum* | Las Vegas buckwheat | 5 |
| *Eriogonum crosbyae* | Crosby buckwheat | 5 |
| *Eriogonum diatomaceum* | Churchill Narrows buckwheat | 5 |
| *Eriogonum heermannii var. clokeyi* | Clokey buckwheat | 5 |
| *Eriogonum lewisii* | Lewis buckwheat | 5 |
| *Eriogonum phoeniceum* | scarlet buckwheat | 5 |
| *Eriogonum prociduum* | prostrate buckwheat; Austin b. | 5 |
| *Eriogonum robustum* | altered andesite buckwheat; Lobb b. | 5 |
| *Eriogonum tiehmii* | Tiehm buckwheat | 5 |
| *Eustoma exaltatum* | catchfly gentian | 5 |
| *Galium hilendiae ssp. kingstonense* | Kingston bedstraw | 5 |
| *Glossopetalon pungens var. glabrum* | smooth dwarf greasebush | 5 |
| *Glossopetalon pungens var. pungens* | rough dwarf greasebush | 5 |
| *Ionactis caelestis* | Red Rock Canyon aster | 5 |
| *Ivesia aperta var. aperta* | Sierra Valley ivesia | 5 |
| *Ivesia arizonica var. saxosa* | rock purpusia | 5 |
| *Ivesia jaegeri* | Jaeger ivesia | 5 |
| *Ivesia pityocharis* | Pine Nut Mountains ivesia; P.N.M. mousetails | 5 |
| *Ivesia rhypara var. rhypara* | grimy ivesia | 5 |
| *Jamesia tetrapetala* | waxflower | 5 |
| *Lathyrus grimesii* | Grimes vetchling | 5 |
| *Lepidium davisii* | Davis peppergrass | 5 |
| *Lepidium montanum var. nevadense* | Pueblo Valley peppergrass | 5 |
| *Leptodactylon glabrum* | Bruneau River prickly phlox; Owyhee p. p. | 5 |
| *Lotus argyraeus var. multicaulis* | scrub lotus | 5 |
| *Lupinus holmgrenianus* | Holmgren lupine | 5 |
| *Mentzelia argillicola* | Pioche blazingstar | 5 |
| *Mentzelia mollis* | smooth stickleaf | 5 |
| *Mentzelia tiehmii* | Tiehm blazingstar | 5 |
| *Oryctes nevadensis* | oryctes | 5 |
| *Parthenium ligulatum* | ligulate feverfew | 5 |
| *Penstemon albomarginatus* | white-margined beardtongue | 5 |
| *Penstemon arenarius* | Nevada dune beardtongue | 5 |
| *Penstemon bicolor ssp. bicolor* | yellow twotone beardtongue | 5 |
| *Penstemon bicolor ssp. roseus* | rosy twotone beardtongue | 5 |
| *Penstemon concinnus* | Tunnel Springs beardtongue | 5 |
| *Penstemon floribundus* | Cordelia beardtongue | 5 |
| *Penstemon fruticiformis ssp. amargosae* | Death Valley beardtongue; Amargosa bush penstemon | 5 |
| *Penstemon pahutensis* | Pahute Mesa beardtongue | 5 |
| *Penstemon palmeri var. macranthus* | Lahontan beardtongue | 5 |
| *Penstemon pudicus* | bashful beardtongue | 5 |

### TABLE E-1. Nevada BLM Sensitive Species (Continued)

| Scientific Name | Common Name | Factor(s) |
|---|---|---|
| *Penstemon tiehmii* | Tiehm beardtongue | 5 |
| *Phacelia beatleyae* | Beatley scorpion plant | 5 |
| *Phacelia filiae* | overlooked phacelia; Clarke phacelia | 5 |
| *Phacelia inundata* | playa phacelia | 5 |
| *Phacelia minutissima* | least phacelia; dwarf phacelia | 5 |
| *Phacelia monoensis* | Mono phacelia | 5 |
| *Phacelia parishii* | Parish phacelia; playa p | 5 |
| *Pinus washoensis* | Washoe pine | 5 |
| *Plagiobothrys glomeratus* | altered andesite popcornflower | 5 |
| *Porophyllum pygmaeum* | pygmy poreleaf | 5 |
| *Potentilla cottamii* | Cottam cinquefoil | 5 |
| *Salvia dorrii var. clokeyi* | Clokey mountain sage; C. purple sage | 5 |
| *Sphaeralcea caespitosa var. williamsiae* | Blaine pincushion; B. fishhook cactus | 5 |
| *Sclerocactus nyensis* | Nye pincushion | 5 |
| *Sclerocactus schlesseri* | Schlesser pincushion; S. fishhook cactus | 5 |
| *Sclerocactus blainei* | Jan's catchfly; Nachlinger catchfly | 5 |
| *Silene nachlingerae* | Railroad Valley globemallow | 5 |
| *Streptanthus oliganthus* | Masonic Mountain jewelflower; M. M. twistflower | 5 |
| *Stroganowia tiehmii* | Tiehm stroganowia | 5 |
| *Tonestus graniticus* | Lone Mountain tonestus | 5 |
| *Townsendia jonesii var. tumulosa* | Charleston grounddaisy | 5 |
| *Trifolium andinum var. podocephalum* | Currant Summit clover | 5 |
| *Trifolium leibergii* | Leiberg clover | 5 |
| *Viola lithion* | rock violet | 5 |

Approved by:

Signed by:
Rovert V. Abbey
State Director, Nevada
U.S. Bureau of Land Management
Date: 07-01-03

Signed by:
R. Michael Turnipseed, P.E.
Director, Nevada Department of Conservation and Natural Resources
Date: 07-10-02

Signed by:
Terry R. Crawforth
Director, Nevada Department of Wildlife
Date: 07-14-03

# APPENDIX F: NOTICE OF INTENT (NOI) TO PREPARE A SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE FLOOD CONTROL MASTER PLAN, CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

FR Doc 03-594
[Federal Register: January 10, 2003 (Volume 68, Number 7)]
[Notices]
[Page 1475-1476]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr10ja03-73]
-----------------------------------------------------------------------
DEPARTMENT OF THE INTERIOR
Bureau of Land Management
[NV-050-03-1430-ER]
Notice of Intent To Prepare a Supplemental Environmental Impact Statement for the Flood Control Master Plan, Clark County Regional Flood Control District
AGENCY: Bureau of Land Management, Las Vegas Field Office.
COOPERATING AGENCY: U.S. Army Corps of Engineers, Sacramento District.
ACTION: Notice of intent to prepare a supplemental Environmental Impact Statement (SEIS) for the Flood Control Master Plan, Clark County Regional Flood Control District (CCRFCD).
-----------------------------------------------------------------------
SUMMARY: This document provides notice that the BLM intends to prepare an SEIS of the Final Environmental Impact Statement for the Flood Control Master Plan, Clark County Regional Flood Control District, approved on June 4, 1991, by record of decision. The project area is located in Clark County,
[[Page 1476]]
Nevada, hydrographic basins 212 and 167. This activity encompasses private and public lands within the Las Vegas Valley and Boulder City, Nevada. The SEIS will fulfill the needs and obligations set forth by the National Environmental Policy Act (NEPA), the Federal Land Policy and Management Act (FLPMA), and BLM management policies. The BLM will work collaboratively with the U.S. Army Corps of Engineers (USACE), Sacramento District and interested parties to identify any local concerns. The public scoping process will help identify issues and concerns including an evaluation of the existing Final Environmental Impact Statement (FEIS) for the Flood Control Master Plan in the context of the needs and interests of the public.

DATES: This notice initiates the public scoping process. Comments and concerns on issues can be submitted in writing to the address listed below and will be accepted throughout the 30-day scoping period. All public meetings will be announced through the local news media, newsletters, and the BLM web site at www.blm.nv.gov at least 15 days prior to the event. The minutes and list of attendees for each meeting will be available to the public and open for 30 days to any participant who wishes to clarify the views they expressed.

Public Participation: Public meetings will be held throughout the SEIS scoping and preparation period. Public scoping meetings will be held from 6-8 p.m. Pacific standard time on January 22, 2003, at the CCRFCD, RTC Building, Room 108, 600 S. Grand Central Parkway, Las Vegas, Nevada 89106; and on January 23, 2003, from 6-8 p.m. Pacific standard time at the Henderson Convention Center and Visitors Bureau, 200 Water Street, Henderson, Nevada 89015. Early participation is encouraged and will provide guidance and suggestions for the future management of flood control facilities within the Las Vegas Valley. In addition to the ongoing public participation process, formal opportunities for public participation will be provided upon publication of the BLM draft SEIS.

ADDRESSES: Written comments should be sent to the Bureau of Land Management, Las Vegas Field Office, 4701 North Torrey Pines Drive, Las Vegas, Nevada 89130-2301; Fax (702) 515-5023. Documents pertinent to this proposal may be examined at the Las Vegas Field Office or the CCRFCD. The CCRFCD is located at 600 S. Grand Parkway, Suite 300, Las Vegas, NV 89106-4511.

Comments, including names and street addresses of respondents, will be available for public review at the Las Vegas Field Office during regular business hours (7:30 a.m. through 4:15 p.m.), Monday through Friday, except holidays, and may be published as part of the SEIS. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection in their entirety.

FOR FURTHER INFORMATION CONTACT: For further information and/or to have your name added to our mailing list, contact Jeffrey Steinmetz, BLM, Las Vegas Field Office, Telephone (702) 515-5097; e-mail jsteinme@blm.gov, or Anna Wharton, at (702) 515-5095: e-mail awharton@blm.gov.

SUPPLEMENTARY INFORMATION: The changing needs and interests of the public and the growth within the Las Vegas Valley necessitates a revision to the Flood Control Master Plan FEIS published in 1991 for the Las Vegas Field Office and CCRFCD. Preliminary issues and management concerns have been identified by BLM and CCRFCD personnel, their consultant, and other agencies. They represent the BLM's knowledge to date on the existing issues and concerns with current management. The major issue themes that will be addressed in the SEIS include: Impacts to surface water hydrology and water quality; protection of federally-listed species, state-listed species, and BLM sensitive species; minimizing impacts to air quality; minimizing visibility impacts; balancing conflicting and compatible land uses; protection of cultural and paleontological resources; cumulative impacts of the project; and the creation of a new project-specific analysis procedure for future flood control facilities.

After gathering public comments on what issues the SEIS should address, the suggested issues will be placed in one of three categories:

1. Issues to be resolved in the SEIS;
2. Issues resolved through policy or administrative action; or
3. Issues beyond the scope of the SEIS.

Rationale will be provided in the SEIS for each issue placed in category two or three. In addition to these major issues, a number of management questions and concerns will be addressed in the SEIS. The public is encouraged to help identify these questions and concerns during the scoping phase. An interdisciplinary approach will be used to develop the SEIS in order to consider the variety of resource issues and concerns identified. Disciplines involved in the SEIS process will include specialists with expertise in soils, minerals and geology; hydrology; botany; wildlife and fisheries; transportation; visual resources; air quality; lands and realty; outdoor recreation; archaeology; paleontology; and sociology and economics.

Mark T. Morse,
Field Manager.
[FR Doc. 03-594 Filed 1-9-03; 8:45 am]

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# APPENDIX G: REFERENCE TABLES FOR CHAPTER 8

Chapter 8 presents the process by which each new CCRFCD facility will be reviewed to ensure full compliance with environmental regulatory requirements and to minimize potential environmental impacts during construction, operation and maintenance. Some sections of the chapter require tables to assist in evaluating impacts to that specific resource. Appendix G provides tables for the following sections: 8.4 Surface Water, 8.10 Air Quality and 8.15 Land Use.

## TABLE G-1. Potential Surface Water Impacts from Flood Control System Construction and Operation

| | Potential Impacts[1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Facility Characteristics[2]** | **Increased Flood Hazard** | **Flow Pattern Changes** | **Increased Erosion** | **Reduced Groundwater Recharge** | **Sediment Transport Changes** | **Water Quality Degradation[3]** | **Construction Disturbance** | **Construction Disturbance** |
| ***Construction*** | | | | | | | | |
| Construction Activities (all structures) | NI | NI | NS | NI | NS | NS | NS | NI |
| ***Direct Operation*** | | | | | | | | |
| Closed Conveyances | NI | NS | NI | NS | NS | NI | NS | NS |
| Lined Channels | S | S | NI | NS | NI | NS | NS | NS |
| Unlined Channels | NS | NS | S | NI | S | NS | NS | NS |
| Detention Basins | NS | NS | NI | NI | S | NI | S | NS |

Source: BLM/CCRFCD (1991).
1 NI = No impact; NS = Not significant; S = Significant
2 Facility characteristics refer to activities, operational characteristics, and facilities that may result in the impacts identified.
3 Water qia;otu o,[acts om this column refer to the increaseed downstream transport of containments other than waterborne sediments.

## TABLE G-2a. Composite $PM_{10}$ and CO Emission Rate Calculations for Construction Activities

| COLUMN A | COLUMN B | COLUMN C | COLUMN D | COLUMN E | COLUMN F | COLUMN G | COLUMN H | COLUMN I | COLUMN J |
|---|---|---|---|---|---|---|---|---|---|
| **Facility Type** | **Construction Length (feet)** | **Construction Width (feet)** | **Area Disturbed (feet²)** | **Construction Daily Rate[1] (feet²)** | **Construction Length (days)** | **PM10 Daily Emissions[2] (lb/day)** | **CO Daily Emissions[3] (lb/day)** | **Total PM10 (tons)** | **Total CO (tons)** |
| | **(Enter length)** | **(Enter width)** | **(Col. B × Col. C)** | **(Constant)** | **(Col. D ÷ Col. E)** | **(Constant)** | **(Constant)** | **(Col. F × Col. G ÷ 2,000)** | **(Col. F × Col. H ÷ 2,000)** |
| Pipelines | | | | 15,000 | | 61.14 | 305.20 | | |
| Concrete Box | | | | 4,500 | | 54.40 | 305.20 | | |
| Unlined Channel | | | | 20,000 | | 33.60 | 121.20 | | |
| Lined Channel | | | | 7,000 | | 43.90 | 233.00 | | |
| Unlined Dike | | | | 20,000 | | 40.60 | 158.40 | | |
| Lined Dikes | | | | 8,000 | | 50.34 | 265.40 | | |
| Bridges[5] | | | | 200 | | 77.43 | 459.10 | | |
| Floodway | | | | 125,000 | | 101.05 | 121.20 | | |
| Other Instructions | Enter Size (acres) | | Column B ÷ 43,560 | | | | | | |
| Detention Basin | | | | | | | | | |
| Total Project Emissions[5] | | | | | | | | | |
| Conformity Thresholds | | | | | | | | 70 tons/year | 100 tons/year |
| Conformity Determination is not needed if Total Project Emissions are less than Conformity Thresholds | | | | | | | | N/A | N/A |

1 Construction rate is the same rate used in the 1991 BLM/CCRFCD (Dames & Moore 1991).
2 Emission factor is from PM10 Attainment Demonstration Plan, Las Vegas Valley Non-attainment Area, Clark County, NV. PM10 emission = 0.42 tons/acre-month ×disturbed area (feet²) × duration of project (months). This includes fugitive dust and does not include credit for use of fugitive dust controls.
3 The calculation is lb/typical weekday. This value is assumed to be lb/8-hr.
4 Assumes a 60-foot right-of-way with 10-foot easement on each side.
5 This includes all project components and facilities combined for a single project.
Source: CCRFCD (2001).

## TABLE G-2b. Estimating Ozone Precursors

| COLUMN A | COLUMN B | COLUMN C | COLUMN D | COLUMN E | COLUMN F | COLUMN G | COLUMN H | COLUMN I | COLUMN J |
|---|---|---|---|---|---|---|---|---|---|
| **Facility Type** | **Construction Length (feet)** | **Construction Width (feet)** | **Area Disturbed ($feet^2$)** | **Construction Daily Rate[1] ($feet^2$)** | **Construction Length (days)** | **VOC Daily Emissions[2] (lb/day)** | **$NO_2$ Daily Emissions[3] (lb/day)** | **Total VOC (tons)** | **Total $NO_2$ (tons)** |
| | **(Enter length)** | **(Enter width)** | **(Col. B × Col. C)** | **(Constant)** | **(Col. D ÷ Col. E)** | **(Constant)** | **(Constant)** | **(Col. F × Col. G ÷ 2,000)** | **(Col. F × Col. H ÷ 2,000)** |
| Pipelines | | | | 15,000 | | 0.141 | 1.658 | | |
| Concrete Box | | | | 4,500 | | 0.141 | 1.658 | | |
| Unlined Channel | | | | 20,000 | | 0.147 | 1.784 | | |
| Lined Channel | | | | 7,000 | | 0.198 | 2.367 | | |
| Unlined Dike | | | | 20,000 | | 0.172 | 2.192 | | |
| Lined Dikes | | | | 8,000 | | 0.256 | 3.163 | | |
| Bridges[5] | | | | 200 | | 0.21 | 2.505 | | |
| Floodway | | | | | | 0.147 | 1.784 | | |
| Other Instructions | Enter Size (acres) | | | | | | | | |
| Detention Basin | | | | 20,473.2 | | 0.184 | 2.33 | | |
| Total Project Emissions[5] | | | | | | | | 0 | 0 |
| Conformity Thresholds | | | | | | | | 50 tons/year | 100 tons/year |
| Conformity Determination is not needed if Total Project Emissions are less than Conformity Thresholds | | | | | | | | N/A | N/A |

1 Construction rate is the same rate used in the 1990 Flood Control Master Plan for Clark County Regional Flood Control District.
2 Emission factor is from summation of emissions from equipmetn used for an 8-hr day (Table 4.8-1).
3 For electronic version, only enter length and width of project or acres for basins.
4 Assumes a 60-foot right-of-way with 10-foot easement on each side.
5 Total project emissions from all facility types comined as a single project.

## TABLE G-3. Impact Type by Land Use Category

| Land Use | Eliminate | Barrier | Divide | Inconvenience | Safety | Health | Attract | Beneficial Recreation |
|---|---|---|---|---|---|---|---|---|
| Residential | O/M | O/M | O/M | C/O/M | C/O/M | O/M | O/M | -- |
| Commercial | O/M | O/M | O/M | C/O/M | C/O/M | O/M | O/M | -- |
| Industrial | O/M | -- | O/M | C | C | -- | -- | -- |
| Public Facilities | O/M | O/M | O/M | C/O/M | C/O/M | O/M | O/M | -- |
| Open Space/ Recreation (i.e., Parks, Golf Courses) | O/M | -- | -- | C | C/O/M | O/M | -- | O/M |
| Agriculture | -- | -- | O/M | C | C | -- | -- | -- |
| Undeveloped Land/ Rural | -- | -- | -- | -- | -- | -- | -- | O/M |

KEY:
C = Construction-related Impact
O/M = Operation/Maintenance-related Impact
Eliminate - Displace, remove or relocate existing structures or uses causing a substantial change in the land use pattern
Barrier - Create a barrier adjacent to the development causing inaccessibility or effecting the expansion of future development.
Divide - Separate or break the existing land use pattern by locating the proposed facility within established land uses/developments thereby disrupting the integrity of a neighborhood unit or other land use complex. May reduce the viability of land uses requiring large areas such as mineral extraction or agriculture.
Inconvenience - Create a nuisance during or after construction by generating noise, dust, traffic detours; inhibits normal operating procedures.
Safety - Create an unsafe environment for the public with facilities.
Health - Create health hazards to the public by operational procedures.
Attract - Attract undesirable recreational activities to the proposed facilities (i.e., ATC/off-road vehicles).
Beneficial Recreation - Proposed facilities offers opportunities for recreational development or passive recreational activities (such as parks in detention basins and nature trails or bikeways in floodways).
Source: Modified from BLM/CCRFCD (1991).

