

## **3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

### **3.1 INTRODUCTION**

The purpose of this chapter is to describe the existing environment potentially affected by the project alternatives and the potential direct, indirect, and cumulative effects (or impacts) of activities pertaining to each alternative. Resources considered include air quality, water resources, earth resources, biological resources, land use, recreation resources, socioeconomics, visual resources, cultural resources, and noise. The sections that follow this introduction describe the existing environment and address the potential impacts on each resource. Most sections contain information characterizing the resource (issues and concerns, data collection, and a resource overview) followed by a discussion of the environmental consequences (including impact assessment methods, description of impacts by alternative, and a summary of mitigation and residual impacts). The last sections of the chapter include summaries of unavoidable adverse impacts and cumulative effects, respectively.

Impacts are defined as modifications to the existing condition of the environment and/or probable future condition that would be brought about by a proposed undertaking. Impacts can be beneficial (positive) or adverse (negative) and can result from the project directly or indirectly. Impacts can be permanent and long lasting (long-term) or temporary (short-term). Long-term impacts are defined as those that would remain substantially throughout and beyond project construction and operation. Short-term impacts are defined as those changes to the environment during construction that would revert to preconstruction conditions at or within a few years of the end of construction, either naturally or through mitigation. Impacts can vary in degree from no change or only slight discernible change to full modification of the environment.

Using the information regarding the existing environmental conditions and the description of the alternatives (Chapter 2), the types and magnitudes of impacts anticipated to occur from each alternative were identified and quantified to the extent practicable given this conceptual stage of the project. Impact discussions in this chapter are based on the types and amounts of disturbance estimated to occur under each alternative. Mitigation measures were identified for resources and are discussed by resource and summarized in Section 3.13.

### **3.2 CLIMATE**

The project area lies in north-central Maricopa County, Arizona, within the northeastern area of the City of Phoenix. Climatological data for the National Weather Service meteorological monitoring station, located at the Sky Harbor International Airport (approximately 16 miles south of the Reach 11 project site), were examined for discussion here (National Climatic Data Center 1999). Since the project site is approximately 300 feet higher in elevation and more rural than the Sky Harbor station, the actual site conditions would be expected to be nominally cooler and wetter than at the airport.

The Phoenix area is characterized by an exceptionally dry climate. Normal rainfall amounts rarely exceed 10 inches per year and average approximately 7 inches per year. Roughly every 7

to 10 years a global phenomenon, commonly referred to as “El Niño,” results in higher than normal rainfall amounts in many areas of the western United States, including Arizona. These periods are sometimes followed by the reverse effect, known as “La Niña,” which is characterized by drought conditions.

Two distinct seasons generally account for the majority of rainfall in the Phoenix area. During the summer months of July, August, and September, moist air flows northward from the Gulf of Mexico, causing moderately heavy afternoon and evening thundershowers. This season is known as the monsoon season. These storms are often restricted to the higher elevations lying east and north of the project site, but when they spread over the desert floor around Phoenix, they are often preceded by gusty winds and dust storms from the south and east. The July to September period is usually characterized with the highest humidity of the year. During the cooler season, primarily October to March, additional precipitation occurs as moist air moves easterly across much of the Southwest with Pacific fronts. Typically, May and June are the driest months of the year.

Table 3-1 summarizes average monthly rainfall amounts recorded for Phoenix during the 100-year period from 1896 to 1995.

<b>TABLE 3-1 SUMMARY OF RECORDED PRECIPITATION PHOENIX, ARIZONA</b>		
<b>Month</b>	<b>Mean (inches)</b>	<b>Highest Daily Rainfall (inches)</b>
January	0.73	1.18
February	0.57	0.89
March	0.70	0.90
April	0.27	0.71
May	0.09	0.70
June	0.16	1.37
July	0.72	1.15
August	1.10	2.73
September	0.65	2.43
October	0.50	1.69
November	0.44	1.07
December	0.81	1.43
Source: Schmidli 1996		

Summer temperatures in the Phoenix area are very high with afternoon maximums exceeding 110 degrees Fahrenheit (°F) regularly during June and July. During July and August, morning lows above 80°F are common. During the winter, temperatures are usually mild with lows ranging from the high 30s to low 50s. Subfreezing temperatures are uncommon, usually occurring less than 10 days per year.

Table 3-2 summarizes the maximum, minimum, and average monthly temperatures recorded for Phoenix during the 100-year period from 1896 to 1995.

**TABLE 3-2  
SUMMARY OF RECORDED TEMPERATURES  
PHOENIX, ARIZONA**

<b>Month</b>	<b>Record High (°F)</b>	<b>Record Low (°F)</b>	<b>Monthly Average (°F)</b>
January	88	17	51.3
February	89	22	55.1
March	95	25	59.8
April	104	37	68.0
May	113	40	76.5
June	116	51	85.2
July	118	66	91.4
August	116	61	89.3
September	118	47	83.9
October	104	34	72.7
November	92	27	60.3
December	88	22	52.6
Source: Schmidli 1996			

Dominant daytime winds are usually from the west and southwest, as influenced by upper air movement throughout the southwestern United States. Early morning wind flows from the east are also common. Winds are less than 15 miles per hour a majority of the time; stronger winds can occur during times of pronounced regional pressure gradients (more common in the spring and fall, usually from the west and southwest) and with summer thunderstorms. While even light winds can cause particulate matter to become airborne creating dust and haze (depending on the relative quantity of disturbed, unstabilized high-silt soils), their effect on the air quality typically is localized and temporary in nature. Visibility values are normally high and fog is rare.

### **3.3 AIR QUALITY**

#### **3.3.1 Issues and Concerns**

Ground-disturbing activities associated with each alternative would emit pollutants into the atmosphere as fugitive emissions. The amount of pollutants emitted would depend on the extent of the ground-disturbing activities in each specific area, number of areas disturbed at any one time, and duration of the ground-disturbing activities in each area.

Under each alternative, the same types of construction-related ground-disturbing activities would occur, but at different rates, and over different sized areas and locations. These activities would include but not be limited to: demolition and debris removal (loading and unloading of material into trucks, scraping, bulldozing, vehicle travel on paved and unpaved roads, and grading); site preparation (loading and unloading of material into trucks, vehicle travel on paved and unpaved roads, grading, and bulldozing); wind erosion from exposed areas; and topsoil replacement.

#### **3.3.2 Data Collection**

Air quality in the Reach 11 study area was characterized using data from the City. Information on emission factors was provided by the U.S. Environmental Protection Agency (EPA) publication titled *Compilation of Air Pollutant Emission Factors, Volume 1, Fifth Edition, AP-42* (1997).

### 3.3.3 Resource Overview

The Phoenix metropolitan area is classified as a non-attainment area for particulate matter less than 10 microns in diameter (PM<sub>10</sub>). Maricopa County requires an earth-moving permit for disturbances over 0.1 acre that addresses fugitive dust-generating activities. This permit stipulates that the contractor must have a dust control plan in place that adequately addresses controlling fugitive dust emissions from ongoing ground-clearing activities.

If the projected particulate emissions from the Reach 11 project equal or exceed 100 tons per year, a State Implementation Plan (SIP) Conformity Analysis would be necessary, assuming the area remains classified as a nonattainment area for PM<sub>10</sub>.

### 3.3.4 Environmental Consequences

#### 3.3.4.1 *Impact Assessment Methods*

Without refined atmospheric dispersion modeling, it is difficult to assess off-site pollutant impacts that may result from ground-disturbing activities. However, a rough estimate of pollutant emissions (in tons per year) was developed using generic emission factors for criteria such as the number of vehicle miles traveled, area cleared, and other related factors. These emission factors and the specific parameters for each location can be used to roughly assess pollutant impacts associated with the ground-disturbing activities (refer to Appendix C for details).

#### 3.3.4.2 *Alternatives*

Under all alternatives, including the No-Action Alternative, construction of the already approved 64<sup>th</sup> Street crossing would occur between Zones 5 and 6. There would be some deterioration of air quality during construction; however, this would be a localized condition that would cease once construction is completed. Increased recreation-related traffic in the area is not expected to contribute significantly to the changes in existing air quality. A small portion of total vehicle pollutant emissions from traffic in the area will be attributable to the proposed actions or other alternatives. Total estimated increases in vehicle pollutant emissions associated with the increase in vehicle traffic related to recreation use of Reach 11 are less than 0.5 ton per year (Appendix C, Table C-9). Long-term adverse impacts are not expected to result from use of Reach 11 (Reclamation 1997a).

#### *No-Action Alternative*

Extensive ground clearing and construction of facilities would occur throughout Zones 1 and 3 under the No-Action Alternative. Additional areas would be cleared, to a lesser degree, in Zones 4 and 6. If the displaced facilities that were originally targeted to be located in Zone 2 were to be relocated in Zone 4, 5, or 6, there could be up to about 200 additional acres disturbed. Ground-disturbing activities may create fugitive dust and PM<sub>10</sub> above current ambient levels; however, the amount disturbed and duration in any given area cannot be predicted. The PM<sub>10</sub> levels typically associated with these ground-disturbing activities are anticipated to be minimal and short-term, primarily occurring during construction. The No-Action Alternative includes a motor bike training facility as part of future development in Zone 1. Potential long-term fugitive dust levels associated with use of the 9-acre motor bike training facility are expected to be higher

than current ambient levels, as well as higher than for activities contemplated for the action alternatives (refer to Appendix C for more information).

#### *Proposed Action*

Under the Proposed Action, a maximum of 300 acres would be disturbed during construction, although the amount disturbed and duration in any given area currently is not known. Environmental impacts resulting from construction and operation of the proposed activities would be similar to those discussed under the No-Action Alternative. The estimated calculations, presented in Appendix C, indicate conformity threshold limits would not be exceeded.

#### *Alternative 1*

Under Alternative 1, a maximum of 182 acres not previously disturbed would be disturbed. Environmental impacts would be similar to those discussed under the Proposed Action.

#### *Alternative 2*

Construction of Alternative 2 would result in a maximum of 476 acres that would be disturbed during construction, although the amount disturbed and duration in any given area is currently not known. Environmental impacts would be similar to those discussed under the No-Action Alternative. Due to the amount of acres that would be disturbed, the estimated emissions could exceed conformity threshold limits, depending upon the amount of construction occurring concurrently. It is anticipated that a State Implementation Plan Conformity Analysis would be required; this would need to be completed prior to commencement of construction.

#### **3.3.4.3 Summary**

For the most part, air quality effects resulting from the alternatives are expected to be short-term and cease once construction activities are completed. Increased recreation-related traffic in the area is not expected to contribute significantly to the changes in existing air quality. However, the No-Action Alternative may create longer-term impacts as a direct result of the operation of the motor bike training facility.

#### **3.3.5 Mitigation Measures**

Ground-disturbing activities during construction under all of the alternatives may create fugitive dust and PM<sub>10</sub> above current ambient levels. Potential dust emissions during construction can be controlled by the following methods:

- Design construction activities in such a manner that a minimum amount of fugitive dust would be created and would be kept within the project boundaries by barriers or absorbent materials (e.g., polymer sprays, soil cement). A dust control plan would be completed and implemented in accordance with Maricopa County permit requirements.
- Spray water on the soil and excavated materials to keep dust on the ground.

- Place gravel on access roads.
- Cover soil and debris piled in open trucks.

Potential dust emissions after construction can be reduced by the following methods:

- Implement habitat and vegetation enhancement measures.
- Place gravel or asphalt on parking areas.
- Spray water as needed to control dust levels in the equestrian areas and on ball-field infields.

## **3.4 WATER RESOURCES**

### **3.4.1 Issues and Concerns**

Water resource-related issues are of primary concern to Reclamation, the Arizona Department of Water Resources (ADWR), Arizona Department of Environmental Quality (ADEQ), COE, and FCDMC. In addition, public comments indicated concerns associated with preservation of surface drainages and the use of reclaimed water for irrigation of golf courses and other turfed facilities; specifically, concerns have focused on the potential for impacts on underlying groundwater as well as public contact with reclaimed water. Another concern identified during the planning process was whether the construction of several irrigation ponds throughout the park could create an environment that would foster a larger mosquito population. Jurisdictional waters of the United States also exist in Reach 11, presenting the potential need for permitting under Section 404 of the Clean Water Act. The City of Phoenix will prepare a detailed jurisdictional delineation and confirm this with the COE, and complete any necessary permitting prior to site construction.

Hydrologic data were collected and reviewed to evaluate floodplain issues, surface water issues related to runoff and detention of stormwater, and groundwater resource issues related to irrigation and use of treated reclaimed water. Hydrology of Reach 11 is shown on Figure 3-1. Potential effects on surface water and groundwater quality and quantity, drainage, and associated xeroriparian habitat were also identified. These are presented in the environmental consequences section.

### **3.4.2 Data Collection**

Surface water and groundwater resource information was collected for the Reach 11 site and the area immediately surrounding the Reach 11 stormwater detention dikes. Aerial photographs were reviewed to identify major washes. Site visits also were conducted to review existing surface water drainage conditions. Water quality data related to surface water, groundwater, and reclaimed water, and projected wastewater treatment capacity and existing turf irrigation demands for the area were obtained from the City of Phoenix Water Services Department (WSD). Water level and water quality data associated with the groundwater underlying the site were accessed using the ADWR Groundwater Site Inventory (GWSI) database (1999).

### **3.4.3 Resource Overview**

#### **3.4.3.1 Surface Water**

The Reach 11 dikes intercept a number of natural desert washes flowing from the north. These washes vary in capacity and dimension. Flow in these drainages is intermittent, usually conveying water and sediment only as a result of stormwater runoff. Several washes may be classified as jurisdictional waters of the United States under Clean Water Act Section 404 rules.

The existing dike structures cause surface water runoff to pond, initially in the vicinity of the individual drainages. As flows continue into the detention basin from larger storms, the ponded areas expand, as described below in the discussion on floodplains. Sediment carried by stormwater flows deposit within the footprint of the ponded areas. The natural wash segments closest to the dikes receive the greatest sediment accumulation due to their greater frequency of ponding.

#### **3.4.3.2 Floodplains**

The Reach 11 area has two dikes and detention basins to intercept and hold surface water runoff originating from the watershed north of the dike system, as shown on Figure 3-1. Dike 1 contains surface water runoff between Cave Creek Road and Tatum Boulevard, with Dike 2 containing surface water runoff from Tatum Boulevard to Scottsdale Road. During the summer, drainage to the detention basins travels through typically dry desert washes in response to brief but intense storms associated with the monsoon season. Winter rainfall tends to be of longer duration, thereby allowing a greater degree of natural recharge to occur in comparison to summer monsoons.

While the land within the detention basin is available for the development of recreational facilities, any construction occurring within the basin must not reduce its detention capacity. The detention capacities of Dikes 1 and 2 are approximately 19,000 acre-feet and 14,000 acre-feet, respectively, to top of dike elevation 1,553 feet. Movement of earth material from above the 100-year storm, 50-year sediment elevation to below that elevation is permitted only if an equal volume is removed from below the 100-year storm, 50-year sediment elevation. The 100-year storm, 50-year sediment elevations for Dikes 1 and 2 are approximately 1,535 feet and 1,540 feet, respectively. The 100-year flood volume and 50-year sediment volume for Dike 1 is 2,080 acre-feet and 840 acre-feet, respectively. The 100-year flood volume and 50-year sediment volume for Dike 2 is 3,340 acre-feet and 1,190 acre-feet, respectively.

#### **3.4.3.3 Groundwater**

A search of the ADWR GWSI database was conducted to locate wells within a 1-mile radius of Dikes 1 and 2.

A query for 72 sections along and north of Dikes 1, 2, and part of Dike 3 yielded 10 wells with most recent water level depths of 367 to 671 feet between ADWR measured dates of 1989 and 1994. ADWR verified one at 671 feet and the average depth to water of the 10 wells is 516 feet. The groundwater elevation ranges from 987 to 1,194 feet above mean sea level.

The decline in groundwater levels since the 1980s is approximately 30 feet. It is currently held that declining groundwater elevations are caused by excessive groundwater withdrawal. The Arizona State Groundwater Management Act of 1980 restricts desert cities' reliance on groundwater; under this Act, the Phoenix Active Management Area must achieve a safe yield (i.e., groundwater withdrawn must not exceed groundwater replenished) by the year 2025 or earlier.

#### **3.4.3.4 Turf and Landscape Irrigation**

Turf areas within Reach 11 would be subject to water conservation requirements pursuant to the 1980 Groundwater Management Code (GMC), which is administered and enforced by the ADWR Phoenix Active Management Area (Phoenix AMA). Phoenix City Code (Article IX § 37-110 through § 37-112) also requires water conservation.

Under both State and City regulations, turf-related facilities that are 10 acres and larger are subject to annual water allotments based on landscape area and type as prescribed in Table 3-3. Golf courses are subject to special water allotments based on the number of regulation holes.

<b>TABLE 3-3 ANNUAL WATER ALLOTMENTS</b>	
<b>Landscape Type</b>	<b>Allotment (Acre-Feet/Acre)</b>
Turf	4.8
Water Feature	6.2
Desert	1.5

Turf facilities that use groundwater in excess of their allotment are subject to fines from the Phoenix AMA as well as water use surcharges from the Phoenix Water Services Department.

Turf facilities that are larger than five acres must obtain a permit from the City of Phoenix to use water for irrigation. The permit requires the turf facility to develop a water conservation plan and to use reclaimed water for irrigation and for filling water features, if it is available.

#### *Reclaimed Water Source*

Reach 11 lies within the City of Phoenix Cave Creek Reclaimed Water Service Area, which requires that reclaimed water be used for irrigation to the fullest extent possible. Reclaimed water would come from the Cave Creek Wastewater Reclamation Facility (CCWRF), located just west of Cave Creek Road and north of the CAP canal. Wastewater collected at the facility comes primarily from domestic sources and is purified through a tertiary treatment process, which includes primary clarification, activated sludge treatment, nitrification/denitrification, filtration, and ultraviolet light disinfection. A chlorine residual of up to 2 milligrams/liter will be maintained in the distribution system to help maintain water quality. General water quality criteria from the outlet of the ultraviolet (UV) disinfection system at the reclamation plant are listed in Table 3-4.

Figure 3-1  
Hydrology

11 x 17  
Color

<b>TABLE 3-4 GENERAL WATER QUALITY CRITERIA (from outlet of UV disinfection system at reclamation plant)</b>	
<b>Parameter</b>	<b>Mean</b>
Biological oxygen demand	0.4 mg/l
Dissolved oxygen	1.0 mg/l
Enteric virus	N/A
Fecal coliform bacteria	<2.2 CFU/100ml
<i>Giardia lamblia</i>	N/A
Total nitrate (as n)	7.0 mg/l
pH	7.0 pH
Phosphate	4.0 mg/l
Settable solids	0.1 mg/l
Suspended solids	1.2 mg/l
Temperature	80 °C
Total residual chlorine	1.5 mg/l
Turbidity	<2.0 NTU

ADEQ has established five water quality classes for direct use of reclaimed water. Effluent produced by the CCWRF meets or exceeds the highest quality criteria, A+, as described in Arizona Administrative Code, Title 18, Chapter 11, Article 3.

Use of reclaimed water for irrigation and lake filling must be permitted by ADEQ. The type of permit needed is based on the quality of the water. The Water Services Department (WSD) is in the process of modifying the Aquifer Protection Permit (APP) for the CCWRF to obtain the A+ water quality certification. With this certification, facilities wishing to use reclaimed water must obtain a Type 2 General Permit.

#### *Availability of Reclaimed Water*

The CCWRF has an initial design capacity to treat 8 million gallons per day (MGD) of wastewater. With plant expansions, the facility will have an ultimate capacity of 32 MGD. At this time, only about 2 MGD are being treated.

WSD is contractually obligated to deliver reclaimed water to nine turf facilities, which include four golf courses, three parks, a high school, and a cemetery. Irrigation demand from these facilities will vary from little to no use during cool, wet periods to 5.5 MGD during the hot, dry summer months. Since only 2 MGD of reclaimed water are currently being produced, there is not enough reclaimed water to meet peak demand. Because of this situation, no new customers will be served until production approaches demand level. Reach 11, therefore, may need to use water from other sources (i.e., potable, or raw CAP water) initially until reclaimed water is available. The amount of time it will take for effluent production to meet current peak demand will depend on how quickly the Cave Creek area develops.