## TABLE G-4. Flood Control Facilities Principal Impacts

| Flood Control Facilities | Eliminate | Barrier | Divide | Inconvenience | Safety | Health | Attract | Beneficial Recreation |
|---|---|---|---|---|---|---|---|---|
| Natural Channel | -- | Yes | -- | -- | Yes | Yes | Yes | -- |
| Unlined Channel | -- | Yes | Yes | Yes | Yes | Yes | Yes | -- |
| Lined Channel | -- | Yes | Yes | Yes | Yes | Yes | Yes | -- |
| Culvert/Box Culvert | -- | -- | -- | Yes | -- | -- | -- | -- |
| Pipeline | -- | -- | -- | Yes | -- | -- | -- | -- |
| Bridge | -- | -- | -- | Yes | -- | -- | -- | -- |
| Floodways and Dike/ Levee | -- | Yes | Yes | Yes | -- | -- | -- | Yes |
| Detention Basin | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Debris Basin | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

IMPACT CATEGORY KEY:
Eliminate - Displace, remove or relocate existing structures or uses causing a substantial change in the land use pattern
Barrier - Create a barrier adjacent to the development causing inaccessibility or effecting the expansion of future development.
Divide - Separate or break the existing land use pattern by locating the proposed facility within established land uses/developments thereby disrupting the integrity of a neighborhood unit or other land use complex. May reduce the viability of land uses requiring large areas such as mineral extraction or agriculture.
Inconvenience - Create a nuisance during or after construction by generating noise, dust, traffic detours; inhibits normal operating procedures.
Safety - Create an unsafe environment for the public with facilities.
Health - Create health hazards to the public by operational procedures.
Attract - Attract undesirable recreational activities to the proposed facilities (i.e., ATC/off-road vehicles).
Beneficial Recreation - Proposed facilities offers opportunities for recreational development or passive recreational activities (such as parks in detention basins and nature trails or bikeways in floodways).
Source: BLM/CCRFCD (1991).

## TABLE G-5. Summary of Facilities Impact Levels by General Land Use Category

| General Land Use Classification | Natural Channels | Unlined Channels | Lined Channels | Culvert | Pipeline | Bridge | Floodway | Detention Basins | Debris | Drop Structure |
|---|---|---|---|---|---|---|---|---|---|---|
| Residential | L-N | L-M | H | L | L | L | L-H | H | L-M | L-M |
| Commercial | L-N | L-H | M-H | L | L | L | L-M | M-H | L-M | L-M |
| Industrial | L-N | L-M | M-H | L | L | L | L-M | M-H | L-M | L |
| Public Facilities | L-N | L-H | H | L | L | L | L-M | H | L-M | L |
| Open Space/ Recreation (i.e., Parks, Golf Courses) | L-N | L-M | M-H | L | L | L | L-M | L-M | L | L |
| Agriculture | L-N | L-M | L-M | L | L | L | L-M | M | L-H | L |
| Undeveloped Land/ Rural | N | N | N | N | N | N | N | N | N | N |

KEY:
H = High Impact Potential - Nearly Always Significant Unless Mitigated
M-H = Moderate to High Impact - Likely Significant Unless Mitigated
M = Moderate Impact - Significant Under Many Circumstances; Mitigation Appropriate in Most Cases
L-M = Low to Moderate Impact - Generally Not Significant, But May Be Under Special Circumstances
L = Low Impact - Not Significant
N = No Identifiable Impact - Not Significant
Source: Modified from BLM/CCRFCD (1991).

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# APPENDIX H: COMMENTS RECEIVED ON THE DRAFT SEIS

Comment Document 001

**STEVE ROBINSON**
*State Forester Firewarden*

**KENNY C. GUINN**
*Governor*

**JOHN JONES**
*Regional Forester*

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**STATE OF NEVADA**
**DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES**
**NEVADA DIVISION OF FORESTRY**
**4747 W. Vegas Drive**
**Las Vegas, Nevada 89108-2135**
**Phone (702) 486-5123 • Fax (702) 486-5186**

April 21, 2004

Adrian Garcia
Bureau of Land Management
Las Vegas Field Office
4701 North Torrey Pines Drive
Las Vegas, Nevada 89130-2301

Dear Mr. Garcia,

This letter responds to your request for comments on the Draft Supplemental Environmental Impact Statement for the Clark County Regional Flood Control Master Plan (SEIS).

The Nevada Division of Forestry (NDF) has the statutory responsibility for the protection of state listed critically endangered plant species. In Table 3.5-1 on page 101 of the SEIS four state-listed critically endangered plant species are shown to have potential to occur on the project. If any of these species, Blue Diamond Cholla (*Opuntia whipplei var. multigeniculata)*, Las Vegas bearpoppy (*Arctomecon californica)*, Threecorner milkvetch *(Astragalus geyeri var. triquetrus)* and Unusual Catseye (Cryptantha insolita) are identified in the rare plant survey or it is determined their habitat will be affected, a permit from NDF for the take of plants and/or habitat destruction will be required. 1

NDF has issued a permit to Clark County for take of Las Vegas bearpoppy on non-federal land and NDOT rights of way in Clark County. Any of the project areas located on non-federal land would be covered under this permit. However, should Las Vegas bearpoppy be found, you are requested to notify us of the number of plants present. If federal land is involved and Las Vegas bearpoppy habitat or plants will be affected, a permit from the Nevada Division of Forestry would be required. 2

For more information on state listed endangered species and regulations, please see the Nevada Natural Heritage Program website at www.heritage.nv.gov.

Thank you for the opportunity to comment on the proposed project. If you have any questions please feel free to contact me.

Sincerely,

Mark Hill

Mark Hill
Resource Management Officer

Cc: Rich Harvey, John Jones

(NSPO 2-02)

(O) 798

Comment Document 0(

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A Place To Call Home

**CITY OF HENDERSON**
240 Water Street
P. O. Box 95050
Henderson, NV 89009

April 29, 2004

Mr. Adrian Garcia
Bureau of Land Management
Las Vegas Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130-2301

RE: Supplemental Environmental Impact Statement Clark County Regional Flood Control Master Plan 2800 (NV-056)

Dear Mr. Garcia,

Thank you for the opportunity to review the above referenced Supplemental Environmental Impact Statement. The City of Henderson Community Development Department has evaluated the draft document and concurs with the implementation of the preferred alternative. The City of Henderson Public Works Department has worked with Clark County Regional Flood Control District and also concurs with the implementation of the preferred alternative. 1

The preferred alternative appears to have the least amount of environmental impact and all identified impacts can be mitigated.

Please contact me at 702-267-1537 if you have any questions or need further information.

Sincerely,

Sue Gray

Sue Gray, AICP
Principal Planner

KENNY C. GUINN
Governor

STATE OF NEVADA

JOHN P. COMEAUX
Director

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**DEPARTMENT OF ADMINISTRATION**

**209 E. Musser Street, Room 200**
**Carson City, Nevada 89701-4298**
**Fax (775) 684-0260**
**(775) 684-0209**

June 17, 2004

Mark T. Morse, Field Manager
Bureau of Land Management
4701 N. Torrey Pines Drive
Las Vegas, Nevada 89130

Re: SAI NV # E2004-141

Project: (NV-056) 2800 DEIS Clark County Master Flood Control Plan

Dear Mr. Morse:

Enclosed are the comments from the Nevada Department of Wildlife Southern Region regarding the above referenced document. These comments constitute the State Clearinghouse review of this proposal as per Executive Order 12372.

Please address these comments or concerns in your final decision. If you have questions, please contact me at (775) 684-0209.

Sincerely,

Michael J. Stafford
Nevada State Clearinghouse Coordinator/SPOC

Enclosure

Comment Document 003

# NEVADA DEPARTMENT OF WILDLIFE

**Southern Region**
4747 West Vegas Drive • Las Vegas, Nevada 89108
(702) 486-5127 Fax (702) 486-5133

**May 25, 2004**

Mr. Adrian Garcia
Bureau of Land Management LVFO
4701 N. Torrey Pines Drive
Las Vegas Nevada 89130-2301

NDOW SR# 04-139

RE: Clark County Regional Flood Control District Draft Supplemental EIS Reference No. 2800 (NV-056)

Dear Mr. Garcia:

The Nevada Department of Wildlife (Department) is in receipt of the subject SEIS. We recognize and appreciate the need for flood control structures to protect life and property during flood events in the Las Vegas Valley. Upon examination of the document, we found several concerns that should be addressed relative to existing and future populations of wildlife in and around the Las Vegas hydrographic basin.

In Chapter Three, section 3.5.2, pages 95 & 96, there should be mention of mesquite/acacia communities as a specific habitat type. The areas depicted on Figure 3.5-1 in light green and described as "salt desert scrub" actually contain mesquite and acacia stands located northerly in the watershed and bounded by U.S. 95 to the west, Interstate 15 to the east, the Sheep Mountains to the north, and bisected by the 215 beltway. This woodland type is habitat for phainopepla, a neo-tropical migrant that is protected by federal and state law, is a BLM Sensitive Species, and is a species of concern to the Clark County Desert Conservation Program. 1

Conspicuous misclassifications of wildlife relative to management status occur in Chapter Three, section 3.5.3.2, page 97. These raise concerns that appropriate minimization and mitigation measures may be overlooked for these species prior to when implementation of specifications and construction design draws closer. Most noticeably,

- The desert bighorn sheep listed in the document as "general wildlife" is in fact a BLM Sensitive Species due in part to loss of habitat and encroachment from expanding urbanization of the Las Vegas Valley. Furthermore, this species is also afforded state protection under Nevada Administrative Code 503.103, 503.110, and Title 45 of Nevada Revised Statutes. Bighorn should be listed in Table 3.5-2 on page 105 and given due management consideration concerning timing of construction to avoid the lambing season, mostly January through March, with some lambing still occurring through June. 2

Garcia, A. 2 May 25, 2004

This proactive avoidance should apply to flood control projects occurring in the La Madre Mountains, the Arden Hills, and the North McCullough and River Mountains.

- Feral domestic cats are not wildlife and should be struck from consideration in the subject document regarding impacts to wildlife. 3

Biologists who perform pre-construction surveys for desert tortoise should also be on alert for:

- Burrowing Owls. The U.S. Fish & Wildlife Service has specific protocols for addressing encounters with this species. For information on the Burrowing Owl and other federally protected species, project proponents should contact the local office at (702) 515-5230. 4
- Prairie Falcon, Golden Eagle, and Red-tailed Hawk, all of which are afforded protection under the Migratory Bird Treaty Act. Construction activity should be scheduled to avoid the breeding season, April through July, for those projects located in the southwestern portion of the project area: the Arden Hills, Bird Springs Range, and Blue Diamond Hill area. 5
- State protected carnivores such as kit fox, grey fox, and bobcat to minimize incidental take on these species. Grey fox and bobcat would most likely not be detected during day-time presence\ absence survey, but kit fox inhabit conspicuous sub-surface dens much as tortoises inhabit burrows. NDOW should be contacted in the event of discovery of maternal sites. 6
- Banded Gila monster, a State protected, sensitive species and CCMSHCP Evaluation species. State protocols for encounters in the construction area should already be available through the BLM, however, please find enclosed for your files. 7

In Chapter Five, section 5.5.3 under "mitigation for special status plants", page 223, we agree that an avoidance and impact minimization plan should be implemented. However, it is stated that project proponents will work with U.S. Fish and Wildlife Service and NDOW to develop this plan. It is appropriate to substitute the Nevada Division of Forestry (NDF) for NDOW here, as NDF is the State regulatory authority for Nevada's sensitive plants. Table ES-1 in the Executive Summary should also be changed to reflect the correct administrative authority, NDF. Project proponents should contact Mr. John Jones of NDF at (702) 486-5123 or by e-mail a jjones@forestry.nv.gov. 8

Additionally in Chapter Five on page 224, a desert tortoise education program is mentioned. The Department not only supports this measure, but we suggest that it be expanded to include information on other wildlife that inhabit burrows and dens such as Burrowing Owl, kit fox and banded Gila monster. We encourage conservation educators to contact the Department for useful program information, and perhaps for additional contacts. 9

Chapter Six, section 6.2.5, p.236 states that there will be no significant unavoidable adverse
impacts to wildlife resources. The purpose of flood control structures in these areas is to serve
expanding residential and commercial properties into the future, facilitating growth and
development. The ultimate development boundary depicted in Figure 2-1 envelopes remaining
wildlife habitat in the Las Vegas Valley's: northern portion in mesquite acacia communities, the 10
northwest portion in the La Madre Range, the southeast portion in the River and North
McCullough mountains, and the southwest portion in the Bird Springs Range and Arden Hills.
Individual flood control structures placed in wash corridors now used by wildlife could serve as
barriers to habitat used for access to feeding, shelter, water, and open space resulting to an
increase in degradation, fragmentation and destruction of wildlife habitat along the periphery of
the project area. We also anticipate an increase in human-wildlife conflicts. This scenario in
addition to the multitude of pressures exerted on wildlife and their habitats by other projects such
as the U.S. 95 widening, Hoover Dam Bypass and Boulder City/Eldorado Corridor development,
proposed and constructed utilities (wind energy & gas-fired power plants), transmission lines, gas 11
pipelines, and water pipelines in a cumulative sense, are not addressed or accounted for in the
SEIS. For example, expansion of the Lone Mountain Community Pit and future installation of a
flood water detention basin ultimately involves additional habitat degradation, fragmentation and
loss. Where are the mitigation measures for this flood project's contribution to cumulative 12
impacts?

The Department looks forward to working with the Clark County Regional Flood Control District on methods to minimize and mitigate impacts to wildlife resources resulting from floodwater control structure construction. If you have any questions, please contact me at (702) 486-5127 ext. 3613, or by e-mail at rshepard@ndow.org.

Sincerely,

Roddy Shepard
Habitat Biologist

RS/DBH:rs

cc: Cynthia Martinez, U.S. Fish and Wildlife Service
Files, NDOW

**GILA MONSTER PROTOCOL FOR MINIMIZING IMPACTS ON THE CONSTRUCTION SITE**
(Revised July 2003)

**Background**

X Per Nevada Administrative Code 503.080, the Gila monster is classified as a Protected reptile.

X Per Nevada Administrative Codes 503.090, and 503.093, no person shall capture, kill, or possess any part thereof of Protected wildlife without the prior written permission by the Nevada Department of Wildlife (NDOW).

This species is rarely observed relative to other species and is the primary reason for its Protected classification by the State of Nevada. The USDI Bureau of Land Management has recognized this lizard as a sensitive species since 1978. Most recently, the Gila monster was designated as a □Evaluation□ species under the Clark County Multiple Species Habitat Conservation Plan (MSHCP). The designation was warranted because inadequate information exists to determine if mitigation facilitated by the MSHCP would demonstrably cover conservation actions necessary to insure the species□ persistence without protective intervention as provided under the federal Endangered Species Act.

The Gila monster is the only venomous lizard endemic to the United States. Its behavioral disposition is somewhat docile and avoids confrontation. But it will readily defend itself if threatened. Most bites are illegitimate, resulting from harassment or careless handling.

The banded Gila monster (*Heloderma suspectum cinctum*) occurs in Clark, Lincoln, and Nye counties of Nevada. Found mainly below 5,000 feet elevation, its geographic range approximates that of the desert tortoise and coincident to the Colorado River drainage. The Gila monster is recognizable by its striking black and orange-pink coloration. In keeping with its namesake, the banded Gila monster retains a black chain-link, banded appearance into adulthood. Other lizard species are often mistaken for the Gila monster. Of these, the western banded gecko (*Coleonyx variegatus*) and chuckwalla (*Sauromalus obesus (= ater)*) are most frequently confused with the Gila monster. All three species share the same habitats.

The banded gecko is often mistakenly identified as a baby or juvenile Gila monster. Banded geckos do have a finely granular skin and pattern that can be suggestive of the Gila monster to the untrained eye. However, banded gecko heads are somewhat pointed at the snout and the relatively large eyes have vertical pupils. Snouts of Gila monsters are bluntly rounded and the smallish eyes have round pupils. Newly hatched Gila monsters are about 5-6 inches long with a vivid orange and black, banded pattern. Geckos are at best cream to yellow and brown in pattern and do not exceed 5□ inches.

Both juvenile and adult chuckwallas are commonly confused with the Gila monster. Juvenile chuckwallas have an orange and black, banded tail. Although banding of the tail fades as chuckwallas mature, their large adult size (up to 17 inches) rivals that of the Gila monster. Adult chuckwallas have a body shape somewhat suggestive of the Gila monster, but they lack the coarsely beaded skin and black and orange body pattern of the Gila monster.

Gila monster habitat requirements center on desert wash, spring and riparian habitats that interdigitate primarily with complex rocky landscapes of upland desert scrub. Hence, Gila monster habitat bridges and overlaps that of both the desert tortoise and chuckwalla. Gila monsters are secretive and difficult to locate, spending >95% of their lives underground.

Gila monsters make use of deep crevices and caves of primarily rocky slopes for winter and summer refuge. When active they will also frequent animal burrows and other shallow refugia on more gentle slopes. Foraging Gila monsters seek nestlings of ground or low-shrub nesting birds (e.g. doves, quail), rodents (e.g. mice, kangaroo rats), and lagomorphs (e.g. cottontail) which are found in highest concentration in greater productivity areas, such as along well-vegetated wash courses of bajadas.

Scant information exists on detailed distribution and relative abundance in Nevada. The Nevada Department of Wildlife (NDOW) has ongoing management investigations addressing the species' status and distribution, hence additional distribution, habitat, and biological information is of utmost interest. In assistance to gathering additional information about Gila monsters in Nevada, NDOW will be notified whenever a Gila monster is encountered or observed, and under what circumstances.

**Construction Site Protocols**

Helpful to any instructional program, personnel should at least know how to: 1) identify Gila monsters and be able to distinguish it from other lizards such as chuckwallas and banded geckos; 2) report any observations of Gila monsters to the Nevada Department of Wildlife (NDOW); 3) be alerted to the consequences of a bite resulting from carelessness or unnecessary harassment; and 4) be aware of protective measures provided under state law.

1) Live Gila monsters found in harms way on the construction site will be captured and then detained in a cool, shaded environment (≤85EF) by the project biologist or equivalent personnel until a NDOW biologist can arrive for documentation purposes. Despite that a Gila monster is venomous and can deliver a serious bite, its relatively slow gate allows for it to be easily coaxed or lifted into an open bucket or box carefully using a long handled instrument such as a shovel or snake hook (Note: it is not the intent of NDOW to request unreasonable action to facilitate captures; additional coordination with NDOW will clarify logistical points). A clean 5-gallon plastic bucket w/ a secure, vented lid; an 18"x 18"x 4" plastic sweater box w/ a secure, vented lid; or, a tape-sealed cardboard box of similar dimension may be used for safe containment. Additionally, written information identifying mapped capture location (e.g. GPS record), date, time, and circumstances (e.g. biological survey or construction) and habitat description (vegetation, slope, aspect, substrate) will also be provided to NDOW.

2) Injuries to Gila monsters may occur during excavation, blasting, road grading, or other construction activities. In the event a Gila monster is injured, it should be transferred to a veterinarian proficient in reptile medicine for evaluation of appropriate treatment. Rehabilitation or euthanasia expenses will not be covered by NDOW. However, NDOW will be immediately notified during normal business hours. If an animal is killed or found dead, the carcass will be immediately frozen and transferred to NDOW with a complete written description of the discovery and circumstances, habitat, and mapped location.

3) Should NDOW's assistance be delayed, biological or equivalent personnel on site may be requested to remove and release the Gila monster out of harms way. Should NDOW not be immediately available to respond for photo-documentation, a 35mm camera or equivalent will be used to take good quality photographs of the Gila monster in situ at the location of live encounter or dead salvage. The pictures, preferably on slide film, will be provided to NDOW. Pictures will include: 1) Encounter location (landscape overview with Gila monster in clear view); 2) a clear overhead shot of the entire body with a ruler next to it for scale (Gila monster should fill camera's field of view and be in sharp focus); 3) a clear, overhead close-up of the head (head should fill camera's field of view and be in sharp focus).

Please contact NDOW Biologist Christy Klinger at (702) 486-5127 x3718 for additional information regarding these protocols.

Comment Document 004

# Clark County Water Reclamation District

***Mission: To manage reclaimed water as a resource.***

The "Clean Water Team"



RECEIVED MAY 26 2004

May 21, 2004

Adrian Garcia
Bureau of Land Management
Las Vegas Field Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130-2301

RE: SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (EIS), FLOOD CONTROL MASTER PLAN, CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, DRAFT FEBRUARY 2004

Dear Mr. Garcia:

Pursuant to the review of the above document, the following comments are offered for your consideration:

1. As far as we can see, this study does not affect any current projects the Clark County Water Reclamation District has on the books. 1

2. The name of the Clark County Water Reclamation District is incorrect and inconsistent throughout the document. Some areas use the old name of "Clark County Sanitation District." 2

3. Page xxx of the Summary: Would topsoil seed bank dominated by invasive (non-native) species need to be preserved? 3

4. Figure 3.5-2: Provide the source of data used in the Figure as a footnote. 4

5. 2.2.9.2 Las Vegas Wash: The EIS notes that "the SNWA has taken charge of design of facilities between the Service Road and Lake Las Vegas." 5

   The District currently is conducting a study of the Las Vegas Wash reach that is within its property, and is coordinating with the SNWA staff, as appropriate.

Thank you for the opportunity to provide comments to you in this regard, and we look forward to the receipt of the final report.

Very truly yours,

PUNDA PAI, P.E.
Engineering Services Supervisor

PP:mk

cc: Peter Archuleta, General Manager
~~Ken McDonald~~, SWCA Environmental Consultants

5857 East Flamingo Road Las Vegas, Nevada 89122 (702) 434-6600 (800) 782-4324
*cleanwaterteam.com*

Comment Document 005

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION IX**
**75 Hawthorne Street**
**San Francisco, CA 94105-3901**

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LAS VEGAS FIELD OFF.

June 3, 2004

Sharon DiPinto, Assistant Field Manager
Bureau of Land Management
Las Vegas Field Office
4701 North Torrey Pines Drive
Las Vegas, NV 89130-2301

Subject: Draft Supplemental Environmental Impact Statement (DSEIS) for the Flood Control Master Plan, Clark County Regional Flood Control District, Nevada [CEQ #040127]

Dear Ms. DiPinto:

The U.S. Environmental Protection Agency (EPA) has reviewed the document referenced above. Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Section 309 of the Clean Air Act. We appreciate your office granting us an informal extension of the due date for these comments.

We have rated this DSEIS as EC-2 -- Environmental Concerns- Insufficient Information (see enclosed "Summary of Rating Definitions"). Our concerns are based on the project's potential impacts to air quality, waters of the U.S., shallow groundwater, and biological resources. We are also concerned that this DSEIS evaluated only the Proposed Action and No Action alternatives; therefore, it does not appear that a rigorous alternatives analysis was conducted. We recommend that additional information be provided in the Final Environmental Impact Statement (FEIS) regarding other reasonable alternatives to meet the project purpose, as well as the project's potential indirect impacts. The FEIS should also include additional information on existing conditions and potential impacts to air and water resources, including waters of the U.S.; biological resources; and mitigation measures. More detailed information on land ownership status is also needed for a clear understanding of the roles of BLM, the Clark County Regional Flood Control District (CCRFCD), and private entities with respect to this project. Our detailed comments are enclosed.

We appreciate the opportunity to review this DSEIS. Please send a copy of the Final EIS to this office when it is officially filed with our Washington, D.C., office. In the meantime, if

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you have any questions, please call Jeanne Geselbracht, the lead reviewer for this project, at (415) 972-3853.

Sincerely,

Lisa B. Hanf

Lisa B. Hanf, Manager
Federal Activities Office

000600

Enclosures

cc: U.S. Army Corps of Engineers, Las Vegas
Clark County Regional Flood Control District

2

**Clark County Flood Control Master Plan DSEIS**
**EPA Comments – June, 2004**

General Comment

This Draft Supplemental Environmental Impact Statement (DSEIS) was prepared as a
supplement to an EIS that was completed in 1991. BLM's 1991 Record of Decision (ROD)
authorized construction and operation of flood control facilities proposed in the *Clark County*
*Regional Flood Control District Flood Control Master Plan*, which was a 10-year plan. The
proposal in the DSEIS is for construction and operation of flood control facilities under a new
10-year plan. We commend BLM for conducting a new NEPA analysis for the updated flood
control master plan. However, given that the initial EIS and ROD were completed in 1991 and 1
that the initial 10-year plan life was reached a few years ago, it is unclear why the current
proposal is the subject of a supplemental EIS.

**Recommendation:** The FEIS should explain the role of the 1991 EIS and ROD in relation to this DSEIS. Also, please clarify why the decision was made to prepare a supplement to the 1991 ROD, rather than initiating a new Draft EIS.

Alternatives

The DSEIS evaluates only the No Action Alternative and the Proposed Alternative. No
other alternatives are addressed, so it is unclear whether other reasonable alternatives are
available to meet the project purpose. Pursuant to 40 CFR 1502.14, the EIS should rigorously
explore and objectively evaluate all reasonable alternatives, briefly discuss the reasons for
eliminating alternatives from detailed study, and include reasonable alternatives not within the 2
jurisdiction of the lead agency. Although Chapter 8 of the DSEIS describes how individual
analyses for site-specific projects on BLM lands will be tiered to this programmatic EIS, we
understand from discussions with BLM staff that these site-specific evaluations will not
necessarily rigorously explore and evaluate all reasonable alternatives either. That is, they will
likely address only the no action alternative and the site-specific alternative proposed by the
Clark County Regional Flood Control District (CCRFCD). Furthermore, alternatives for site-
specific projects on privately owned lands will not be analyzed in a subsequent tiered process.
Therefore, neither this programmatic EIS nor the anticipated subsequent site-specific NEPA
analyses appear to satisfy the requirement to rigorously evaluate all reasonable alternatives.

**Recommendation:** EPA recognizes the need for flood control measures in the project
area to protect life and property. We also recognize that the flood control Master Plan has 3
been updated to alleviate flooding in the area. However, the programmatic FEIS should
evaluate other reasonable alternatives for Las Vegas Valley flood control at the system-
wide level. Subsequent NEPA documents that are tiered to this EIS should also evaluate
project-specific alternatives. EPA strongly recommends that the FEIS and tiered NEPA
documents examine alternatives which would compliment the various natural and cultural

1

resources of the project area. To this end, EPA encourages BLM, the Army Corps of Engineers, and CCRFCD to take a system-wide approach to developing solutions. The alternatives analyses should:

- Rely on natural stream functions to reduce flood damage;
- Address possibilities for ecosystem restoration, including fish and wildlife habitat enhancement along stream channels;
- Identify strategies for reducing human impacts in restoration and sensitive habitat areas;
- Identify opportunities for improving geomorphic conditions in the watersheds;
- Protect water quality and beneficial uses; and
- Address strategies for minimizing shallow groundwater problems in the project area.

Indirect Effects/Growth Inducement

In defining the terms "effects" or "impacts," the Council on Environmental Quality's (CEQ) NEPA implementation regulations at 40 CFR, Part 1508.8(b) define indirect effects as those:

> "...which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and the related effects on air and water and other natural systems, including ecosystems."

The DSEIS (p. 202) states that reduction of flood risk in some currently undeveloped areas administered by BLM could influence future land exchanges, particularly if development interest exists. The document provides no analysis or estimates of the potential indirect land use impacts that may occur as a result of this project. How much residential, commercial and/or industrial development is currently planned or allowed in the study area? How will the timing, type, magnitude, and location of development change under the proposed project compared with the No Action alternative? What are the traffic and air quality implications from that development? Improved flood protection in undeveloped areas can induce more development. The indirect impacts associated with increased development from this project could be substantial. 4

**Recommendation:** The FEIS should include an analysis of the potential growth inducing effects from reduced flood risk in the project area. The FEIS should describe reasonably foreseeable changes in land use in the study area, including the potential timing, type, magnitude, and location of development, and related indirect impacts to natural resources, water quality, traffic, air quality, and habitat from the proposed project.

Air Quality

The ozone National Ambient Air Quality Standard (NAAQS) was revised on July 18, 1997 (62 FR 38856) when EPA promulgated an ozone standard of 0.08 ppm as measured over an 8-hour period. EPA's final rule designating non-attainment areas under the 8-hour NAAQS was published in the Federal Register on April 30, 2004. On that date, EPA announced the designation of Clark County as a Subpart 1 "Basic" non-attainment area for the new national 8-hour ozone standard, effective June 15, 2004. EPA intends to revoke the 1-hour ozone standard on June 15, 2005. In accordance with Clean Air Act Section 176(c)(6), the conformity requirements for projects located within the newly designated ozone non-attainment areas do not apply until one year from the effective date of the area's designation.[1] Thus, projects approved by BLM after June 15, 2005, will need to meet the conformity requirements at 40 CFR Part 93.150-160. 5

**Recommendation:** The FEIS should discuss Clark County's new non-attainment designation for ozone, the new 8-hour ozone NAAQS, revocation of the one-hour NAAQS; and revise the text and tables in this regard. Tables 3.8-5, 3.8-6, and 3.8-7 should be revised to reflect the 8-hour ozone standard. The Environmental Consequences section of the FEIS should identify emissions of ozone precursors associated with the project. Figure 8.10-1 should also address emissions calculations and conformity for ozone at the appropriate steps along the decision flow chart. BLM should coordinate with the Clark County Department of Air Quality Management (DAQM) regarding the need for a conformity determination after the June 15, 2005, effective date.

The DSEIS (p. 191) indicates that the construction of a typical detention basin would result in approximately 117 tons per year of carbon monoxide (CO) and 21 tons per year of PM10 (particulates smaller than 10 microns). Pursuant to the federal general conformity regulations at 40 CFR Part 93.150-160, the de minimis thresholds applicable to the Clark 6 County non-attainment area for CO and PM10 are 100 tons per year and 70 tons per year, respectively. On May 3, 2004 EPA's Regional Administrator signed our final rulemaking approving the Clark County PM-10 plan (see http://www.epa.gov/region9/air/vegaspm/). The

[1] The one-year grace period for conformity determinations only applies with respect to the national ambient air quality standard for which an area is newly designated non-attainment (e.g., ozone in Clark County) and does not affect the area's requirements with respect to all other national ambient air quality standards for which the area is designated non-attainment or has been redesignated from non-attainment to attainment with a maintenance plan pursuant to section 175A of the Clean Air Act (including any pre-existing national ambient air quality standard for a pollutant for which a new or revised standard has been issued).

final rulemaking will be announced soon in the Federal Register. It is unclear from the DSEIS how many tons per year of CO and PM10 would be emitted by construction of detention basins because the document does not indicate the "typical" size of a detention basin or how many basins could potentially be built in one year. However, given that the construction of just one detention basin would exceed the de minimis threshold for CO, it appears that a conformity determination is necessary. If the project does not conform with the State Implementation Plans (SIPs), BLM cannot approve the project.

**Recommendation:** We recommend that BLM coordinate with the Clark County DAQM regarding the need for a conformity determination for CO and PM10 for this action and future projects that may be tiered to this EIS. BLM's decision on whether a conformity determination is necessary should be included in the FEIS. If a conformity determination is needed, a full explanation of how the project conforms should be included in the FEIS. It may be either summarized and referenced in the FEIS or included in an appendix.

The DSEIS (Table 3.8-5 and pp. 124-125) identifies NAAQS for several criteria pollutants. However, some of the standards are incorrect, and others are missing. For example, the annual and 24-hour PM2.5 standards are 15 $\mu g/m^3$ and 65 $\mu g/m^3$, respectively. The 3-hour sulfur oxides standard is 0.5 parts per million (ppm) rather than 0.05. Table 3.8-5 and page 125 provide an incorrect nitrogen dioxide standard. The standard is 0.053 ppm. A table with the NAAQS is enclosed with this letter and can also be viewed at EPA's web site (http://epa.gov/air/criteria.html). 7

**Recommendation:** Section 3.8.7 and Table 3.8-5 should be revised in the FEIS to reflect the correct NAAQSs. The units in Table 3.8-5 should be changed from *u*/g/m3 to *u*g/m3. Table 3.8-7 should include ambient air quality for PM2.5.

The DSEIS identifies the Clark County DAQM construction dust control procedures that will be implemented to minimize particulate emissions from project construction activities over the life of the project (Appendix A). It also identifies some measures for reducing exhaust emissions from construction equipment.

**Recommendation:** Additional best practices, listed below, are recommended to further reduce exhaust emissions from construction equipment. The FEIS should evaluate the feasibility of these measures to reduce construction emissions, and the ROD should reference all measures that will be adopted for this project. 8

- Use particle traps and other appropriate controls to reduce emissions of diesel particulate matter (DPM) and other air pollutants. Traps control approximately 80 percent of DPM, and specialized catalytic converters (oxidation catalysts) control approximately 20 percent of DPM, 40 percent of carbon monoxide emissions, and 50 percent of hydrocarbon emissions;

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- Visible emissions from all heavy duty off road diesel equipment should not exceed 20 percent opacity for more than three minutes in any hour of operation;
- Minimize construction-related trips of workers and equipment, including trucks and heavy equipment;
- Lease or buy newer, cleaner equipment (1996 or newer model);
- Employ periodic, unscheduled inspections to ensure that construction equipment is properly maintained at all times, is tuned to manufacturer's specifications, and is not modified to increase horsepower except in accord with established specifications.

<u>Waters of the U.S.</u>

Natural washes in Clark County perform a diversity of hydrologic and biogeochemical functions that directly affect the integrity and functional condition of higher-order waters downstream. They also play a significant role in receiving surface waters from adjacent higher elevations, such as waters from adjacent mountains or foothills. Healthy ephemeral waters with characteristic plant communities control rates of sediment deposition and dissipate the energy associated with flood flows. The loss of these lower-order waters can result in the need for larger flood control infrastructure downstream. Ephemeral washes also provide habitat for breeding, shelter, foraging, and movement of wildlife. Many plant populations are dependent on these aquatic ecosystems and are adapted to the unique conditions of these systems. The DSEIS does not provide sufficient information for each of the proposed facilities with regard to potential direct and indirect impacts to water resources, especially undisturbed waters of the U.S.

**Recommendation:** The FEIS should identify waters of the U.S. in the project area. A map of these waters should be provided. For natural washes currently proposed for flood control construction under the Master Plan, the FEIS should indicate the approximate acres of waters that could be affected by the project alternatives, and include an overview 9
of their condition and current threats to their ecological health. Describe the project's potential impacts to functions and values, including how shallow groundwater problems could be exacerbated and how vegetation along the streams would be affected. Discuss how adverse impacts to waters of the U.S. could be mitigated by BLM, CCRFCD, or developers, including avoiding adverse impacts to washes to the fullest extent, i.e., considering leaving washes as open, natural earthen washes.

Future tiered projects that involve filling waters of the U.S. will be required to comply with the Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the Clean Water Act (CWA). Some projects may qualify for authorization under a nationwide permit, and others will likely require 10
individual CWA Section 404 permits. To comply with the Guidelines, the actions subject to Individual Permits must meet all of the following criteria:

- There is no practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem (40 CFR 230.10(a)).

- The proposed action does not violate State water quality standards, toxic effluent standards, or jeopardize the continued existence of federally listed species or their critical habitat (40 CFR 230.10(b)).

- The proposed action will not cause or contribute to significant degradation of waters of the U.S., including wetlands (40 CFR 230.10(c)). Significant degradation includes loss of fish and wildlife habitat, including cumulative losses.

- All appropriate and practicable steps are taken to minimize adverse impacts on the aquatic ecosystem (i.e., mitigation) (40 CFR 230.10(d)). This includes incorporation of all appropriate and practicable compensation measures for unavoidable losses to waters of the U.S., including wetlands.

Furthermore, although the flood control projects in the Master Plan are qualified as
recommendations only, we are concerned that they will be the only alternatives in future project
analyses. In future site-specific analyses, the applicant might justify the preferred alternative, and
the unavoidable impacts of that alternative, by citing the project as a facility proposed in the 11
Master Plan or stating that they are limited in their options due to downstream constraints. For
projects that require a CWA Section 404 permit, however, a thorough alternatives analysis will
be required by the 404 (b)(1) Guidelines (40 CFR 230.10(a)(4)).

Because the CCRFCD Master Plan assumes full build-out of the Southern Nevada
Regional Policy Plan, we are concerned that future tiered analyses could be limited to full build-
out alternatives. Full build-out may be the most profitable for applicants and would limit the
need for the CCRFCD to upgrade and expand facilities. However, direct, secondary, and
cumulative impacts to natural resources would need to be considered and thoroughly assessed in
order to meet the 404(b)(1) Guidelines and ensure selection of the least environmentally
damaging practicable alternative (LEDPA). 12

**Recommendation:** The FEIS should discuss CWA Section 404 requirements. The FEIS should analyze alternatives in a manner that would ensure inclusion of a LEDPA in future CWA Section 404 permitting reviews, and discuss design and management strategies that ensure that future site-specific projects can comply with the Section 404(b)(1) Guidelines.

**Recommendation:** The FEIS should distinguish those actions under the proposal that
would likely be authorized under a nationwide permit or an individual CWA Section 404
permit. The discussion should address the analyses that would be conducted for both
types of future tiered project. Furthermore, although projects authorized under a 13
nationwide permit may not require compensation for site specific losses of waters of the
U.S., several small actions subject to such permits could have a significant cumulative

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impact on waters of the U.S. over the project area. The CEQ NEPA Implementation regulations require that EISs include appropriate mitigation measures not already included in the proposed action or alternatives [40 CFR 1502.14(f)]. The FEIS should identify measures that would be implemented to mitigate for such overall, systemwide impacts that would occur as a result of many small projects being authorized under a nationwide CWA 404 permit over the time frame of the plan. The FEIS should describe types, locations, and timing of mitigation measures and identify who would be responsible for mitigation measures on BLM and privately owned lands.