### **3.4.3.5 Mosquito Habitat**

Members of the public have expressed concern over whether the addition of irrigation ponds would create an environment conducive to breeding mosquitos. Mosquitoes can be a nuisance, or a health threat by transmitting diseases such as viral encephalitis. Although mosquito-borne encephalitis in humans is rare, it can be very dangerous. The risk of occurrence is highest during the warm months when mosquitoes reproduce (Mayo Clinic 1999).

Two major varieties of mosquitoes may occur in Reach 11. Marsh-breeding mosquitoes (*Culex* sp.) typically seek shelter in dense vegetation such as lodged bulrush/cattail or dense grasses along shorelines. They utilize permanent standing water with high organic content (Banck 1998-2000). The second major variety is floodwater mosquitoes (*Aedes* sp.). These mosquitoes tend to breed when and where periodic inundation occurs. These species are most prevalent at Reach 11 under existing conditions and do not carry disease, but may constitute a nuisance. These mosquitoes can be located around small ponds and in low areas that collect water.

As of the date of this EIS, the mosquito-borne West Nile Virus has not arrived in Arizona. In the event of its arrival, the PRD would continue to follow the Maricopa County vector control protocol for eliminating mosquitoes, or would implement any revised protocol identified by Maricopa County. This treatment would benefit both the users and adjacent property owners.

To control mosquito populations at Reach 11, the PRD currently applies “Vectobac G”, a larvicide, into standing water within 48 hours of a rain event. PRD also has employed the use of fog treatments (Fyfanon ULV Adulticide) as needed.

## **3.4.4 Environmental Consequences**

### **3.4.4.1 Impact Assessment Methods**

Reclamation’s agreement with the City requires that the detention basins not be altered in any manner that would affect their ability to detain runoff from the design storm. To compare the alternatives, the acres of turf and associated irrigation requirements were estimated. Key considerations included water use and reclaimed water availability. General types of impacts for groundwater, surface water, and mosquitoes are described below.

#### *Water Resources*

Potential water quality impacts from stormwater runoff could result from an increase in parking areas within Reach 11 where oil and other petroleum-based products can be deposited. Runoff from these parking areas may contain an increased amount of oil and petroleum products.

The very nature of the detention basin, regardless of recreational use, causes sediment accumulation over time. PRD maintenance activities for the recreation facilities would include sediment removal on an as-needed basis. The removal of accumulated sediments would minimize impacts on natural desert wash segments within the developed portions of the flood basins by lowering the flow and flood elevations behind the dikes.

Although each of the three action alternatives has been developed with the intent of minimizing impacts on existing desert washes, there still may be some activities affecting washes that would require permitting by COE under the Section 404 permit program. Individual Section 401 certification by ADEQ also may be needed if an individual 404 permit is required.

There would be a decrease in the amount of land available for infiltration and natural recharge due to construction of parking facilities or concrete surfacing. There would also be increased infiltration in turf areas during storm events, since the turf would hold water longer, thus increasing percolation. This is not expected to affect the quality or quantity of the groundwater.

Reclaimed water would be used for irrigation within Reach 11 to varying degrees depending upon the alternative implemented. Under all alternatives, reclaimed water would be stored within lined irrigation ponds. The ponds would allow for better management of the resource; reclaimed water stored within the ponds would be drawn down during irrigation times, and then refilled at a rate based upon the delivery capability of the reclaimed water distribution system.

To prevent the loss of stored irrigation water through infiltration, the ponds would be lined. Although liners can leak, it is highly unlikely that a leak of sufficient size and duration would develop to allow reclaimed water to reach the groundwater, due to the considerable depth to groundwater that exists within Reach 11 (ranging roughly between 350 and 500 feet below land surface). In the event that any major leaks occur, they would be repaired or the pond relined. Use of reclaimed water for irrigation would pose little threat to the quality of the groundwater because it would not reach the groundwater table through surface application. Turf irrigation typically is controlled to minimize water use, ponding, and runoff. The natural processes of evaporation and transpiration by vegetation limit the depth of water infiltration, resulting from drip or sprinkler irrigation, to a range of several inches to several feet. Although greater infiltration depths can occur in very permeable soil conditions, it is highly unlikely that turf irrigation would impact the groundwater quality at this site.

### *Mosquitoes*

Mosquito populations may increase with the presence of the proposed irrigation ponds. Marsh-breeding mosquito populations may be managed through the lined irrigation pond design that eliminates the development of dense vegetation (habitat) on pond edges, application of larvicides, and potentially the introduction of the Mosquito fish (*Gambusia affinis*) in the ponds that can control the mosquito population. Floodwater mosquito populations also can be controlled after storm events that produce standing water, through the continued application of larvicides and other vector control measures. Additionally, populations of this type of mosquito may be controlled through regular drawdown of the ponds.

#### **3.4.4.2 Alternatives**

Potential impacts on water resources are discussed below by alternative. Tables B-1a through B-1h in Appendix B provide estimated monthly turf irrigation requirements for each alternative, as well as the reclaimed water availability from the CCWRF after meeting existing demands. CCWRF should be able to supply enough reclaimed water to meet the long-term irrigation needs

for any of the alternatives. Potable or raw CAP water, however, may need to be used initially if the CCWRF is not producing enough recycled water to meet existing customer demands.

Estimates of the amount of supplemental irrigation that would be used to maintain or enhance wildlife habitat were not estimated because the amount of water occurring naturally (e.g., precipitation) will vary seasonally over time.

Under all alternatives, in compliance with ADOT regulations, all drainage incurred as a result of the freeway construction within Zone 2 will be controlled by ADOT in a new basin being constructed on the west side of SR 51. ADOT does not expect that freeway drainage in Zone 2 will affect drainage in the other zones (Romero 2000).

The 64<sup>th</sup> Street crossing, which will be constructed regardless of the alternative selected, will partially fill one wash at the north end of the basin, and use of the designated borrow area will eliminate four small washes. The points at which these washes enter the borrow area basin will be protected by slope stabilization treatments such as riprap, to minimize erosion (Reclamation 1997a).

Under all alternatives, jurisdictional waters of the U.S. will be avoided to the greatest extent practicable. Where avoidance is not practicable, impacts on waters of the U.S. will be minimized and mitigated consistent with Clean Water Act Section 404 permit requirements.

#### *No-Action Alternative*

Modifications in Zones 1, 3, and 4 would result in some minor but unquantifiable increase in stormwater runoff due to changes in surface cover (i.e., displacement with hard surface structures such as parking areas and buildings). Reach 11 cannot be modified in a way that reduces detention capabilities. Any runoff from additional structures or pavement would be contained on site.

There would be approximately 195 acres of turf in Zone 1 under the No-Action Alternative. The turf irrigation requirements would total approximately 956 acre-feet annually. The introduction of turf vegetation would result in some minor but unquantifiable increase in infiltration during storm events.

Creation and use of a scenic drive along the entire northern edge of the Reach could result in the introduction of additional roadway-related pollutants (oil and grease) in surface runoff entering into the Reach. Depending upon the design of the drive roadway, ephemeral washes could be cut off, or the manner in which stormwater runoff enters the Reach could change into more of a sheetflow pattern.

#### *Proposed Action*

Modifications to Zones 1, 3, 4, and 5 would result in a minor increase in surface water runoff due to changes to approximately 43 acres of surface cover. The majority of the change in surface cover would occur in Zone 1, where 28 acres of desert land would be converted to basketball courts, parking areas, buildings, and a maintenance yard. About 12 acres in Zone 3 would be

converted to parking areas. Just over 1 acre in Zone 4 would be converted to a building, and less than 1 acre each in Zones 5 and 6 would become parking areas.

Approximately 172 acres would be converted to turf under the Proposed Action: 99 acres in Zone 1, 41 acres in Zone 3, and 32 acres in Zone 6. The turf irrigation requirements of the Zone 1 playing fields would total approximately 485 acre-feet annually. The irrigation requirements for Zone 3 would total approximately 201 acre-feet annually and the requirements for Zone 6 would total approximately 157 acre-feet annually. The total turf irrigation requirements for the Proposed Action are approximately 843 acre-feet. The introduction of turf vegetation would result in some increased infiltration of runoff during storm events, which could offset any increase in surface runoff.

#### *Alternative 1*

Surface water runoff would increase nominally as a result of modifications to approximately 8 acres of surface cover in Zone 1, and just under 1 acre in Zone 6. Any increase in surface runoff would be retained behind the dike.

Alternative 1 would require the least amount of irrigation in comparison to the other alternatives. There would be approximately 84.5 acres of turf in Zone 1 and 7.5 acres of turf in Zone 6. The turf irrigation requirements for both zones would total approximately 451 acre-feet annually.

#### *Alternative 2*

An increase in surface water runoff would occur due to modifications to the surface cover (i.e., displacement with hard surface structures) to approximately 71 acres under Alternative 2. Approximately 41 acres in Zone 1 would be converted for parking areas, a recreation center, and basketball courts. About 8.5 acres in Zone 3 would become hard-surfaced parking areas. Just over 10 acres in Zone 4 would be converted picnic areas. About 6 acres would be converted to a clubhouse and parking area in Zone 5, and another 5.5 acres in Zone 6 would be converted to another clubhouse and parking area. The increased surface water runoff from these 71 acres would need to be contained within the detention basins.

Alternative 2 would have the greatest need for turf irrigation water in comparison to the other alternatives. The construction of two golf courses and various open turf areas would result in about 227 acres of turf requiring approximately 1,114 acre-feet annual irrigation. Of all the alternatives, Alternative 2 would have the greatest likelihood of requiring use of potable water in addition to reclaimed water, for turf irrigation purposes.

Although unquantifiable, this alternative would result in the greatest increase in stormwater runoff infiltration resulting from the conversion to turf vegetation. This increased infiltration could ameliorate any increased runoff resulting from hard surfacing.

#### **3.4.4.3 Summary**

There would be an increase in stormwater runoff due to changes in surface cover of between 9 and 71 acres, depending upon the alternative implemented. The action alternatives have been designed to avoid major washes and none of the alternatives would conflict with the primary

function of the detention basins. Sufficient reclaimed water from the CCWRF should be available to supply all turf irrigation needs, regardless of the alternative; however, should additional water be needed during summertime peak use, potable or raw CAP water would be used. It is anticipated there would be no impacts from use of reclaimed water on the local groundwater due to the depth to groundwater in the area and use of normal irrigation practices.

### **3.4.5 Mitigation Measures**

The following mitigation measures could be implemented to reduce impacts on water resources related to water use and runoff:

- Avoid water pollution through control of sanitary facilities and proper storage of fuels and other contaminants.
- Obtain appropriate permits, including Section 404 of the Clean Water Act, for any portions of project implementation in the event that jurisdictional waters are crossed or disturbed.
- Avoid discharge or pollutants into waters of the United States
- Irrigate at night, to the degree practicable, to minimize evaporation.
- Use highly drought-tolerant grass species in turf areas such as Bermuda grass to the degree practicable.
- Incorporate the use of an oil-water separator for high-use, paved parking areas, where appropriate.

Potential impacts related to mosquito populations can be mitigated through measures to address each type of mosquito. The potential for marsh-breeding mosquito populations to develop would be effectively mitigated by incorporating any of the following irrigation pond design considerations (Olson 2000):

- Sharply angle the edges (90 degrees) of irrigation ponds.
- Ensure that water does not stagnate, and drawdown on the irrigation ponds occurs regularly.
- Allow little to no vegetation growth along the pond's edge.

Potential impacts related to floodwater mosquitoes would be mitigated effectively through the development and implementation of a vector control management plan by the City, in consultation with the Maricopa County Vector Control Division (Olson 2000). Related mitigation measures could include the following:

- Implement the existing action plan for applying insecticides in a timely manner after storm events, during breeding conditions, with an emphasis on primary treatment in the larval stage.

- Ensure that an operation and maintenance road is available to provide treatment to flooded areas where practicable.
- Provide for vector control in the operation and maintenance budget for the park.

## **3.5 EARTH RESOURCES**

### **3.5.1 Issues and Concerns**

Issues related to earth resources associated with project implementation include possible subsidence, soil erosion, and the protection of existing flood control structures. Subsidence has occurred in southern Arizona due to excessive groundwater withdrawal in broad alluvial-filled basins. Although subsidence has been an issue in the past in this area (25-square-mile area bounded by 36<sup>th</sup> Street, Phoenix Mountains, Scottsdale Road, and about Bell Road) very little or no subsidence appears to be occurring in the area at this time (Matteson 1995). Soil erosion potentially could occur where there is loss of topsoil, mixing of soil horizons, and loss of soil productivity.

### **3.5.2 Data Collection**

An inventory of the earth resources that potentially may be affected by the action alternatives was compiled from several sources. The soils in the project area were mapped by the NRCS in the *Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona* (1986). Other geological data were obtained from Reclamation. The City and ADWR provided historical and subsidence information.

### **3.5.3 Resource Overview**

Reach 11 is located in the Sonoran Desert section of the Basin and Range physiographic province, which is typified by deep, broad alluvial valleys separated by steep, discontinuous subparallel mountain ranges. The Basin and Range physiographic province formed as a result of extensional tectonics approximately 10 to 13 million years ago. The mountain ranges generally trend north-south or northwest-southeast and the basins consist of up to several thousand feet of alluvium. Reach 11 is located in a northwest-trending structural basin within the Paradise Valley that is bounded on the east and northeast by the McDowell Mountains and on the south and west by the Phoenix Mountains and Union Hills. Depth to bedrock in the area is estimated to be greater than 3,000 feet. The McDowell Mountains are located about 5 miles east of Reach 11.

The basin fill deposits of the site include Recent to Quaternary alluvium and colluvium consisting of unconsolidated to weakly consolidated sandy silt, sandy clay, lean clay, and poorly to well-graded sand. Scattered boulders up to 24 inches in diameter were encountered during construction of the Reach 11 canal. These alluvial/colluvial deposits typically are caliche-cemented. The term “caliche” is a broadly used term that refers to deposits of secondary calcium carbonate of various origins. Excavation in areas where there are caliche deposits can be extremely difficult and expensive.

The soils in the Reach 11 area have been mapped by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), formerly Soil Conservation Service (SCS). The soils

are typically deep, well-drained loams, clay loams, and gravelly loams formed from alluvial and colluvial deposits on floodplains. Some of the soils have a moderate shrink-swell potential, which could result in damage to structures or buried pipelines. The water erosion hazard potential is slight. Table 3-5 presents restrictive soil features for development based on native, undisturbed soil types and on the NRCS criteria (SCS 1986).

### ***3.5.3.1 Land Subsidence***

In portions of southern Arizona, particularly in several broad alluvial-filled basins, excessive groundwater withdrawal has caused land subsidence. In some of these basins, groundwater levels have been lowered by 300 to 500 feet or more during a period of record from 1948 to 1983. With such large depletions, the alluvium has compacted and subsided. At the margins of some of these basins, earth fissures have formed over buried ridges or irregular bedrock surfaces due to tensional stress. Earth fissures vary in width from barely discernable to about 0.25 mile wide or more and may extend up to several miles long. They may be vertically offset. Damage to highways, canals, pipelines, buildings, and earth-filled dams has occurred as a result of land subsidence and/or earth fissures. Areas with extensive land subsidence often have required reconstruction of gravity-based pipelines and routine repair to various structures. Differential settlement may occur along portions of subsiding basins. Earth fissures may become enlarged in length and width when water from precipitation, irrigation, or sprinklers flows along the fissures and accelerates erosion. Piping along the fissure also may occur, causing collapse in the surface layer (Holzer 1984; Schumann and Genualdi 1986).

In a portion of northeast Phoenix near Reach 11, approximately 25 square miles of land have subsided. The area is generally bounded by 36<sup>th</sup> Street on the west, the Phoenix Mountains to the south, Scottsdale Road to the east, and between Greenway and Bell roads to the north. Subsidence of up to about 5 feet was measured in this area between 1962 and 1982, resulting in a bowl-like shape. Land subsidence in this area decreased the slope along sewer lines, which reduced the sewer lines' velocities and capacities. Storm drains and irrigation lines also were affected. At the southwestern margin of this subsiding basin, an earth fissure was discovered after heavy rains in January 1980. The fissure trends east-west near 40<sup>th</sup> Street and Lupine Avenue (Harmon 1982; Slaff 1993).

Since about 1975, the City has been monitoring subsidence in the area, between 24<sup>th</sup> and 72<sup>nd</sup> streets, and between Mountain View Road and Bell Road. From the survey data, it appears that the rate of subsidence leveled out by about 1988. Very little or no subsidence appears to have occurred in the area in the recent past (Matteson 1995).

### ***3.5.3.2 Collapsible Soils***

The fine-grained soils within Reach 11 have been classified as having generally low-to-moderate shrink-swell potential. Collapsible soils are those that shrink in volume when exposed to increased loading and moisture levels—in this case, either due to irrigation or ponding of water. This characteristic is due to the flocculated nature of the soils' deposition and is only evident in soils that have not been subsequently disturbed. Soil collapse generally occurs in near-surface soils and has most likely occurred beneath the Reach 11 dikes either during their construction or subsequently following the impoundment and infiltration of any stormwater. This is because a

**TABLE 3-5  
RESTRICTIVE SOIL FEATURES  
FOR DEVELOPMENT<sup>1</sup>**

<b>Map Unit No.</b>	<b>Soil Name</b>	<b>Picnic Areas<sup>2</sup></b>	<b>Playgrounds<sup>3</sup></b>	<b>Paths and Trails<sup>4</sup></b>	<b>Golf Fairways<sup>5</sup></b>	<b>Dwellings Without Basements<sup>6</sup></b>	<b>Small Commercial Buildings<sup>6</sup></b>
50	Estrella calcareous	moderate dusty	moderate dusty	moderate dusty	slight	severe flooding hazards	severe flooding hazards
	Estrella noncalcareous	moderate dusty	moderate dusty	moderate dusty	slight	severe flooding hazards	severe flooding hazards
55	Gilman noncalcareous	slight	slight	slight	slight	severe flooding hazards	severe flooding hazards
	Gilman calcareous	slight	slight	slight	slight	severe flooding hazards	severe flooding hazards
60	Glenbar noncalcareous	moderate dusty	moderate dusty	moderate dusty	slight	severe flooding hazards	severe flooding hazards
	Glenbar calcareous	moderate dusty	moderate dusty	moderate dusty	slight	severe flooding hazards	severe flooding hazards
75	Mohall	moderate dusty	moderate dusty	slight	slight	moderate shrink-swell conditions	moderate shrink-swell conditions
76	Mohall	moderate dusty	moderate dusty	moderate dusty	slight	moderate shrink-swell conditions	moderate shrink-swell conditions
78	Mohall	slight	slight	slight	slight	moderate shrink-swell conditions	moderate shrink-swell conditions
90	Momoli	moderate small stones	severe small stones	slight	severe droughty	slight	slight
112	Tremont noncalcareous	moderate small stones	severe small stones	slight	moderate small stones	moderate shrink-swell conditions	moderate shrink-swell conditions
	Tremont calcareous	moderate small stones	severe small stones	slight	moderate small stones	moderate shrink-swell conditions	moderate shrink-swell conditions
124	Valencia noncalcareous	slight	moderate small stones	slight	slight	severe flooding hazards	severe flooding hazards
	Valencia calcareous	slight	moderate small stones	slight	slight	severe flooding hazards	severe flooding hazards

**Notes:**

<sup>1</sup> The degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that some properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

<sup>2</sup> *Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

<sup>3</sup> *Playgrounds* require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry.

<sup>4</sup> *Paths and trails* for hiking and horseback riding should require little or no cutting and filling. The best soils are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

<sup>5</sup> *Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding. They have moderate slopes and no stones or boulders on the surface.

<sup>6</sup> *Dwellings and small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. Flooding and shrink-swell potential can cause the movement of footings. Depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction.

Source: USDA Soil Conservation Service, 1986. Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona.

higher relative load increase is experienced by the soils directly beneath the dikes than those at depth. Portions of Reach 11 dikes were rehabilitated by adding a seepage barrier and toe drain system in 1994-95. These modifications were made primarily to control potential internal erosion, and to safely control any seepage that might occur during major flood events.