EPA Region 9's Wetlands Regulatory Office is currently reviewing a Clean Water Act Section 404 permit application for 5,354 acres of a project site known as Summerlin West, located in the northwest portion of the Gowan Watershed. Flood protection activities for this development are identified in the DSEIS (Figures 2-1 and 2-4). Of the 34.4 acres of waters of the U.S. delineated by the U.S. Army Corps of Engineers, the applicant is planning to preserve only 20 percent (7 acres). The applicant's justification for adversely affecting 80 percent of waters of the U.S. is the need for stormwater conveyance designs to adhere to the outflow restrictions created by downstream developments and to be compatible with existing or proposed CCRFCD master planned facilities

One of the CCRFCD's facilities, Detention Basin #5, has been built in Summerlin West, and the larger natural washes onsite are proposed to be concrete lined under the Master Plan. EPA is, therefore, working with the applicant to consider development plans that would avoid 14
and minimize impacts to the washes, and this has included the recommendation that the washes be left as open, natural earthen washes. Because the property abuts the Red Rock Canyon National Conservation Area (RRCNCA), we are even more concerned about flood control construction along or in the washes and impacts to wildlife migration corridors and washes farther up in the adjacent foothills located within the RRCNCA. A few plant species listed as "sensitive" by the State of Nevada are found in the project site, and several wildlife species unique to ephemeral systems are present as well, including the desert tortoise.

**Recommendation:** It is appropriate for site specific projects to be reviewed through future 404 permit applications. However, we urge BLM at this programmatic stage to consider the need for future compliance with the 404(b)(1) Guidelines and facilitate proper alternatives analyses for future projects, especially those in undisturbed areas.

Opportunities exist to enhance, restore, and/or protect natural stream channel functions and values in the Las Vegas Valley. However, the DSEIS does not discuss these opportunities either as part of the proposed project (Chapter 2) or as mitigation measures for overall impacts to these resources (Chapter 5). 15

**Recommendation:** EPA recommends that BLM consider the benefits of stream enhancement/restoration/protection in the project area. The FEIS should address

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opportunities for improving the quality and quantity of waters of the U.S. in the study
area in designing management options and infrastructure improvements.

<u>Groundwater Impacts</u>

According to the DSEIS, rising shallow groundwater levels may be exacerbated by the
proposed project and comprise significant adverse direct, indirect, and cumulative impacts to 16
water quality and existing structures. However, the project will not minimize or mitigate these
effects (p. 209). Furthermore, additional imports of groundwater from outside the Las Vegas
basin are planned for the foreseeable future, but the impacts of additional effluent in the basin are
not addressed in the SDEIS. The CEQ NEPA Implementation regulations require that EISs
include appropriate mitigation measures not already included in the proposed action or
alternatives and include reasonable alternatives not within the jurisdiction of the lead agency [40
CFR 1502.14]. 17

**Recommendation:** The FEIS should address the potential impacts of additional effluent
in the project area; provide details regarding how rising shallow groundwater levels could
be mitigated to ensure against these potential impacts; identify agencies with jurisdiction
on these issues; and identify who would be responsible for conducting and ensuring these
measures.

<u>Biological Resources</u>

The DSEIS states that, by virtue of developing and analyzing a county-wide ecosystem
plan such as the Clark County Multi-Species Habitat Conservation Plan (MSHCP), a cumulative
effects analysis for special-status species has largely been completed. However, CCRFCD's
Master Plan and BLM's plans for land disposals have been revised since the MSHCP was
finalized. 18

**Recommendation:** The FEIS should describe how consistency with the Multi-Species
Habitat Conservation Plan will be ensured for the proposed project.

The DSEIS (p. 255) states that the biological review procedure addresses resources such
as riparian areas and wetlands, and page 222 states that impacts to riparian and wetland
vegetation would be minimized by the mitigation measures in section 5.5.1. However, Figure
8.7-1 indicates that if these resources are not regulated by State or Federal statutes, impacts
would be acceptable. 19

**Recommendation:** The FEIS should rectify this discrepancy and clarify the mitigation
discussion regarding impacts to riparian and wetland vegetation. The FEIS should
identify the types of riparian and wetland vegetation that would be avoided, discuss how
the measures in section 5.5.1 would be ensured, and identify the agencies or parties

responsible for implementing and enforcing them. The FEIS should also identify State or Federal statutes that could regulate these resources.

Land Status

The DSEIS does not include a map depicting land ownership for the project area. We understand that land sales/auctions occur a few times each year and that land ownership status is rapidly changing in the project area. However, in order for readers to understand the role of BLM, private investors, and local jurisdictions for this project, a land status map overlayed with the existing and proposed flood control projects would be extremely useful. 20

**Recommendation:** The FEIS should include a map depicting current land ownership overlayed with the existing and proposed flood control projects. The map should also identify the BLM lands that are anticipated to be disposed over the next 20 years.

## National Ambient Air Quality Standards

| Pollutant | Primary Stds. | Averaging Times | Secondary Stds. |
|---|---|---|---|
| Carbon Monoxide | 9 ppm (10 $mg/m^3$) | 8-hour[1] | None |
| | 35 ppm (40 $mg/m^3$) | 1-hour[1] | None |
| Lead | 1.5 $\mu g/m^3$ | Quarterly Average | Same as Primary |
| Nitrogen Dioxide | 0.053 ppm (100 $\mu g/m^3$) | Annual (Arithmetic Mean) | Same as Primary |
| Particulate Matter ($PM_{10}$) | 50 $\mu g/m^3$ | Annual[2] (Arith. Mean) | Same as Primary |
| | 150 $\mu g/m^3$ | 24-hour[1] | |
| Particulate Matter ($PM_{2.5}$) | 15 $\mu g/m^3$ | Annual[3] (Arith. Mean) | Same as Primary |
| | 65 $\mu g/m^3$ | 24-hour[4] | |
| Ozone | 0.08 ppm | 8-hour[5] | Same as Primary |
| | 0.12 ppm | 1-hour[6] | Same as Primary |
| Sulfur Oxides | 0.03 ppm | Annual (Arith. Mean) | ------- |
| | 0.14 ppm | 24-hour[1] | ------- |
| | ------- | 3-hour[1] | 0.5 ppm (1300 $\mu g/m^3$) |

[1] Not to be exceeded more than once per year.

[2] To attain this standard, the expected annual arithmetic mean PM10 concentration at each monitor within an area must not exceed 50 $ug/m^3$.

[3] To attain this standard, the 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15 $ug/m^3$.

[4] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 65 $ug/m^3$.

[5] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

[6] (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is <= 1, as determined by appendix H. (b) The 1-hour standard is applicable to all areas notwithstanding the promulgation of 8-hour ozone standards under Sec. 50.10. On June 2, 2003, (68 FR 32802) EPA proposed several options for when the 1-hour standard would no longer apply to an area.

# SUMMARY OF EPA RATING DEFINITIONS

This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

## ENVIRONMENTAL IMPACT OF THE ACTION

### *"LO" (Lack of Objections)*

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

### *"EC" (Environmental Concerns)*

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

### *"EO" (Environmental Objections)*

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

### *"EU" (Environmentally Unsatisfactory)*

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

## ADEQUACY OF THE IMPACT STATEMENT

### *Category 1" (Adequate)*

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

### *"Category 2" (Insufficient Information)*

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

### *"Category 3" (Inadequate)*

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

Comment Document 006

**R. MICHAEL TURNIPSEED, P.E.**
*Director*
Department of Conservation and Natural Resources

**DAVID K. MORROW**
*Administrator*

**KENNY C. GUINN**
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**DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES**
**DIVISION OF STATE PARKS**

May 28, 2004

Adrian Garcia
Bureau of Land Management
Las Vegas Field Office
4701 North Torrey Pines Drive
Las Vegas, Nevada 89130-2301

Dear Mr. Garcia;

Thank you for the opportunity to review and comment on the Draft Supplemental Environmental Impact Statement for the Clark County Flood Control District Flood Control Master Plan.

Chapter 2.2.2.1 identifies the following proposed actions in the Range Watershed:

- A proposed storm drain in Iron Mountain Road from Homestead Road to Mountain Spa
- A proposed storm drain in Log Cabin Way from Cimarron Road to Buffalo Drive
- A proposed storm drain in Buffalo Drive from Log Cabin Way to Iron Mountain Road 1

These proposed actions will have significant impacts on Floyd Lamb State Park (FLSP). The maps do not provide the detail needed to determine the exact location of the storm drains, but it does appear that they will traverse FLSP. Roads or easements in the park proper are not acceptable.

The proposed actions will result in a great deal of disturbance to the turf in FLSP. This would not be acceptable. The amount of irrigation is extensive and this amount of digging would certainly result in damage. The proposed actions will also limit any future development plans of Nevada Division of State Parks (NDSP). 2

Another area of concern is the potential impact to the cultural resources of FLSP. Again, it cannot be determined from the maps exactly where the storm drains run, but they could 3

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(NSPO Rev. 7-03)

(O) 252

be near some of the cultural resource sites which would require significant mitigation to resolve.

Another area that needs to be addressed concerns the City of Las Vegas. NDSP has agreed to not do anything that would change FLSP without discussion with them. This is
due to the possible 'gifting' of the park to the City of Las Vegas. 4

NDSP and the Division of State Lands (DSL) would need to approve of any proposed action that occurs on State Park property. Chapter 1.4 and Table 1.1 do not list NSDP or DSL.

Although NDSP feels that any flood control in the area would be beneficial, we do see
problems with installing these storm drains through what appears to be the main section 5
of FLSP.

Chapter 2.2.4.2 identifies the following proposed actions in the Central Watershed:

- A new facility is proposed in 4th Street between Washington and Owens, which
  then turns west in Owens to Las Vegas Wash 6

Fourth Street was not identified on the map provided, but following Owens to Las Vegas Wash requires a direction of east.

If you have any questions about these comments, or Nevada Division of State Parks, feel free to give me a call.

Sincerely,

Brad Eckert

Brad Eckert
Park and Recreation Program Manager

cc: David Morrow, Administrator, NDSP
Steve Weaver, Chief, Planning and Development, NDSP
Allen Newberry, Chief, Operations and Maintenance, NDSP
Gary Rimbey, Region Manager, NDSP

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# APPENDIX I:
# RESPONSES TO COMMENTS RECEIVED ON THE DRAFT SEIS

| Document/ Comment Number | COMMENT | RESPONSE | Changes Made to: |
|---|---|---|---|
| 001 / 1<br>* Nevada Division of Forestry | In Table 3.5-1 on page 101 of the SEIS four state-listed critically endangered plant species are shown to have potential to occur on the project. If any of these species, Blue Diamond Cholla (*Opuntia whipplei var. multigeniculata*), Las Vegas bearpoppy (*Arctomecon californica*), Threecorner milkvetch (*Astragalus geyeri var. triquetrus*) and Unusual Catseye (*Cryptantha insolita*) are identified in the rare plant survey or it is determined their habitat will be affected, a permit from NDF for the take of plants and/or habitat destruction will be required. | The following text will be added to page 100, Section 3.5.4.1: "If Blue Diamond cholla, threecorner milkvetch or unusual catseye are identified in a rare plant survey, or it is determined their habitat will be affected by any construction or maintenance activities, a permit from the Nevada Division of Forestry (NDF) for the take of plants and/or habitat destruction will be required. NDF has issued a permit to Clark County for take of Las Vegas bearpoppy on non-federal land and NDOT rights-of-way in Clark County. Any of the project areas located on non-federal land would be covered under this permit. However, should Las Vegas bearpoppy be found, NDF will be notified of the number of plants present. If the project area is located on federal land, and Las Vegas bearpoppy habitat or plants will be affected, a permit from the NDF would be acquired before any groundbreaking activities take place." Additionally, please see table ES1 for mitigation measures. | Section 3.5.4.1, Pg.105 |
| 001 / 2 | NDF has issued a permit to Clark County for take of Las Vegas bearpoppy on non-federal land and NDOT rights of way in Clark County. Any of the project areas located on non-federal land would be covered under this permit. However, should Las Vegas bearpoppy be found, you are requested to notify us of the number of plants present. If federal land is involved and Las Vegas bearpoppy habitat or plants will be affected, a permit from the Nevada Division of Forestry would be required. | See response to Comment 001 / 1 | No Change Required |
| * 002 / 1<br>City of Henderson | The City of Henderson Community Development Department has evaluated the draft document and concurs with the implementation of the preferred alternative. The City of Henderson Public Works Department has worked with Clark County Regional Flood Control District and also concurs with the implementation of the preferred alternative. | Thank you for your comment. | No Change Required |

*001 = Nevada Division of Forestry
*002 = City of Henderson
*003 = Nevada Department of Wildlife
*004 = Clark County Water Reclamation District
*005 = Environmental Protection Agency
*006 = State Parks

| Document/ Comment Number | COMMENT | RESPONSE | Changes Made to: |
|---|---|---|---|
| * 003 / 1<br>Nevada Department of Wildlife | In Chapter 3, section 3.5.2, pages 95 & 96, there should be mention of mesquite/acacia communities as a specific habitat type. The areas depicted on Figure 3.5-1 in light green and described as “salt desert scrub” actually contain mesquite and acacia stands located northerly in the watershed and bounded by U.S. 95 to the west, Interstate 15 to the east, the Sheep Mountains to the North, and bisected by the 215 beltway. This woodland type is habitat for Phainopepla, a neo-tropical migrant that is protected by federal and state law, is a BLM sensitive Species, and is a species of concern to the Clark County Desert Conservation Program. | Existing GIS data does not provide specific data for mesquite/acacia communities and is therefore not addressed as a specific habitat type. However, Section 3.5.2 now describes the salt desert scrub community as “salt desert scrub-mesquite/acacia” and describes where and why areas of mesquite/acacia are found. Impacts to specific habitat types and related wildlife will be addressed during the project-specific evaluation process as stated in Chapter 8.<br><br>Phainopepla habitat and impacts are addressed in the wildlife sections of this document. | Section 3.5.2.1.13,<br>Pg. 96 |
| 003 / 2 | The desert bighorn sheep listed in the document as “general wildlife” is in fact a BLM Sensitive Species due in part to loss of habitat and encroachment from expanding urbanization of the Las Vegas Valley. Furthermore, this species is also afforded state protection under Nevada Administrative Code 503.103, 503.110, and Title 45 of Nevada Revised Statutes. Bighorn should be listed in Table 3.5-2 on page 105 and given due management consideration concerning timing of construction to avoid the lambing season, mostly January through March, with some lambing still occurring through June.<br>This proactive avoidance should apply to flood control projects occurring in the La Madre Mountains, the Arden Hills, and the North McCullough and River Mountains. | Desert bighorn sheep was removed from the general list and added to Table 3.5-2.<br><br>This document is programmatic in nature; specific projects will be evaluated on a case-by-case basis according to the procedures set forth in Chapter 8 of the document. The individual projects will be scheduled appropriately should it be determined during the Chapter 8 process that desert bighorn sheep would be affected by the project.<br><br>Additionally, please see table ES1 for mitigation measures. | Section 3.5.3.2,<br>Pg. 98<br><br>Table 3.5-2, Pg. 101 |
| 003 / 3 | Feral domestic cats are not wildlife and should be struck from consideration in the subject document regarding impacts to wildlife. | Feral cat has been removed from the list. | Section 3.5.3.2,<br>Pg. 98 |
| 003 / 4 | Burrowing Owls. The U.S. Fish & Wildlife Service has specific protocols for addressing encounters with this species. For information on the Burrowing Owl and other federally protected species, project proponents should contact the local office at (702) 515-5230. | Specific protocols are referenced in the special status plant and animal species mitigation section. | Section 5.5.3, #5, Pg. 206 |

*001 = Nevada Division of Forestry
*002 = City of Henderson
*003 = Nevada Department of Wildlife
*004 = Clark County Water Reclamation District
*005 = Environmental Protection Agency
*006 = State Parks

| Document/ Comment Number | COMMENT | RESPONSE | Changes Made to: |
|---|---|---|---|
| 003 / 5 | Prairie Falcon, Golden Eagle, and Red-tailed Hawk, all of which are afforded protection under the Migratory Bird Treaty Act. Construction activity should be scheduled to avoid the breeding season, April through July, for those projects located in the southwestern portion of the project area: the Arden Hills, Bird Springs Range, and Blue Diamond Hill area. | This issue was addressed in the document. Specifically, the text states, “The proposed action may be subject to some or all of the laws and regulations in Table 1-2.” The Migratory Bird Treaty Act is mentioned in Table 1-2. This document is programmatic in nature; specific projects will be evaluated on a case-by-case basis according to the procedures set forth in Chapter 8 of the document. Additionally, please see table ES1 for mitigation measures. The individual projects will be scheduled appropriately should it be determined during the Chapter 8 process that any species afforded protection by the Migratory Bird Treaty Act would be impacted. | No Change Required |
| 003 / 6 | State protected carnivores such as kit fox, grey fox, and bobcat to minimize incidental take on these species. Grey fox and bobcat would most likely not be detected during day-time presence/absence survey, but kit fox inhabit conspicuous sub-surface dens much as tortoises inhabit burrows. NDOW should be contacted in the event of discovery of maternal sites. | This document is programmatic in nature; specific projects will be evaluated on a case-by-case basis according to the procedures set forth in Chapter 8 of the document. Additionally, please see table ES1 for mitigation measures. NDOW would be contacted if maternal sites are discovered during construction activities, or if grey fox or bobcats were discovered during any pre-construction surveys that may take place. | No Change Required |
| 003 / 7 | Banded Gila monster, a State protected, sensitive species and CCMHCP Evaluation species. State protocols for encounters in the construction area should already be available through the BLM, however, please find enclosed for your files. | See response to comment 003 / 4. | Section 5.5.3, #5, Pg. 206 |
| 003 / 8 | In Chapter 5, section 5.5.3 under “mitigation for special status plants”, page 223, we agree that an avoidance and impact minimization plan should be implemented. However, it is stated that project proponents will work with U.S. Fish and Wildlife Service and NDOW to develop this plan. It is appropriate to substitute the Nevada Division of Forestry (NDF) for NDOW here, as NDF is the State regulatory authority for Nevada’s sensitive plants. Table ES-1 in the Executive Summary should also be changed to reflect the correct administrative authority, NDF. Project proponents should contact Mr. John Jones of NDF at (702) 486-5123 or by e-mail a jjones@forestry.nv.gov. | NDF has been substituted for NDOW in Chapter 5 as appropriate. | Section 5.5.3, Pg.206 |

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| 003 / 9 | Additionally in Chapter 5 on page 224, a desert tortoise education program is mentioned. The Department not only supports this measure, but we suggest that it be expanded to include information on other wildlife that inhabit burrows and dens such as Burrowing Owl, kit fox and banded Gila monster. We encourage conservation educators to contact the Department for useful program information, and perhaps for additional contacts. | These species were added to Chapter 5 and covered in the education program. | Section 5.5.3, Pg. 206 |

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| 003 / 10 | Chapter 6, section 6.2.5, p.236 states that there will be no significant unavoidable adverse impacts to wildlife resources. The purpose of flood control structures in these areas is to serve expanding residential and commercial properties into the future, facilitating growth and development. The ultimate development boundary depicted in Figure 2-1 envelopes remaining wildlife habitat in the Las Vegas Valley's: northern portion in mesquite acacia communities, the northwest portion in the La Madre Range, the southeast portion in the River and North McCullough mountains, and the southwest portion in the Bird Springs Range and Arden Hills. Individual flood control structures placed in wash corridors now used by wildlife could serve as barriers to habitat used for access to feeding, shelter, water, and open space resulting to an increase in degradation, fragmentation and destruction of wildlife habitat along the periphery of the project area. We also anticipate an increase in human-wildlife conflicts. | The preparers of the SEIS disagree with the commenters assertion that flood control facilitates growth.<br><br>As was stated in the 1991 FEIS: "The availability of publicly supported flood control facilities is not a constraint on or an impetus to growth in the same way that the availability of other public services such as availability of water or a sewer system. This is apparent in the existing development patterns in the Las Vegas Valley in particular, which does not appear to have been constrained by the lack of adequate flood control facilities in many areas." This statement remains true today. In addition, the existence or absence of flood control facilities does not dictate if an area develops as residential, commercial or industrial. The Flood Control Master Plan is developed in close coordination with the local governmental entities, which, among other things, provide insight and guidance on projected development throughout the area. Existing and future land uses are identified in Section 3.13 and Figure 3.13-1 in the SEIS.<br><br>As was identified in the 1991 FEIS, Flood Control Master Plan projects are evaluated annually to determine a priority schedule for project implementation. The relative priority of Master Plan project is assessed in terms of ten criteria, the most import of which is Population Affected. Consistent application of this prioritization process ensures that Master Plan flood control facilities planned and constructed by the CCRFCD and local entities respond to development impacts rather than induce additional growth.<br><br>Individual flood control facilities will be evaluated on a case-by-case basis as discussed in the process outline in Chapter 8<br><br>It is likely that development will cause the human-wildlife conflicts described. Flood control facilities are typically built in association with or immediately following other development but Flood Control does not determine the location nor is it the primary driver. | No Change Required |