### **3.5.4 Environmental Consequences**

#### *Impact Assessment Methods*

Potential impacts on earth resources include increases in soil erosion and geologic hazards such as subsidence or soil collapse. Potential impacts in Reach 11 were determined based on the low slopes, type of recreation facilities, and using the assumption that areas disturbed by construction that are not needed for permanent facilities would be revegetated. General impact types for collapsible soils are described below.

#### *Land Subsidence*

Future subsidence resulting from groundwater use for Reach 11 recreation purposes is not expected to occur as a result of project implementation. Damage to recreation facilities would not be anticipated from subsidence or earth fissures.

#### *Collapsible Soils*

Additional water use associated with turf irrigation would not cause any significant amount of collapse to occur. This is because surface preparation and grading activities for turf-covered areas would have disturbed the soil structure, effectively removing its collapse potential. Additionally, the amount of water applied for irrigation would not be enough to significantly saturate the subsurface and interact with the soils at depth.

All of the alternatives include the excavation of irrigation ponds in their design. The excavation for these ponds could create the potential of exposing higher-permeability soils that may cause infiltration of either irrigation or stormwater, which could affect the integrity of the dikes. The majority of the irrigation ponds have been sited more than 200 feet away from the flood control structures, thus any infiltrating water and its associated collapse would not pose any threat to the dikes' stability. All excavations within 200 feet of the dikes would be inspected and treated if necessary, prior to lining irrigation ponds or other activities, according to Reclamation's Technical Guidelines. The inspections should occur prior to starting dirtwork and periodically thereafter, so potential problems are identified early.

None of the alternative designs would increase the potential for near-surface collapse to either occur or affect the existing flood control capacity of the existing dikes. The dikes were designed intentionally to impound and infiltrate the stormwater associated with the design storm, and any collapse beneath the structure has more than likely already occurred.

### **3.5.4.1 Alternatives**

As mentioned earlier, portions of the 64<sup>th</sup> Street crossing borrow area basin will be treated with slope protection to prevent erosion. This will occur under any of the alternatives, including the No-Action Alternative.

#### *No-Action Alternative*

As turf, parking lots, and desert landscaping are established, soil erosion is expected to be minimal. The motor bike training area in Zone 1 (9 acres) may be subject to increased erosion over any of the action alternatives, because of ongoing ground surface disturbance from motor bikes.

Since very little surface disturbance is expected in Zones 4 and 5 under the No-Action Alternative, impacts would be very minimal and short term (i.e., limited to minor earthwork for the perimeter road and some facilities in the zone such as picnic tables).

#### *Proposed Action*

Under the Proposed Action, there may be some minor increases in soil erosion during construction. These increases are expected to be minimal and short term. Similar to the No-Action Alternative, construction activities would be minimized in Zones 4 and 5. Increased use of multi-use trails in all zones under the Proposed Action may increase damage to existing vegetation and result in some minor increases in soil erosion due to increased visitation and use.

#### *Alternative 1*

Some areas may be subject to increased soil erosion under Alternative 1. Environmental impacts would be similar to those discussed under the No-Action Alternative and Proposed Action.

#### *Alternative 2*

Environmental impacts resulting from Alternative 2 would be similar to those discussed under the No-Action Alternative and Proposed Action; however, some areas may be subject to increased soil erosion. Because this alternative contains plans for two golf courses, a larger portion of the area would be graded, reducing the overall abundance of natural vegetation. The increased soil erosion generally would be limited to the construction phase and should be short term and minimal because turf would replace the natural vegetation.

### **3.5.4.2 Summary**

Effects on earth resources are expected to be short-term, minimal, and primarily result from construction activities and increased visitation.

## **3.5.5 Mitigation Measures**

Mitigation measures that may reduce or eliminate the impacts on earth resources include the following:

- Conduct all construction and maintenance activities in a manner that minimizes disturbance to xeroriparian vegetation, wash channels, and the existing flood control structures.
- Conduct any excavation near the flood control structures under the review and supervision of Reclamation. Use soil removed during impoundment excavation for site grading and fill where appropriate.
- Revegetate disturbed areas as appropriate.
- Use erosion control measures, including the use of geo-web, hay bale checks, and rock riprap (as appropriate), during construction to reduce the impacts of surface water runoff.
- Provide signs to encourage park users to stay on trails or within developed areas to protect soils.

## **3.6 BIOLOGICAL RESOURCES**

### **3.6.1 Issues and Concerns**

Issues and concerns related to biological resources in Reach 11 include preservation of existing vegetation and wildlife habitat, especially between Tatum Boulevard and 56<sup>th</sup> Street, where habitat is considered to be of relatively higher quality due to greater vegetative diversity, cover, and vertical structure. The maintenance of potential wildlife movement corridors was also identified as an issue. The clustering of developed areas and the separation of developed areas from natural areas have been identified as potential ways to minimize habitat disturbance and fragmentation. A comment on the DEIS from the AGFD indicated that the presence of wildlife habitat within Reach 11 adjacent to new developments (especially north of Reach 11) will result in occasional conflicts between wildlife and people. On occasion, AGFD may need to capture and remove nuisance wildlife on or adjacent to the park, or resolve the problem in other ways.

### **3.6.2 Data Collection**

General vegetation and habitat data were mapped for Reach 11 and include xeroriparian and desertscrub vegetation (Figure 3-2). Vegetation and wildlife habitat data were obtained from a survey and habitat analysis effort for Reach 11 conducted by the Arizona Game and Fish Department (AGFD) and Reclamation in May and June of 1994, and site visits conducted by Dames & Moore in August and October 2000. The effort by AGFD and Reclamation focused on characterizing areas of dense vegetation cover associated with ephemeral drainages and areas of water detention adjacent to the dike of the CAP canal. Plant species composition and relative wildlife value were described for these areas. Dames & Moore's visits focused on characterizing vegetation and wildlife habitat present throughout Reach 11.

Information sources for wildlife species known or expected to occur in Reach 11 included published literature and unpublished data from AGFD; Reclamation; Arizona State University School of Planning and Landscape Architecture (1995a,b); KEA Environmental, Inc. (1999); and Dames & Moore. The 56<sup>th</sup> and 64<sup>th</sup> Street Extension (Bell Road-Pima Freeway) Environmental Assessment (Reclamation 1997) evaluated the habitat in selected parts of Zones 4, 5, and 6; however, the habitat descriptions pertain only to discrete areas adjacent to the street alignments

and not the entire zone. Unpublished data consisted of bird surveys conducted at Reach 11 during 1995 and 1996 (Jakle 1996), as well as species lists resulting from site visits conducted by AGFD and Reclamation on June 4, 1994; by Reclamation on December 16, 1999, January 30, March 4, April 15, and May 12, 2000, and June 6, 2002; and Dames & Moore on August 24, 2000.

### 3.6.3 Resource Overview

Reach 11 is located in the Sonoran Desert region, which is characterized by low annual precipitation, warm to hot summer temperatures, and mild to warm winter temperatures. Reach 11 is within an area that is ecotonal between the Lower Colorado River Valley and Arizona Upland subdivisions of Sonoran Desertscrub (Turner and Brown 1994). Plant communities in surrounding areas, such as to the north of Reach 11, contain components more typical of the Arizona Upland Subdivision, including saguaro (*Carnegiea gigantea*), foothill palo verde (*Cercidium microphyllum*), ocotillo (*Fouquieria splendens*) and a variety of other cacti and shrubs. Reach 11 supports plant communities more typical of the Lower Colorado River subdivision, which is characterized by sparse shrub cover and relatively low plant species diversity and structure. Creosotebush (*Larrea tridentata*) and triangle-leaf bursage (*Ambrosia deltoidea*) are dominant shrub species within the subdivision. The dominant plants along ephemeral washes within these communities include mesquite (*Prosopis* sp.), blue palo verde (*Cercidium floridum*), and ironwood (*Olneya tesota*).

#### 3.6.3.1 Vegetation Resources

For purposes of this EIS, vegetation resources within Reach 11 can be separated into two broad categories—desertscrub and xeroriparian communities. Xeroriparian vegetation is present along ephemeral drainages and within bosque-like areas where water collects adjacent to the dike of the CAP canal. Areas between these drainages support relatively sparse desertscrub vegetation. There are a number of disturbed areas (mostly borrow pits that were excavated during construction of the dikes) on-site where vegetation is particularly sparse or consists of species commonly associated with disturbance, such as desert broom (*Baccharis sarothroides*).

##### *Desertscrub Community*

The desertscrub community within Reach 11 is re-establishing after disturbance to the area resulting from construction of the CAP canal in 1978. This community is largely dominated by sparse growth of creosote bush and jimmy weed (*Isocoma plurifolia*), with some scattered small trees including mesquite, palo verde, and ironwood. Cacti are largely under-represented within Reach 11 and are limited to a few barrel cacti (*Ferocactus* sp.) and at least two saguaros east of Tatum Boulevard.

##### *Xeroriparian Community*

Most ephemeral watercourses that traverse Reach 11 support some amount of xeroriparian vegetation. These communities also are present in areas where water tends to collect adjacent to the CAP canal. Generally, the vegetation in this community includes taller trees and shrubs

Figure 3-2  
Site Inventory and Surrounding Land Use

including blue palo verde, ironwood, mesquite, desert broom, desert hackberry (*Celtis pallida*), and wolfberry (*Lycium pallidum*). There are several isolated cottonwood trees (*Populus fremontii*) located on the margins of water detention areas adjacent to the CAP canal. Xeroriparian habitat along the base of the CAP dike did not exist historically within the project area and is the result of construction of the dikes and subsequent ponding of flood waters. The vegetation in this community is more dense and its structure more complex and diverse than the desertscrub community.

Tree growth is promoted along ephemeral washes because water is available in greater quantities than in adjacent desertscrub. Mesquite and palo verde trees dominate this community, and shrubs such as desert hackberry and wolfberry are common. Ironwood trees are restricted to this vegetation type. Bosque-like vegetation is restricted to areas where water collects at the base of the CAP canal dike. The dominant plant in these areas is mesquite, but blue palo verde and desert broom are common. Desert broom has become dominant in some areas where water collects, but where there is insufficient water to support the bosque-like conditions.

From the standpoint of wildlife diversity, xeroriparian vegetation is expected to support more wildlife species within Reach 11 by providing relatively more food, cover, and vegetative structural complexity than desertscrub habitat. This habitat type probably supports more nesting bird species than the desertscrub community and provides “stop-over” habitat for migrating birds. Migrating songbirds take advantage of the rich insect fauna associated with flowering palo verde, mesquite, and ironwood trees in the spring.

### **3.6.3.2 Open Water**

Sources of open water in Reach 11 include one permanent and one seasonal pond, ephemeral drainages, and a number of detention basins that may contain water for a period of time following precipitation events in summer and winter. These areas provide a source of drinking water, foraging opportunities, and breeding habitat for wildlife.

### **3.6.3.3 General Wildlife**

This section describes the general wildlife found in Reach 11. Although no systematic surveys have been conducted on mammals, reptiles, and amphibians, Reclamation conducts periodic surveys for birds and other mammals within the Reach. Bird species recorded in Maricopa County can be found in Table B-2b of Appendix B. As additional surveys are conducted, it is anticipated that a number of these species will be confirmed in Reach 11. Tables B-2a and B-2c list species of mammals, reptiles, and amphibians representative of the Sonoran Desert. More intensive surveys would be required to confirm which species use Reach 11.

#### *Mammals*

Mammals known to occur in Reach 11 include coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), black-tailed jack rabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), white-throated woodrat (*Neotoma albigula*), and cactus mouse (*Peromyscus eremicus*). Several species of bats are likely to use open water in Reach 11 as a source of drinking water and a place to forage on insects. Bat

species expected to occur with the most frequency include the California leaf-nosed bat (*Macrotus californicus*), western pipistrelle (*Pipistrellus hesperus*), and pallid bat (*Antrozous pallidus*). Reach 11 does not provide roosting habitat for these species, although pallid bats potentially could roost under bridges that cross the CAP canal within the general project area. Rodent species that are likely common in Reach 11 include Arizona pocket mouse (*Perognathus amplus*) and Merriam's kangaroo rat (*Dipodomys merriami*), which are associated with open desertscrub. Larger mammals that may occur at least occasionally on Reach 11 include raccoon (*Procyon lotor*), badger (*Taxidea taxus*), and western spotted skunk (*Spilogale gracilis*). A herd of collared peccary, or javelina (*Tayassu tajacu*), has been observed in the vicinity of the permanent pond, as well as near Paradise Valley High School just north of Reach 11 (Brady, 2001).

### *Birds*

The occurrence of 57 bird species has been confirmed during surveys (Jakle 1996). Among the most abundant of species observed are mourning dove (*Zenaida macroura*), house finch (*Carpodacus mexicanus*), Gambel's quail (*Callipepla gambelii*), Abert's towhee (*Pipilo aberti*), and Anna's hummingbirds (*Calypte anna*).

Avifauna of Reach 11 likely is most diverse in the xeroriparian vegetation community. The structural diversity and density of vegetation in these areas provide habitat for a large number of bird species. Larger trees, especially the isolated cottonwoods in Reach 11, provide potential nest, roost, and perch sites for raptors such as red-tailed hawks (*Buteo jamaicensis*), Harris' hawks (*Parabuteo unicinctus*), and great-horned owls (*Bubo virginianus*). Northern harriers (*Circus cyaneus*) and Cooper's hawks (*Accipiter cooperii*) occur as winter residents or transients in the area. Resident songbirds commonly associated with xeroriparian vegetation include the northern cardinal (*Cardinalis cardinalis*), Abert's towhee, and phainopepla (*Phainopepla nitens*). Mourning dove and Gambel's quail commonly nest in xeroriparian vegetation.

The xeroriparian vegetation within Reach 11 provides habitat for neotropical migratory birds, including a number of species of warblers and flycatchers. Populations of neotropical migratory birds are experiencing threats from factors including habitat loss and fragmentation within their breeding, wintering, and migration areas, and nest parasitism. Bell's vireo (*Vireo bellii*) and Lucy's warbler (*Vermivora luciae*) are two neotropical migratory birds that breed in Reach 11's xeroriparian areas. Neotropical migratory birds that commonly travel through Reach 11 during migration include orange-crowned warbler (*Vermivora celata*), yellow-rumped warbler (*Dendroica coronata*), and Wilson's warbler (*Wilsonia pusilla*).

Although the desertscrub communities support a lower diversity of bird species, these areas are important to some birds. Hawks and American kestrels (*Falco sparverius*) generally forage in open country, where small mammals, reptiles, and other prey are more easily detected and approached. Verdins (*Auriparus flaviceps*) and cactus wrens (*Campylorhynchus brunneicapillus*) nest in desertscrub areas. Say's phoebe (*Sayornis saya*) and black-throated sparrow (*Amphispiza bilineata*) also are likely to nest in more open areas. However, the greatest value of the open desertscrub community is for wintering or transient species such as the loggerhead shrike (*Lanius ludovicianus*), northern harrier, vesper sparrow (*Pooecetes gramineus*), and lark sparrow (*Chondestes grammacus*).

## Reptiles and Amphibians

The reptiles and amphibians of Reach 11 are poorly known or documented. Whiptail (*Cnemidophorus* spp.) and tree lizards (*Urosaurus ornatus*) are probably common. Western diamondback rattlesnakes (*Crotalus atrox*), gopher snakes (*Pituophis melanoleucus*), and Gila monsters (*Heloderma suspectum*) are confirmed residents. It is anticipated that future surveys would increase knowledge about the distribution and occurrence of reptiles and amphibians in Reach 11.

### 3.6.3.4 Threatened and Endangered Species

Federal agencies must assess the potential effects of their project/actions on threatened and endangered species according to Section 7 of the Endangered Species Act of 1973. In addition, a Federal nexus (i.e., Federal ownership of land, Federal projects or projects for which Federal permits are required) can trigger consultation with FWS, if a proposed activity is determined to possibly have an effect on a Federally protected species.

The FWS lists 14 threatened, endangered, or proposed species within Maricopa County (Table 3-6). The listed fish, rail, and flycatcher are found in aquatic and/or dense riparian ecosystems that are not present in Reach 11. Habitat for the remaining species, with the possible exception of the cactus ferruginous pygmy-owl, also does not occur within Reach 11. No designated critical habitat for any listed species occurs within or near Reach 11. Critical habitat for the Southwestern willow flycatcher was designated in July 1999 (64 *Federal Register* 37419, July 12, 1999).

Common Name	Scientific Name	Status <sup>1</sup>
Arizona agave	<i>Agave arizonica</i>	E
Arizona cliffrose	<i>Purshia subintegra</i>	E
Arizona hedgehog cactus	<i>Echinocereus triglochidiatus arizonicus</i>	E
Sonoran pronghorn	<i>Antilocapra americana sonoriensis</i>	E
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Cactus ferruginous pygmy-owl	<i>Glaucidium brasilianum cactorum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Yuma clapper rail	<i>Rallus longirostris yumanensis</i>	E
Brown pelican	<i>Pelicanus occidentalis</i>	E
Desert pupfish	<i>Cyprinodon macularius</i>	E
Gila topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	E
Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuena</i>	E
Razorback sucker	<i>Xyrauchen texanus</i>	E
Source: U.S. Fish and Wildlife Service ( <a href="http://arizonaes.fws.gov">http://arizonaes.fws.gov</a> ) August 2001		
Notes: <sup>1</sup> T = Threatened, E = Endangered.		

The cactus ferruginous pygmy-owl was listed as an endangered species by the FWS in March 1997 (62 *Federal Register* 10730, March 10, 1997). The pygmy-owl is a small reddish-brown, or sometimes grayish, bird with a cream-colored belly streaked with reddish-brown. The tail is long for an owl and reddish-brown in color with dark bars. The diet of the pygmy-owl includes birds, lizards, insects, and small mammals (FWS 1998).

The range of the pygmy-owl includes the southern half of Arizona and Texas, south to Colima and Michoacan in western Mexico and Tamaulipas and Nuevo Leon in eastern Mexico. The owl is thought to have been more widespread historically, occurring throughout south-central Arizona. The cactus ferruginous pygmy-owl was once a common inhabitant of the cottonwood groves in the Salt River Valley (vicinity of the confluence of the Salt and Verde rivers) and was “quite common” at New River (Cartron and Finch 2000). Recent observations have been restricted to Sonoran desertscrub characterized by braided-wash systems and dense vegetation including ironwood, palo verde, and mesquite; and semidesert grasslands containing drainages with mesquite, hackberry, and ash (*Fraxinus* sp.) Historically, pygmy-owl nests were documented in cavities of cottonwoods, willows (*Salix* spp.), or mesquites although recent nest sites have been primarily located in saguaro cavities. In 1999, two nests were located in cavities of an ash and eucalyptus (*Eucalyptus* sp.) (AGFD and FWS 2000). Cactus ferruginous pygmy-owl were last observed in Maricopa County in 1971.

In January 2000, the FWS defined suitable habitat for the pygmy-owl as areas below 4,000 feet in elevation containing one or more of the following vegetation communities:

**Riparian vegetation**—broadleaf, riparian gallery forests of cottonwoods, willows, mesquites, ash, or other trees growing along watercourses.

**Sonoran desertscrub**—characterized by braided wash systems and vegetation that is dense and well structured. Key species include mesquite, foothill and blue palo verde, ironwood, saguaro, organ pipe cactus (*Lemaireocereus thurberi*), and various other shrubs and cacti.

**Semidesert grasslands**—containing wooded drainages with mesquite, hackberry, ash, and a limited number of saguaros.

Vegetative communities listed above containing saguaro cactus or other columnar cactus that are 8 feet or taller, or ironwood, mesquites, palo verde or other large trees with a trunk diameter of 6 inches or greater measured at 4.5 feet above the ground may provide nesting opportunities for pygmy-owls.

Reach 11 is below 4,000 feet and supports some of these vegetative characteristics. However, the habitat within Reach 11 is not suitable for the pygmy-owl due to lack of structure and vegetative diversity that is present from locations where the pygmy-owl is known to breed. Areas of dense mesquite within Reach 11 are considered too fragmented and small. The highly urbanized landscape to the south of Reach 11 and the rapidly urbanizing area to the north are also not conducive to the occupancy of the area by the pygmy-owl. Reclamation has determined that surveys will not be required for the development of recreational facilities within Reach 11. Reach 11 is within “Zone 3,” an area that FWS considers to have low potential for occupancy (FWS 2000).

### 3.6.4 Environmental Consequences

#### 3.6.4.1 Impact Assessment Methods

This section addresses potential impacts on biological resources that would result from the development and use of recreational facilities in Reach 11. The discussion first describes the

general types of impacts on vegetation and wildlife shared by all alternatives. This is followed by a comparison of the alternatives.

### **3.6.4.2**    *Vegetation Resources*

#### *Desertscrub*

Grading land for the development of recreational facilities within Reach 11 would result in permanent loss and fragmentation of desertscrub vegetation (defined in Section 3.6.1). Disturbance to desertscrub vegetation from off-trail foot traffic and bicycle use would be expected to increase with increased use of Reach 11 recreational developments. On a regional level, the loss of desertscrub vegetation within Reach 11 would not be a significant impact due to the relatively poor quality of this vegetation community within the Reach.

#### *Xeroriparian Vegetation*

Xeroriparian communities are being lost at a rapid rate in metropolitan Phoenix. In Reach 11, this community provides important habitat for wildlife, especially neotropical migratory birds. The existing xeroriparian vegetation in Zones 4 and 5 is of relatively high quality, providing a diversity of vegetation structure. Because of the relatively high habitat value, loss of large areas or areas of particularly high quality xeroriparian vegetation within Reach 11 could be considered significant at a local level. However, on a regional level, the loss of this high quality habitat would not be as significant because of the availability of other xeroriparian areas in the region that provide similar values for wildlife.

Varying amounts of xeroriparian habitat would be lost due to construction of recreational developments, depending upon the alternative implemented. Under all alternatives, loss of some vegetation would occur where development of trails and facilities infringe on xeroriparian areas. Additionally, increased human use of recreational areas adjacent to xeroriparian vegetation could increase degradation of the vegetation from unauthorized foot traffic and bicycle use. Development of recreational areas and roads within Reach 11 would also degrade this community through fragmentation and isolation.

#### *Open Water*

Although development of lands directly north of Reach 11 are anticipated to maintain most of the major drainages into Reach 11, it is likely that water flow through the ephemeral washes during smaller storm events will decrease over time. This would occur under any of the alternatives.

Permanent and seasonal ponds at Reach 11 would not be affected by any of the alternatives. The majority of development at Reach 11 would occur outside of the 10-year floodplain, thus avoiding existing detention basins. These areas would continue to provide a seasonal source of water for wildlife.

In addition to existing sources of open water, irrigation ponds would be constructed under all the alternatives including the No-Action Alternative. These ponds would contain steep, reinforced banks and would be lined to minimize mosquito populations by discouraging growth of emergent

vegetation; these design features would greatly reduce the value and accessibility of the ponds for wildlife.

During construction, limited grading activities may occur in or adjacent to ephemeral drainages resulting in soil disturbance. Vegetation removal adjacent to ephemeral drainages could encourage bank erosion. Revegetation of disturbed areas would minimize erosion potential in these areas.

### **3.6.4.3 General Wildlife**

#### *Mammals*

Xeroriparian vegetation can provide valuable movement corridors, cover, and foraging opportunities for mammals. Impacts on small mammals would result primarily from removal of vegetation within Reach 11; however, some direct mortality to burrowing mammals could occur during construction of recreational facilities in desertscrub or xeroriparian vegetation.

Increased human use associated with recreational improvements may disturb foraging and breeding activities for some mammalian species. As a result, overall numbers could decrease.

Due to habitat area requirements, larger mammals such as collared peccary could be completely displaced from Reach 11, with adjacent development isolating the area. Regardless of the alternative ultimately selected, the encroaching development surrounding Reach 11 and its isolation from formerly contiguous habitat likely will lead to the eventual extirpation of collared peccary and possibly other mammal species in the area.

#### *Birds*

Potential direct impacts on birds from development of recreational facilities in Reach 11 would result from habitat loss and fragmentation, potential disturbance to nesting birds, and/or destruction of nests during construction. Habitat fragmentation and increased human and livestock presence in the area also may increase parasitism from brown-headed cowbirds.

The majority of habitat loss would occur in desertscrub communities. Species that would be most affected are those that tend to prefer more open desertscrub environments, such as Say's phoebe, cactus wren, and loggerhead shrike. Raptors generally use open areas to hunt for small mammals, birds, and reptiles. Although removal of desertscrub vegetation likely would result in population declines and displacement of some prey species, prey species that do well in urban environments may experience population increases following development of recreational facilities (e.g., European starlings and house sparrows). These areas also are used by wintering and open habitat-adapted raptors and sparrows.

Xeroriparian vegetation within Reach 11 is used by neotropical migratory birds. In addition, it provides nesting habitat for mourning and white-winged doves and Gambel's quail. Habitat loss and fragmentation would likely reduce the value of Reach 11 as stop-over habitat during migration. Habitat loss within this community type would range from an estimated 10 acres and up to a maximum of 177 acres, depending upon the alternative.

Increased human use associated with recreational improvements may disturb foraging and breeding activities for some bird species. However, any decrease in bird species diversity and population size would be due mainly to habitat loss. Scheduling facility construction outside the breeding season (late March through early June) would minimize impacts on breeding birds.

#### *Reptiles and Amphibians*

Reptiles and amphibians would be expected to experience direct loss from construction as well as loss and fragmentation of habitat. Development of lands surrounding Reach 11 will isolate these populations further from previously contiguous habitat and populations. Species diversity also could decrease.

Increased human use associated with recreational improvements may disturb foraging and breeding activities for some reptile and amphibian species. As a result, overall numbers could decrease.

Amphibians, which are closely associated with open water sources, would be affected as a result of alteration of ephemeral drainages, which provide amphibians with an important source of water following storm events.

#### **3.6.4.4** *Threatened and Endangered Species*

##### *Cactus Ferruginous Pygmy-Owl*

The potential for Reach 11 to support the cactus ferruginous pygmy-owl is considered extremely low. Saguaros and large trees that may provide potential nesting cavities are few and widely spread within Reach 11. The vegetative structure characteristic of known pygmy-owl territories also is limited on the site; pygmy-owl habitat typically consists of vegetation communities that are denser with greater structural complexity. As urban development continues to isolate Reach 11 from contiguous xeroriparian vegetation, the potential for owls to occupy the area or use it in dispersal will diminish further. Reclamation has determined that the habitat within Reach 11 is not suitable for supporting the cactus ferruginous pygmy-owl. Surveys will not be required prior to development of recreational activities within Reach 11.

#### **3.6.4.5** *Alternatives*

To compare the impacts of the alternatives, displacement of desertscrub and xeroriparian vegetation was estimated. Acreage estimates of impacted vegetation were derived by applying standard sizes of recreation facilities to elements in the conceptual plan.

Under all alternatives, including the No-Action Alternative, the Loop 101/SR 51 interchange will be completed in Zone 2. Areas not needed for permanent facilities will be revegetated and landscaped (Reclamation 1997b). In addition, approximately 13 acres will be permanently lost from the construction of the 64<sup>th</sup> Street crossing. The vegetation along this alignment consists primarily of sparse desertscrub vegetation with scattered pockets of mesquite and palo verde trees. An additional 20 acres just west of this alignment has been designated as the borrow source for the roadway embankment. This area is sparsely vegetated with shrub species such as

creosote and brittlebush, except in one area where mesquite trees and desert hackberry are associated with a small wash. The borrow area will be revegetated (Reclamation 1997a).

### *No-Action Alternative*

Under the No-Action Alternative, approximately 422 acres of desertscrub vegetation and up to a maximum of 177 acres of xeroriparian vegetation would be removed<sup>1</sup>. About 75 percent of the area within Zone 1, and the great majority of the area within Zone 3, would be altered. Desertscrub would largely remain untouched in Zones 4, 5 and 6, unless the developments originally identified to be placed in what is now Zone 2 (78-acre youth activities area; 65-acre day camp; and 55-acre education center) are relocated within any of those zones. Impacts are expected to be concentrated in the western portion of Reach 11. Removal of native vegetation would reduce the habitat available within Reach 11 for all classes of wildlife. The establishment of a scenic drive that would traverse the entire Reach along its northern edge would lead to the further loss of habitat and provide a potential mortality factor to local wildlife.

### *Proposed Action*

Approximately 255 acres of desertscrub and 30 to 45 acres of xeroriparian vegetation would be removed by the development of recreational facilities under the Proposed Action. In Zone 1, wildlife habitat would be replaced with turf areas for softball and soccer fields and picnic facilities. Additional habitat would be replaced by parking areas, ball courts, play areas, restrooms and a concession building, group picnic facilities, irrigation pond, and trails. Vegetation would be used to provide a visual and sound buffer between the various active recreation areas. In Zone 3, a 20-acre turfed area for special events, irrigation pond and additional parking would be developed, in addition to any development already approved for the equestrian center. In Zone 4, habitat would be lost due to the construction of an interpretive center, irrigation pond, multi-use trails and an equestrian trailhead. The higher quality habitat would be protected and enhanced for use in the interpretive habitat focus of this zone. Habitat in Zone 5 would essentially be left undisturbed except in the eastern portion where desert picnic areas, a playground, multi-use trails and parking would be developed. In Zone 6, desertscrub vegetation would be replaced with large open turf areas, playgrounds, park-like picnic areas, comfort facilities, irrigation pond, multi-use trails and parking. Areas of natural and enhanced vegetation would be used to provide visual and sound buffers.

With the Proposed Action, some desertscrub vegetation would remain in place within the individual and group picnic areas and in preservation areas. Xeroriparian vegetation largely would remain in place with limited tree removal. There would be increased disturbance to wildlife from greater activity as a result of these new developments. The event areas, including active recreational fields, courts, and the equestrian areas would experience greater nighttime use, thus increasing disturbance during periods of peak activity for many desert animals. The

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<sup>1</sup> The 1987 Master Plan contains only general information regarding location of facilities, and estimates of acres impacted by this alternative have been calculated at a gross level. It is current PRD practice to avoid impacting higher quality xeroriparian habitat when locating developments; therefore, the amount of xeroriparian vegetation that would be destroyed by the No-Action Alternative would likely be less than the maximum estimated amount identified. The amount of desertscrub vegetation destroyed would increase proportionally.

event areas with anticipated night-time use would be located west of Tatum Road, which consists of lesser quality habitat. This would avoid disturbance from night-time recreational activities in the eastern portion of Reach 11 where more environmentally xeroriparian habitat is located. Good quality xeroriparian habitat would be maintained in large existing patches east of Tatum Road as part of this alternative.

Approximately 172 acres of naturally vegetated areas would be enhanced by landscaping with native vegetation, including use of supplemental irrigation. This effort is anticipated to maintain and/or enhance wildlife habitat into the future when, over time, runoff from smaller storm events is expected to decrease as development occurs north of the Reach.

### *Alternative 1*

Development of recreational facilities would remove approximately 137 acres of desertscrub and 30 to 45 acres of xeroriparian vegetation. Fewer facilities would be developed for Alternative 1 than for the Proposed Action. In Zone 1 there would be fewer ball fields, less parking, and no courts or group picnic facilities. In Zone 4 the proposed interpretive center and equestrian trailhead would be eliminated. With the exception of an irrigation pond and the trail underpass at Tatum Boulevard, under Alternative 1 no development or changes would occur within Zone 3 beyond what has already been approved for the Equestrian Center. Recreational improvements in Zone 5 would be limited to trail improvements. Overall, improvements in Zone 6 would be similar to changes under the Proposed Action except less native vegetation would be affected. The addition of a roadway and parking for the group picnic area in Zone 6 would result in the loss of approximately 3 acres of sensitive wildlife habitat.

Improvements to Reach 11 are likely to increase visitor use of the area, which would cause more disturbance to wildlife. As in the Proposed Action, under Alternative 1, additional native vegetation would be planted on approximately 173 acres of natural areas. These enhancements are meant to maintain and/or enhance the existing wildlife habitat.

### *Alternative 2*

Under Alternative 2, much more native vegetation would be removed than under the Proposed Action or Alternative 1. Approximately 326 acres of desertscrub and 150 acres of xeroriparian vegetation would be lost by the development of recreational facilities. Under this alternative, an adventure play area, additional volleyball and basketball courts, a recreation center, and additional parking spaces would be added to what has already been identified for the Proposed Action in Zone 1. Impacts on vegetation communities in Zone 3 would be similar to those in the Proposed Action. Impacts in Zone 4 would be similar to those described for the Proposed Action, but would be somewhat greater due to the additional development of individual and group picnic areas. In Zone 5, Alternative 2 would result in the largest loss of native vegetation of all the alternatives, due to the addition of a municipal golf course, training center/clubhouse, overnight camping and an irrigation pond. In Zone 6, desertscrub vegetation would be lost to build a tournament golf course, clubhouse and irrigation pond. Some native vegetation would remain in place, and vegetation buffers would be added.

Approximately 126 acres of native areas would be enhanced by planting additional native vegetation, which could improve some wildlife habitat.

Under Alternative 2, potential impacts on wildlife would be greater than those described for the Proposed Action. There would be greater wildlife displacement due to increased vegetation losses. In addition, the camping facilities and golf courses proposed in Zones 5 and 6 could cause some species of wildlife to avoid adjacent habitat.

#### **3.6.4.6 Summary**

The amount of xeroriparian vegetation displaced by the Proposed Action or Alternative 1 is estimated to be approximately the same, although the Proposed Action would accommodate more active recreational uses and most likely would result in more disturbance than the more passive Alternative 1. However, these activities would be concentrated in the western half of the Reach, which consists of relatively lower quality habitat. Both the Proposed Action and Alternative 1 have been conceived to avoid or minimize impacts on sensitive resources (i.e., xeroriparian vegetation along washes and at the toe of dikes and open water habitats). Both Alternative 2 and the No-Action Alternative would result in disturbance to a greater number of acres. Under the No-Action Alternative, the majority of this disturbance would be concentrated in Zones 1 and 3. Under Alternative 2, the creation of a municipal and tournament style golf course in Zones 5 and 6, respectively, would result in loss of higher quality xeroriparian habitat as well as desertscrub habitat. Biological resource impacts from either Alternative 2 or the No-Action Alternative could be locally significant due to a relatively large loss of xeroriparian vegetation. This habitat is valuable as it is structurally diverse and increases the diversity of wildlife species that live in the area and utilize it on a seasonal basis.

Impacts related to removal of xeroriparian and desertscrub habitat under all alternatives is not expected to be significant at regional or national levels due to protection of xeroriparian habitat and higher quality desertscrub in the Sonoran Preserve and Federally managed lands.

#### **3.6.5 Mitigation Measures**

Habitat enhancement associated with the action alternatives would mitigate some impacts on wildlife. In addition, each proposed development activity would continue to be evaluated through the NEPA process as development proceeds, where appropriate.

To minimize the increase of invasive exotic species such as grasses into wash corridors, there would be several methods of management and design used, as follows:

- Design will include a buffer distance between turf recreational areas and wash corridors.
- The turf recreation areas will be separated from natural landscape by mow curbs. Any spread of turf past mow curbs into the buffer regions will be eradicated by maintenance staff.
- Construction envelopes will be minimized. Nonrecreational areas impacted during construction will be revegetated using a native seed mix approved by Reclamation. Areas will be monitored to ensure successful re-establishment of native plants. It is Reclamation's policy to use native species when revegetating any natural landscape.

- Construction personnel will be instructed not to harass or molest wildlife.

Also, to minimize the potential for damage to vegetation by fire, the following methods and management and design will be used:

- Barbeque grills and picnic areas will be placed within improved recreational areas and sited to decrease fire hazard from wind.
- Maintenance may include reducing fine fuel loads within wash corridors in areas adjacent to commercial and residential areas if they exceed minimum safety levels as determined with guidance from the fire department.
- Pursuant to Phoenix City code 24-25, the Parks and Recreation Director can declare a fire ban. The site would be posted accordingly.
- Access for fire trucks at gated locations and fire lanes in high access recreation areas will be incorporated with site development.

### **3.7 LAND USE**

#### **3.7.1 Issues and Concerns**

Land use concerns expressed by the public focused on indirect impacts on residences adjacent to Reach 11, including the potential for increased dust, noise, and light resulting from new recreation uses. Existing adjacent residences include those located across Cave Creek Road west of Reach 11, and those south of Reach 11.

#### **3.7.2 Data Collection**

Jurisdiction, existing land uses, planned land uses, and transportation were inventoried and assessed for the area within 1 mile of Reach 11. Data collection involved mapping land uses based on interpretation of aerial photography and field verification. Current land status was verified through contact with Federal and State agencies.

Planned land uses were identified through coordination with representatives of Federal, State, and local land management and planning agencies. State and local transportation plans were reviewed in conjunction with the transportation studies to identify existing and potential transportation and access issues.

#### **3.7.3 Resource Overview**

The area to the south of Reach 11 is urbanized, primarily with residential and commercial uses. The commercial uses tend to be located along major arterials. The residences to the south of Reach 11 are buffered from Reach 11 by the CAP canal and the dike to its north. Currently, Tatum Boulevard and 56<sup>th</sup> Street are the only roadways that cross through Reach 11. The primary existing access to Reach 11 is from Tatum Boulevard.

Two major freeways—Loop 101 and SR 51—have been planned to meet in a major traffic interchange that will be located within Reach 11. ADOT became the land manager for the 140-acre parcel in which the traffic interchange and associated retention basins have been located, under an agreement with the City that was approved by Reclamation (Reclamation 1997b). ADOT will provide an equestrian/hiking trail through the transportation easement; the trail had not been designed at the publication of this EIS.

Travel across the CAP canal is anticipated to increase from 142,000 vehicles per day in 2005 to 254,000 vehicles per day in 2015 (Reclamation 1997b). This growth is based on population projections for the area, anticipated development, and the completion of Loop 101. To accommodate this increase, Cave Creek Road has been widened, 56<sup>th</sup> Street has been built as a four-lane road, and 64<sup>th</sup> Street is planned as a four-lane road.

The Arizona Horse Lovers' Park is located in Zone 3 between the future Loop 101/SR 51 traffic interchange and Tatum Boulevard. The center includes arena facilities, offices and meeting space, and parking. The equestrian center occupies 90 acres, and was planned by the City of Phoenix and approved by Reclamation in a 1990 Categorical Exclusion.

Existing facilities adjacent to the north edge of Reach 11 include the CCWRF to the east of Cave Creek Road, Paradise Valley High School to the northwest of the future traffic interchange of Loop 101 and SR 51, the Sumitomo Sitix factory on the east side of Tatum Boulevard, and Mayo Clinic on the east side of 56<sup>th</sup> Street.

The land north of Reach 11 is generally State-owned and is currently vacant, although land uses have been planned. The major planned developments are Desert Ridge, located south of Pinnacle Peak Road and west of 64<sup>th</sup> Street, and Paradise Ridge, located south of Pinnacle Peak Road between 64<sup>th</sup> Street and Scottsdale Road. Residential developments and a golf course have been completed within Desert Ridge, and a regional shopping mall directly north of Loop 101 at Tatum Boulevard has been constructed. The remainder of the plans in Desert Ridge and Paradise Ridge are still in the conceptual stage, awaiting the lease or sale of land from the State of Arizona or final zoning approval. Also, a large business office complex northwest of 56<sup>th</sup> Street and a mixed-use commercial strip mall on the northwest corner of Scottsdale Road and Princess Drive have been constructed. Arizona Public Service (APS) also plans to construct a 69/12-kilovolt substation on the southwest corner of Beardsley Road and the future SR 51, beginning in 2002. Future plans also include the extension of 64<sup>th</sup> Street across Reach 11, as described earlier, although this project has not been programmed for funds by the City of Phoenix Streets Department.

### **3.7.4 Environmental Consequences**

#### ***3.7.4.1 Impact Assessment Methods***

Potential impacts were evaluated for existing and planned land uses based on the issues and concerns that emerged during scoping and the master planning process. Impacts have been defined to include physical restrictions on any existing or planned land use or incompatibility with existing land use and transportation plans. Some land use and transportation issues relate to

potential nuisance impacts on nearby residences, and are addressed by specific resource in the visual resources, noise, recreation, and air quality discussions.