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| 003 / 11 | This scenario in addition to the multitude of pressures exerted on wildlife and their habitats by other projects such as the U.S. 95 widening, Hoover Dam Bypass and Boulder City/Eldorado Corridor development, proposed and constructed utilities (wind energy & gas-fired power plants), transmission lines, gas pipelines, and water pipelines in a cumulative sense, are not addressed or accounted for in the SEIS. For example, expansion of the Lone Mountain Community Pit and future installation of a flood water detention basin ultimately involves additional habitat degradation, fragmentation and loss. | See response to Comment 003/10. The specific infrastructure projects mentioned are outside the study area, but Chapter 6 Cumulative Impacts, includes a discussion of cumulative impacts to biological resources, including wildlife. | No Change Required |
| 003 / 12 | Where are the mitigation measures for this flood project's contribution to cumulative impacts? | Mitigation for potential flood impacts are described in Chapter 5. Other projects would be responsible for their impacts in accordance with their NEPA documentation. | No Change Required |
| * 004 / 1<br>Clark County Water Reclamation District | As far as we can see, the study does not affect any current projects the Clark County Water Reclamation District has on the books. | Thank you for your comment. | No Change Required |
| 004 / 2 | The name of the Clark County Water Reclamation District is incorrect and inconsistent throughout the document. Some areas use the old name of "Clark County Water Reclamation District". | The document has been amended for consistency in all references to the Clark County Water Reclamation District. | Editorial Changes Made |
| 004 / 3 | Page xxx of the Summary: Would topsoil seed bank dominated by invasive (non-native) species need to be preserved? | The text has been amended to read; … potential native, non-invasive seed-bearing… to prevent propagation of exotic and noxious weeds. | Summary Table biology, #2, Pg. x<br>5.5.1, #2, Pg.205 |
| 004 / 4 | Figure 3.5-2: Provide the source of data used in the Figure as a footnote. | Figure 3.5-2 now includes source data. | Figure 3.5-2 Pg. 107 |

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| 004 / 5 | 2.2.9.2 Las Vegas Wash: The EIS notes that "the SNWA has taken charge of design facilities between the Service Road and Lake Las Vegas."<br><br>The District currently is conducting a study of the Las Vegas Wash reach that is within its property, and is coordinating with the SNWA staff, as appropriate. | Thank you for your comment. | No Change Required |
| * 005 / 1<br><br>Environmental Protection Agency | This Draft Supplemental Environmental Impact Statement (DSEIS) was prepared as a supplement to an EIS that was completed in 1991. BLM's 1991 Record of Decision (ROD) authorized construction and operation of flood control facilities proposed in the Clark County Regional Flood Control District Flood Control Master Plan, which was a 10-year plan. The proposal in the DSEIS is for construction and operation of flood control facilities under a new 10-year plan. We commend BLM for conducting a new NEPA analysis for the updated flood control master plan. However, given that the initial EIS and ROD were completed in 1991 and that the initial 10-year plan life was reached a few years ago, it is unclear why the current proposal is the subject of a supplemental EIS.<br><br>Recommendation: The FEIS should explain the role of the 1991 EIS and ROD in relation to this DSEIS. Also, please clarify why the decision was made to prepare a supplement to the 1991 ROD, rather than initiating a new Draft EIS. | The 1991 FEIS utilized a programmatic approach to identify and analyze potential impacts. In addition to containing an overall analysis of the entire Clark County Regional Flood Control District Flood Control Master Plan, it also contains a more specific analysis of the CCRFCD's proposed 10-year construction program. The impacts of projects that were not included in the 10-year plan were determined on a site-by-site basis as outlined in Section 14 of the FEIS. Due to changes in Federal regulations and standards, this Supplemental EIS has been prepared. At the time that the FEIS was prepared, it was estimated that construction of the Detention/ Conveyance Alternative would take 59 years. The ROD did not limit the applicability of the FEIS analysis or of the Section 14 analysis procedure (Appendix A).<br><br>A rationale for the decision to prepare an SEIS instead of an entirely new EIS is presented in Chapter 1. | Section 1.1.2, Pg. 1 |

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| 005 / 2 | The DSEIS evaluates only the No Action Alternative and the Proposed Alternative. No other alternatives are addressed, so it is unclear whether other reasonable alternatives are available to meet the project purpose. Pursuant to 40 CFR 1502.14, the EIS should rigorously explore and objectively evaluate all reasonable alternatives, briefly discuss the reasons for eliminating alternatives from detailed study, and include reasonable alternatives not within the jurisdiction of the lead agency. Although Chapter 8 of the DSEIS describes how individual analyses for site-specific projects on BLM lands will be tiered to this programmatic EIS, we understand from discussions with BLM staff that these site-specific evaluations will not necessarily rigorously explore and evaluate all reasonable alternatives either. That is, they will likely address only the no action alternative and the site-specific alternative proposed by the CCRFCD. | The 1991 Flood Control Master Plan Final Environmental Impact Statement included an evaluation of a Detention/Conveyance Alternative, and All Conveyance Alternative, and a No Action Alternative. The Detention/Conveyance Alternative was identified as the selected alternative in the FEIS and ROD. While subsequent Master Plan Updates have added/deleted/relocated some flood control facilities, the CCRFCD's approach to providing protection from flooding has been consistent with the Detention/Conveyance alternative analyzed in the FEIS and approved in the ROD. This Supplemental EIS has been prepared due to changes in Federal regulations and standards adopted since the preparation of the FEIS. As was the case with the FEIS, the DSEIS is programmatic in nature. Alternatives to the individual projects identified in the MPU are considered and evaluated as those projects are brought forward in the design phase of project implementation. | No Change Required |

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| 005 / 3 | Furthermore, alternatives for site-specific projects on privately owned lands will not be analyzed in a subsequent tiered process. Therefore, neither this programmatic EIS nor the anticipated subsequent site-specific NEPA analyses appear to satisfy the requirement to rigorously evaluate all reasonable alternatives.<br>Recommendation: EPA recognizes the need for flood control measures in the project area to protect life and property. We also recognize that the flood control Master Plan has been updated to alleviate flooding in the area. However, the programmatic FEIS should evaluate other reasonable alternatives for Las Vegas Valley flood control at the system-wide level. Subsequent NEPA documents that are tiered to this EIS should also evaluate project-specific alternatives. EPA strongly recommends that the FEIS and tiered NEPA documents examine alternatives which would compliment the various natural and cultural resources of the project area. To this end, EPA encourages BLM, the Army Corps of Engineers, and CCRFCD to take a system-wide approach to developing solutions. The alternatives analyses should:<br>Rely on natural stream functions to reduce flood damage;<br>Address possibilities for ecosystem restoration, including fish and wildlife habitat enhancement along stream channels;<br>Identify strategies for reducing human impacts in restoration and sensitive habitat areas;<br>Identify opportunities for improving geomorphic conditions in the watersheds;<br>Protect water quality and beneficial uses; and<br>Address strategies for minimizing shallow groundwater problems in the project area. | See response to comment 005/2.<br>The ROD for the 1991 FEIS required that the CCRFCD, on other than public lands, administer the programmatic application of site-specific analyses and mitigation measures to ensure that mitigation measures and stipulations of the ROD were properly and consistently applied (Appendix A). | No Change Required |

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| 005 / 4 | The DSEIS (p. 202) states that reduction of flood risk in some currently undeveloped areas administered by BLM could influence future land exchanges, particularly if development interest exists. The document provides no analysis or estimates of the potential indirect land use impacts that may occur as a result of this project. How much residential, commercial and/or industrial development is currently planned or allowed in the study area? How will the timing, type, magnitude, and location of development change under the proposed project compared with the No Action alternative? What are the traffic and air quality implications from that development? Improved flood protection in undeveloped areas can induce more development. The indirect impacts associated with increased development from this project could be substantial. | As was stated in the 1991 FEIS: “The availability of publicly supported flood control facilities is not a constraint on or an impetus to growth in the same way that the availability of other public services such as availability of water or a sewer system. This is apparent in the existing development patterns in the Las Vegas Valley in particular, which does not appear to have been constrained by the lack of adequate flood control facilities in many areas.” This statement remains true today. In addition, the existence or absence of flood control facilities does not dictate if an area develops as residential, commercial or industrial. The Flood Control Master Plan is developed in close coordination with the local governmental entities, who, among other things, provide insight and guidance on projected development throughout the area. Existing and future land uses are identified in Section 3.13 and Figure 3.13-1 in the SEIS.<br><br>As was identified in the 1991 FEIS, Flood Control Master Plan projects are evaluated annually to determine a priority schedule for project implementation. The relative priority of Master Plan project is assessed in terms of ten criteria, the most import of which is Population Affected. Consistent application of this prioritization process ensures that Master Plan flood control facilities planned and constructed by the CCRFCD and local entities are a response to development impacts rather than an inducement for additional growth. | No Change Required |

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| 005 / 5 | The ozone National Ambient Air Quality Standard (NAAQS) was revised on July 18, 1997 (62 FR 38856) when EPA promulgated an ozone standard of 0.08 ppm as measured over an 8-hour period. EPA's final rule designating non-attainment areas under the 8-hour NAAQS was published in the Federal Register on April 30, 2004. On that date, EPA announced the designation of Clark County as a Subpart 1 "Basic" non-attainment area for the new national 8-hour ozone standard, effective June 15, 2004. EPA intends to revoke the 1-hour ozone standard on June 15, 2005. In accordance with Clean Air Act Section 176(c)(6), the conformity requirements for projects located within the newly designated ozone non-attainment areas do not apply until one year from the effective date of the area's designation.[a] Thus, projects approved by BLM after June 15, 2005, will need to meet the conformity requirements at 40 CFR Part 93.150-160.<br><br>Recommendation: The FEIS should discuss Clark County's new non-attainment designation for ozone, the new 8-hour ozone NAAQS, revocation of the one-hour NAAQS; and revise the text and tables in this regard. Tables 3.8-5, 3.8-6, and 3.8-7 should be revised to reflect the 8-hour ozone standard. The Environmental Consequences section of the FEIS should identify emissions of ozone precursors associated with the project. Figure 8.10-1 should also address emissions calculations and conformity for ozone at the appropriate steps along the decision flow chart. BLM should coordinate with the Clark County Department of Air Quality Management (CCDAQM) regarding the need for a conformity determination after the June 15, 2005, effective date. | Discussion of non-attainment designation for ozone and revocation of the 1-hour ozone standard has been added.<br><br>Tables 3.8-5 has been revised to include the 8-hr ozone standard. Table 3.8-7 has been revised to include monitoring data of 8-hr ozone concentrations. Table 3.8-6, however, is an emissions inventory and ozone is not an emission. The ozone precursors are included in Table 3.8-6.<br><br>The environmental consequences section has been revised to identify emissions of ozone precursors. The largest facility (140-acre) detention basin was used as an example, and one ozone precursor emission is above the conformity thresholds that will become effective on June 15, 2005. Calculating ozone precursors for the entire project, however, cannot be done without a specific and detailed construction schedule of facilities. Such details are not yet available. Thus the project-specific EA process will calculate all emissions and a determination will be made at that time.<br><br>Figure 8.10-1 has been revised to include estimates of ozone precursors and the possible need for a conformity determination. | Section 3.8.5,<br>Pg. 118-121<br>Table 3.8-5, Pg. 119<br>Table 3.8-6 Pg. 120<br>Table 3.8-7, Pg. 121<br>Table 4.8-3, Pg. 177<br>Section 4.8.1.1<br>Pg. 175, 178<br>Figure 8.10-1 Pg. 237 |

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| 005 / 6 | The DSEIS (p. 191) indicates that the construction of a typical detention basin would result in approximately 117 tons per year of carbon monoxide (CO) and 21 tons per year of PM10 (particulates smaller than 10 microns). Pursuant to the federal general conformity regulations at 40 CFR Part 93.150-160, the de minimis thresholds applicable to the Clark County non-attainment area for CO and PM10 are 100 tons per year and 70 tons per year, respectively. On May 3, 2004 EPA's Regional Administrator signed our final rule-making approving the Clark County PM-10 plan (see http://www.epa.gov/ region9/air/vegaspm/). The final rule-making will be announced soon in the Federal Register. It is unclear from the DSEIS how many tons per year of CO and PM10 would be emitted by construction of detention basins because the document does not indicate the Atypical@ size of a detention basin or how many basins could potentially be built in one year. However, given that the construction of just one detention basin would exceed the de minimis threshold for CO, it appears that a conformity determination is necessary. If the project does not conform with the State Implementation Plans (SIPs), BLM cannot approve the project.<br><br>Recommendation: We recommend that BLM coordinate with the CCDAQM regarding the need for a conformity determination for CO and PM10 for this action and future projects that may be tiered to this EIS. BLM's decision on whether a conformity determination is necessary should be included in the FEIS. If a conformity determination is needed, a full explanation of how the project conforms should be included in the FEIS. It may be either summarized and referenced in the FEIS or included in an appendix. | The DSEIS used an example of a 200 acre detention basin, which is not typical of the proposed action. Furthermore, the resulting emissions from this detention basin (117 tons CO and 21 tons PM10) occur over the entire time frame for this example of 425 days – not over the year. This was an error in the original analysis. The analysis has been changed to a 140 acre detention basin (the largest proposed facility of 38 proposed basins or basin expansions with a mean disturbance of 31 acres) that is built within one year. PM10, CO and VOC emissions are below the conformity determination thresholds.<br><br>Construction of the proposed facilities would be analyzed for air quality impacts during the more project-specific environmental analysis. When construction schedules are known, emission estimates can be made. It should be noted, the example used in the DEIS would overestimate actual emissions because it did not include the normal mitigation measures and best management practices.<br><br>The Chapter 8 process includes a facility-specific evaluation of air impacts with a step for making a conformity determination. The Clark County Division of Air Quality Management has been delegated Federal responsibility for air quality and will issue permits on a case-by-case basis. | Section 4.8.1.1<br><br>Pg. 175<br><br>Table 4.8-2 Pg. 177 |

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| 005 / 7 | The DSEIS (Table 3.8-5 and pp. 124-125) identifies NAAQS for several criteria pollutants. However, some of the standards are incorrect, and others are missing. For example, the annual and 24-hour PM2.5 standards are 15 $g/m^3$ and 65 $g/m^3$, respectively. The 3-hour sulfur oxides standard is 0.5 parts per million (ppm) rather than 0.05. Table 3.8-5 and page 125 provide an incorrect nitrogen dioxide standard. The standard is 0.053 ppm. A table with the NAAQS is enclosed with this letter and can also be viewed at EPA's web site (http://epa.gov/air/criteria.html).<br>Recommendation: Section 3.8.7 and Table 3.8-5 should be revised in the FEIS to reflect the correct NAAQSs. The units in Table 3.8-5 should be changed from $u/g/m^3$ to $ug/m^3$. Table 3.8-7 should include ambient air quality for PM2.5. | Corrections to Table 3.8-5 have been made, and additions have been made (addition of PM2.5, 8-hr ozone; correction of micrograms per cubic meter). Corrections in the text (nitrogen dioxide changed from 0.05 to 0.053, and 3-hour sulfur oxides changed to 0.5 from 0.05 ppm). | Table 3.8-5<br>Pg.119<br>Section 3.8.7.2<br>Pg.121<br>3.8.7.3<br>Pg. 121 |

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| 005 / 8 | The DSEIS identifies the CCDAQM construction dust control procedures that will be implemented to minimize particulate emissions from project construction activities over the life of the project (Appendix [B]). It also identifies some measures for reducing exhaust emissions from construction equipment.<br>Recommendation: Additional best practices, listed below, are recommended to further reduce exhaust emissions from construction equipment. The FEIS should evaluate the feasibility of these measures to reduce construction emissions, and the ROD should reference all measures that will be adopted for this project.<br>Use particle traps and other appropriate controls to reduce emissions of diesel particulate matter (DPM) and other air pollutants. Traps control approximately 80 percent of DPM, and specialized catalytic converters (oxidation catalysts) control approximately 20 percent of DPM, 40 percent of carbon monoxide emissions, and 50 percent of hydrocarbon emissions;<br>Visible emissions from all heavy duty off road diesel equipment should not exceed 20 percent opacity for more than three minutes in any hour of operation;<br>Minimize construction-related trips of workers and equipment, including trucks and heavy equipment;<br>Lease or buy newer, cleaner equipment (1996 or newer model);<br>Employ periodic, unscheduled inspections to ensure that construction equipment is properly maintained at all times, is tuned to manufacturer's specifications, and is not modified to increase horsepower except in accord with established specifications. | These additional best practices have been added to Section 5.8 – Mitigation Measures – Air Quality. | Section 5.8<br>Pg. 209 |

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| 005 / 9 | The DSEIS does not provide sufficient information for each of the proposed facilities with regard to potential direct and indirect impacts to water resources, especially undisturbed waters of the U.S.<br><br>Recommendation: The FEIS should identify waters of the U.S. in the project area. A map of these waters should be provided. For natural washes currently proposed for flood control construction under the Master Plan, the FEIS should indicate the approximate acres of waters that could be affected by the project alternatives, and include an overview of their condition and current threats to their ecological health. Describe the project's potential impacts to functions and values, including how shallow groundwater problems could be exacerbated and how vegetation along the streams would be affected. Discuss how adverse impacts to waters of the U.S. could be mitigated by BLM, CCRFCD, or developers, including avoiding adverse impacts to washes to the fullest extent, i.e., considering leaving washes as open, natural earthen washes. | The document now describes general WOUS conditions, threats, functions/values, etc. within the Valley. Furthermore, this document is programmatic in nature and impacts to WOUS will be evaluated on a site-specific basis.<br><br>The Las Vegas Valley is a rapidly urbanizing area. Where opportunities exist to provide adequate protection from flooding using natural stream channels, the CCRFCD strongly encourages and promotes the preservation and use of those channels<br><br>With the exception of the Lower Las Vegas Wash below the Water Reclamation District discharge points and the lower reaches of the other major washes in the Valley, there are no flowing streams in the Las Vegas Valley or Boulder City. The potential waters of the United States (WOUS) in the study area are typically ephemeral streams that flow only during and immediately following significant rainfall events. Ephemeral streams are regulated as WOUS if they are directly connected to other WOUS. | Section 3.3.1, pg.65<br><br>Section 3.3.2, pg. 69<br><br>Section 3.5.3.1, pg. 97<br><br>Section 4.3.1.1, pg. 161<br><br>Section 4.5.1.1.2, pg. 167<br><br>Section 5.3, pg.203<br><br>Section 5.5.1, #'s 5 & 6, pg. 205 |