### **3.7.4.2 Alternatives**

#### *No-Action Alternative*

The plan associated with the No-Action Alternative would include a scenic drive following the northern edge of the park boundary. Although this drive may improve access to all facilities within Reach 11, it may facilitate cut-through traffic or introduce more noise and activity to areas of passive recreation. The plan is compatible with surrounding land uses.

#### *Proposed Action*

The Proposed Action includes an underpass and trail under Tatum Boulevard, which would improve circulation and safety by diverting trail users away from traffic on Tatum Boulevard. The implementation of the underpass also would eliminate the need for horse trailers to park away from the Arizona Horse Lover's Park in the small lot on the east side of Tatum Boulevard in order to use eastern trails.

The Proposed Action would provide a balanced set of uses (between active and passive recreation) and would meet demands that are likely to be associated with projected residential development north of the park, including the desire for open space and recreational facilities. The plan also is compatible with the surrounding land uses and open space. The increase in Reach 11-related traffic is anticipated to be negligible relative to total projected volumes in the area.

#### *Alternative 1*

Environmental impacts associated with this alternative would be similar to the No-Action Alternative and Proposed Action.

#### *Alternative 2*

Environmental impacts associated with this alternative would be similar to the No-Action Alternative and Proposed Action.

### **3.7.4.3 Summary**

Reach 11 has been designated as a district park by the City in its General Plan, the General Plan for Peripheral Areas C and D, and North Land Use Plan (for the Desert View Village). The boundaries of all alternative plans and access to facilities are contained within the land owned by Reclamation, and no physical conflict or restrictions on adjacent land uses are anticipated. Existing land uses south of Reach 11 would be buffered from the park by the fenced CAP canal and the flood control dike. Planned land uses to the north generally are compatible with recreation facilities, including residential and commercial uses, a high school, and additional recreation facilities.

Under all of the action alternatives, access to Reach 11 facilities would occur from Cave Creek Road, Tatum Boulevard (the main access), and Scottsdale Road. The development of multiple access points would improve access to the various zones of Reach 11.

### **3.7.5 Mitigation Measures**

Implementation of the Proposed Action would generate traffic in and out of Reach 11 over the long term, although changes in traffic volumes would become more certain as plans become more specific. Although sports tournaments may generate larger traffic volumes in the vicinity of Zone 1, this would be on an occasional rather than a constant basis. Given the projected level of traffic increase in the area due to development, population growth, and freeway completions, it is anticipated that Reach 11 would contribute a negligible increase to the total traffic in this region. As development of Reach 11 becomes denser, particularly on the west end in Zone 1, the City would evaluate the need for a traffic signal or other measures to address access issues related to event traffic. In addition, to address short-term access issues that may arise, construction access routes would be pre-approved by the PRD and Reclamation and shown on construction drawings for specific construction projects.

## **3.8 RECREATION RESOURCES**

### **3.8.1 Issues and Concerns**

The need for a variety of recreation opportunities was emphasized throughout the scoping and master planning process. The demand for active recreation facilities has resulted from a lack of facilities and scheduling difficulties at existing facilities, while passive recreation users indicated that natural areas are increasingly being replaced by development. Concern was voiced about potential impacts of the master plan on the existing equestrian center. The potential for conflicts on multi-use trails, and between active and passive recreation areas that are located in close proximity to each other, also were raised as issues. Linking with other recreation areas via trails was noted as a potential positive opportunity of a Reach 11 Recreation Master Plan.

### **3.8.2 Data Collection**

As described earlier, a recreation needs assessment was conducted in the fall of 1998 to inventory the recreation opportunities and demands in northeast Phoenix. This study constitutes the primary baseline information for this section. The inventory resulted in the identification and mapping of existing and planned golf courses, parks, and schools (see Figures 2-1, 2-2, and 2-3 in Chapter 2). The inventory area included the Deer Valley, Paradise Valley, and Desert View villages, or City planning areas. Field reviews of the park and school sites were conducted to verify the availability of facilities.

The following tasks were completed to identify the opinions of the general public regarding the availability of park facilities or needed features:

- Direct interviews were conducted with representatives from a variety of potential user groups or interested organizations (see Chapter 4).

- Public meetings and open houses were held to provide opportunities for the public to express user preferences for recreational opportunities.
- Project newsletters were mailed to members of the public throughout the scoping process, which included comment forms that were filled out and returned.
- Direct interviews were conducted with PRD staff who are familiar with available facilities and public requests for facilities and programs; staff input contributed to the assessment of capacity levels of existing facilities.

Capacity evaluations of the facilities were conducted based on input from the public and data from PRD. Guidelines for the recommended minimum standards from the National Recreation and Parks Association (NRPA) also were reviewed in conjunction with existing facilities available in the general vicinity. Based on the results of the recreation needs assessment, there were a variety of demands identified for passive, active, and special event recreation opportunities in the City of Phoenix.

### **3.8.3 Resource Overview**

Existing recreation in Reach 11 includes the Arizona Horse Lovers' Park and trails that are used by hikers and walkers, cyclists, and equestrians. A master plan was completed for the equestrian center that was consistent with the 1987 master plan, and was approved by Reclamation in 1990. Existing nearby recreation opportunities that serve larger areas than the immediate neighborhood include the Tournament Players Club (TPC) golf course east across Scottsdale Road from Reach 11, and the Paradise Valley Park and golf course approximately 1 mile south of Reach 11. The event field in Paradise Valley Park has been eliminated by the extension of SR 51 through the park. The Cave Buttes Recreation Area is located several miles northwest of Reach 11. The Cave Buttes Recreational Area has been designated a district park; however, the area has not been master planned at this time. The Sonoran Preserve will be located directly north and west of Cave Buttes, and will provide trails and natural areas. The Sonoran Preserve comprises approximately 15,000 acres of State land in north central Phoenix that the City applied to designate as open space under the Arizona Preserve Initiative. This designation was approved in early 2000, and the preserve is anticipated to include trails and passive uses. Parts of the preserve will be located within 5 miles of Reach 11.

Results of the recreation needs assessment are illustrated in Tables 2-1, 2-2, and 2-3 in Chapter 2. The tables include an inventory of the existing lighted and unlighted facilities and proposed facilities, design guidelines established by NRPA and local deficiency based on those standards and local population projections for the year 2000, a capacity ranking, and indicators of public interest or opposition. Overall, the study recommended the following park facilities for inclusion in Reach 11 based on high demand:

- Active Recreation Use
  - lighted soccer fields
  - lighted softball/baseball fields
  - large group picnic areas
  - equestrian arena facilities

- Passive Recreation Use
  - playgrounds
  - equestrian trails
  - large open turf areas
  - nature-oriented opportunities including a variety of trails, wildlife observation areas, interpretation of the existing setting
- Special Event Activities
  - sports field tournament opportunities
  - special event area (multi-purpose)

The study also identified several moderate-demand active recreation uses including a skate park, affordable golf, volleyball, and basketball.

### **3.8.4 Environmental Consequences**

#### ***3.8.4.1 Impact Assessment Methods***

To evaluate the probable effects on recreation opportunities associated with the alternatives, each plan was contrasted to the set of high-demand activities identified in the recreation needs assessment and City district park standards. This exercise evaluated the success of each plan in meeting the area's key needs and requirements. In addition, the alternatives were qualitatively assessed based on the issues and concerns voiced from the public throughout the planning process.

#### ***3.8.4.2 Alternatives***

##### *No-Action Alternative*

The No-Action Alternative would not meet current PRD district park standards. This is primarily due to the population increase that has taken place in the surrounding area. The plan would accommodate the existing equestrian center. The plan includes a multi-use trail but would not incorporate the Tatum Boulevard underpass. In addition, lighting for fields is not explicitly included in the plan.

##### *Proposed Action*

The Proposed Action would provide a balanced set of uses (between active and passive recreation) and would meet demands that are likely to be associated with projected residential development north of the park, including the desire for open space and recreational facilities. The plan also meets current district park standards. Active and passive recreation would be separated into different zones to minimize potential conflicts between those uses. The Tatum Boulevard underpass would improve loop trail access throughout Reach 11.

The existing equestrian center would be maintained under the Proposed Action and compatible uses would be sited adjacent to it (e.g., turf fields that could be used for equestrian activities, parking for horse trailers, and trail access).

As with all of the action alternatives, the trails included in the Proposed Action would be multiple use (equestrian, hiking, and bicycling), consistent with PRD practice. To mitigate concerns regarding trail conflicts, signs would be provided to educate trail users on yielding to other users. Potential points for trail linkages that ultimately could connect to the Cave Buttes Recreation Area, Sonoran Preserve, or Indian Bend Wash are indicated in the plan. The design and actual siting of potential trail linkages would be determined during detailed design prior to construction.

#### *Alternative 1*

Alternative 1 would address all of the high-demand recreation needs identified in the recreation needs assessment and would meet district park standards. Although the diversity of activities would be similar to that included in the Proposed Action, the active-use areas would be developed in a less dense manner in order to limit alterations to existing vegetation.

#### *Alternative 2*

Alternative 2 would address all of the high-demand recreation needs identified in the recreation needs assessment and would meet district park standards. This alternative would offer a higher diversity of recreation opportunities due to the addition of golf, and would provide the highest density of active sports facilities in Zone 1.

### **3.8.4.3 Summary**

All of the alternatives would result in an increase in recreational opportunities in northeast Phoenix compared to current conditions. All of the alternatives assign similar categories of uses (i.e., active or passive) to the zones delineated within Reach 11. The Proposed Action, Alternative 2 and No-Action Alternative emphasize high-demand recreation needs in Zone 1, whereas Alternative 1 emphasizes a balanced active-passive recreation use in this same Zone. Alternative 2 would add a greater diversity of recreational opportunities including moderate-demand uses; however, overall there would be a reduced amount of acreage available for high-demand passive recreation opportunities. This is because golf requires that land be designated for single use. With the other alternatives, there would be greater flexibility to accommodate multiple passive uses in Zones 5 and 6 (e.g., picnic, habitat, and interpretive areas), which could occur simultaneously within the same area.

### **3.8.5 Mitigation Measures**

The following mitigation measure would be implemented to help minimize potential conflicts among users:

- Provide signage to educate trail users on minimizing conflicts among horses, bikes, and hikers.

## **3.9 SOCIOECONOMIC RESOURCES**

### **3.9.1 Issues and Concerns**

The Phoenix metropolitan area—designated by the U.S. Census Bureau to represent the City of Phoenix together with adjacent communities that have a high degree of economic and social integration with the City population—is potentially affected. In particular, the City of Scottsdale, which borders the eastern end of Reach 11 and the Town of Paradise Valley, which is located immediately south of the project site, potentially would be impacted. Thus, the secondary area of potential socioeconomic effect was defined as the City of Scottsdale and Town of Paradise Valley. Regional data for Maricopa County and the State of Arizona are included for comparison.

### **3.9.2 Data Collection**

Data such as population, household income, and race were collected from a variety of sources including published and unpublished literature from various State and Federal agencies such as the Arizona Department of Economic Security (DES), Arizona Department of Commerce, and U.S. Census Bureau.

### **3.9.3 Resource Overview**

The socioeconomic inventory includes a description of the demographic, economic, fiscal growth, and user benefit characteristics within the area that potentially would be affected by the proposed development of Reach 11. Figure 3-3 shows the area of potential impact in the City-designated district park service area, which is defined as a 5-mile radius around Reach 11. For the purposes of socioeconomic analysis, this translates into 41 1990 U.S. Census Bureau tracts that fall within the Reach 11 district park service area.

#### ***3.9.3.1 Population Trends and Projections***

Reach 11 is located in an area that has experienced a trend of population growth that is projected to continue. In terms of population, Phoenix is the sixth largest city in the United States. By comparison, the State of Arizona is the 23rd most populous state in the United States. This population trend is integral to the intent of the Reach 11 Recreation Master Plan, which is to serve current and future recreation demands for the growing population of northeast Phoenix. As shown in Table 3-7, the population within both the primary and secondary areas of potential impact is rapidly growing. The affected census tracts show about a 43 percent increase in population from 1990 to 1999. The population in Maricopa County increased about 32 percent from 1990 to 1998.

Population projection data are not available for the census tracts; however, the construction of two planned residential developments, Desert Ridge and Paradise Ridge, within proximity to Reach 11, would increase the population within the primary area of concern. Desert Ridge, a 6,000-acre primarily residential area, is approximately 35 percent developed. Paradise Ridge will occupy 2,000 acres that are currently vacant, and is anticipated to include residential and commercial uses. No definitive timeline has been established for completing either development.

Figure 3-3  
Census Data Tracts  
11 x 17

Place	1990 Population	1998 Population	Numeric Change (1990 – 1998)	Percent Change (1990 – 1998)
<b>Area of Potential Effect</b>				
Sum of affected census tracts	204,162	291,707*	87,545*	42.9*
<b>Secondary Area of Potential Effect</b>				
Phoenix	983,403	1,220,710	237,307	24.1
Scottsdale	130,069	195,495	65,426	50.3
Paradise Valley	11,674	13,315	1,641	14.1
<b>Regional Area</b>				
Maricopa County	2,122,101	2,806,100	683,999	32.2
State of Arizona	3,665,228	4,764,025	1,098,797	30.0
Sources: Arizona DES and U.S. Census Bureau				
Note: *1999 Environmental Systems Research Institute population data				

Population projection data are available for the secondary area of potential effect as well as the regional area. As shown in Table 3-8, over the next 25 years, the population in the vicinity of the project area will continue to grow. Much of the projected population growth in Arizona over the next 25 years will occur within Maricopa County, which is projected to increase by 67.5 percent. By 2025, the Phoenix population is projected to be double the 1990 population.

	2000	2005	2010	2015	2020	2025	Net Percent Change
Phoenix	1,298,121	1,415,330	1,544,093	1,671,489	1,795,539	1,958,470	50.9
Scottsdale	204,892	242,179	270,763	294,181	306,713	330,308	61.2
Paradise Valley	13,309	13,344	13,375	13,397	13,418	13,435	0.9
Maricopa County	2,954,157	3,329,561	3,709,566	4,101,784	4,516,090	4,948,423	67.5
State of Arizona	4,798,000	5,230,000	5,522,000	5,808,000	6,111,000	6,412,000	33.6
Source: Arizona DES 1997							

### **3.9.3.2 Employment and Income Characteristics**

#### *Employment*

Within Maricopa County, three industry groups—service, retail trade, and manufacturing—provide about 70 percent of the employment. While the service industry accounts for about one third of the total employment in Maricopa County, manufacturing is the leading employer in Phoenix. Retail trade and services account for about 45 percent of the total employment in Phoenix (Arizona Department of Commerce 1999).

The project area is experiencing an increase in jobs. From 1984 to 1994, there was a 49 percent gain in employment in Maricopa County. By comparison, the gain in employment for the United States during this time frame was 24 percent (City of Phoenix 1999). Available civilian labor force and employment data as provided in Table 3-9 show the strength of the civilian labor force and the low unemployment rate within the project vicinity.

Place	Civilian Labor Force	Employed	Unemployed	Unemployment Rate (%)
Phoenix	695,311	674,833	20,478	2.9
Scottsdale	100,544	98,614	1,930	1.9
Paradise Valley	7,686	7,574	112	1.5
Maricopa County	1,450,062	1,411,454	38,609	2.7
State of Arizona	2,272,388	2,178,306	94,082	4.1
Source: Arizona Department of Commerce 1999				

### *Household Income*

The mean household income data in the project area are shown in Table 3-10. Approximately 56 percent of the households within the primary area of potential effect report a household income of more than \$40,000 compared to 25 percent in Phoenix and 28 percent in Maricopa County.

Place	Total Households	Number of Households Reporting Total Household Income in Category			
		Less than \$14,999	\$15,000-\$39,999	\$40,000-\$59,999	\$60,000 and up
<b>Area of Potential Effect</b>					
Sum of Affected Census Tracts	61,899	7,212	20,259	15,972	18,456
<b>Secondary Area of Potential Effect</b>					
Phoenix	421,687	57,457	99,217	53,740	49,667
Scottsdale	49,667	4,377	12,957	10,192	16,323
Paradise Valley	16,323	84	143	246	2,011
<b>Regional Area</b>					
Maricopa County	957,730	114,342	229,860	135,601	128,614
Source: Arizona DES 1990					

### **3.9.3.3 Race and Hispanic Origin Ethnicity**

Data on race were collected for the following categories: White, Black, Native American, Asian and Pacific Islanders, and other. Hispanic origin represents ethnicity, not race, and includes all persons who identify themselves as Mexican, Puerto Rican, Cuban, Central American, or of other Hispanic origin or decent. The race and Hispanic origin data for the population potentially

affected by the proposed Reach 11 Recreation Master Plan are presented in Table 3-11. Whereas 1998 and 1999 data were presented in the previous subsections, 1995 data were used for this subsection because it is the most recent complete data for race and Hispanic origin. (Note: Persons of Hispanic origin may be included also in other categories; e.g., White, Black, Native American, etc.).

Within the area of potential effect, the majority of the population (88.21 percent) is categorized as White. At 7.76 percent, persons of Hispanic origin constitute the next strongest category. Comparatively, Phoenix and Maricopa County are about 26 and 20 percent Hispanic origin, respectively. At 1.65 percent, Asian and Pacific Islanders constitute the largest percentage of persons of minority race in the primary area of effect. By comparison, Blacks and Native Americans are more strongly represented than Asian and Pacific Islanders in both Phoenix and Maricopa County.

<b>TABLE 3-11 RACE AND HISPANIC ORIGIN OF THE POPULATION IN THE PROJECT VICINITY</b>						
<b>Place</b>	<b>Percent of Total 1995 Population</b>					
	<b>White</b>	<b>Black</b>	<b>Native American</b>	<b>Asian and Pacific Islander</b>	<b>Other</b>	<b>Hispanic Origin</b>
<b>Area of Potential Effect</b>						
Sum of Affected Census Tracts	88.21	1.21	0.55	1.65	0.61	7.76
<b>Secondary Area of Potential Effect</b>						
Phoenix	64.51	4.95	1.55	1.85	0.78	26.37
Scottsdale	90.68	0.89	0.52	1.55	0.54	5.81
Paradise Valley	94.62	0.65	0.13	1.70	0.38	2.53
<b>Regional Area</b>						
Maricopa County	71.91	3.48	1.52	1.92	0.70	20.48
State of Arizona	69.43	3.45	5.70	1.94	20.84	88.91
Sources: Arizona DES 1995, U.S. Census Bureau 1995						

### **3.9.4 Environmental Consequences**

#### **3.9.4.1 Impact Assessment Methods**

This section addresses potential impacts on the social and economic environment as a result of the proposed development of Reach 11. It also evaluates the current and future socioeconomic impacts of Reach 11 in terms of its current and future contribution to the social and economic environment within the project area. Project costs are estimated as a way of comparing alternatives and financing options. Environmental justice considerations also are discussed. Impacts common to all alternatives are described below.

#### **3.9.4.2 Alternatives**

Development of Reach 11 would create changes in recreation opportunities for residents within existing and future developed areas within the primary and secondary areas of potential effect. Among such changes would be the conversion of a flood detention basin into an area designed

for the recreational use and benefit of local residents and area visitors. Those living and working within the district park service area would most directly experience the benefits of these recreation opportunities.

Funding for implementation of all action alternatives would occur as funding becomes available, over the next several years. A City of Phoenix sales tax initiative was passed on September 9, 1999. This initiative contributes construction costs to several PRD amenities as well as towards the cost of acquiring lands within the Sonoran Preserve. The Phoenix Parks and Preserve Initiative is projected to fund \$11,274,000 towards Reach 11 construction costs from the sales tax over its 10-year duration. Other park improvements may be funded privately, by future bond programs, or by grants and donations. Reach 11 could receive funding from the Phoenix Parks and Preserve Initiative (Proposition 101), which received public approval in September 1999. No additional increase in taxes is anticipated unless a city-wide tax is approved in a bond election. With the action alternatives, local construction firms may be hired to complete the development within Reach 11, thus contributing to the local as well as county economy.

Positive short-term impacts on local services may occur from the increase in construction laborers. Construction firms may hire local skilled workers, which also would provide a positive impact on the local as well as regional economy. The increase in recreational opportunities also would create positive impacts on local businesses with the influx of visitors patronizing local businesses.

Regardless of the alternative selected, construction activities would affect current recreation activities within Reach 11. During construction, certain areas would be closed to public access. This would result in an unavoidable adverse impact, but is necessary to protect the public's safety, and would be short term in duration.

#### *No-Action Alternative*

Zone 1 under the No-Action Alternative is identified for future development of a motor bike training area, sports fields, picnic areas, and a designated special events area. Potential positive impacts on the local economy would include revenue generated from possible tournaments and events. Costs for the No-Action Alternative are uncertain due to a lack of design specifics, but it is anticipated that costs would be within the range of costs for the action alternatives.

#### *Proposed Action*

As shown in Table 3-12, the estimated cost associated with the implementation of the Proposed Action is \$46,619,031. Approximately 45 percent of the total cost is associated with the development of the 10 lighted soccer and ball fields proposed for Zone 1.

<b>TABLE 3-12 ESTIMATED COSTS ASSOCIATED WITH IMPLEMENTING THE PROPOSED ACTION</b>		
<b>Design Element</b>	<b>Estimated Costs</b>	<b>Percentage of Total Cost</b>
Zone 1 – Active Sports Field Area	\$ 21,165,921	45.4
Zone 2 – Trail by Freeway	\$ 136,620	0.3
Zone 3 – Equestrian Area	\$ 9,596,619	20.5
Zone 4 – Interpretive Habitat Area	\$ 3,117,865	6.7
Zone 5 – Habitat Picnic Area	\$ 5,754,999	12.3
Zone 6 – Open Park Area	\$5,407,007	11.6
Tatum Boulevard Underpass	\$1,440,000	3.2
<b>Total Buildout Estimate</b>	<b>\$ 46,619,031</b>	<b>100.0</b>
Source: BRW 2000		
Note: Preliminary estimates include materials and labor.		

In suburban areas, property values tend to be enhanced on parcels adjacent to or near recreational open space. There also can be an increase in social amenity values from increased recreation activities. Aesthetic improvements also will increase the social value of the area.

Revenues generated from recreational uses (e.g., user fees and special events) must be used within Reach 11 for recreational purposes and cannot be used by the City for any other purpose. Local businesses may experience an increase in revenue due to the expected increase.

#### *Alternative 1*

Alternative 1 emphasizes passive recreation. Minimal changes to the existing operation and uses of Reach 11 are expected. The total estimated cost is \$33,590,820 as illustrated in Table 3-13. The majority of the cost for Alternative 1 would be for the four lighted soccer and ball fields, activity center, and maintenance yard/offices planned for Zone 1.

<b>TABLE 3-13 ESTIMATED COSTS ASSOCIATED WITH IMPLEMENTING ALTERNATIVE 1</b>		
<b>Design Element</b>	<b>Estimated Costs</b>	<b>Percent of Total Cost</b>
Zone 1 – Active Sports Field Area	\$19,070,516	56.8
Zone 2 – Trail by Freeway	\$136,620	0.4
Zone 3 – Equestrian Area	\$4,874,934	14.5
Zone 4 – Interpretive Habitat Area	\$2,720,241	8.1
Zone 5 – Habitat Picnic Area	\$1,874,238	5.6
Zone 6 – Open Park Area	\$3,474,271	10.3
Tatum Boulevard Underpass	\$1,440,000	4.3
<b>Total Buildout Estimate</b>	<b>\$33,590,820</b>	<b>100.0</b>
Source: BRW 2000		
Note: Preliminary estimates include materials and labor.		

#### *Alternative 2*

Table 3-14 shows the design elements and probable estimated costs associated with the implementation of Alternative 2. The total estimated cost for implementing this active recreational alternative is \$71,197,362.

Alternative 2 would include the installation of two golf courses, overnight camping facilities, an extensive sports complex, additions to the existing equestrian park, and a multi-use trail system. Zones 5 and 6 would include a municipal golf course and tournament golf course, respectively, and account for 35 percent of the total build-out cost estimate. If developed, these courses would have the ability to generate revenue from user fees.

**TABLE 3-14  
ESTIMATED COSTS ASSOCIATED WITH IMPLEMENTING  
ALTERNATIVE 2**

<b>Design Element</b>	<b>Estimated Costs</b>	<b>Percent of Total Cost</b>
Zone 1 – Sports Complex and Youth Area	\$30,172,469	42.4
Zone 2 – Trail by Freeway	\$136,620	0.2
Zone 3 – Equestrian Area	\$9,569,827	13.5
Zone 4 – Interpretive Center	\$5,126,898	7.2
Zone 5 – Municipal Golf Course	\$11,058,084	15.5
Zone 6 – Tournament Golf Course	\$13,693,464	19.2
Tatum Boulevard Underpass	\$1,440,000	2.0
<b>Total Buildout Estimate</b>	<b>\$71,197,362</b>	<b>100.0</b>
Source: BRW 2000		
Note: Preliminary estimates include materials and labor.		

### 3.9.4.3 Summary

Overall, the development of Reach 11 is expected to result in economic and social benefits for the local community. The costs associated with Alternative 2, the most developed alternative, are higher than the other alternatives. The golf courses in Alternative 2 could generate revenue that must be used within Reach 11 for recreational purposes and cannot be used by the City for any other purpose.

### 3.9.5 Environmental Justice

Title IV of the Civil Rights Act of 1964 and related statutes ensure that individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving Federal assistance on the basis of race, color, national origin, age, sex, or disability. Executive Order 12898 on Environmental Justice directs that programs, policies, and activities not have a disproportionately high and adverse human health and environmental effect on minority and low-income populations. The proposed development of Reach 11 would not result in significant social and economic impacts on the surrounding area. No minority or low-income residences or businesses would be relocated or directly impacted. Therefore, the project is not anticipated to have any disproportionately high and adverse effects on populations protected by Title VI of the Civil Rights Act. All recreationists would benefit from the proposed development.

Approximately 56 percent of the households within the area of potential effect report a household income of more than \$40,000 and 33 percent report a household income between \$15,000 and \$39,999. Within the area of potential effect, the majority of the population is between the ages of 18 and 54 and is predominately (88 percent) White. Therefore, there would be no adverse impact on a disproportionately high minority and low-income population.

### 3.9.6 Mitigation Measures

No adverse impacts were identified; therefore, no mitigation is warranted.

## 3.10 VISUAL RESOURCES

### 3.10.1 Issues and Concerns

A limited number of concerns have been expressed regarding the visual resources of the Reach 11 area. These include concerns regarding proposed lighted facilities and their impacts on nearby residents' nighttime views, as well as the effects of diffuse light entering homes. In addition, concern regarding the change from a natural-appearing landscape to a developed one was expressed.

### 3.10.2 Data Collection

The visual resource inventory for Reach 11 included the collection of data necessary to evaluate the effects of change on the landscape character of the area and on sensitive viewers. Data for the visual resource inventory were gathered primarily from field observations; however, aerial photography also was used to determine the extent and pattern of landscape characteristics in conjunction with the mapping of vegetation units for the biological resources inventory.

### 3.10.3 Resource Overview

#### 3.10.3.1 Landscape Character Types

The landscape character types in Reach 11 are defined primarily by the vegetation patterns and, to a lesser extent, the topography of the area. The site has limited geographic variability due to the park's narrow configuration and location adjacent to the CAP canal. Much of the area within Reach 11 has been modified and has undergone considerable alteration in response to its use as a borrow area for the dikes and its function as a flood control feature. The overall visual setting is somewhat uncommon within the urban context of Phoenix.

In general, landscapes with greater diversity of features are considered to be of higher scenic quality. The natural-appearing landscape character types within Reach 11 fall under several categories including desertscrub, xeroriparian communities, and reclaimed borrow areas. These landscapes vary according to variety and diversity based primarily on landform, vegetation, and cultural or manmade features. These character types are briefly described below.

#### *Natural Landscapes*

**Desertscrub**—The desertscrub natural landscape can be subdivided into two categories: scrublands and grasslands. The scrubland character type is the most common found in the Reach 11 area. The landform is generally flat or gently sloping and there is little variety in the mix of trees and shrubs that are evenly distributed, with little or no groundcover.

**Xeroriparian Communities**—This landscape character type is distinctive within this area due to the density of trees that typically are found only along intermittent water features. The landform

is flat or gently sloping with bisecting minor drainage features. The communities provide an increased although limited variety of vegetation as the concentrations of trees create a contrast to the immediate surrounding landscape.

**Reclaimed Borrow Areas**—The reclaimed borrow areas are the result of naturally occurring revegetation of a disturbed setting, which has created a character type uncommon to the immediate area. The landform is variable in size and form. Vertical relief provides a natural-tiered visual effect that reproduces a valley, bench, and hill character. Sides of the borrow areas have eroded into gully patterns that mimic natural conditions.

### *Modified Landscapes*

**Transportation**—The transportation character type includes areas that have been altered by the location of major roadways. This has occurred in locations where major roads currently cross the Reach 11 area, and will continue with the development of the ADOT interchange for the Loop 101 and SR 51 (Zone 2), and 64<sup>th</sup> Street.

**Developed/Disturbed**—The developed/disturbed character type includes modifications, mostly recent, including areas where structures have been introduced, particularly in Zone 3 where equestrian facilities are located. A borrow area, used for the construction of 56<sup>th</sup> Street, is in the eastern portion of Zone 4. The landscape in these areas has been altered including changes to landform and the introduction of landscaped areas and structures. Also, a borrow area in the eastern portion Zone 5 has been approved for the construction of 64<sup>th</sup> Street.

### *Sensitive Viewers*

Sensitive viewers include current on-site recreation users (primarily equestrians, bicyclists, and hikers), residential viewers adjacent to the site, and transportation viewers.

Recreational views include those from specific locations on-site including the equestrian facilities and the existing trail system, as well as views from other dispersed use areas throughout Reach 11 (e.g., birdwatching). Visibility from these locations is often somewhat limited, and localized based on the presence of the CAP canal and existing vegetation; however, views from selective areas (particularly in the northern portion of Reach 11) can include off-site and distant views to the McDowell and Estrella mountains.

Existing residential views to the Reach 11 area also are somewhat limited due to the presence of the CAP canal on the southern boundary of the site, and the current lack of development immediately to the north of Reach 11. Selective views are primarily located to the southwest and northwest of Reach 11 from residences located along Cave Creek Road. Portions of existing light standards located at the equestrian facilities are visible from second-story dwellings and apartments to the south of Reach 11 in select locations. Future residential areas may have selective views into Reach 11, depending upon final configuration of housing developments and the introduction of design features including vegetation and walls.

Existing transportation views include those from Cave Creek Road, Tatum Boulevard, 56<sup>th</sup> Street, and Scottsdale Road. Views from future transportation routes include those in the vicinity

of the Loop 101 and SR 51 interchange (Zone 2), and from 64<sup>th</sup> Street. These views are primarily limited to visibility from the roadway where the site is crossed.

### **3.10.4 Environmental Consequences**

#### ***3.10.4.1 Impact Assessment Methods***

Impacts on visual resources were determined based on the anticipated change in the landscape character and the effects on sensitive viewers associated with each alternative. Effects on landscape character would result from alteration of the landscape resulting from earth grading, vegetation removal, and placement of new roadways, trails, structures, buildings, and infrastructure associated with the alternatives. Potential effects on viewers were determined both on site and locally based on these alterations. Following is a discussion of impacts common to all alternatives, followed by a description of impacts specific to each alternative including an approximation of the disturbance to the existing landscape character types.

#### ***3.10.4.2 Alternatives***

In general, the landscape character is anticipated to change in selective areas based on introduction of new recreation facilities. Sensitive recreation and transportation viewers would be affected in the short term especially during construction, particularly in those areas designated for active use. Effects on existing residential viewers, mainly located south of the canal, would be limited due to the presence of the CAP canal and dikes; however, selective planned facilities, including tall infrastructure elements such as light standards, may be sky-lined (silhouetted). The lighted facilities could also produce either direct or diffuse lighting depending upon final location. Visual impacts would be less intrusive in areas planned for passive recreation.

##### *No-Action Alternative*

Under the No-Action Alternative, the eastern portion of Reach 11 is planned for passive recreation oriented toward a natural setting. As a result, the landscape character is not anticipated to change appreciably with the exception of construction of the planned 64<sup>th</sup> Street crossing. The western portion of Reach 11, where the landscape character is primarily composed of a natural-appearing desertscrub setting, would be transformed into a developed park setting with the introduction of active recreation facilities.

##### *Proposed Action*

The Proposed Action would combine active and passive recreation with an emphasis on preserving the natural-appearing character of the site in those areas of greatest visual diversity (Zones 4, 5, 6). Under this alternative, approximately 255 acres of the desertscrub landscape type and 27 acres of the already developed/disturbed landscape type would be altered (primarily in Zone 1). The Proposed Action would alter an estimated 30 to 45 acres of xeroriparian vegetation. The largest area of that disturbance would be in Zone 1. The Proposed Action also would incorporate approximately 173 acres of enhanced vegetation that would increase visual diversity throughout Reach 11. The introduction of light standards in particular areas (Zone 1 for sports fields and Zone 3 for the equestrian areas) would be visible, and direct or diffuse lighting

associated with organized play fields could impact surrounding residences depending on type, height, and final location of facilities.

### *Alternative 1*

Alternative 1 is oriented around passive recreation with an emphasis on preserving the natural setting and, as a result, impacts on the landscape character likely would be minimal. Approximately 137 acres of the desertscrub character type and 22 acres of the already developed/disturbed character types would be altered by Alternative 1. Similar to the Proposed Action, Alternative 1 would locate active areas in Zone 1. Similar to the Proposed Action, Alternative 1 would alter an estimated 30 to 45 acres of xeroriparian vegetation; although the Proposed Action would accommodate more active recreational uses and most likely result in more disturbance than Alternative 1. As is the case with the Proposed Action, the largest area of that disturbance resulting from Alternative 1 would be in Zone 1.

Alternative 1 also would incorporate approximately 173 acres of enhanced vegetation that would increase the overall visual diversity of the area. Similar to the Proposed Action, the introduction of light standards in Zone 1 for sports fields and Zone 3 for the equestrian areas would be directly visible from a limited number of surrounding residences and would affect nighttime views.

### *Alternative 2*

Alternative 2 is oriented around active recreation and would involve the greatest alteration to the current setting. Providing a larger area for developed facilities across a broader area generally would alter the existing landscape character under this alternative, particularly in Zones 5 and 6 where two golf courses would be introduced. Depending on the design of the proposed golf courses, the complexity in landform and vegetation could increase, thus producing a park setting in addition to that introduced in Zone 1. Approximately 326 acres of the desertscrub character type and 44 acres of already developed/disturbed area would be altered under Alternative 2. Alternative 2 also would alter approximately 150 acres of xeroriparian vegetation, which has a greater degree of visual landscape character diversity. Alternative 2 would incorporate approximately 126 acres of enhanced vegetation. Similar to the other alternatives, the introduction of light standards in Zone 1 for sports fields and Zone 3 for the equestrian areas would be directly visible from a limited number of surrounding residences and would affect nighttime views.

#### **3.10.4.3 Summary**

Regardless of the alternative implemented, Reach 11 recreational developments would be designed to provide visually appealing park environments with consideration given to on-site and off-site views. The Proposed Action and Alternative 1 would provide areas of active recreation that would be located primarily in desertscrub areas. Most of the xeroriparian vegetation areas of greatest variety would be retained within the park. Under each alternative, protection of xeroriparian vegetation areas and the incorporation of vegetation enhancements for disturbed areas and facilities, as well as consideration for construction materials, would minimize impacts or could potentially improve the on-site landscape character. The placement of new facilities and

introduced vegetation would assist in the separation of active uses from passive uses; however, this also could reduce desirable off-site views throughout the Reach 11 area. Selective tree placement could preserve these views (where practicable) and aid in the visual separation between active- and passive-use areas.

### **3.10.5 Mitigation Measures**

Selective residential viewers may be significantly affected by the introduction of light standards and taller infrastructure features; however, mitigation measures would be employed to reduce these impacts (as practicable) by specifying light size, type, and shielding. In addition, the potential night-lighting impacts likely would diminish with the introduction of new lighting associated with future land uses including the completion of Loop 101 and SR 51 and residential and mixed use development planned for the area immediately north of Reach 11.

## **3.11 CULTURAL RESOURCES**

### **3.11.1 Issues and Concerns**

The cultural environment includes those physical aspects of the environment that relate to human culture and society, along with the social institutions that form and maintain communities and link them to their surroundings. All alternatives studied in detail in this document are designed to enhance recreational opportunities, an important element of modern urban culture. The impacts on residents of the local neighborhoods are addressed in other sections of this EIS. The specific cultural resources addressed in this section include archaeological, historical, and traditional cultural sites, buildings, structures, districts, and objects that reflect local, regional, and national heritage.

The Reach 11 project is a Federal “undertaking” as defined by regulations for *Protection of Historic Properties* (36 Code of Federal Regulations [CFR] Part 800), which implement Section 106 of the National Historic Preservation Act. Potential impacts on historic properties were considered in accordance with those regulations. Historic properties are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (36 CFR Part 800.16(l)).

### **3.11.2 Data Collection**

Reclamation sponsored cultural resource surveys and data recovery studies in conjunction with the planning and construction of the Hayden-Rhodes Aqueduct (previously designated as the Granite Reef Aqueduct) and for the original planning of recreational development within the Reach 11 detention basin. The reports of these studies and other documentation in Reclamation’s files were reviewed. The previously compiled field survey information provided an adequate basis for assessing impacts of the Proposed Action and alternatives, and no additional field inventory was undertaken for this EIS. In July 1999, Reclamation contacted tribal governments with traditional cultural affiliations to the region to solicit information about potential traditional cultural places and resources that may have significance for those tribal communities. These tribes include the Salt River Pima Maricopa Indian Community, Gila River Indian Community, Ak-Chin Indian Community, Tohono O’odham Nation, Fort McDowell Yavapai Nation, Hopi

Tribe, and Zuni Pueblo. Only the Hopi Tribe indicated any interest in the project and no specific traditional cultural resources or concerns have been identified at this time.

### 3.11.3 Resource Overview

Human societies have lived in Arizona for approximately 12,000 years and perhaps longer. For approximately 9,000 to 10,000 years these groups lived by hunting game and collecting native plant foods. Populations remained small and dispersed. As subsistence strategies shifted to farming domesticated plants such as corn, beans, squash, and cotton, populations grew and became more sedentary, residing in larger villages and towns. The farmers of this era in central Arizona are known as the Hohokam, and they became the most sophisticated irrigation agriculturists in North America.

When the first Europeans explored the Salt River Valley they found the Hohokam villages in ruins and the irrigation system long abandoned. The valley was essentially a no-man's land on the boundary of the Pimas living in several villages along the Gila River to the south, and the Yavapais and Apaches who ranged to the north and east. The Spaniards and Mexicans never settled in the Salt River Valley during their periods of hegemony from the sixteenth through the mid-nineteenth centuries. The pace of Euro-American settlement quickened only after the United States acquired the territory in the mid-1800s. Farmers reopened the ancient Hohokam canals in the 1860s, and the Phoenix townsite was platted in 1870. The region continued to grow as an agricultural area, a service center, and seat of government, exploding after World War II into one of the largest metropolitan areas of the United States.

Two cultural surveys conducted during the early planning of the Hayden-Rhodes Aqueduct resulted in the discovery of two small archaeological sites (Dittert and others 1969; Kemrer and others 1972). Prior to construction of Reach 11, data recovery studies were undertaken at one of these sites, which was designated as AZ U:5:13 (ASM) (Reynolds 1972). This site was a scatter of Hohokam artifacts probably several hundred to more than one thousand years old. The artifact scatter included sherds of broken ceramic vessels (plain and red wares) and flaked stone. The other site, designated AZ U:5:14 (ASM), was described as a series of rock alignments that were interpreted as platforms for tents that may have been used by workers excavating the Rio Verde Canal in the 1890s. The location of this site is plotted as being outside the Reach 11 right-of-way.