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| 005 / 10 | Future tiered projects that involve filling waters of the U.S. will be required to comply with the Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the Clean Water Act (CWA). Some projects may qualify for authorization under a nationwide permit, and others will likely require individual CWA Section 404 permits. To comply with the Guidelines, the actions subject to Individual Permits must meet all of the following criteria:<br>There is no practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem (40 CFR 230.10(a)).<br>The proposed action does not violate State water quality standards, toxic effluent standards, or jeopardize the continued existence of federally listed species or their critical habitat (40 CFR 230.10(b)).<br>The proposed action will not cause or contribute to significant degradation of waters of the U.S., including wetlands (40 CFR 230.10(c)). Significant degradation includes loss of fish and wildlife habitat, including cumulative losses.<br>All appropriate and practicable steps are taken to minimize adverse impacts on the aquatic ecosystem (i.e., mitigation) (40 CFR 230.10(d)). This includes incorporation of all appropriate and practicable compensation measures for unavoidable losses to waters of the U.S., including wetlands. | All CCRFCD projects that involve filling waters of the U.S. will comply with CWA and associated regulations. | No Change Required |
| 005 / 11 | Furthermore, although the flood control projects in the Master Plan are qualified as recommendations only, we are concerned that they will be the only alternatives in future project analyses. In future site-specific analyses, the applicant might justify the preferred alternative, and the unavoidable impacts of that alternative, by citing the project as a facility proposed in the Master Plan or stating that they are limited in their options due to downstream constraints. For projects that require a CWA Section 404 permit, however, a thorough alternatives analysis will be required by the 404 (b)(1) Guidelines (40 CFR 230.10(a)(4)). | All projects requiring a CWA section 404 permit will follow 404 guidelines, which include alternatives analysis. | No Change Required |

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| 005 / 12 | Because the CCRFCD Master Plan assumes full build-out of the Southern Nevada Regional Policy Plan, we are concerned that future tiered analyses could be limited to full build-out alternatives. Full build-out may be the most profitable for applicants and would limit the need for the CCRFCD to upgrade and expand facilities. However, direct, secondary, and cumulative impacts to natural resources would need to be considered and thoroughly assessed in order to meet the 404(b)(1) Guidelines and ensure selection of the least environmentally damaging practicable alternative (LEDPA).<br><br>Recommendation: The FEIS should discuss CWA Section 404 requirements. The FEIS should analyze alternatives in a manner that would ensure inclusion of a LEDPA in future CWA Section 404 permitting reviews, and discuss design and management strategies that ensure that future site-specific projects can comply with the Section 404(b)(1) Guidelines. | The CCRFCD MPU assumes full development of the Las Vegas Valley. Based upon recent as well as projected development patterns, this is a reasonable and foreseeable condition. It would be imprudent for the MPU to assume otherwise. The FEIS and the DSEIS are programmatic in nature. The impacts of future facilities as well as practicable alternatives will be evaluated on a case-by-case basis.<br><br>See also response to Comment 005/11. | No Change Required |
| 005 / 13 | Recommendation: The FEIS should distinguish those actions under the proposal that would likely be authorized under a nationwide permit or an individual CWA Section 404 permit. The discussion should address the analyses that would be conducted for both types of future tiered project. Furthermore, although projects authorized under a nationwide permit may not require compensation for site specific losses of waters of the U.S., several small actions subject to such permits could have a significant cumulative impact on waters of the U.S. over the project area. The CEQ NEPA Implementation regulations require that EISs include appropriate mitigation measures not already included in the proposed action or alternatives [40 CFR 1502.14(f)]. The FEIS should identify measures that would be implemented to mitigate for such overall, system-wide impacts that would occur as a result of many small projects being authorized under a nationwide CWA 404 permit over the time frame of the plan. The FEIS should describe types, locations, and timing of mitigation measures and identify who would be responsible for mitigation measures on BLM and privately owned lands. | The applicability of Nationwide Permits is limited and is anticipated that nearly all proposed MPU projects will require either an individual CWA Section 404 Permit, or be authorized under the existing Regional General 007 Permit. Appropriate mitigation will be determined for an individual project as part of the permitting process.<br><br>The timing, location, size, and sequence of projects planned over the next decade cannot be determined at this time, therefore each facility will be evaluated on a case-by-case basis in full accordance with CWA requirements. Mitigation will be the responsibility of the proponent. | No Change Required |

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| Document/ Comment Number | COMMENT | RESPONSE | Changes Made to: |
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| 005 / 14 | EPA Region 9's Wetlands Regulatory Office is currently reviewing a Clean Water Act Section 404 permit application for 5,354 acres of a project site known as Summerlin West, located in the northwest portion of the Gowan Watershed. Flood protection activities for this development are identified in the DSEIS (Figures 2-1 and 2-4). Of the 34.4 acres of waters of the U.S. delineated by the U.S. Army Corps of Engineers, the applicant is planning to preserve only 20 percent (7 acres). The applicant's justification for adversely affecting 80 percent of waters of the U.S. is the need for stormwater conveyance designs to adhere to the outflow restrictions created by downstream developments and to be compatible with existing or proposed CCRFCD master planned facilities<br><br>One of the CCRFCD's facilities, Detention Basin #5, has been built in Summerlin West, and the larger natural washes on-site are proposed to be concrete lined under the Master Plan. EPA is, therefore, working with the applicant to consider development plans that would avoid and minimize impacts to the washes, and this has included the recommendation that the washes be left as open, natural earthen washes. Because the property abuts the Red Rock Canyon National Conservation Area (RRCNCA), we are even more concerned about flood control construction along or in the washes and impacts to wildlife migration corridors and washes farther up in the adjacent foothills located within the RRCNCA. A few plant species listed as "sensitive" by the State of Nevada are found in the project site, and several wildlife species unique to ephemeral systems are present as well, including the desert tortoise.<br><br>Recommendation: It is appropriate for site specific projects to be reviewed through future 404 permit applications. However, we urge BLM at this programmatic stage to consider the need for future compliance with the 404(b)(1) Guidelines and facilitate proper alternatives analyses for future projects, especially those in undisturbed areas. | While these facilities are described in the DSEIS, the comments are beyond the purview of the document.<br><br>All CCRFCD projects that involve filling waters of the U.S. will comply with CWA and associated regulations. | No Change Required |

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| 005 / 15 | Opportunities exist to enhance, restore, and/or protect natural stream channel functions and values in the Las Vegas Valley. However, the DSEIS does not discuss these opportunities either as part of the proposed project (Chapter 2) or as mitigation measures for overall impacts to these resources (Chapter 5).<br><br>Recommendation: EPA recommends that BLM consider the benefits of stream enhancement/ restoration/protection in the project area. The FEIS should address opportunities for improving the quality and quantity of waters of the U.S. in the study area in designing management options and infrastructure improvements. | The following has been added as the description of the proposed action:<br><br>The Las Vegas Valley is a rapidly urbanizing area. Where opportunities exist to provide adequate protection from flooding using natural stream channels, the CCRFCD strongly encourages and promotes the preservation and use of those channels. | Section 2.2, pg.25-26 |
| 005 / 16 | According to the DSEIS, rising shallow groundwater levels may be exacerbated by the proposed project and comprise significant adverse direct, indirect, and cumulative impacts to water quality and existing structures. However, the project will not minimize or mitigate these effects (p. 209). | According to the DSEIS, rising shallow groundwater levels could be the result of increased development in the Las Vegas Valley. The DSEIS does not state or imply that rising groundwater levels would be exacerbated by proposed MPU facilities.<br><br>The flood control facilities within the effected area will employ mitigation measures to reduce the impacts to the shallow ground water zone and to reduce impacts from the shallow ground water zone on these facilities so as not to contribute to the potential problem.<br><br>The discussion has been changed to explain that mitigation measures employed in project specific construction and operation will be employed so as not to contribute to increased recharge to the shallow ground water zone. | Section 4.16.4<br><br>Pg. 192-193 |

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| 005 / 17 | Furthermore, additional imports of groundwater from outside the Las Vegas basin are planned for the foreseeable future, but the impacts of additional effluent in the basin are not addressed in the SDEIS. The CEQ NEPA Implementation regulations require that EISs include appropriate mitigation measures not already included in the proposed action or alternatives and include reasonable alternatives not within the jurisdiction of the lead agency [40 CFR 1502.14].<br>Recommendation: The FEIS should address the potential impacts of additional effluent in the project area; provide details regarding how rising shallow groundwater levels could be mitigated to ensure against these potential impacts; identify agencies with jurisdiction on these issues; and identify who would be responsible for conducting and ensuring these measures. | Effluent volumes will increase in Las Vegas due to development and increased water use (regardless of source water), flood control facilities exert no control over water supplied to and returned from domestic, commercial and industrial uses. Effluent comes from the wastewater treatment plants and that which is not re-used is discharged to the Las Vegas Wash. The Clean Water Coalition (CWC) – Citizens Advisory Committee – reports that wastewater could double over the next thirty years, which would have the potential to significantly impact the Las Vegas Wash, Las Vegas Bay and parts of Lake Mead. The CWC member agencies are studying alternative ways to handle the increase in wastewater, including alternative discharge (not directly to the wash) and increased re-use. Increased re-use will be encouraged, particularly by SNWA and its member agencies, because imported water will not count as return flow credit to Lake Mead and the Colorado River System, and if not re-used would be a lost resource. | Section 4.16.3<br>Pg. 192 |

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| 005 / 17 (cont) | | Increased development in Las Vegas Valley has the potential to contribute urban runoff to the shallow ground water zone, and therefore, has the potential to increase shallow ground water levels. Currently, the SNWA monitors the shallow ground water zone with a network of monitoring wells, and SNWA has no published report since the 1987 report (Brothers and Katzer 1987) that suggests that these levels are continuing to rise. In fact, section 3.4.5.1 reported that the 1995 report by SNWA (Zikmund 1995) did not report a rise in the shallow ground water zone. It may be that increased urban runoff and possible recharge to the shallow ground water zone is balanced by increased discharge from the shallow ground water zone to the wash, but no monitoring data exists to determine this.<br><br>Flood control facilities will include results from site specific investigations of ground water conditions on site into facility design, which will incorporate appropriate mitigation measures so as to avoid ground water mounding. Some of these measures may result in discharge from the shallow ground water zone through weep holes or active de-watering operations. NDEP regulates any facility construction or facility operation that results in discharge of any water to ensure that no adverse impacts occur as a result of this discharge. The discussion in Section 4.16 of cumulative impacts to and from shallow ground water has been expanded. | |
| 005 / 18 | The DSEIS states that, by virtue of developing and analyzing a county-wide ecosystem plan such as the Clark County Multi-Species Habitat Conservation Plan (MSHCP), a cumulative effects analysis for special-status species has largely been completed. However, CCRFCD's Master Plan and BLM's plans for land disposals have been revised since the MSHCP was finalized.<br><br>Recommendation: The FEIS should describe how consistency with the Multi-Species Habitat Conservation Plan will be ensured for the proposed project. | The text now reads that "the CCRFCD's Master Plan and BLM's plan for land disposals have been revised since finalization of the MSHCP. Consistency with the MSHCP will be ensured through the site-specific evaluation process." | Section 4.16.5, pg. 194 |

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| 005 / 19 | The DSEIS (p. 255) states that the biological review procedure addresses resources such as riparian areas and wetlands, and page 222 states that impacts to riparian and wetland vegetation would be minimized by the mitigation measures in section 5.5.1. However, Figure 8.7-1 indicates that if these resources are not regulated by State or Federal statutes, impacts would be acceptable.<br><br>Recommendation: The FEIS should rectify this discrepancy and clarify the mitigation discussion regarding impacts to riparian and wetland vegetation. The FEIS should identify the types of riparian and wetland vegetation that would be avoided, discuss how the measures in section 5.5.1 would be ensured, and identify the agencies or parties responsible for implementing and enforcing them. The FEIS should also identify State or Federal statutes that could regulate these resources. | Figure 8.7-1 has been changed to include Federal, state, and local regulations. Impacts to resources that are not regulated are acceptable; however, the CCRFCD will avoid disturbance to riparian-wetland vegetation to the extent possible, as stated in the biological mitigation section of the SEIS.<br><br>The mitigation section has been clarified regarding impacts to riparian-wetland vegetation and impact avoidance. The mitigation section now provides information on agencies responsible for implementing and enforcing riparian-wetland impacts. | Figure 8.7-1, pg.234<br><br>Section 5.5.1, #'s 5 & 6, pg. 205 |
| 005 / 20 | The DSEIS does not include a map depicting land ownership for the project area. We understand that land sales/auctions occur a few times each year and that land ownership status is rapidly changing in the project area. However, in order for readers to understand the role of BLM, private investors, and local jurisdictions for this project, a land status map overlayed with the existing and proposed flood control projects would be extremely useful.<br><br>Recommendation: The FEIS should include a map depicting current land ownership overlayed with the existing and proposed flood control projects. The map should also identify the BLM lands that are anticipated to be disposed over the next 20 years. | A figure (3.13-1 Land Ownership) has been added. | Figure 3.13-1, pg. 139 |

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| 006 / 1<br>* State Parks | Chapter 2.2.2.1 identifies the following proposed actions in the Range Watershed:<br>A proposed storm drain in Iron Mountain Road from Homestead Road to Mountain Spa<br>A proposed storm drain in Log Cabin Way from Cimarron Road to Buffalo Drive<br>A proposed storm drain in Buffalo Drive from Log Way to Iron Mountain Road<br>These proposed actions will have significant impacts on Floyd Lamb State Park (FLSP). The maps do not provide the detail needed to determine the exact location of the storm drains, but it does appear that they will traverse FLSP. Roads or easements in the park proper are not acceptable.<br>The proposed actions will result in a great deal of disturbance to the turf in FLSP. This would not be acceptable. The amount of irrigation is extensive and this amount of digging would certainly result in damage. | Each proposed facility will undergo a project-specific environmental assessment. Any potential impacts to lands or neighboring lands will be assessed and mitigated under this process (refer to Chapter 8). It is worth noting that the project database and the SEIS database will be available on the internet at the CCRFCD web page. | No Change Required |
| 006 / 2 | The proposed actions will also limit any future development plans of Nevada Division of State Parks (NDSP). | Facility specific impacts will be evaluated and mitigated during the project specific environmental assessment (see Chapter 8). | No Change Required |
| 006 / 3 | Another area of concern is the potential impact to the cultural resources of FLSP. Again, it cannot be determined from the maps exactly where the storm drains run, but they could be near some of the cultural resource sites which would require significant mitigation to resolve. | See response to comment 006 / 2. | No Change Required |
| 006 / 4 | Another area that needs to be addressed concerns the City of Las Vegas. NDSP has agreed not to do anything that would change FLSP without discussion with them. This is due to the possible “gifting” of the park to the City of Las Vegas.<br>NDSP and the Division of State Lands (DSL) would need to approve of any proposed action that occurs on State Park property. Chapter 1.4 and Table 1.1 do not list NDSP of DSL. | See response to comment 006 / 2. Table 1.1 has been be modified to include NDSP and DSL. | Table 1.4-1, Pg. 6 |

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| 006 / 5 | Although NDSP feels that any flood control in the area would be beneficial, we do see problems with installing these storm drains through what appears to be the main section of FLSP. | See response to comment 006 / 2. | No Change Required |
| 006 / 6 | Chapter 2.2.4.2 identifies the following proposed actions in the Central Watershed:<br>A new facility is proposed in 4th Street between Washington and Owens, which then turns west in Owens to Las Vegas Wash.<br>Fourth Street was not identified on the map provided, but following Owens to Las Vegas Wash requires a direction of East. | The text has been changed to reflect this comment. | Section 2.2.4.2,<br>Pg. 33 |
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a. The one-year grace period for conformity determinations only applies with respect to the national ambient air quality standard for which an area is newly designated non-attainment (e.g., ozone in Clark County) and does not affect the area's requirements with respect to all other national ambient air quality standards for which the area is designated non-attainment or has been redesignated from non-attainment to attainment with a maintenance plan pursuant to section 175A of the Clean Air Act (including any pre-existing national ambient air quality standard for a pollutant for which a new or revised standard has been issued).

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# Abbreviations and Acronyms

| | |
|---|---|
| µg/m³ | micrograms per cubic meter |
| ACEC | Area of Critical Environmental Concern |
| ACHP | Advisory Council of Historic Preservation |
| AFB | Air Force Base |
| AIRFA | American Indian Religious Freedom Act |
| ARPA | Archeological Resources Protection Act |
| ASTM | American Society for Testing and Materials |
| BLM | Bureau of Land Management |
| BMI | Basic Magnesium, Inc. |
| BPB | British Plaster Board |
| C | Candidate (for listing under the ESA) |
| CAA | Clean Air Act |
| CCA | Clark County Assessor |
| CCCPLNRA | Clark County Conservation of Public Land and Natural Resources Act |
| CCDAQM | Clark County Department of Air Quality Management |
| CCDCP | Clark County Department of Comprehensive Planning |
| CCMHCP | Clark County Multispecies Habit Conservation Plan (see also MSHCP) |
| CCN | Clark County, Nevada |
| CCPCS | Clark County Parks and Community Service |
| CCPW | Clark County Public Works |
| CCRFCD | Clark County Regional Flood Control District |
| CCSD | Clark County School District |
| CCUDC | Clark County Unified Development Code |
| CCWRD | Clark County Water Reclamation District |
| CE | Critically Endangered |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| cfs | cubic feet per second |
| CO | Carbon Monoxide |
| COC | Community of Comparison |
| CRM | Cultural Resources Management |
| CWA | Clean Water Act |
| CWCCAC | Clean Water Coalition Citizens Advisory Committee |
| CY | Cactus/Yucca |
| dB | decibels |

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| dBA | A-weighted decibels |
| DOI | Department of the Interior |
| DPM | Diesel Particulate Matter |
| DSEIS | Draft Supplemental Environmental Impact Statement |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| EPD | Environmental Planning Database |
| ESA | Endangered Species Act |
| FAA | Federal Aviation Administration |
| FE | Federally Endangered (under the ESA) |
| FEIS | Final Environmental Impact Statement |
| FHA | Federal Highway Administration |
| FLPMA | Federal Land Policy and Management Act |
| FONSI | Finding of No Significant Impact |
| FR | Federal Register |
| FRA | Federal Railroad Administration |
| FSEIS | Final Supplemental Environmental Impact Statement |
| FT | Federally Threatened (under the ESA) |
| g | gram |
| GAP | Gap Analysis Program |
| GIS | Geographic Information System |
| HUD (Federal) | Housing and Urban Development |
| IBC | International Building Code |
| km | kilometer |
| $L_{dn}$ | Day-Night Sound Level |
| $L_{eq}$ | Equivalent Sound Level |
| LOP | Letter of Permission |
| LVFD | Las Vegas Fire and Rescue Department |
| LVMPD | Las Vegas Metropolitan Police Department |
| LVVFC | Las Vegas Valley Flood Control |
| LVVWD | Las Vegas Valley Water District |
| LVWCAMP | Las Vegas Wash Comprehensive Adaptive Management Plan |
| LVWCC | Las Vegas Wash Coordination Committee |
| m | meter |
| MCL | Maximum Contaminant Level |