Additional intensive archaeological survey conducted in the Reach 11 detention basin resulted in the discovery of four additional small archaeological sites similar to site AZ U:5:13 (ASM) (Brown 1978). To mitigate the impacts of constructing Reach 11 and recreational use of the detention basin, archaeological testing and data recovery studies were conducted at all four of these sites [designated as AZ T:8:53 (ASU), AZ U:5:67 (ASU), AZ U:5:68 (ASU), and AZ U:5:69 (ASU)]. These studies resulted in the collection of the approximately 25 to 250 artifacts that were on the surface of each site, including ceramic sherds (plain and red-on-buff wares), pieces of flaked stone, and ground stone tools (Brown and Stone 1982; Stone 1979). Other isolated or small clusters of similar artifacts were noted throughout the areas surveyed along Reach 11. The archaeological studies concluded that the isolated artifacts and small sites primarily represented temporary seasonal work locations related to collecting and processing native plant foods, such as mesquite beans.

A series of five channels about 10 feet wide, up to 500 feet long, and 0.5 to 3 feet deep were noted at one of the small artifact scatters. The function of these ditches was never specifically determined, but it was suggested they might have been related to development of historic irrigation and the Rio Verde Canal.

Historic research has documented that the Rio Verde Canal Company was incorporated in 1892, and in 1889 had begun developing grand plans to irrigate the entire northern segment of the Phoenix Basin. The project envisioned a major storage dam on the Verde River and three or four smaller dams on smaller intermittent water courses to the west, as well as 140 miles of main canals. By 1892, a diversion tunnel had been built at the dam site on the Verde River and a segment of main canal, variously reported as about 12, 18, or 25 miles long, had been excavated in Paradise Valley (Ciolek-Torrello 1982; Ellis 1996; Introcaso 1990). Project promoters encountered financial difficulties the following year, and although they struggled for more than 40 years to revive the project, they eventually lost water rights to the Salt River Project. Although Horseshoe and Bartlett dams were then constructed on the Verde River as part of the Salt River Project, the planned Rio Verde Canal was never completed.

Urbanization and erosion have destroyed most of the remnants of the Rio Verde Canal that were excavated more than a century ago. In 1996 Reclamation consulted with the State Historic Preservation Office (SHPO) about the proposed Sanctuary Golf Club located about 2 miles to the east of Reach 11 (Ellis 1996). Reclamation concluded that the remnants of the Rio Verde Canal within the proposed golf course were eligible for listing in the National Register of Historic Places under Criteria A and B. Criterion A relates to important historic events or broad patterns of development. The association of the old Rio Verde Canal with water resource development in the Salt River Valley was deemed to be significant. Criterion B addresses associations with important persons. Augustus C. Sheldon and Prosper P. Parker were key officers of the Rio Verde Canal Company, and both were prominent in promoting irrigation development in the Arizona Territory.

As a result of the consultations, Reclamation agreed to stipulate that the Sanctuary Golf Club course be designed to preserve and interpret segments of the Rio Verde Canal with signs and a brochure. The consultations also determined that no original drawings or plans of the canal had been identified and were unlikely to exist, but that the history of the proposed development had been adequately documented in a Historic American Engineering Record study prepared for Bartlett Dam (Introcaso 1990). Reclamation agreed to document segments of the canal on Federal land with large-format photographs, and that was done.

Two segments of the Rio Verde Canal, each about 0.5 mile long, can still be traced at the eastern end of Reach 11. One of these segments is within Zone 5 and the other is within Zone 6. The canal segments appear as shallow swales with an approximately 8- to 12-foot-high earthen berm on the downslope side of the canal. The swales retain runoff and desert trees and shrubs have grown quite densely along the canal alignment, mimicking natural vegetation found along desert washes. Ongoing erosion and headcutting of washes from the borrow areas at the base of the Reach 11 dike threaten segments of the canal, but most of the canal remnants are likely to remain largely intact under current conditions for the foreseeable future. Land leveling or other earth moving associated with development of new recreation facilities certainly could obliterate the remnants of the canal.

Other recent investigations along Mayo Boulevard and the Pima Freeway corridor just to the north of Reach 11 have discovered earlier archaeological materials buried by a meter or more of sediments. There were few clues on the ground surface about the presence of these sites, which date from the early Pioneer period of the Hohokam occupation, as well as from the older preceding Archaic era (Macnider 1999; Hackbarth 1998). Conceivably, similar buried archaeological materials might be present within the Reach 11 area; however, there is no reasonable, effective method for predicting the presence of such subsurface remains.

The review of file information identified one additional major cultural resource beyond the limits of Reach 11—the Taliesin West National Historic Landmark. This property is located more than 5 miles to the east of Reach 11. Because of this distance and the extent of prior development within its viewshed, Reach 11 recreation facilities have no potential to affect Taliesin West.

### **3.11.4 Environmental Consequences**

#### ***3.11.4.1 Impact Assessment Methods***

The assessment of effects on cultural resources was based on the alternative conceptual plans that have been developed at this time. More detailed design of the footprints of specific recreation facilities would allow for a more precise evaluation of impacts, but specific designs for recreational facilities will be initiated only after one of the alternative plans is approved. However, no prehistoric, and only a single historic property—the old Rio Verde Canal—has been identified as potentially affected and the conceptual plans provide an adequate basis for considering impacts of the different alternative plans. It is recognized that additional archaeological resources with no indication of their presence on the ground surface may be present, and regardless of which plan is selected, archaeological monitoring would be implemented in any areas identified as sensitive during subsequent phases of project implementation. Any new findings would be documented, evaluated, and treated in consultation with the SHPO.

The criteria defined by regulations for *Protection of Historic Properties* (36 CFR Part 800) were used to assess effects of the alternative plans on historic properties. Those regulations define effects as direct or indirect alterations of the characteristics of a historic property that make it eligible for inclusion in the National Register of Historic Places. Such effects that diminish a property’s integrity of location, design, setting, materials, workmanship, feeling, or association are considered to be adverse. Examples of adverse effects that were considered for the proposed Reach 11 recreational development include physical destruction, changing important physical features, and introducing visual or audible elements within a property’s setting that contribute to its historic significance.

The potential for indirect impacts on cultural resources that might be located on lands adjacent to Reach 11 was considered. Any cultural properties on those private and State lands have been or will be affected by recent and ongoing urban development. Within that context of this recent and future development, recreational development within Reach 11 is unlikely to have any significant indirect effects on cultural resources on adjacent lands. Therefore, the area of potential effect is limited to the recreational master planning area.

### 3.11.4.2 *Alternatives*

#### *No-Action Alternative*

The No-Action Alternative calls for a wildlife area and desert picnic area at the eastern end of Reach 11 where remnants of the Rio Verde Canal are located. Development of nature and wildlife areas, picnic areas, camping areas, roads, and parking areas under this plan would be designed to avoid direct impacts on at least parts of the Rio Verde Canal remnants. Construction of the Reach 11 dike has previously altered the general setting of the canal, although the natural desert vegetation along the historic canal remains relatively intact. Further changes of the general landscape under the 1987 Conceptual Master Plan likely would be minor in the vicinity of the Rio Verde Canal remnants. Public interpretation of the canal would not be a focus of recreational development, but would be considered for preserved segments of the canal.

#### *Proposed Action*

The Proposed Action incorporates a mixture of active and passive recreational facilities. The more passive facilities would be focused in the eastern end of Reach 11 where remnants of the Rio Verde Canal are located. The proposed plan identifies Zone 5 as a habitat picnic area and Zone 6 as an open park area with picnic facilities and open turf areas. The roads, parking areas, trails, picnic areas, turf, and irrigation pond that would be developed under this scenario would be designed to avoid direct impacts on at least parts of the Rio Verde Canal. Construction of the Reach 11 dike has previously altered the general setting of the canal, although the natural desert vegetation along the canal remains relatively intact. Further changes under the Proposed Action would introduce additional changes into the viewshed of the canal; these would be minimal in Zone 5 but somewhat more extensive in Zone 6. Public interpretation of the canal would not be a focus of recreational development but would be considered for preserved segments of the canal.

#### *Alternative 1*

Alternative 1 emphasizes passive recreation and identifies Zone 5 as a natural habitat area, and Zone 6 as an open park area with playgrounds and picnic areas in both a desert setting and with open turf. The roads, parking areas, trails, ramadas, playgrounds, turf, and an irrigation pond that would be developed under this scenario would be designed to avoid direct impacts on at least parts of the Rio Verde Canal remnants. Further changes under Alternative 1 would be similar to the Proposed Action in both Zone 5 and Zone 6. Public interpretation of the canal would not be a focus of recreational development, but would be considered for preserved segments of the canal.

#### *Alternative 2*

Alternative 2 emphasizes more active recreational facilities; a municipal golf course would be developed in Zone 5, and a tournament-style golf course would be developed in Zone 6. The roads, parking areas, clubhouses, turf, and irrigation ponds that would be developed under this scenario could be designed to avoid direct impacts on some parts of the Rio Verde Canal, but segments of the canal are likely to be obliterated. Further changes under Alternative 2 would be more substantial than under any of the other alternatives being considered. Public interpretation of the canal would be considered for any segments of the canal that were preserved.

### **3.11.4.3 Summary**

Consultation with the SHPO for construction of the Hayden-Rhodes Aqueduct was completed as part of the Granite Reef Aqueduct Environmental Impact Statement in January 1974 (Reclamation 1974). There is only one eligible property for listing on the National Register of Historic Places—the Rio Verde Canal remnants.

Prior consultations for the Sanctuary Golf Club to the east of Reach 11 concluded that incorporation of remnants of the old Rio Verde Canal into the design of the course and interpretation of the history of the canal through signage and creation and distribution of a brochure resulted in a determination of "no effect" (Lincoln 1997). Under that project, the Rio Verde Canal was impacted in five locations. For the most part, the canal was not affected. A gap was cut in the canal at one spot to provide drainage, and fill was added to the edge of the canal at three other locations.

In conjunction with preparation of this EIS, Reclamation provided a preliminary draft version of the EIS to the SHPO for review. The SHPO recommended strengthening the public interpretation aspect of the proposal. Under any of the alternatives ultimately implemented, PRD and Reclamation would interpret any portions of the Rio Verde Canal that remain intact, including signage as deemed appropriate.

### **3.11.5 Mitigation Measures**

The following mitigation measures would be taken under any of the alternatives to minimize impacts on cultural resources:

- Avoid disturbance to the Rio Verde Canal wherever practicable, and interpret any portions of it that remain intact.
- Prior to construction, instruct all supervisory personnel on the protection of cultural resources in the eastern portion of Reach 11.
- Stop construction activities if previously unknown cultural resources are encountered, and notify Reclamation. Additional mitigation measures may be necessary to protect any cultural resources discovered during land disturbing activities.

## **3.12 NOISE**

### **3.12.1 Issues and Concerns**

With the further development of Reach 11, there would be increased noise generated by recreation uses that could impact adjacent land uses and existing recreational use in Reach 11.

### **3.12.2 Data Collection**

Ambient noise levels were measured during the fall of 1999 in each zone. It is difficult to predict future noise levels for recreation areas as current noise modeling software is tailored to highway, roadway, or airport noise rather than recreational noise. However, it is possible to estimate a

range of future noise levels based on current noise levels and an existing knowledge base of noise levels produced by various types of recreation activities. Potential impacts were evaluated based on established standards and future noise level estimates.

### 3.12.3 Resource Overview

Presently, there are no universal standards or policies for recreation noise levels. The most widely accepted land use-related noise standards are those of the U.S. Department of Transportation's Federal Highway Administration (FHWA) and the U.S. Department of Housing and Urban Development (HUD).

The FHWA noise guidelines (23 CFR 772) for residential, recreation, and picnic areas specify a maximum noise level of 67 Leq(h). Leq(h) represents the equivalent, steady-state sound level expressed in A-weighted decibels (dBA) which, on an hourly basis, contains the same acoustic energy as the time-varying sound level during the same period.

The HUD noise guidelines (24 CFR 51 B) for residential areas specify a maximum noise level of 65 Ldn. Ldn represents a 24-hour day-night noise level expressed in decibels. In calculating an Ldn noise level, a penalty of 10 dBA is added to noise occurring between the hours of 10:00 p.m. and 7:00 a.m. to represent the greater perceived impact of noise during these hours.

The ambient noise levels were monitored within Zones 1, 3, 4, 5, and 6 between 9:30 a.m. and 12:00 p.m. on Tuesday, October 12, 1999. No activities were taking place in or adjacent to the Reach during this time. A reading was not taken of the existing ambient noise level in Zone 2 as the noise level will increase from traffic on the proposed Loop 101/SR 51 interchange. Monitoring consisted of a 10-minute reading using a Larson Davis Model 820 Type I Integrating Sound Level Meter. The microphone on the meter was set at 5 feet above natural grade to simulate the height of human hearing. The readings were conducted in accordance with widely accepted methods for sound level readings.

The ambient noise levels are as follows:

	<b><u>dBA Leq(h)</u></b>
Sports fields, courts, and maintenance	47
Equestrian events area	45
Interpretive habitat area	46
Habitat picnic area	45
Open Park Area	47

### 3.12.4 Environmental Consequences

#### 3.12.4.1 Impact Assessment Methods

Two types of impacts may be expected from a recreation project of this type. First, there would be impacts from the recreation activities to adjacent properties. Second, impacts from adjacent

land uses that may affect the recreation activities were addressed. Also briefly addressed are impacts that may result on passive recreation users from active users.

#### ***3.12.4.2 Impacts Common to All Alternatives***

The active uses within the sports fields, courts, and maintenance area in Zone 1 may present a noise issue for adjacent properties. The flood control dike along the southern edge of the project area effectively attenuates noise impacts for the industrial and commercial properties located south of this area. The property north of the recreation area consists mostly of undeveloped desert land. Noise impacts from the recreation activities would need to be considered during site planning processes for future mixed-use development. Possible techniques to minimize noise impacts may be to locate parking or garage structures along the property line adjoining the recreation area.

Potential additional noise would be generated primarily by events occurring at the existing equestrian arena/future event field located near the center of the recreation area. The facility contains several public address speakers mounted on poles approximately 15 feet above the ground. Although several noise complaints have been raised by residents south of the facility, computer modeling of the area incorporating the effects of topography, suggests that the equestrian arena has only a negligible noise impact on properties south of the facility. The noise impacts are attenuated effectively by the flood control dike located between the arena and the residences to the south. The fact that the residents may be able to hear the speakers during arena events does not necessarily mean that a noise impact has occurred. Adjacent residential areas to the south may experience a noise level increase of less than 1 dBA over ambient noise levels during event times.

Property adjacent to the north of the equestrian and events area is currently planned for low-density residential uses; redesignation for mixed use is being contemplated. These properties do not have the benefit of a large earthen dike to attenuate noise levels. The occasional noise impacts from the equestrian facility and event area may need to be considered during the planning and layout of the parcels.

Due to the passive nature of the recreation uses within the eastern half of the project area, there is not expected to be as much noise impact from the recreation uses to properties east of Tatum Boulevard that are adjacent to Reach 11. Activities on trails typically do not produce noise levels sufficiently high to impact adjacent land uses. The vegetation buffer along the north property limit would minimize noise from the picnic areas in Zones 5 and 6.

In addition to active recreation uses impacting adjacent land uses, there may be noise impacts from adjacent land uses on the recreation uses. Unlike the impacts from active recreation uses discussed above, impacts from adjacent land uses on recreation uses may be more pronounced in areas of passive recreation where a low-noise environment is part of the recreation experience.

As discussed above, the existing flood control dike along the southern boundary of the project area effectively attenuates potential noise impacts from adjacent land uses south of the Reach.

Land uses to the north of the Reach include the water treatment plant and high school, which are adjacent to proposed active recreation uses in the western portion of the Reach. It is not anticipated that these facilities would have a noise impact on this portion of the recreation area.

The Sitix of Phoenix manufacturing plant is located along Tatum Boulevard north of Zone 4. The plant is a high-tech circuit-manufacturing facility. All manufacturing activities are conducted indoors and noise from the facility is minimal. Therefore, the plant is not expected to have a noise impact on the recreation uses in the Reach.

The Mayo Clinic is located along 56<sup>th</sup> Street north of Zone 5. Noise emanating from the Mayo Clinic is minimal. Occasional noise may be generated by sirens of approaching ambulances during emergency transport of patients; however, this is not expected to present more than a negligible noise impact on recreation uses.

Other areas north of Reach 11 are designated for multi-family residential and mixed-use developments. Consequently, there may be future noise impacts on recreation uses from these areas depending on the types of uses that are developed.

The Scottsdale Airport is located approximately 1 mile east of the eastern edge of Reach 11. Due to the orientation of the runway and the approved flight paths, Reach 11 is not located within the noise impact contours for aircraft operations associated with Scottsdale Airport. Aircraft enroute produce noise in the area of Reach 11, but because of their altitude and low frequency of operations in the airspace, the noise generated is not considered a significant impact on the proposed recreation activities of the Reach.

Noise levels from traffic on 56<sup>th</sup> Street and the proposed 64<sup>th</sup> Street are not anticipated to be a significant impact on recreation activities. Noise levels from traffic on the proposed Loop 101/SR 51 interchange in Zone 2 are anticipated to result in a substantive increase over existing levels. However, for the action alternatives, uses that are less noise-sensitive (e.g., maintenance yard, parking, and open and retention areas) have been planned for areas in proximity to the interchange thereby buffering recreation activities from the interchange traffic noise and minimizing impacts on the recreation activities.

Although data are limited, it can be expected that noise from active recreation uses may have an impact on passive uses, as they tend to generate more noise. However, noise levels from active recreation uses usually are short in duration, so impacts would only be temporary.

### **3.12.4.3 Alternatives**

#### *No-Action Alternative*

Under the No-Action Alternative, noise levels would remain similar to current levels except in Zones 1 and 3, where they would increase from implementing planned actions and from increased noise from traffic on the Loop 101/SR 51 interchange in Zone 2. The wildlife and desert picnic areas planned for Zones 4, 5, and 6 typically would not produce sufficient noise levels to impact adjacent land uses. However, the addition of a motor bike training facility in Zone 1 and additions to the equestrian center in Zone 3 may present increased noise issues for adjacent properties. Noise levels from traffic on 56<sup>th</sup> Street and proposed 64<sup>th</sup> Street, and along

the proposed scenic road, although not considered significant, could result in impacts on the passive and nature-oriented activities in the eastern half of Reach 11. Noise impacts from these recreation activities would need to be considered during the site planning process for future development north the Reach 11. Possible techniques to minimize noise impacts may be to situate parking or garage structures along the property line adjoining the recreation area.

### *Proposed Action*

The eastern half of the Reach 11 project area would contain the passive recreation uses under the Proposed Action within the interpretive habitat area, habitat picnic area, and open park area. Based on the current ambient noise levels, future noise levels (including expected traffic noise from 56<sup>th</sup> Street and proposed 64<sup>th</sup> Street) within these three passive use areas are expected to be in the range of 50 to 55 dBA, constituting ambient levels. The open turf areas planned for Zones 1 and 6 would help absorb noise generated by recreationalists using the picnic areas.

The active recreation uses contained within the western half of the Reach 11 project area under the Proposed Action are expected to generate slightly higher average noise levels. These areas include the sports fields, courts and maintenance area, and equestrian/events area. Noise levels at these two recreation areas are expected to fluctuate depending on the scheduling of activities. During times when there are no scheduled events in these areas, noise levels would be in the range of those expected for the passive recreation uses. However, noise levels would be higher during ball games, tournaments, and equestrian arena events and would depend on the type of event and the number of people in attendance, among other factors. Noise levels from traffic on the proposed Loop 101/SR 51 interchange in Zone 2 are anticipated to result in a substantive increase over existing levels. However, uses that are less noise-sensitive (e.g., maintenance yard, parking, and open and retention areas) have been planned for areas in proximity to the interchange thereby buffering recreation activities from the interchange traffic noise and minimizing impacts on the recreation activities.

When all types of activities are averaged throughout the day and week, the future noise levels within these active use areas are expected to be in the range of 55 to 60 dBA.

### *Alternative 1*

Due to the passive nature of the recreation uses planned for Alternative 1, noise impacts from the recreation uses on adjacent properties would not be expected. The open turf areas planned for Zones 1 and 6 would help absorb noise generated by individuals using the picnic areas.