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|---|---|
| mg/L | milligrams per liter |
| MOA | Memorandum of Agreement |
| MOU | Memorandum of Understanding |
| mph | miles per hour |
| MPU | Master Plan Update |
| MSHCP | Clark County Multi-Species Habitat Conservation Plan (see also CCMHCP) |
| MWH | Montgomery Watson Harza (Company) |
| NAAQS | National Ambient Air Quality Standards |
| NAGPRA | Native American Graves Protection and Repatriation Act of 1990 |
| NCA | Noise Control Act of 1972 |
| NDETR | Nevada Department of Employment, Training, and Rehabilitation |
| NDOT | Nevada Department of Transportation |
| NDOW | Nevada Department of Wildlife |
| NDT | Nevada Department of Taxation |
| NDWR | Nevada Division of Water Resources |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NLVFD | North Las Vegas Fire Department |
| NNHP | Nevada Natural Heritage Program |
| NNPS | Nevada Native Plant Society |
| $NO_2$ | Nitrogen Dioxide |
| NOI | Notice of Intent |
| NRA | National Recreation Area |
| NRHP | National Register of Historic Places |
| NRS | Nevada Revised Statutes |
| NSD | Nevada State Demographer |
| NSHPO | Nevada State Historic Preservation Office |
| NTA | Nevada Telecommunications Association |
| $O_3$ | Ozone |
| OHV | Off-Highway Vehicle |
| OHWM | Ordinary High Water Mark |
| OSHA | Occupational Safety and Health Act |
| OSL | Oregon Short Line (Company) |
| PBS&J | |
| PCB | Polychlorinated Biphenyls |
| PCE | Perchloroethylene |
| $PM_{10}$ or $PM_{2.5}$ | Particulate Matter |

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|---|---|
| PPA | Pollution Prevention Act |
| ppm | parts per million |
| PRG | Preliminary Remedial Goals |
| RCRA | Resource Conservation and Recovery Act |
| RMP | Resource Management Plan |
| ROD | Record of Decision |
| ROG | Reactive Organic Gases |
| ROW | Right-of-way |
| RTC | Regional Transportation Commission |
| SC | Federal Species of Special Concern |
| SCS | Soil Conservation Service |
| SDWA | Safe Drinking Water Act |
| SEIS | Supplemental Environmental Impact Statement |
| SHPO | State Historic Preservation Office |
| SIP | State Implementation Plan |
| SNPLMA | Southern Nevada Public Land Management Act |
| SNRPC | Southern Nevada Regional Planning Coalition |
| SNRPP | Southern Nevada Regional Policy Plan |
| SNWA | Southern Nevada Water Authority |
| $SO_2$ | Sulphur Dioxide |
| SP, LA & SL | San Pedro, Los Angeles and Salt Lake City Railroad Company |
| SRMA | Special Recreation Management Areas |
| T&E | Threatened and Endangered |
| TCE | Trichloroethylene |
| TCP | Traditional Cultural Property |
| TDS | Total Dissolved Solids |
| THPO | Tribal Historic Preservation Officer |
| TKN | Total Potassium Nitrate |
| TPH | Total Petroleum Hydrocarbons |
| TSP | Total Suspended Particulates |
| TSS | Total Suspended Sediment |
| TTI | Texas Transportation Institute |
| U.S.C. | U.S. Code |
| UNLV | University of Nevada Las Vegas |
| UPRR | Union Pacific Railroad |
| USACE | U.S. Army Corps of Engineers |
| USBOR | U.S. Bureau of Reclamation |

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|---|---|
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UST | Underground Storage Tank |
| VOC | Volatile Organic Compounds |
| VRM | Visual Resource Management |
| WEAP | Worker Environmental Awareness Program (not defined) |
| WSA | Wilderness Study Area |
| WWTP | Wastewater Treatment Plant |

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# GLOSSARY

**Acre-Foot:** Volume of water (43,560 cubic feet) that would cover one acre, one foot deep.

**Advection:** The horizontal transfer of heat or other atmospheric properties.

**Aeolian sands:** Deposits of sand arranged by the wind.

**Aeration:** The process of exposing to air.

**Aesthetic quality:** A perception of the beauty of a natural or cultural landscape

**Affected environment:** Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as the result of a proposed human action.

**Air quality:** The cleanliness of the air as measured by the levels of pollutants relative to standards or guideline levels established to protect human health and welfare. Air quality is often expressed in terms of the pollutant for which concentrations are the highest percentage of a standard (e.g., air quality may be unacceptable if the level of one pollutant is 150 percent of its standard, even if levels of other pollutants are well below their respective standards.

**Alluvial (Alluvium):** An optional path or direction for a transmission line. Relating to material deposited by running water, such as clay, silt, sand, and gravel. Sedimentary material transported and deposited by the action of flowing water.

**Alluvial fan:** Cone-shaped deposits of alluvium made by a stream. Fans generally form where streams emerge from mountains onto the lowland.

**Alternative (Action):** Other possible actions that might be taken to meet the stated need other than the proposed project.

**Alternative (Route):** An option for meeting the stated need.

**Ambient:** The surrounding natural conditions (or environment) in a given place and time.

**Anaerobic:** A process or situation lacking oxygen.

**Anthropogenic:** Of or relating to human beings.

**Aquatic:** Growing or living in or near the water.

**Aquifer:** A stratum of rock, or sediment that is sufficiently permeable to conduct groundwater and to yield economically significant quantities of water to wells and springs.

**Aquitard:** A stratum of rock or sediment that retards, but does not prevent the flow of water to or from an adjacent aquifer.

**Archaeology:** The scientific study of the life and culture of ancient peoples, as by excavation of ancient cities, relics, or artifacts.

**Area of Critical Environmental Concern (ACEC):** A BLM designation for an area within public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life from natural hazards.

**Artifact:** Any object showing human workmanship or modification, especially from a prehistoric or historic culture.

**Assessment (Environmental):** An evaluation of existing resources and potential impacts to them from a proposed act or change to the environment.

**A-weighted decibel (dBA):** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

**Bajada:** Sloping, coalescing, spreading masses of gravel and sand deposited by streams as they emerge from narrow mountain valleys, and extending from the mountain base into the surrounding valley.

**Bayena:** Hilly topography characteristic of incised head of alluvial fan.

**Berm:** A levee, shelf, ledge, or bench along a stream bank that may extend laterally into the channel to partially obstruct the flow, or parallel to the flow to contain the flow within its stream banks. May be natural or man-made.

**Bureau of Land Management (BLM):** An agency of the U.S. Department of the Interior that is responsible for managing public lands.

**Caliche:** Cemented deposit of secondary calcium carbonate found in layers or disseminated throughout the horizon of certain soils in arid to semiarid regions.

**Cambrian:** The earliest geologic period in the Paleozoic Era, spanning the time of 500 - 570 million years ago, and marked by a profusion of marine animals.

**Candidate species:** A plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the U.S. Fish and Wildlife Service.

**Channel degradation:** Channel erosion.

**Channels:** The space above the bed and between banks.

**Clastic:** Made up of fragments.

**Clasts:** Clastic fragment.

**Clean Water Act:** Provides for pollution control activities and funding at the Federal level including grant programs, research and related programs, as well as provisions for setting standards and enforcement actions.

**Color:** The property of reflecting light of a particular intensity and wavelength (or mixture of wavelengths), to which the eye is sensitive. It is the major visual property of surfaces.

**Compaction faults:** Faults in unconsolidated sediments that are a result of differential compaction. Differential compaction can occur because sediments on one side of the fault compacts more than the other due to weight of overlying material or due to changes in hydrostatic pressure brought about by physical de-watering or over-pumping of the groundwater system.

**Comprehensive plan:** A document (or set of documents) that sets forth goals and policies for guiding future land use and development in a community. Also known as a Master Plan.

**Convective overturning:** Density, or heat-driven movement of liquid or plastic material. Generally, a pattern of movement in which the central area is uprising and the outer area is down flowing, due to heat variations. Heat variations result in differing densities.

**Conveyance facilities:** A facility to carry, or divert material

**Council on Environmental Quality (CEQ):** The President's Council on Environmental Quality was established by the National Environmental Policy Act and is the agency responsible for the oversight and development of national policy.An advisory council to the President established by the National Environmental Policy Act. It reviews Federal programs for their effort on the environment studies, and advises the President on environmental matters.

**Cultural resources:** Areas or objects that are of cultural significance to Native Americans and other ethnic groups.

**Cumulative impacts:** The impacts assessed in an environmental impact statement that could potentially result from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or nonfederal), private industry, or individual undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

**Curvilinear:** Characterized by, or following a curved line.

**Day-night sound level (Ldn):** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period 10:00 p.m. - 7:00 a.m.

**Debris basins:** A basin designed to hold debris from associated flood events.

**Decibel (dB):** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to reference sound pressure amplitude. The reference pressure is 20 micro-pascals.

**Deposition:** The process of laying down a deposit of something.

**Detention basins:** A basin designed to hold floodwaters.

**Detritus deposition:** The process of laying down a deposit of undissolved organic or inorganic matter resulting from the decomposition of its parent material.

**Diffusion-equation modeling:** A partial differential equation describing the variation in space and time of a physical quantity that is governed by diffusion, or the movement of ions or molecules from regions of high concentration to low concentration within a solution.

**Dike:** A barrier constructed to contain the flow of water.

**Direct impact:** An effect that results solely from the construction or operation of a proposed action without intermediate steps or processes.

**Distance zones:** A subdivision of the landscape as viewed from an observer position. The subdivision (zones) includes foreground-middleground, background, and seldom seen.

**Downcutting:** Erosion that occurs in the bed of a stream, causing the stream to decrease in elevation and perhaps, to increase in grade.

**Earthquake spectral response accelerations:** Following earthquakes larger than magnitude 5.5, spectral response maps are made showing the response of a damped, single-degree-of-freedom oscillator to the recorded ground motions. The data collected shows the accelerations in spectral response following the earthquake.

**Endangered species:** Any species in danger of extinction throughout all or a significant portion of its range.

**Endemic environment:** Plants or animals those are native to a particular region or country, the surrounding conditions, influences or forces that affect or modify an organism or an ecological community and ultimately determine its form and survival.

**Environmental Impact Statement, Draft:** A detailed written statement as required by Section 102(2)(c) of the National Environmental Policy Act.

**Environmental Impact Statement, Final:** The final version of the public document required by National Environmental Policy Act.

**Environmental Impact Statement, Supplemental:** An EIS that includes changes to laws, resources, planning, etc. since the publication of its associated FEIS.

**Environmental Impact Statement:** A NEPA compliant document that is used to explore and evaluate potential alternatives where a major federal action would have significant effect on the quality of the human environment.A formal public document prepared to analyze the impacts on the environment of the proposed project or action and released for comment and review. An EIS must meet the requirements of NEPA, CEQ guidelines, and directives of the agency responsible for the proposed project or action.

**Environmental Justice:** The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

**Environmental Protection Agency (EPA):** The EPA is a federal agency that provides guidance on the preparation of NEPA documents and compliance with environmental justice concerns.

**Ephemeral:** Present only during a portion of the year. Generally refers to watercourses.

**Equivalent sound level (Leq):** The equivalent steady state sound or vibration level, which in a stated period of time would contain the same acoustical or vibration energy.

**Evapotranspiration:** The combined loss of water from a given area and during a specific period of time by evaporation from the soil surface and by transpiration from plants.

**Fault:** A fracture or fracture zone in the earth's surface along which there has been displacement of the sides relative to one another parallel to the fracture.

**Fauna:** The wildlife or animals of a specified region or time.

**Federal Land Policy and Management Act of 1976 (FLPMA):** Public Law 94-579 established public land policy for management lands administered by the Bureau of Land Management (BLM). FLPMA specifies several key directions for the BLM, notably:-Management on the basis of multiple use and sustained yield;-Land use plans prepared to guide management actions;-Public lands for the protection, development, and enhancement of resources;-Public lands retained in Federal ownership; and, -Public participation used in reaching management decisions.

**Flood control facilities:** Structures designed to convey and control floodwaters.

**Flood conveyance corridors:** Channels used to convey floodwater flows.

**Floodplain:** That portion of a river or stream valley, adjacent to the river channel, which is built of sediments and is inundated with water when the stream overflows its banks.

**Form:** The mass or shape of an object or of objects, which appear unified.

**Fossil:** The remains or traces of an organism or assemblage of organisms that have been preserved by natural processes in the earth's crust; exclusive of organisms that have been buried since the beginning of historical time.

**Gabion:** A stream embankment stabilization device consisting of connected wire baskets filled with rock, usually placed in a terraced formation. They can also be made by using two rows of heavy fencing with rock fill between them (two fence gabion).

**Geologic formation:** A rock unit distinguished from adjacent deposits by some common character, such as its composition, origin, or the type of fossil associated with the unit.

**Geology:** The science that studies the earth; the materials, processes, environments, and history of the planet, especially the lithosphere, include the rocks and their formation and structure.

**Gypsiferous carbonate rocks:** Chemical sedimentary rocks that are produced by the precipitation of calcium carbonate in ancient oceans that are rich in gypsum, acalcium sulfate mineral derived from the evaporation of saline waters.

**Habitat:** The region where a plant or animal naturally grows or lives. A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and home range.

**Headcutting:** Erosion that occurs in the upstream end of the valley of a stream, causing it to lengthen its course in such a direction

**Herbivorous:** Species that strictly eats plants.

**High angle block faulting:** A type of normal fault in which the crust is divided into structural blocks of different elevations and orientations.

**Hydroconsolidation:** The consolidation of unconsolidated sediments by the removal of water from the pore space.

**Hydrogeology:** The branch of geology dealing with the waters below the earth's surface and with the geological aspects of surface waters.

**Hydrology:** The science that studies the properties, distribution, and circulation of natural water systems.

**Impact:** A modification in the status of the environment brought about by a proposed action.

**Impervious area:** An area that will not allow the passage of air, water, etc.

**Indirect effect:** Caused by the action later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth-rate, and related effects on air and water and other natural systems, including ecosystems.

**Indirect impact:** An effect that is related to but removed from a proposed action by an intermediate step or process.

**Infrastructure:** The basic installations and facilities on which the continuance and growth of a community depend (i.e., roads, schools, sewers, flood control facilities, transportation, and communication systems).

**Intermontane:** Interior mountain region.

**Isoclinal:** Having equal inclination or dip.

**Lacustrine sediments:** Lake Sediments.

**Landform:** A term used to describe the many types of land surfaces that exist as a result of geologic activity and weathering (e.g., plateaus, mountains, plains, and valleys).

**Line:** The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture or when objects are aligned in a one-dimensional sequence. Usually evident as the edge of shapes or masses in the landscape.

**Liquefaction:** The conversion of a soild or a gas into a liquid.

**Lithic:** Pertaining to stone or a stone tool (e.g., lithic artifact).

**Lithology:** The structure and composition of a rock formation, and the study of rocks with the unaided eye, or with little magnification.

**Loamy gravels:** A rich soil consisting of a mixture of gravelly sand, clay, and organic material.

**Master plan:** A document (or set of documents) that sets forth goals and policies for guiding future land use and development in a community. Also known as a Comprehensive Plan.

**Mesa:** An isolated, nearly level landmass formed of nearly horizontal rocks, standing above the surrounding country and bounded with steep sides.

**Microphytic crusts:** Communities of microorganisms, predominantly cyanobacteria (blue green algae), green algae, filamentous fungi, lichens, and non-vascular plants (mosses) that inhabit the surface soil layer (crust) in arid and semiarid landscapes.

**Migratory:** Birds, animals, or people that migrate, or move from one region or country to another.

**Mineral resource:** Any inorganic or organic substance occurring naturally in the earth that has a consistent and distinctive set of physical properties. Examples of mineral resources include coal, nickel, gold, silver, and copper.

**Mississippian:** A period of the Paleozoic Era, spanning in time from about 320 - 345 million years ago.

**Mitigate:** To alleviate, reduce, or render less intense or severe

**Mitigation:** Action taken to avoid, reduce the severity of, or eliminate an adverse impact.Mitigation concludes:-Avoiding an impact altogether by not taking a certain action or parts of an action;-Minimizing impacts by limiting the degree or magnitudes of an action and its implementation;-Rectifying an impact by repairing, rehabilitating, or restoring the affected environment;-Reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; or,-Compensating for an impact by replacing or providing substitute resources or environments.

**Morphology:** The form and structure of an organism.

**National Ambient Air Quality Standards:** Air quality standards established by the Clean Air Act. The primary NAAQS are intended to protect the public health with an adequate margin of safety; the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

**National Environmental Policy Act (NEPA):** The National Environmental Policy Act was passed in 1969 and requires federal agencies to plan, assess, and document the effects of their actions. National Environmental Policy Act of 1969, Public Law 91-190, establishes environmental policy for the nation. Among other items, NEPA requires Federal agencies to consider environmental values in decision-making processes.

**National Register of Historic Places:** A listing of architectural, historical, archaeological, and cultural sites of local, state, or national significance, established by the Historic Preservation Act of 1966 and maintained by the National Park Service.

**Native vegetation:** Vegetation originating in a certain region or country.

**Noise:** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

**Nonattainment area:** An air quality control region (or portion thereof) in which the U.S. Environmental Protection Agency has determined that ambient air concentrations exceed national ambient air quality standards for one or more criteria pollutants.

**Normal faults:** Fault in which the hanging wall (one that would be hanging overhead for person standing in tunnel along or across fault) appears to have moved downward relative to the footwall (one that would be under feet of person standing in tunnel along or across fault).

**One-hundred-year flood:** A flood with a magnitude that may occur once every one hundred years. A one-in-one hundred chance of a certain area being inundated during any year.

**Orogenic:** A major episode of plate tectonic activity in which lithospheric plates collide and produce mountain belts, in some cases including the formation of subduction zones and igneous activity. Thrust faults and folds are typical geological structures seen in areas of orogeny.

**Overthrust belt oil fields:** A low angle thrust fault of large scale generally measured in kilometers that has created a geologic trap (placing a less permeable layer of stratum over a more permeable layer) to prevent the rise of less dense oil in geologic media.

**Ozone:** A form of oxygen, O3, produced especially when an electric spark is passed through oxygen or air.

**Paleontology:** The science that deals with the life of past geological ages through the study of the fossil remains of organisms.

**Paleoseismic:** Evidence of prehistoric earthquakes.

**Paleozoic:** The geologic era between the Precambrian and Mesozoic eras covering 225 - 570 million years ago. The era was characterized by the development of the first fishes, amphibians, reptiles, and land plants.

**Particulates:** Minute, separate particles, such as dust or other air pollutants.

**Pedogenic horizons:** Layers of soil that have accumulated on top of each other over time.

**Pennsylvanian:** A period of the Paleozoic Era, spanning from about 280 - 320 million years ago.

**Perennial low flows:** Both continuous surface flows and the discontinuous pools of water that are connected by shallow subsurface flows down the washes.

**Perennial stream:** A stream which flows all year round

**Perennial:** Lasting, or active through the whole year. May refer to rivers, streams, or plants.

**Permeability:** The measure of the ease with which a fluid can diffuse through a particular porous material.

**Permian:** The seventh and last period of the Paleozoic Era, spanning from about 225 - 280 million years ago, characterized by increased reptile life and major mountain building in North America.

**Petroglyph:** A symbolic design or drawing of an animal or human pecked or carved into a rock or cliff face-generally prehistoric.

**Phreatophyte:** A plant that derives its water from subsurfaces, typically having roots that reach the water table, and is therefore somewhat independent of precipitation.

**Physiographic province:** An area characterized by distinctive topography, geologic structure, climate, drainage patterns, and other features and phenomena of nature.

**Plateau:** An elevated tract of relatively level land, such as a tableland or mesa.

**Playa:** The shallow central basin of a desert plain, in which water gathers after a rain and is evaporated.

**Pleistocene:** The first geologic epoch during the Quaternary period, spanning from 1.8 million years ago to about 9000 BC, characterized by extensive continental glaciation in the Northern Hemisphere.

**Plume:** A featherlike flow, as of polluted water entering a river.

**Pluvial lake:** A lake formed during a rainy period.

**Policy:** A guiding principle upon which is based a specific decision or set of decisions.

**Potentiometric surface:** An imaginary surface representing the total head of groundwater and defined by the level to which water will rise in a well. The water table is a particular potentiometric surface.

**Precambrian:** The earliest geologic era covering all time from the formation of the earth and ending at the Paleozoic Era which began about 570 million years ago.

**Propagation:** The act of producing offspring or multiplying by such production.

**Quaternary:** The geologic period following the Tertiary in the Cenozoic Era, beginning about 1.8 million years ago, composed of the Pleistocene and Holocene epochs, characterized by the evolution of Hominids into modern humans.

**Range:** A large, open area of land over which livestock can wander and graze.

**Rare:** A plant or animal restricted in distribution. May be locally abundant in a limited area or few in number over a wide area.

**Reclamation:** Returning disturbed lands to a form and productivity that will be ecologically balanced.

**Region:** A large tract of land generally recognized as having similar character types and physiographic types.

**Relict alluvial fans:** An alluvial fan that has survived decay or disintegration, or one that has been left behind after the disappearance of the greater part of its substance.

**Revegetation:** The reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as reseeding.

**Right-of-way:** Strip of land acquired by legal means, over which the power line and access roads would pass.

**Riparian:** On or pertaining to the bank of a stream or river.

**Riprap:** A foundation or sustaining wall positioned in a stream, usually made of stones thrown together

**Ruderal:** Weedy vegetation growing on compacted, plowed, or otherwise disturbed ground and showing a preference for this type of habitat.

**Sediment:** Solid fragmental material, either mineral or organic, that is transported or deposited by air, water, gravity, or ice.

**Seismicity:** The likelihood of an area being subject to earthquakes. The phenomenon of earth movements.

**Semi-arid:** A climate or region characterized by little yearly rainfall and by the growth of a number of short grasses and shrubs.

**Sensitive species:** Species whose populations are small and widely dispersed or restricted to a few localities; species that are listed or candidates for listing by the state or Federal government.

**Sensitivity level:** A measure of public concern for scenic quality based on various indicators of public concern.

**Sheet flow erosion:** Erosion caused by an overland flow or downslope movement of water taking the form of a thin, continuous fild over surfaces and not concentrated in channels.

**Side-stream gullying:** Erosion of soil or soft rock by running water that forms distinct narrow channels that receive water from a drainage area separate from that of the main stream into which it flows.

**Slumping:** Certain type of landslide. It is characterized by a shearing and rotary movement of a generally independent mass of rock or earth along a concave upward curved surface.

**Socioeconomic:** Have or involving both social and economic factors. A given geographical area delineated for specific research.

**Sound:** A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

**Spall:** A chip or fragment removed from a rock surface by weathering or a physical abrasion.

**Species:** A group of individuals of common ancestry that closely resemble each other structurally and physiologically, and in nature interbreed producing fertile offspring.

**Splitter Structure:** A flood control structure that splits the flow of water in a main channel into separate channels or pipes.

**Storm drains:** A structure used to covey storm water.

**Strata:** Plural of stratum-horizontal layer of sedimentary rock.

**Strike slip Fault:** A fault in which the movement is parallel to the fault's strike, where strike refers to the direction or trend taken by a surface.

**Sub-basin:** The area contributing overland flow to a stream segment. A basin generally consists of a number of sub-basins, that together contribute all overland flow to a single stream segment.

**Subsidence:** The gradual settling or sinking of an area, usually due to the withdraw of large amounts of ground-water.

**Surfactants:** A wetting agent or an agent that lowers the surface tension of a liquid, allowing easier spreading.

**Surficial soil:** Surface level soil.

**Taxa:** A group or category, at any level, in a system for classifying plants or animals.

**Tectonic modeling:** A branch of geology dealing with the broad architecture of the outer part of the Earth, that is the regional assembling of structural or deformational features (such as faults); a study of their mutual relations, origin, and historical evolution.

**Tertiary:** The first period in the Cenozoic Era, spanning 65 - 1.8 million years ago.

**Texture:** The aggregation of small forms or color mixtures into a continuous surface pattern; the aggregated parts are enough that they do not appear as discrete objects in the composition of the scene.

**Threatened species:** Any plants or animals that are likely to become endangered species within the foreseeable future throughout all or a significant portion of their ranges and which have been listed as threatened by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service following the procedures set out in the Endangered Species Act and its implementing regulations. Note: Some states also list species as threatened. Thus, in certain cases, a state definition would also be appropriate.

**Thrust faulting:** A fault with a dip of 45 degrees or less from an imaginary horizontal on which the hanging wall (one that would be hanging overhead for person standing in tunnel along or across fault) appears to have moved upward relative to the footwall (one that would be under feet of person standing in tunnel along or across fault).

**Topography:** The relative positions and elevations of surface features of an area.

**Trackway:** Fossils that are casts of animal tracks or footprints

**Traditional cultural property:** A location that is valuated by some group, such as an ethnic group, because it is a place of cultural patrimony, an important place in the traditional cultural landscape.

**Triassic:** The first period in the Mesozoic Era, spanning from 190 - 225 million years ago and following the Permian Period of the Paleozoic Era; characterized by the appearance of many reptiles, including the dinosaurs.

**Turbidity:** A measurement of the extent to which light passing through water is reduced due to suspended materials.

**Vadose zone soil:** Soil that is above the water table or above soil that is saturated. The pore space in between the grains in the vadose zone is occupied by air, not water.

**Vegetation community:** Species of plants that commonly live together in the same region or ecotone.

**Viewshed:** Visible portion of the specific landscape seen from a specific viewpoint, normally limited by landform, vegetation, distance and existing cultural modifications.

**Visual Resource Management (VRM):** A system for minimizing the visual impacts of surface-disturbing activities and maintaining scenic values for the future.

**Visual resource management class:** Classification of landscapes according to the kinds of structures and changes that are acceptable to meet established visual goals (BLM).

**Volatile organic compound:** Organic compound that participates in atmospheric photochemical reactions.

**Waters of the United States (U.S.):** All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce including adjacent wetlands and tributaries to waters of the United States; and all waters by which the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce.

**Watershed:** The line of division between two adjacent rivers or lakes with respect to the flow of water by natural channels into them; the natural boundary of a basin.

**Wetlands:** Those areas that are inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.Wetlands generally include swamps, marshes, bogs, and similar areas (e.g., sloughs, potholes, wet meadows, river overflow areas, mudflats, natural ponds).

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# INDEX

**RECORD OF DECISION**

FINAL
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
2002 MASTER PLAN UPDATE

*Environmental Impact Statement No. BLM/LV/PL-04/015+1793*

United States Bureau of Land Management
Las Vegas District
4701 N. Torrey Pines Dr.
Las Vegas, NV 89130

In cooperation with

Department of the Army
Sacramento District Corps of Engineers
650 Capital Mall
Sacramento, California 95814-4794

Approved by:

Mark T. Morse

Field Manager, Las Vegas Field Office

NOV 24 2004

Date

## DECISION

Based on the Final Supplemental Environmental Impact Statement (FSEIS), I approve Clark County Regional Flood Control District's proposed action for the implementation of their *2002 Master Plan Update*, along with the stipulations and mitigation measures specified within this Record of Decision (ROD). Completion of the proposed action including stipulations and mitigation measures specified within this ROD will not cause unnecessary degradation of public lands. Approval of this action includes my decision to grant rights-of-way (ROW) to construct, operate and maintain the facilities identified in the FSEIS with stipulations, as identified in this ROD. Additionally, the rights-of-ways when granted shall also be subject to Bureau of Land Management (BLM) standard stipulations applicable to this type of action as well as any other stipulations which the BLM Authorized determines may be necessary so as to ensure protection of the environment and the health and safety of the public with the following exceptions:

1. There will be no facilities located within Wilderness Areas. Should there be future proposed facilities within Wilderness Areas, the proposed action will be denied.

2. Facilities located partially or wholly within the Red Rock Canyon National Conservation Area (RRCNCA) and the Sloan Canyon National (SCNCA) Conservation Area are not compatible with the mandate for management of the RRCNCA and SCNCA. ROW applications that fall within these areas will not be accepted and these facilities will not be approved.

## NEED FOR ACTION

In 1985, the Clark County Regional Flood Control District (CCRFCD) was established in response to major floods in 1983 and 1984. The CCRFCD was tasked with developing a regional flood control program for Las Vegas and the surrounding area that would provide long-term improvement in public safety and protect property from major flooding events. In response, the CCRFCD prepared the *Clark County Regional Flood Control District Flood Control Master Plan* (Master Plan). The Master Plan required a review and update at 5-year intervals. Many of the facilities identified in the Master Plan are located on federal lands managed by the BLM. The National Environmental Policy Act (NEPA) of 1969 requires that actions involving federal agencies on public lands be supported by analyses of the environmental impacts of the proposed action and alternatives. In 1991, an Environmental Impact Statement (EIS) was prepared for the Master Plan and approved by the BLM in the EIS ROD.

Due to projects proposed outside of the original study boundary as well as changes in federal regulations that have occurred since 1991, a FSEIS was prepared for the Master Plan to update the 1991 Final EIS (FEIS). The purpose of the FSEIS was to assess impacts associated with implementation of the Master Plan and subsequent updates.

## DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The analysis in the FSEIS included the proposed action (detention/conveyance system) and no-action alternatives. The FEIS for the Master Plan approved June 4, 1991 analyzed three principal project alternatives and chose the detention/conveyance alternative (environmentally preferable alternative). Because the FSEIS is a supplement to the FEIS, it was not necessary to re-analyze alternatives other than the proposed action, tiered to the FEIS and ROD, and no-action alternatives. A complete description of the alternatives analyzed can be found in Chapter 2 of the FSEIS.

## MANAGEMENT CONSIDERATIONS

My decision to approve the CCRFCD's proposed action, including stipulations and mitigation, will not result in unnecessary degradation of public land. After examination of the findings of the FSEIS and consultation with the U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (USACE), and the Nevada State Historical Preservation Office (SHPO), the proposed action, as mitigated, is consistent with local planning and other public land uses in the area. The proposed action is also consistent with the Las Vegas Resource Management Plan, approved October 5, 1998. Approval of the proposed action will provide long-term improvement in public safety and protect property from major flooding events within and surrounding Las Vegas, Nevada. Additionally, the stipulations in this ROD, including project-specific analysis as described in Chapter 8 of the FSEIS, will provide comprehensive environmental protection during construction, operation, and maintenance of the facilities under the proposed action.

## MITIGATION AND MONITORING

This ROD adopts all mitigation measures contained in the FSEIS and requires they be implemented along with any additional measures deemed necessary. The mitigation measures adopted in the ROD will be developed into stipulations to the permits and ROW grants for the various individual components of the project. All practicable means to avoid or minimize environmental harm from the selected alternative will be implemented. Monitoring and enforcement programs will be required under the specific permits and ROW grants. Because the FSEIS includes lands administered by entities other than the BLM, annual progress meetings between the BLM's Authorizing Officer, USACE, CCRFCD, and those entities in which projects are constructed, will be conducted in order to ascertain compliance with all mitigation and stipulations. In order to ensure that project impacts on non-public lands are reduced through proper implementation, the CCRFCD will administer the programmatic application of project-specific mitigation measures (see Stipulation No. 2). The mitigation measures stated in this ROD will minimize potential adverse impacts identified in the FSEIS and the monitoring requirements will assist in identifying any unforeseen adverse impacts and implementing avoidance and/or mitigation measures.

## STIPULATIONS

1) Each facility will be reviewed on a project-specific level as described in Chapter 8 of the FESIS.

2) On non-public lands, the CCRFCD will administer the programmatic application of project specific analyses and mitigation measures to ensure that all objectives are achieved. The CCRFCD and BLM have agreed that the CCRFCD will, as a condition of funding projects within an entity, require that entity to comply specifically with both the letter and intent of the mitigation measures and stipulations identified in the FSEIS. This includes those processes necessary to comply with all applicable local, state, and federal laws and regulations, including NEPA. On those projects involving BLM permits and/or ROW grants, BLM will maintain lead responsibility for project-specific NEPA and regulatory compliance.

3) On BLM administered lands, excess sand and gravel excavated during construction of flood control facilities will be made available at BLM's discretion. Disposal of these excess materials may be accomplished through Material Site ROW's, Free Use permits or Material Sales Contracts.

4) The USFWS was consulted during the 1991 EIS process, as required under Section 7 of the Endangered Species Act of 1973 (ESA), as amended. The resultant Biological Opinion (BO) found that the proposed action would not result in jeopardy to the desert tortoise. As part of this ROD, the incidental take, terms and conditions, and reporting requirements in the BO are adopted as stipulations. Furthermore, the proposed action contains several facilities located outside of the area covered by the existing BO. Section 7 consultation will be reinitiated prior to the construction of any facility not covered by the existing BO. Additionally, the BLM and the CCRFCD will coordinate to the fullest extent possible with the Nevada Department of Wildlife (NDOW) on those proposed flood control structures located specifically around the periphery of the Las Vegas Valley in order to resolve conflicts, identify impacts to wildlife and their habitat, and to develop reasonable site specific mitigation measures which are deemed necessary to ensure protection of wildlife and their habitat.

5) Approval of authorizations is conditioned upon the CCRFCD obtaining and complying with all Federal, state, county and local permits and approvals; and complying with all applicable Federal, state, county and local laws and regulations. Major authorizing actions include Section 404 permitting through the USACE, Section 7 consultation under the ESA with the USFWS, and Section 106 consultation under the National Historic Preservation Act with SHPO. Facility construction will also require various project-specific permits and approvals.

6) The following stipulations, in addition to those previously identified, will be required with all use authorizations concerning the placement of dams upon lands administered by the BLM.

a) All state and local requirements pertaining to the location, construction, maintenance, major repair work, reconstruction, removal, and emergency action plans shall apply as minimum requirements.

b) Design shall be prepared by a Professional Engineer registered in the State of Nevada.

c) Design and Plans shall be submitted to the State of Nevada, Department of Conservation and Natural Resources, Division of Water Resources, State Engineer, for approval. Upon approval of the plans by that agency, a copy of NDWR's approval letter shall be submitted to the Authorized Officer of the BLM.

d) For facilities on BLM-administered lands, record drawings and the final inspection shall be provided to BLM within 90 days of completion of construction.

e) Any proposed modification to the structure shall be approved by the Nevada State Engineer's Office and a copy of the approved modification submitted to the BLM with the record drawings upon project completion.

f) Any changes in ownership must be approved by the Authorized Officer of the BLM in the form of a ROW assignment in advance of actual transfer to another party. These stipulations shall be a part of any change in ownership and shall be binding upon the legal owner until such time as the structure is removed to the satisfaction of the Nevada State Engineer's Office and the BLM.

g) An official representative for the BLM may at any time inspect the onsite construction, maintenance, and operation of the dam in connection with the use of public land for reservoir purposes. Official representatives of State and other Federal agencies may also inspect such activities if necessary to the performance of official duties that relate to the reservoir. The right to inspect includes the right to use private roads belonging to the permittee in order to reach the site.

h) If an inspection reveals that any damage has occurred to the structure, outlet works, spillway, or appurtenances, the damaged area shall be restored to the originally constructed lines and grades with materials and workmanship equal in quality to original construction. Such repairs shall be completed within 90 days following inspection and written notification.

i) The permittee, prior to initiation of construction, reconstruction, or major maintenance of facilities on the ROW which will involve disturbance of the land or use of heavy construction equipment will notify the BLM of their intent to proceed with such work, the date work is to commence, and the name of the delegated representative of the permittee.

j) If the permittee does not perform needed maintenance within 90 days of written notification, BLM will perform the required maintenance and charge the owner for the full cost of this work or; the authorizations previously granted by BLM may be revoked and the structure removed.

k) The permittee shall comply with all applicable local, state, and federal air, water, hazardous substance, solid waste, or other environmental laws and regulations, existing or hereafter enacted or promulgated. To the full extent permissible by law, the permittee agrees to indemnify and hold harmless, within the limits, if any, established by state law (as state law exists on the effective date of the right-of-way/permit), the United States against any liability arising from the permittee's use or occupancy of the pemit/right-of-way area, regardless of whether the permittee has actually developed or caused development to occur on the permit/right-of-way area, from the time of the issuance of the permit/right-of-way, and during the term of the pemit/right-of-way. This agreement to indemnify and hold harmless the United States against any liability shall apply without regard to whether the liability is caused by the permittee, its agents, contractors, or third parties. If the liability is caused by third parties, the permittee will pursue legal remedies against such third parties, as if the permittee were the fee owner of the permit/right-of-way area.

Notwithstanding any limits to the permittees ability to indemnify and hold harmless the United States which may exist under state law, the permittee agrees to bear all responsibility (financial or other) for any and all liability or responsibility of any kind or nature assessed against the United States, arising from the permittees use or occupancy of the permit/right-of-way area, regardless of whether the permittee has actually developed or caused development to occur on the permit/right-of-way area, from the time of issuance of the permit/right-of-way to the permittee, and during the term of the pemit/right-of-way.

l) The permittee shall prepare an emergency action plan for retention or detention dams in accordance with BLM standards for each structure with a high or significant hazard classification. The Authorized Officer will determine the hazard classification following an annual inspection of the downstream potential for property damage and/or loss of life.

m) In the event of a breach or major damage in the dam, repair plans shall be submitted by a Professional Engineer registered in the State of Nevada to the State of Nevada for approval. A copy of these plans shall be sent to BLM at the same time. BLM shall also be sent a copy of the approved plans.

n) The specific use authorization shall be deemed a non-exclusive right to use the land of the United States for construction, use, improvement, and maintenance of the dam and reservoir area. The public shall have the right to use the land for all activities allowed on public land which do not interfere with the permittee's right to safely construct and maintain the dam or the right to store and divert water for beneficial purposes in accordance with the Nevada State water permit.

o) Prior to termination of the authorization, the holder shall contact the Authorized Officer to arrange a pre-termination conference. This conference will be held to review the termination provisions of the authorization.

p) Within a specified time period prior to termination of the authorization, the holder shall contact the Authorized Officer to arrange a joint inspection of the authorization. This inspection will be held to agree to an acceptable termination (and rehabilitation) plan. The Authorized Officer must approve the plan in writing prior to the holder's commencement of any termination activities.

q) The authorization may be renewed. If renewed, it will be subject to regulations existing at the time of renewal, and such other terms and conditions deemed necessary to protect the public interests.

**PUBLIC INVOLVEMENT**

Completion of the FSEIS included public scoping meetings prior to onset of the project and public hearings for the Draft SEIS. The public involvement procedure was completed following NEPA regulations and guidelines.

**IMPLEMENTATION AND MONITORING**

Until this ROD has been signed and at least 30 days following the release of the FSEIS, no action having either an adverse environmental effect or which would limit the choice of alternative can be taken (40 CFR 1506.1(a)). Following approval of this ROD and the satisfaction of all other program-specific procedural requirements, implementation may begin. Implementation actions must be in accordance with the decisions as documented in this ROD. No substantive changes may be made in the implementation of the decision without reconsideration of NEPA compliance needs.