Noise levels from traffic on 56<sup>th</sup> Street and the proposed 64<sup>th</sup> Street are anticipated to be within the range of 50 to 55 dBA and not a significant impact on recreation activities. Noise levels from traffic on the proposed Loop 101/SR 51 interchange in Zone 2 are anticipated to result in a substantive increase over existing levels. However, uses that are less noise-sensitive (e.g., maintenance yard, parking, and open and retention areas) have been planned for areas in proximity to the interchange thereby buffering recreation activities from the interchange traffic noise and minimizing impacts on the recreation activities.

## *Alternative 2*

Under Alternative 2, the eastern half of the Reach 11 project area would contain a municipal and a tournament golf course. While this type of recreation is considered active, noise levels would be similar to passive recreation uses; however, noise disturbance could be generated from a public address system. The vegetation, including turf, would absorb much of the noise generated by golfers using the courses; however, additional noise would be generated if a loudspeaker system were used. Other active recreation uses associated with Alternative 2 and their noise level impacts would be similar to those discussed in the Proposed Action.

Noise levels from traffic on 56<sup>th</sup> Street and the proposed 64<sup>th</sup> Street are anticipated to be within the range of 50 to 55 dBA and not a significant impact on recreation activities. Noise levels from traffic on the proposed Loop 101/SR 51 interchange in Zone 2 are anticipated to result in a substantive increase over existing levels. However, uses that are less noise-sensitive (e.g., maintenance yard, parking, and open and retention areas) have been planned for areas in proximity to the interchange thereby buffering recreation activities from the interchange traffic noise and minimizing impacts on the recreation activities.

### **3.12.4.4 Summary**

Based on the analyses conducted and discussed above, it does not appear that there would be a noise impact on existing adjacent land uses from implementation of any of the alternatives. The earthen dike along the south side of the project area effectively mitigates potential noise impacts on the land uses south of the project area.

The most probable location for possible noise impact on future development would occur if higher density residential development is completed immediately north of the equestrian center. If there were noise impacts from future development, possible mitigation measures would be to reduce the volume of public address broadcasts at the equestrian arena and golf courses, lower the height of the speakers, or re-orient the direction of the speakers. However, it is important for neighbors and prospective landowners to note that the Arizona Horse Lovers' Park currently uses a public address system that will not be required to be modified.

### **3.12.5 Mitigation Measures**

Potential impacts on passive users from active users can be mitigated as follows:

- Separate active and passive uses as much as possible.
- Plant appropriate vegetation to create a noise buffer.
- Control the volume of concurrent active recreation activities by restricting the use of loud speakers, public address systems, etc.

### 3.13 SUMMARY OF MITIGATION MEASURES

Mitigation measures have been developed to address potential project-related issues and impacts. These measures will be incorporated into the project to protect resources as standard practice for the entire project. Specific mitigation measures for each resource are shown in Table 3-15. Unless otherwise stated, these measures will be implemented by the City of Phoenix.

<b>TABLE 3-15 RESOURCE-SPECIFIC MITIGATION MEASURES</b>	
<b>Resource</b>	<b>Mitigation Measures to be Incorporated into the Project</b>
Air Quality	<ul style="list-style-type: none"> <li>• Design construction activities in such a manner that a minimum amount of fugitive dust will be created and will be kept within the project boundaries by barriers or absorbent materials. (A dust control plan will be completed and implemented in accordance with Maricopa County Permit requirements.)</li> <li>• Implement habitat and vegetation enhancement measures.</li> <li>• Place gravel or asphalt on parking areas.</li> <li>• Spray water as needed to control dust levels in the equestrian areas and ball fields.</li> </ul>
Water Resources	<ul style="list-style-type: none"> <li>• Avoid water pollution through control of sanitary facilities and proper storage of fuels and other contaminants.</li> <li>• Obtain appropriate permits, including Section 404 of the Clean Water Act, for any portions of project implementation in the event that jurisdictional waters are crossed or disturbed.</li> <li>• Avoid discharge of pollutants into waters of the U.S.</li> <li>• Irrigate at night, to the degree practicable, to minimize evaporation.</li> <li>• Use drought-tolerant grass species in turf areas such as Bermuda grass, to the degree practicable.</li> <li>• Incorporate use of an oil-water separator for high-use, paved parking areas, where appropriate.</li> </ul>
Vector Control	<ul style="list-style-type: none"> <li>• Sharply angle the edges (90 degrees) of irrigation ponds.</li> <li>• Ensure that water does not stagnate, and drawdown on the irrigation ponds occurs regularly.</li> <li>• Allow little to no vegetation growth along the pond's edge.</li> <li>• Implement the existing action plan for applying insecticides in a timely manner after storm events, during breeding conditions, with an emphasis on primary treatment in the larval stage.</li> <li>• Ensure that an operation and maintenance road is available to provide treatment to flooded areas where practicable.</li> <li>• Provide for vector control in the operation and maintenance budget for the park.</li> </ul>
Earth Resources	<ul style="list-style-type: none"> <li>• Conduct all construction and maintenance activities in a manner that minimizes disturbance to xeroriparian vegetation and wash channels.</li> <li>• Revegetate disturbed areas as appropriate.</li> <li>• Obtain appropriate permits, including Section 404 of the Clean Water Act, for any portions of the implementation in the event that drainages are crossed or impacted.</li> </ul>

**TABLE 3-15  
RESOURCE-SPECIFIC MITIGATION MEASURES**

<b>Resource</b>	<b>Mitigation Measures to be Incorporated into the Project</b>
Biological Resources	<ul style="list-style-type: none"> <li>• Follow AGFD’s <i>Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects</i>, should any Sonoran desert tortoise be encountered prior to or during construction.</li> <li>• Salvage and/or transplant large trees, such as ironwood, palo verde, and mesquite within Reach 11, to the greatest degree practicable.</li> <li>• Prior to final design, re-inventory habitat to avoid disturbance to xeroriparian habitat to the extent practicable.</li> <li>• Design will include a buffer distance between turf recreational areas and wash corridors to minimize increase of invasive exotic vegetation species.</li> <li>• The turf recreation areas will be separated from natural landscape by mow curbs. Any spread of turf past mow curbs into the buffer regions will be eradicated by maintenance staff.</li> <li>• Construction envelopes will be minimized. Nonrecreational areas impacted during construction will be revegetated using a native seed mix approved by Reclamation. Areas will be monitored to ensure successful re-establishment of native plants. It is Reclamation’s policy to use native species when revegetating any natural landscape.</li> <li>• Construction personnel will be instructed to not harass or molest wildlife.</li> <li>• Barbeque grills and picnic areas will be placed within improved recreational areas and sited to decrease fire hazard from wind.</li> <li>• Maintenance may include reducing fine fuel loads within wash corridors in areas adjacent to commercial and residential areas if they exceed minimum safety levels as determined with guidance from the fire department.</li> <li>• Pursuant to Phoenix City code 24-25, the Parks and Recreation Director can declare a fire ban. The site would be posted accordingly.</li> <li>• Access for fire trucks at gated locations and fire lanes in high access recreation areas will be incorporated with site development.</li> </ul>
Land Use	Reclamation and City of Phoenix will pre-approve construction access, and construction limits. These will be shown on construction drawings.
Recreation	Provide signage to educate trail users on minimizing conflicts among horses, bikes, and hikers.
Visual Resources	Select lighting fixtures and locations to minimize impacts on adjacent residences where practicable.
Cultural Resources	<ul style="list-style-type: none"> <li>• Prior to construction, instruct all supervisory personnel on the protection of cultural resources in the eastern portion of Reach 11.</li> <li>• Stop construction activities if previously unknown cultural resources are encountered, and notify Reclamation</li> <li>• Reclamation and the City will consider interpreting portions of the Rio Verde Canal that remain intact as appropriate and to the degree practicable.</li> </ul>

In particular, there are several key mitigation measures that would be implemented as part of any of the action alternatives, as follows:

- **Habitat protection and enhancement**—This measure is designed to address concerns about the health of xeroriparian vegetation communities over time. Enhancement would occur throughout the park with a particular focus on the zones designated for passive uses (Zones 4 and 5). Habitat enhancement would occur in the form of irrigation and planting to maintain xeroriparian habitats including those located in drainages. Irrigation water would be available from irrigation ponds that would be located throughout the park. To ensure successful habitat

enhancement throughout operation of the park, the City anticipates it would develop and implement a plan for irrigating and monitoring enhancement.

- **Irrigation pond design and development of a vector control management plan**—These measures are designed to address concerns regarding a potential increase in the mosquito population that could occur near newly located irrigation ponds. To address this issue, irrigation ponds would be lined with a 90-degree angle wall that is tapered; this would prevent vegetation growth that could develop into mosquito habitat. Drawdown for irrigation would keep water from stagnating, also preventing the development of mosquito habitat. To address mosquito populations that develop after flood events, a vector control management plan will continue to be implemented by the City in consultation with the Maricopa County Vector Control Division.
- **Detailed design and implementation**—As facilities are designed in greater detail, if changes occur in the plan or design specifications that may result in environmental impacts that are significantly different from those described in this FEIS, Reclamation will determine whether additional NEPA compliance is needed. During construction and operation, actions will be taken to comply with Federal, State, and local laws and survey requirements regarding environmental protection.

### 3.14 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No long-term significant unavoidable adverse impacts were identified for air, water, earth, land use, recreation, socioeconomic, acoustical (noise), or cultural resources.

Impacts on biological resources, although potentially significant from a localized perspective based on xeroriparian vegetation and habitat displacement, can be minimized through the selective location of facilities and proposed vegetation enhancements.

Potential unavoidable adverse visual impacts are associated with the effects on residential viewers based on the introduction of lighting and effects to nighttime views for all alternatives. However, these views would be from selective areas, and impacts may be reduced depending upon final location of facilities; lighting size, type, and shielding; and the scheduled use of facilities at night. In addition, effects on nighttime views should diminish over time as new light sources are introduced in association with planned future land use development (including residential and mixed-use areas immediately north of Reach 11), and the completion of Loop 101 and SR 51.

### 3.15 CUMULATIVE EFFECTS

Cumulative effects are the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions within the same geographic region. This section addresses past and present actions associated with each resource in context with the development of Reach 11.

**Air Quality**—The recreational development of Reach 11 as outlined by the Proposed Action may have some impacts resulting from particulate emissions. However, the anticipated impacts are expected to be short term and cease once development activities are completed. Potential

impacts from long-term use of the completed equestrian facility and multi-use trails are likely; however, it is difficult to estimate the actual impacts due to the many unknown variables for such activities. Increased recreation-related traffic in the area is not expected to contribute significantly to the changes in existing air quality. Overall, the cumulative effects of the day-to-day activities, once the master plan is completely developed, are expected to be negligible.

**Water Resources**—Development at Reach 11 and to the north may result in modifications to the existing stormwater drainage patterns. However, not knowing the schedule for development within Reach 11 and potential changes in drainage flow patterns into Reach 11, it cannot be determined at this time what the cumulative effects would be on jurisdictional waters of the United States. Jurisdictional waters of the U.S. will be avoided to the greatest extent practicable. Where avoidance is not possible, impacts on waters of the United States will be minimized and mitigated consistent with Clean Water Act Section 404 permit requirements. Negligible impacts on the quality and quantity of the groundwater are expected. Mosquito populations would be controlled by mitigation measures.

**Earth Resources**—The cumulative effects on earth resources would not be measurably different with development of the Reach 11 Master Plan. Generally, ground disturbance associated with construction would be short term and can be effectively mitigated.

**Biological Resources**—Left in its present condition, Reach 11 would become an island of desert vegetation and wildlife habitat once areas to the north are developed. Reach 11 may contain sufficient acreage to support some animal populations; however, without habitat corridors linking Reach 11 with other areas, there would be very limited immigration and dispersal for population interchange. Such isolation would likely discourage genetic diversity and leave animal populations at Reach 11 more vulnerable to threats (Diamond 1975; MacArthur and Wilson 1967; Rosenzweig 1995). Predators requiring large territories may become absent from Reach 11, resulting in overpopulation of prey species (e.g., desert cottontails). Additional clearing of desert vegetation, habitat loss, and disturbance to wildlife also are expected in areas adjacent to Reach 11. These impacts combined with those caused by surrounding future development would likely further reduce species diversity in Reach 11. Development to the north of Reach 11 also would be expected to alter drainage patterns in this area. Alteration of drainage patterns could affect xeroriparian vegetation, which provides high-quality habitat for wildlife. Xeroriparian vegetation present at Reach 11 is dependent on existing drainage patterns and could be eliminated if water flow is reduced, or cut off from Reach 11; habitat enhancement measures would be implemented to attenuate this potential loss.

**Land Use**—The City anticipates increases in traffic in the general region due to the completion of Loop 101 and rapid residential and commercial development north of the CAP canal. Upon completion of Loop 101, traffic volumes on Tatum Boulevard are expected to exceed capacity. To alleviate the projected increase in traffic, the City constructed 56<sup>th</sup> Street, has widened Cave Creek Road and plans to build 64<sup>th</sup> Street across Reach 11 as necessary in the future. The cumulative effects of traffic impacts associated with implementation of the master plan are considered minimal. Reach 11 would provide needed land use benefits (see recreation). An overall change in the land use pattern of north Phoenix is expected as residential development north of the CAP canal creates additional demand for recreational facilities and contributes to the

loss of open space. The implementation of a recreation plan for Reach 11 would serve to address both anticipated occurrences.

**Recreation Resources**—Given the overall increase in population that is expected to occur in northeast Phoenix, planning and developing Reach 11 for recreational use would provide needed benefits including open space conservation and recreation opportunities. Overall, the implementation of the plan would contribute to the provision of large parks in the area along with the Cave Buttes Recreation Area and the Sonoran Preserve. Larger recreation areas such as district parks serve a broader area and can provide more facilities than neighborhood parks that currently exist in the area. As a result, implementation of the project would improve the quality of recreation opportunities in the area and mitigate for the elimination of the event field at Paradise Valley Park due to the construction of SR 51. The provision of recreation and open space is especially critical because this area will continue to experience residential and commercial development that will intensify the need for such amenities.

**Socioeconomic Resources**—Cumulative socioeconomic impacts are generally only a concern if they over-extend public services and accommodations in the project area (especially during event activities), and this is not anticipated. If constructed, the cumulative beneficial impact on the surrounding area would include an increase in short-term employment during construction, and an increase in long-term revenues in conjunction with existing and planned commercial and retail uses based on the increased recreational use in the area. In addition, implementation of the master plan would increase open space and recreation opportunities to the area, thus contributing to the area's social needs.

**Visual Resources**—The implementation of the Reach 11 Master Plan would increase the cumulative visual impacts on views from recreational users, travelers, and residences, and on natural scenic quality. Proposed future development north of Reach 11 will continue to displace existing natural areas, and lighting for nighttime activities would contribute to the effects of additional lighting as development continues north of Reach 11, including the completion of the Loop 101/SR 51 interchange.

**Cultural Resources**—The recreational development of Reach 11 as defined by the Proposed Action would be designed to protect parts of the remnants of the old Rio Verde Canal. Much of the canal has been previously destroyed, but arrangements were made to protect and interpret other segments of the canal within the Sanctuary Golf Club. Other segments of the canal remain intact within the Taliesen West National Historic Landmark. No effects on other cultural resources are projected.

**Noise**—Passive recreation uses are not expected to produce noise impacts on adjacent properties. They typically do not produce sufficient noise levels to impact adjacent land uses. Proposed active recreation uses would increase noise levels and potentially create impacts on passive recreation uses. Such impacts are short in duration; therefore, impacts would be temporary. Also, noise from recreation uses could impact adjacent properties. Mitigation of such impacts needs to be considered during site planning. The construction of Loop 101/SR 51 interchange and the 64<sup>th</sup> Street Crossing, and the rapid commercial and residential development north of Reach 11 will contribute to greater ambient noise levels; however, the cumulative impact on passive recreation users is expected to be minimal.

### **3.16 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY**

For the purposes of this discussion, the short term has been defined as the period during construction and shortly thereafter, and the long term has been defined as the life of the project.

Potential effects on air quality would be short term, mainly localized, and largely the result of construction activities that would create fugitive dust and gaseous emissions from ground transportation.

Short-term effects on water resources include an increase in storm water runoff due to the conversion of desert land to hard surfaced and/or turfed areas. There also would be long-term effects on water supply due to irrigation requirements; however, it is anticipated that this need would be accommodated through the use of reclaimed water. No short- or long-term effects on groundwater quality from the use of reclaimed water for irrigation are anticipated because of the considerable depth to the groundwater table. Flood detention storage would not be affected. Potential effects on soil erosion would be primarily short term and localized.

Potential effects on biological resources would be both short and long term, due to loss and displacement of vegetation and habitat and increased disturbance to wildlife. Loss of long-term productivity would result from some permanent removal of wildlife habitat within Reach 11. Development of the region surrounding Reach 11 would isolate the project area from contiguous wildlife habitat causing the extirpation of some animals from Reach 11. However, no vegetative or wildlife species are expected to become extinct as a result of project-related activities. Wildlife habitat recovery would vary depending upon vegetative type and extent of habitat enhancement implemented.

Potential effects on land use and recreation would be both short and long term. Regardless of the alternative selected, construction activities would affect current transportation access and recreation activities within Reach 11. During construction, certain areas would be closed to public access in order to protect the public's safety; however, long-term effects on transportation should be minimal. Long-term land use and recreational use benefits are expected, and would be enhanced by the introduction of new recreational facilities, which would contribute to the provision of large parks in the area in conjunction with other open space amenities and future residential development.

Regional and local economies could be expected to experience short-term benefits from project-related expenditures during construction and long-term benefits in conjunction with existing and planned commercial and retail development based on revenues associated with recreational and event use in the area.

Effects on visual resources, both positive and negative, would be primarily long term, remaining for the life of the project. The introduction of park facilities would have long-term effects for recreationalists and residential viewers adjacent to the site.

Noise-related impacts would be both short and long term, remaining for the life of the project. Noise generated from active uses and the equestrian arena would have long-term effects on adjacent property owners and passive recreationalists.

Cultural resources are essentially nonrenewable and should degradation or destruction of these resources occur through direct impacts of construction, effects would be permanent.

### 3.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Resources committed to the proposed project would be material and nonmaterial, including financial. “Irreversible commitment of resources” for the purposes of this section has been interpreted to mean that those resources, once committed to the proposed project, would continue to be committed throughout the life of the project. “Irretrievable commitment of resources” has been interpreted to mean that those resources used, consumed, destroyed, or degraded during construction and operation of the proposed project could not be retrieved or replaced for the life of the project or beyond. Irreversible and irretrievable commitment of resources for the proposed project are summarized in Table 3-16.

<b>TABLE 3-16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES</b>			
<b>Resource</b>	<b>Type of Commitment/ Reason for Commitment</b>	<b>Irreversible</b>	<b>Irretrievable</b>
Air	<ul style="list-style-type: none"> <li>• Degradation of air quality</li> <li>• Construction activities</li> </ul>	no	construction phase
Water	<ul style="list-style-type: none"> <li>• Irrigation requirements</li> <li>• Operation</li> </ul>	yes	project life
Soils	<ul style="list-style-type: none"> <li>• Soil loss and erosion</li> <li>• Construction activities</li> </ul>	yes	yes
Biological	<ul style="list-style-type: none"> <li>• Disturbance to and/or loss of vegetation and habitat</li> <li>• Construction and operation</li> </ul>	yes	project life
Land Use	<ul style="list-style-type: none"> <li>• Disturbance to existing recreational use</li> <li>• Construction and operation</li> </ul>	yes	project life
Recreation	<ul style="list-style-type: none"> <li>• Change and increased recreational use</li> <li>• Construction and operation</li> </ul>	yes	project life
Socioeconomic	<ul style="list-style-type: none"> <li>• Increased regional and local employment and revenues</li> <li>• Construction and operation</li> </ul>	yes	project life
Visual	<ul style="list-style-type: none"> <li>• Degradation of natural scenic quality, viewshed intrusion</li> <li>• Construction and operation</li> </ul>	yes	project life
Acoustical (Noise)	<ul style="list-style-type: none"> <li>• Increased noise levels</li> <li>• Construction and operation</li> </ul>	yes	project life
Archaeological and Historical Sites	<ul style="list-style-type: none"> <li>• Disturbance or removal of sites</li> <li>• Construction and operation</li> </ul>	yes	yes